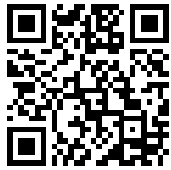

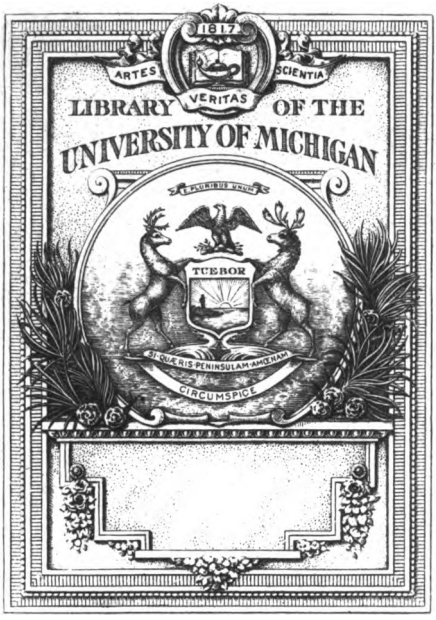

COLORADO RIVER BASIN

HEARINGS

BEFORE THE

COMMITTEE ON IRRIGATION AND RECLAMATION
UNITED STATES SENATE

SEVENTIETH CONGRESS

FIRST SESSION

ON

S. 728 and S. 1274

BILLS TO PROVIDE FOR THE CONSTRUCTION OF WORKS FOR THE PROTECTION AND DEVELOPMENT OF THE LOWER COLORADO RIVER BASIN, FOR THE APPROVAL OF THE COLORADO RIVER COMPACT, AND FOR OTHER PURPOSES

JANUARY 17 TO 21, 1928

Printed for the use of the Committee on Irrigation and Reclamation

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WASHINGTON
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COLORADO RIVER BASIN

TUESDAY, JANUARY 17, 1928

UNITED STATES SENATE,
COMMITTEE ON IRRIGATION AND RECLAMATION,
Washington, D. C.

The committee met, pursuant to call, at 10 o'clock a. m., in room 128, Senate Office Building, Senator Lawrence C. Phipps presiding.

Present: Senators Phipps (chairman), Jones, McNary, Oddie, Johnson, Shortridge, Sheppard, Kendrick, Pittman, Ashurst, and Dill.

There were also present: Senators Bratton, of New Mexico, and Hayden, of Arizona.

The CHAIRMAN. The hearings are to take up proposed legislation for the erection of a dam on the Colorado River, involving the following bills, which are here printed in full, as follows:

[S. 1274, Seventieth Congress, first session]

A BILL To provide for the construction of works for the protection and development of the lower Colorado River Basin, for the approval of the Colorado River compact, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of controlling and regulating the flow of the lower Colorado River for protection against floods, providing for storage and delivery of the waters thereof for reclamation of public lands and other beneficial uses within the United States, and for the generation of electrical energy as a means of making the project herein authorized a self-supporting and financially solvent undertaking, the Secretary of the Interior is hereby authorized, subject to the terms of the Colorado River compact hereinafter mentioned—

(1) To construct, operate, and maintain a dam and incidental works in the main stream of the Colorado River at Black Canyon, Boulder Canyon, or such other advantageous place he may, in the judgment of the Secretary of the Interior, be more suitable, adequate to create a storage reservoir of a capacity of not less than twenty million acre-feet of water;

(2) To construct, operate, and maintain suitable irrigation and other works, if in his judgment such works are necessary and proper to permit the use in the Imperial and Coachella Valleys, for irrigation and domestic purposes, in the most efficient and economical manner, of the waters of the Colorado River; and

(3) To acquire, by proceedings in eminent domain or otherwise, all lands, rights of way, and other property necessary for such purposes.

SEC. 2. (a) There is hereby established a special fund, to be known as the "Colorado River Dam fund" (hereinafter referred to as the "fund") and to be available, as hereinafter provided, only for carrying out the provisions of this act. All revenues received in carrying out the provisions of this act shall be paid into, and expenditures shall be made out of, the fund under the direction of the Secretary of the Interior.

(b) The Secretary of the Treasury is authorized to advance to the fund, from time to time, and within the appropriations therefor, such amounts as the Secretary of the Interior deems necessary for carrying out the provisions of this act, except that the aggregate amount of such advances shall not exceed

the sum of $90,000,000. Interest at the rate of 4 per centum per annum accruing during the year upon the amounts so advanced and remaining unpaid shall be paid annually out of the fund.

(c) Moneys in the fund advanced under subdivision (b) shall be available only for expenditures for construction and the payment of interest, during construction, upon the amounts so advanced. No expenditures out of the fund shall be made for operation and maintenance except from appropriations therefor.

(d) The Secretary of the Treasury shall charge the funds as of June 30 in each year with such amount as may be necessary for the payment of interest on advances made under subdivision (b) at the rate of 4 per centum per annum accrued during the year upon the amounts so advanced and remaining unpaid, except that if the fund is insufficient to meet the payment of interest the Secretary of the Treasury may, in his discretion, defer any part of such payment, and the amounts so deferred shall bear interest at the rate of 4 per centum per annum until paid.

(e) The Secretary of the Interior shall certify to the Secretary of the Treasury, at the close of each fiscal year, the amount of money in the fund in excess of the amount necessary for construction, operation, and maintenance, and payment of interest. Upon receipt of each such certificate, the Secretary of the Treasury is authorized and directed to charge the fund with the amount so certified as repayment of the advances made under subdivision (b), which amount shall be covered into the Treasury to the credit of miscellaneous receipts, and shall be available for the purposes specified in subdivision (g).

(f) In order to make the advances to the fund, the Secretary of the Treasury may, if he deems it advisable, exercise the authority granted by the various Liberty bond acts and the Victory Liberty loan act, as amended and supplemented, to issue bonds, notes, and certificates of indebtedness of the United States; and any bonds so issued shall be disregarded in computing the maximum amount of bonds authorized by section 1 of the second Liberty bond act, as amended.

(g) The Secretary of the Treasury is authorized and directed to use, upon such terms and conditions as he may prescribe, for the payment, redemption, or purchase, at not to exceed par and accrued interest, of any bonds, notes, or certificates of indebtedness of the United States, the money covered into the Treasury under subdivision (e) in repayment of the amounts advanced.

SEC. 3. There is hereby authorized to be appropriated from time to time, out of any money in the Treasury not otherwise appropriated, such sums of money as may be necessary to carry out the purposes of this act, not exceeding in the aggregate $90,000,000.

SEC. 4. (a) No work shall be begun and no moneys expended on or in connection with the works or structures provided for in this act, and no water rights shall be claimed or initiated hereunder, and no steps shall be taken by the United States or by others to initiate or perfect any claims to the use of water pertinent to such works or structures until the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming shall have approved the Colorado River compact mentioned in section 12 hereof.

(b) Before any money is appropriated or any construction work done or contracted for, the Secretary of the Interior shall make provision for revenues, by contract or otherwise, in accordance with the provisions of this act, adequate, in his judgment, to insure payment of all expenses of operation and maintenance of said works incurred by the United States and the repayment, within fifty years from the date of the completion of the project, of all amounts advanced to the fund under subdivision (b) of section 2, together with interest thereon.

SEC. 5. (a) The Secretary of the Interior is authorized, under such regulations as he may prescribe, to contract for the storage of water in said reservoir and for the delivery thereof at such points on the river as may be agreed upon, for irrigation and domestic uses, upon charges that will provide revenue which, in addition to other revenues accruing under the reclamation law and under this act, will, in his judgment, cover operation and maintenance expense of works constructed under this act and the payments to the United States under subdivision (b) of section 4.

(b) All contracts for the delivery of water for irrigation purposes shall provide that all irrigable land held in private ownership by any one owner in excess of one hundred and sixty acres shall be appraised in a manner to be prescribed by the Secretary of the Interior, and the sale prices thereof fixed by the said

Secretary on the basis of its actual bona fide value at the rate of appraisal, without reference to the proposed construction of any irrigation works under the provisions of this act; and that no such excess lands so held shall receive water if the owners thereof shall refuse to execute valid recordable contracts for the sale of such lands under terms and conditions satisfactory to the Secretary of the Interior and at prices not to exceed those fixed by the Secretary of the Interior. Contracts respecting water for irrigation and domestic uses shall be for permanent service.

(c) Subject to the limitations of section 6, the Secretary of the Interior is authorized to permit the use, by any political subdivisions or municipal or private corporations licensed in accordance with the provisions of this section, of water or water power from the dam authorized to be constructed by this act.

(d) The Federal Power Commission is hereby authorized to issue preliminary permits and licenses to political subdivisions or municipal or private corporations for the purpose of utilizing the surplus water or water power from the dam herein authorized, in accordance with the provisions of the Federal water power act, as amended, except that (1) such licenses shall be subject to all the provisions of this act, (2) the amount of the charges shall be fixed by the Secretary of the Interior, with a view to meeting the revenue requirements of the project provided for in this act, and (3) all revenues derived from such licenses shall be deposited in the fund.

(e) All licenses issued by the Federal Power Commission under the authority of this section shall provide (1) that use by the licensee of the water or water power from the dam and reservoir for the generation of electricity shall be subject and subservient to the dominant uses specified in section 6, and to the control, management, and operation of the dam and reservoir by the United States in furtherance of such uses, and (2) that the Secretary of the Interior shall have such control and supervision over the construction of project works by the licensee, including location of construction camp sites and facilities, as may be necessary in his judgment to prevent the licensee from interfering with the Secretary of the Interior in the construction or operation of the dam and incidental works, or with another licensee in the construction or operation of project works.

(f) The use is hereby authorized of such public and reserved lands of the United States as the Secretary of the Interior shall determine to be necessary or convenient for the construction, operation, and maintenance of main transmission lines to transmit electrical energy generated in accordance with the provisions of this act.

(g) After the repayments to the United States of all money advanced, with interest, charges shall be on such basis and the revenues derived therefrom shall be disposed of as may be hereafter prescribed by the Congress.

(h) No person shall have or be entitled to the use for any purpose of the water stored in the reservoir except by contract made or permit or license granted as herein provided.

SEC. 6. The dam and reservoir provided for by section 1 thereof shall be used: First, for river regulations and flood control; second, for irrigation and domestic uses and satisfaction of present perfected rights in pursuance of Article VIII of the Colorado River compact; and third, for power, it being the intent of this act that the use of water for power shall be subservient to the first two uses specified above, which shall be known as the dominant uses. The title to such dam, reservoir, and incidental works shall forever remain in the United States and the United States shall always control, manage, and operate the same, except as otherwise provided in this act.

SEC. 7. The Secretary of the Interior may, in his discretion, when repayments to the United States of all money advanced, with interest, shall have been made, transfer the title to any irrigation works and appurtenant structures constructed under the provisions of this act to the districts or other agencies in the United States having a beneficial interest therein in proportion to their respective capital investments under such form of organization as may be acceptable to him. Such districts or other agencies shall have the privilege at any time of utilizing by contract or otherwise such power possibilities as may exist upon such irrigation works and appurtenant structures, in proportion to their respective contributions or obligations toward the capital cost of such works and structures from and including the diversion works to the point where each respective power plant may be located. The net proceeds from any power development on such irrigation works and/or appurtenant structures shall be paid into the fund and credited to such districts or other

agencies on their contracts, in proportion to their rights to develop power, until the districts or other agencies using such irrigation works or structures have paid thereby and under any contract or otherwise an amount of money equivalent to the operation and maintenance expense and cost of construction thereof.

SEC. 8. (a) All appropriations of water from the Colorado River, incident to or resulting from the construction, use, and operation of the works herein authorized, shall be made and perfected in and in conformity with the laws of those States which may or shall have approved the Colorado River compact ratified in section 12 of this act.

(b) The United States, its permittees, licensees, and contractees, and all users and appropriators of water stored, diverted, carried and/or distributed by the reservoir and other works herein authorized, shall observe and be subject to and controlled by said Colorado River compact in the construction, management, and operation of said reservoir and other works and the storage, diversion, delivery, and use of water for the generation of power, irrigation, and other purposes, anything in this act to the contrary notwithstanding, and all permits, licenses, and contracts shall so provide.

(c) The United States, in constructing, managing, and operating the dam, reservoir, and other works herein authorized, including the appropriation, delivery, and use of water for the generation of power, irrigation, or other uses, and all users of water thus delivered and all users and appropriators of waters stored by said reservoir and/or carried by other works constructed under this act, including all permittees and licensees of the United States or any of its agencies, shall observe and be subject to and controlled, anything to the contrary herein notwithstanding, by the terms of such compact, if any, between the States of Arizona, California, and Nevada, for the equitable division of the benefits, including power, arising from the use of water accruing to said States, subsidiary to and consistent with said Colorado River compact, which may be negotiated and approved by said States and to which Congress shall give its consent and approval on or before June 1, 1928; and the terms of any such compact concluded between said States and approved and consented to by Congress after said date: *Provided*, That in the latter case such compact shall be subject to all contracts, if any, made by the Secretary of the Interior under section 5 hereof and all preliminary permits and licenses issued by the Federal Power Commission prior to the date of such approval and consent by Congress.

(d) Nothing in this act shall be deemed to waive any of the rights or powers reserved or granted to the United States by paragraph 7 of section 20 of the act providing for the admission of Arizona, approved June 20, 1910, and by the tenth paragraph of Article XX of the constitution of Arizona, but the Secretary of the Interior is authorized on behalf of the United States to exercise such of said rights and powers as may be necessary or convenient for the construction and use of the works herein authorized and for carrying out the purposes of this act.

SEC. 9. All lands of the United States found by the Secretary of the Interior to be practicable of irrigation and reclamation by the irrigation works authorized herein shall be withdrawn from public entry. Thereafter, at the direction of the Secretary of the Interior such lands shall be opened for entry, in tracts varying in size but not exceeding one hundred and sixty acres, as may be determined by the Secretary of the Interior, in accordance with the provisions of the reclamation law, and any such entryman shall pay an equitable share in accordance with the benefit received, as determined by the said Secretary, of the construction cost of irrigation works constructed under this act and appurtenant structures; said payments to be made in such installments and at such times as may be specified by the Secretary of the Interior, in accordance with the provisions of the said reclamation law, and shall constitute revenue from said project and be covered into the fund herein provided for: *Provided*, That all persons who have served in the United States Army, Navy, or Marine Corps during the war with Germany, the war with Spain, or in the suppression of the insurrection in the Philippines, and who have been honorably separated or discharged therefrom or placed in the Regular Army or Navy reserve, shall have the exclusive preference right for a period of three months to enter said lands, subject, however, to the provisions of subsection C of section 4, act of December 5, 1924 (Forty-third Statutes at Large, page 702); and also, so far as practicable, preference shall be given to said persons in all construction work authorized by this Act: *Provided further*, That in the event such an entry shall be relinquished at any time prior to actual residence upon the land by the entryman for not less than

one year, lands so relinquished shall not be subject to entry for a period of sixty days after the filing and notation of the relinquishment in the local land office, and after the expiration of said sixty-day period such lands shall be open to entry, subject to the preference in this section provided.

SEC. 10. Nothing in this act shall be construed as modifying in any manner the existing contract, dated October 23, 1918, between the United States and the Imperial irrigation district, providing for a connection with Laguna Dam; but the Secretary of the Interior is authorized to modify the said contract, with the consent of the said district, and also to enter into a contract or contracts with the said district or other districts, persons, or agencies for the construction, in accordance with this act, of suitable irrigation works and appurtenant structures, and also for the operation and maintenance thereof, with the consent of the other users.

SEC. 11. "Political subdivision" or "political subdivisions" as used in this act shall be understood to include any State, irrigation, or other district, municipality, or other governmental organization.

"Reclamation law" as used in this act shall be understood to mean that certain act of the Congress of the United States approved June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public land in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," and the acts amendatory thereof and supplemental thereto.

"Maintenance" as used herein shall be deemed to include in each instance provision for keeping the works in good operating condition.

SEC. 12. (a) The Colorado River compact signed at Santa Fe, New Mexico, November 24, 1922, pursuant to act of Congress approved August 19, 1921, entitled "An act to permit a compact or agreement between the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming respecting the disposition and apportionment of the waters of the Colorado River, and for other purposes," is hereby approved by the Congress of the United States, and this approval shall become effective when the legislatures of each of the signatory States shall have unconditionally approved such compact.

(b) The rights of the United States in or to waters of the Colorado River and its tributaries howsoever claimed or acquired, as well as the rights of those claiming under the United States, shall be subject to and controlled by the said Colorado River compact.

(c) Also all patents, grants, contracts, concessions, leases, permits, licenses, rights of way, or other privileges from the United States or under its authority, necessary or convenient for the use of waters of the Colorado River or its tributaries, or for the generation or transmission of electrical energy generated by means of the waters of said river or its tributaries, shall be upon the express condition and with the express covenant that the rights of the recipients or holders thereof to waters of the river or its tributaries, for the use of which the same are necessary, convenient, or incidental, and the use of the same shall likewise be subject to and controlled by said Colorado River compact.

(d) The conditions and covenants referred to herein shall be deemed to run with the land and the right, interest, or privilege therein and water right, and shall attach as a matter of law, whether set out or referred to in the instrument evidencing any such patent, grant, contract, concession, lease, permit, license, right of way, or other privilege from the United States or under its authority, or not, and shall be deemed to be for the benefit of and be available to the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and the users of water therein or thereunder, by way of suit, defense, or otherwise, in any litigation respecting the waters of the Colorado River or its tributaries.

SEC. 13. This act shall be deemed a supplement to the reclamation law, which said reclamation law shall govern the construction, operation, and management of the works herein authorized, except as otherwise herein provided.

SEC. 14. The Secretary of the Interior is authorized and directed to make investigation and public reports of the feasibility of projects for irrigation, generation of electric power, and other purposes in the States of Colorado, New Mexico, Utah, and Wyoming for the purpose of making such information available to said States and to the Congress, and of formulating a comprehensive scheme of headwater control and the improvement and utilization of the water of the Colorado River and its tributaries. The sum of $250,000 is hereby appropriated from said Colorado River dam fund, created by section 2 of this act, for such purposes.

SEC. 15. The jurisdiction, power, and authority of the Federal Power Commission to issue licenses for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power houses, transmission lines, or other project works necessary or convenient for the development and improvement of navigation on the Colorado River and its tributaries, and for the development, transmission, and utilization of power across, along, from, or in the Colorado River and its tributaries, or upon any part of the public lands or reservations of the United States abutting upon the Colorado River or its tributaries, or for the purpose of utilizing the surplus water or water power from any Government dam constructed or proposed to be constructed upon the Colorado River or its tributaries, is hereby suspended until the Colorado River compact is ratified as provided in section 12.

SEC. 16. (a) The provisions of this act, except subdivision (a) of section 12 and section 15, shall take effect on the date upon which the Colorado River compact becomes binding and obligatory.

(b) Subdivision (a) of section 12 and section 15 of this act shall take effect upon the date of the approval of this act.

SEC. 17. The short title of this act shall be "Boulder Canyon project act."

[S. 1274, Seventieth Congress, first session]

Amendments intended to be proposed by Mr. Phipps to the bill (S. 1274) to provide for the construction of works for the protection and development of the lower Colorado River Basin, for the approval of the Colorado River compact, and for other purposes, viz:

On page 6, line 7, after the word "thereon," insert a semicolon and the following: "except that the provisions of this subdivision requiring provision for revenues before any money is appropriated or any construction work done or contracted for shall not apply in respect of the dam authorized to be constructed under the provisions of subdivision (c) of this section."

On page 6, after line 7, insert the following new subdivision:

"(c) Upon the approval of the Colorado River compact mentioned in section 12 hereof, the Secretary of the Interior is authorized and directed to enter into contracts for the construction, in the main stream of the Colorado River at Black Canyon, Boulder Canyon, or at any other suitable place, at a cost not to exceed $12,000,000, of a retainer dam and incidental works for the purpose of providing adequate protection from flood waters on the lower Colorado River. The foundation work for such flood-control dam shall be adequate to support a dam structure five hundred and fifty feet in height, complying with the requirements of the dam authorized by section 1 of this act."

[S. 728, Seventieth Congress, first session]

A BILL To provide for the construction of works for the protection and development of the lower Colorado River Basin, for the approval of the Colorado River compact, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of controlling the floods and regulating the flow of the lower Colorado River, providing for storage and delivery of the waters thereof for reclamation of public lands and other beneficial uses within the United States, and for the generation of electrical energy as a means of making the project herein authorized a self-supporting and financially solvent undertaking, the Secretary of the Interior, subject to the terms of the Colorado River compact hereinafter mentioned, is hereby authorized to construct, operate, and maintain a dam and incidental works in the main stream of the Colorado River at Black Canyon or Boulder Canyon adequate to create a storage reservoir of a capacity of not less than twenty million acre-feet of water and a main canal and appurtenant structures located entirely within the United States connecting the Laguna Dam with the Imperial and Coachella Valleys in California; also to construct and equip, operate, and maintain at or near said dam, a complete plant and incidental structures suitable for the fullest economic development of electrical energy from the water discharged from said reservoir; and to acquire by proceedings in eminent domain, or otherwise, all lands, rights of way, and other property necessary for said purposes.

SEC. 2. (a) There is hereby established a special fund, to be known as the "Colorado River Dam fund" (hereinafter referred to as the "fund"), and to be available, as hereafter provided, only for carrying out the provisions of this act. All revenues received in carrying out the provisions of this act shall be paid into and expenditures shall be made out of the fund, under the direction of the Secretary of the Interior.

(b) The Secretary of the Treasury is authorized to advance to the fund, from time to time and within the appropriations therefor, such amounts as the Secretary of the Interior deems necessary for carrying out the provisions of this act, except that the aggregate amount of such advances shall not exceed the sum of $125,000,000. Interest at the rate of 4 per centum per annum accruing during the year upon the amounts so advanced and remaining unpaid shall be paid annually out of the fund.

(c) Moneys in the fund advanced under subdivision (b) shall be available only for expenditures for construction and the payment of interest, during construction, upon the amounts so advanced. No expenditures out of the fund shall be made for operation and maintenance except from appropriations therefor.

(d) The Secretary of the Treasury shall charge the fund as of June 30 in each year with such amount as may be necessary for the payment of interest on advances made under subdivision (b) at the rate of 4 per centum per annum accrued during the year upon the amounts so advanced and remaining unpaid, except that if the fund is insufficient to meet the payment of interest the Secretary of the Treasury may, in his discretion, defer any part of such payment, and the amount so deferred shall bear interest at the rate of 4 per centum per annum until paid.

(e) The Secretary of the Interior shall certify to the Secretary of the Treasury, at the close of each fiscal year, the amount of money in the fund in excess of the amount necessary for construction, operation, and maintenance, and payment of interest. Upon receipt of each such certificate the Secretary of the Treasury is authorized and directed to charge the fund with the amount so certified as repayment of the advances made under subdivision (b), which amount shall be covered into the Treasury to the credit of miscellaneous receipts.

SEC. 3. There is hereby authorized to be appropriated from time to time, out of any money in the Treasury not otherwise appropriated, such sums of money as may be necessary to carry out the purposes of this act, not exceeding in the aggregate $125,000,000.

SEC. 4. (a) No work shall be begun and no moneys expended on or in connection with the works or structures provided for in this act, and no water rights shall be claimed or initiated hereunder, and no steps shall be taken by the United States or by others to initiate or perfect any claims to the use of water pertinent to such works or structures until the State of California and at least three of the States of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming shall have approved the Colorado River compact mentioned in section 12 hereof and shall have consented to a waiver of the provisions of the first paragraph of Article XI of said compact, which makes the same binding and obligatory only when approved by each of the seven States mentioned in said section 12, and shall have approved said compact without condition save that of such approval by the State of California and at least three of the other States mentioned and until the President by public proclamation shall have so declared.

(b) Before any money is appropriated or any construction work done or contracted for, the Secretary of the Interior shall make provision for revenues, by contract or otherwise, in accordance with the provisions of this act, adequate, in his judgment, to insure payment of all expenses of operation and maintenance of said works incurred by the United States and the repayment, within fifty years from the date of the completion of the project, of all amounts advanced to the fund under subdivision (b) of section 2, together with interest thereon.

SEC. 5. That the Secretary of the Interior is hereby authorized, under such general regulations as he may prescribe, to contract for the storage of water in said reservoir and for the delivery thereof at such points on the river and on said canal as may be agreed upon, for irrigation and domestic uses, and delivery at the switchboard to municipal corporations, political subdivisions, and private corporations of electrical energy generated at said dam, upon charges that will provide revenue which, in addition to other revenue accruing

under the reclamation law and under this act, will in his judgment cover all expenses of operation and maintenance incurred by the United States on account of works constructed under this act and the payments to the United States under subdivision (b) of section 4. Contracts respecting water for irrigation and domestic uses shall be for permanent service. No person shall have or be entitled to have the use for any purpose of the water stored as aforesaid except by contract made as herein stated.

After the repayments to the United States of all money advanced with interest, charges shall be on such basis and the revenues derived therefrom shall be disposed of as may hereafter be prescribed by the Congress.

General and uniform regulations shall be prescribed by the said Secretary for the awarding of contracts for the sale and delivery of electrical energy, and for renewals under subdivision (b) of this section, and in making such contracts the following shall govern:

(a) No contract for electrical energy shall be of longer duration than fifty years from the date at which such energy is ready for delivery.

(b) The holder of any contract for electrical energy not in default thereunder shall be entitled to a renewal thereof upon such terms and conditions as may be authorized or required under the then existing laws and regulations, unless the property of such holder dependent for its usefulness on a continuation of the contract be purchased or acquired and such holder be compensated for damages to its property, used and useful in the transmission and distribution of such electrical energy and not taken, reulting from the termination of the supply.

(c) Contracts for the sale and delivery of electrical energy shall be made with responsible applicants therefor who will pay the price fixed by the said Secretary with a view to meeting the revenue requirements of the project as herein provided for. In case of conflicting applications, if any, such conflicts shall be resolved by the said Secretary, after hearing, with due regard to the public interest, and in conformity with the policy expressed in the Federal water power act as to conflicting applications for permits and license: *Provided, however*, That no application of a political subdivision for an allocation of electrical energy shall be denied or another application in conflict therewith be granted on the ground that the bond issue of such political subdivision, necessary to enable the applicant to utilize the electrical energy applied for, has not been authorized or marketed, until after a reasonable time, to be determined by the said Secretary, has been given to such applicant to have such bond issue authorized and marketed.

(d) Any agency receiving a contract for electrical energy equivalent to one hundred thousand firm horsepower, or more, may, when deemed feasible by the said Secretary, from engineering and economic considerations and under general regulations prescribed by him, be required to permit other similar agency having contracts hereunder for less than the equivalent of twenty-five thousand firm horsepower to participate in the benefits and use of any main transmission line constructed by the former for carrying such energy (not exceeding, however, one-fourth the capacity of such line), upon payment by such other agencies of a reasonable share of the cost of construction, operation, and maintenance thereof.

The use is hereby authorized of such public and reserved lands of the United States as the said Secretary shall determine to be necessary or convenient for the construction, operation, and maintenance of main transmission lines to transmit said electrical energy.

SEC. 6. That the dam and reservoir provided for by section 1 hereof shall be used: First, for river regulation and flood control; second, for irrigation and domestic uses and satisfaction of present perfected rights in pursuance of Article VIII of said Colorado River compact; and third, for power. The title to said dam, reservoir, plant, and incidental works shall forever remain in the United States, and the United States shall always control, manage, and operate the same: *Provided, however*, That the Secretary of the Interior may, in his discretion, enter into contracts of lease of a unit or units of said plant, with right to generate electrical energy, or, alternatively, to enter into contracts of lease for the use of water for the generation of electrical energy, in either of which events the provisions of section 5 of this act relating to revenue, term, renewals, determination of conflicting applications, and joint use of transmission lines under contracts for the sale of electrical energy, shall apply.

The Secretary of the Interior shall prescribe and enforce rules and regulations conforming with the requirements of the Federal water power act,

so far as applicable, respecting maintenance of works in condition of repair adequate for their efficient operation, maintenance of a system of accounting, control of rates and service in the absence of State regulation or interstate agreement, valuation for rate-making purposes, transfers of contracts, contracts extending beyond the lease period, expropriation of excessive profits, emergency use by the United States of property of lessees, and penalties for enforcing regulations made under this act or penalizing failure to comply with such regulations or with the provisions of this act.

SEC. 7. That the Secretary of the Interior may, in his discretion, when repayments to the United States of all money advanced, with interest, shall have been made, transfer the title to said canal and appurtenant structures to the districts or other agencies of the United States having a beneficial interest therein in proportion to their respective capital investments under such form of organization as may be acceptable to him. The said districts or other agencies shall have the privilege at any time of utilizing by contract or otherwise such power possibilities as may exist upon said canal, in proportion to their respective contributions or obligations toward the capital cost of said canal and appurtenant structures from and including the diversion works to the point where each respective power plant may be located. The net proceeds from any power development on said canal shall be paid into the fund and credited to said districts or other agencies on their said contracts, in proportion to their rights to develop power, until the districts or other agencies using said canal shall have paid thereby and under any contract or otherwise an amount of money equivalent to the operation and maintenance expense and cost of construction thereof.

SEC. 8. (a) All appropriations of water from the Colorado River, incident to or resulting from the construction, use, and operation of the works herein authorized, shall be made and perfected in and in conformity with the laws of those States which may or shall have approved the Colorado River compact ratified in section 12 of this act.

(b) The United States, its permittees, licensees, and contractees, and all users and appropriators of water stored, diverted, carried, and/or distributed by the reservoir, canals, and other works herein authorized, shall observe and be subject to and controlled by said Colorado River compact in the construction, management, and operation of said reservoir, canals, and other works and the storage, diversion, delivery, and use of water for the generation of power, irrigation, and other purposes, anything in this act to the contrary notwithstanding, and all permits, licenses, and contracts shall so provide.

(c) Also the United States, in constructing, managing, and operating the dam, reservoir, canals, and other works herein authorized, including the appropriation, delivery, and use of water for the generation of power, irrigation, or other uses, and all users of waters thus delivered and all users and appropriators of waters stored by said reservoir and/or carried by said canal, including all permittees and licensees of the United States or any of its agencies, shall observe and be subject to and controlled, anything to the contrary herein notwithstanding, by the terms of such compact, if any, between the States of Arizona, California, and Nevada, for the equitable division of the benefits, including power, arising from the use of water accruing to said States, subsidiary to and consistent with said Colorado River compact, which may be negotiated and approved by said States and to which Congress shall give its consent and approval on or before June 1, 1928; and the terms of any such compact concluded between said States and approved and consented to by Congress after said date: *Provided*, That in the latter case such compact shall be subject to all contracts, if any, made by the Secretary of the Interior under section 5 hereof prior to the date of such approval and consent by Congress: "*Provided further*, That in the event no such compact is entered into between the States of Arizona, California, and Nevada, prior to June 1, 1928, then there shall be reserved for acquisition by the States of Arizona and Nevada, their respective agents, licensees, or assignees, at the switchboard, at the plant or plants operated through the use of water impounded by said dam for each, electrical energy equivalent to 15 per centum of the total electrical energy made available by the use of such impounded water, to be contracted for by said respective States, or their agents, licensee, or assignees, within six months after notice by the Secretary of the Interior, and to be paid for as and when said electrical energy is ready for delivery. If said plant or plants are operated by the Government, then said electrical energy shall be delivered on the terms

and charges provided in the general regulations for delivery of electrical energy at the switchboard to municipal corporations and political subdivisions. If, however, said plant or plants are operated by the licensee or licensees of the Government, then said electrical energy shall be delivered at the switchboard by said licensee or licensees upon terms and charges equivalent to those that would have been fixed by the Government had the Government delivered such energy, and said equivalent terms and charges to be made by said licensee or licensees shall be established and fixed by the Government.

(d) Nothing in this act shall be deemed to waive any of the rights or powers reserved or granted to the United States by paragraph 7 of section 20 of the act providing for the admission of Arizona, approved June 20, 1910, and by the tenth paragraph of Article XX of the constitution of Arizona, but the Secretary of the Interior is authorized on behalf of the United States to exercise such of said rights and powers as may be necessary or convenient for the construction and use of the works herein authorized and for carrying out the purposes of this act.

SEC. 9. That all lands of the United States found by the Secretary of the Interior to be practicable of irrigation and reclamation by the irrigation works authorized herein shall be withdrawn from public entry. Thereafter, at the direction of the Secretary of the Interior, such lands shall be opened for entry, in tracts varying in size but not exceeding one hundred and sixty acres, as may be determined by the Secretary of the Interior, in accordance with the provisions of the reclamation law, and any such entryman shall pay an equitable share in accordance with the benefits received, as determined by the said Secretary of the construction cost of said canal and apurtenant structures; said payments to be made in such installments and at such times as may be specified by the Secretary of the Interior, in accordance with the provisions of the said reclamation law, and shall constitute revenue from said project and be covered into the fund herein provided for: *Provided*, That all persons who have served in the United States Army, Navy, or Marine Corps during the war with Germany, the war with Spain, or in the suppression of the insurrection in the Philippines, and who have been honorably separated or discharged therefrom or placed in the Regular Army or Navy Reserve, shall have the exclusive preference right for a period of three months to enter said lands, subject, however, to the provisions of subsection (c) of section 4, act of December 5, 1924 (Forty-third Statutes at Large, page 702); and also, so far as practicable, preference shall be given to said persons in all construction work authorized by this act: *Provided further*, That in the event such an entry shall be relinquished at any time prior to actual residence upon the land by the entryman for not less than one year, lands so relinquished shall not be subject to entry for a period of sixty days after the filing and notation of the relinquishment in the local land office, and after the expiration of said sixty-day period such lands shall be open to entry, subject to the preference in this section provided.

SEC. 10. That nothing in this act shall be construed as modifying in any manner the existing contract, dated October 23, 1918, between the United States and the Imperial irrigation district, providing for a connection with Laguna Dam; but the Secretary of the Interior is authorized to modify the said contract, with the consent of the said district, and also to enter into contract or contracts with the said district or other districts, persons or agencies for the construction, in accordance with this act, of said canal and appurtenant structures, and also for the operation and maintenance thereof, with the consent of the other users.

SEC. 11. "Political subdivision" or "political subdivisions" as used in this act shall be understood to induce any State, irrigation, or other district, municipality, or other governmental organization.

"Reclamation law" as used in this act shall be understood to mean that certain act of the Congress of the United States approved June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public land in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," and the acts amendatory thereof and supplemental thereto.

"Maintenance" as used herein shall be deemed to include in each instance provision for keeping the works in good operating condition.

SEC. 12. (a) The Colorado River compact signed at Santa Fe, New Mexico, November 24, 1922, pursuant to act of Congress approved August 19, 1921, entitled "An act to permit a compact or agreement between the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming

respecting the disposition and apportionment of the waters of the Colorado River, and for other purposes," is hereby approved by the Congress of the United States, and the provisions of the first paragraph of article 11 of the said Colorado River compact, making said compact binding and obligatory when it shall have been approved by the legislature of each of the signatory States, are hereby waived, and this approval shall become effective when the State of California and at least three of the other States mentioned, shall have approved or may hereafter approve said compact as aforesaid and shall consent to such waiver.

(b) The rights of the United States in or to waters of the Colorado River and its tributaries howsoever claimed or acquired, as well as the rights of those claiming under the United States, shall be subject to and controlled by said Colorado River compact.

(c) Also all patents, grants, contracts, concessions, leases, permits, licenses, rights of way, or other privileges from the United States or under its authority, necessary or convenient for the use of waters of the Colorado River or its tributaries, or for the generation or transmission of electrical energy generated by means of the waters of said river or its tributaries, whether under this act, the Federal water power act, or otherwise, shall be upon the express condition and with the express covenant that the rights of the recipients or holders thereof to waters of the river or its tributaries, for the use of which the same are necessary, convenient, or incidental, and the use of the same shall likewise be subject to and controlled by said Colorado River compact.

(d) The conditions and covenants referred to herein shall be deemed to run with the land and the right, interest, or privilege therein and water right, and shall attach as a matter of law, whether set out or referred to in the instrument evidencing any such patent, grant, contract, concession, lease, permit, license, right of way, or other privilege from the United States or under its authority or not, and shall be deemed to be for the benefit of and be available to the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and the users of water therein or thereunder, by way of suit, defense, or otherwise, in any litigation respecting the waters of the Colorado River or its tributaries.

SEC. 13. This act shall be deemed a supplement to the reclamation law, which said reclamation law shall govern the construction, operation, and management of the works herein authorized, except as otherwise herein provided.

SEC. 14. The Secretary of the Interior is authorized and directed to make investigation and public reports of the feasibility of projects for irrigation, generation of electric power, and other purposes in the States of Arizona, Nevada, Colorado, New Mexico, Utah, and Wyoming for the purpose of making such information available to said States and to the Congress, and of formulating a comprehensive scheme of headwater control and the improvement and utilization of the water of the Colorado River and its tributaries. The sum of $250,000 is hereby authorized to be appropriated from said Colorado River Dam fund, created by section 2 of this act, for such purposes.

SEC. 15. Nothing in this act shall be construed as a denial or recognition of any existing rights, if any, in Mexico to the use of the waters of the Colorado River system, and this act shall be without prejudice to the negotiation of a treaty with Mexico affecting such rights.

SEC. 16. That the short title of this act shall be "Boulder Canyon project act."

The CHAIRMAN. The record of former hearings held by the Senate committee are available. They are bound in one volume: In addition to this, the House has had quite extended hearings which may be consulted by members of this committee. It is thought that the evidence which those favoring the suggested legislation and those opposed to it might desire to present could be covered during this week, as nearly as possible the time to be equally divided between the two sides. In addition, there might be some witnesses who are, perhaps, in an independent class, and we will endeavor to arrange to accord them some time. Hearings will open this morning with Gov. George W. P. Hunt, of Arizona.

Senator ASHURST. Mr. Chairman, Governor Hunt will present his own statement, and I respectfully ask, as I expect to do in behalf of

all the witnesses, that he be allowed to proceed without interruption until he shall have finished. Of course, after the witnesses shall have finished any question any Senator desires to propound will be answered. I think this is fair. It means only conservation of time. I thank the committee.

The CHAIRMAN. Of course, the Senator is quite aware of the fact that no such imposition can be placed on the members of this committee, because, regardless of their promise to refrain from interrupting the witness, they are almost certain to do so.

I will ask Governor Hunt to permit the Senator from New Mexico to say just a word.

Senator BRATTON. Mr. Chairman and gentlemen, Mr. Francis C. Wilson is in the city, representing the Governor of New Mexico respecting the rights of that State in the Colorado River problem. He has exactly the status to which the chairman referred, and that is an independent attitude, not aligned with either of the controverted States. After they have been heard I would like Mr. Wilson to have a reasonable time to present the views of New Mexico independently and of our own right in the matter.

Senator JOHNSON. I think that, of course, ought to be done, Senator, and sometime during the hearing, whenever it is convenient for Mr. Wilson, I should be very glad to propose that he be heard.

Senator BRATTON. I thank you.

STATEMENT OF HON. GEORGE W. P. HUNT, GOVERNOR OF ARIZONA

The CHAIRMAN. Governor Hunt, you may proceed.

Governor HUNT. Gentlemen of the committee, I appear before your committee to-day in my capacity as governor of the State and as chairman of the Colorado Commission of Arizona. The commission was created by act of the legislature of our State. It is composed of the governor, the president of the senate, Hon. Mulford Winsor, the speaker of the house of representatives, Hon. A. M. Crawford, State Senators A. H. Favour and Thomas F. Kimball, Hon. M. F. Murphy, member of the house of representatives; Thomas Maddock, and H. S. McCluskey. I shall file a copy of the act creating the commission.

Senator ASHURST. There is no objection to that, I presume?

The CHAIRMAN. No; that will be done.

(The matter referred to follows:)

HOUSE OF REPRESENTATIVES,
Eighth Legislature, Regular Session.

[Chapter No. 37. Substitute House bill No. 15. Introduced by Mr. Francis, of Maricopa]

AN ACT Providing for the Colorado River Commission; the manner of election of said commission; designating the duties and power of said commission; making an appropriation therefor and declaring an emergency

Be it enacted by the Legislature of the State of Arizona:

SECTION 1. For the purpose of encouraging and promoting the development of the Colorado River, and of protecting the rights and interests of the State of Arizona in said river and its tributaries, a commission is hereby created to be known as the Colorado River Commission of Arizona, to consist of eight members, of which commission the Governor of the State of Arizona, the president of the senate and the speaker of the house of representatives of the eighth

legislature of the said States shall be members. The remaining five members of the commission shall be appointed as follows:

A. Three members shall be appointed by the said governor.

B. One member shall be appointed by the said president of the senate from the membership of the senate.

C. One member shall be appointed by the said speaker from the membership of the house.

SEC. 2. It shall be the duty of the said commission to enter into negotiations with accredited representatives of the States of Colorado, California, Nevada, New Mexico, Utah, and Wyoming and the Federal Government, either severally or jointly, with a view to affecting an amicable and equitable agreement or agreements respecting the allocation of the waters of the Colorado River and its tributaries and other benefits to be derived from the development of the said river, and respecting any and all matters that relate to rights of the State of Arizona or of the citizens and property owners of the State of Arizona in and to the waters of the Colorado River or its tributaries. Any and all agreements that may be entered into by this commission in behalf of the State of Arizona and the accredited representatives of the said several States or the Federal Government shall be submitted to the Legislature of the State of Arizona, and, before it is binding upon the State of Arizona, must be ratified by the legislature and approved by the governor of the State and by the Congress of the United States.

SEC. 3. The commission herein created shall take office on March 3, 1927, and on said date shall begin to function. The commission shall meet immediately upon its creation and elect from its membership one member to act as chairman and one member to act as secretary, both of whom shall serve without compensation. Immediately upon the organization of said commission the governor shall notify the governors of the States of California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and the President of the United States of the creation of said commission and shall endeavor to secure, at as early a date as possible, meetings with similar commissions or the properly accredited representatives of said several States and the United States to arrive at understandings and agreements in order to carry out the purpose for which this commission is created. The attorney general of the State of Arizona shall be the legal adviser of the commission and when called on shall advise in all matters or render opinions in writing, except as herein otherwise provided.

SEC. 4. This commission is hereby authorized and empowered:

A. To hold meetings and conferences, within or without the State of Arizona, with accredited representatives of the said several States, or with the Federal Government, in order to carry out any or all of the purposes for which this commission is created.

B. To institute and prosecute, or appear and defend, in the name of, and in behalf of the State of Arizona such actions, suits, or legal proceedings as may be necessary or may be deemed advisable to protect the rights and interests of citizens and property owners of the State of Arizona, or the rights of said State in the Colorado River or its tributaries.

C. To employ such attorneys, counsellors and exports as may be necessary to carry out the purpose of this commission or any of the duties imposed thereon.

D. To employ engineers to investigate and report on any engineering problem relative to the Colorado River, available and logical dam sites for flood control, irrigation, or the creation of hydroelectric power, and the extent of arid lands in the State of Arizona reclaimable from the waters of the Colorado River or its tributaries.

E. To cooperate with the Federal Government or any department or bureau thereof on matters germane to the engineering problems involved.

F. To maintain such office or offices as may be deemed necessary for the performance of the duties of the commission; to employ stenographers and clerical help and to incur the incidental expenses attendant upon the work of this commission.

G. To issue and distribute such reports or bulletins as will inform the public of the facts with respect to Arizona's rights and interests in the Colorado River and its tributaries and in the judgment of the commission will advance the development of said river.

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SEC. 5. The commission shall exist for a period of two years from the date of its creation.

SEC. 6. Members of the commission shall serve without pay, provided, however, that when actually engaged in the duties as outlined herein, and when attending upon the business of the said commission, they shall be reimbursed for travel, hotel bills, and incidental expenses.

SEC. 7. There is hereby appropriated out of the general fund of the State of Arizona, not otherwise appropriated, the sum of $100,000 or so much thereof as may be necessary, and the State auditor is hereby instructed to draw his warrant in the payment of any claim approved by the chairman and the secretary of said commission, and the State treasurer is hereby instructed to pay the same.

SEC. 8. All acts and parts of acts in conflict with the provisions of this act are hereby repealed.

SEC. 9. Whereas the preservation of the public peace, health, and safety make it necessary that the provisions of this act shall become operative immediately, an emergency is hereby declared to exist, and this act is, therefore, hereby exempt from the operation of the referendum provisions of the State constitution, and shall take effect and be in full force and effect from and after its passage and its approval by the governor.

Passed the Senate February 28, 1927, by the following vote: 15 ayes, 4 nays.

MULFORD WINSOR,
President of the Senate.
DOROTHY BURTON,
Secretary of the Senate.

Passed the House February 23, 1927, by the following vote: 44 ayes, 4 nays, 3 absent, 1 excused.

A. M. CRAWFORD,
Speaker of the House.
F. R. DUFFY,
Chief Clerk of the House.

EXECUTIVE DEPARTMENT OF ARIZONA,
OFFICE OF GOVERNOR.

This bill was received by the governor this 1st day of March, 1927, at 11.10 o'clock a. m.

J. H. WHYTE,
Secretary to the Governor.

Approved this 7th day of March, 1927.

GEO. W. P. HUNT,
Governor of Arizona.

EXECUTIVE DEPARTMENT OF ARIZONA,
OFFICE OF SECRETARY OF STATE.

This bill was received by the secretary of state this 7th day of March, 1927, at 10.15 o'clock a. m.

JAMES H. KERBY,
Secretary of State.

Governor HUNT. Our purpose in appearing before your committee to-day is to voice our disapproval and opposition to the measure known as the Swing-Johnson or Boulder Canyon bill.

I have had a long career in public life as a legislator, as president of the constitutional convention, as governor of the State of Arizona, and as a minister of the United States Government to a foreign court. In all my experience I have never read or heard of a more outrageous, unmoral, or sinister proposal than the measure you are now considering. I stand appalled that the Congress of the United States should tolerate and dignify the proposal by according it such serious consideration as to warrant governors of States of this Union to neglect their official duties to journey to Washington to voice their opposition to this astonishing proposal to invade a State.

This bill reads like a peace treaty which a military autocrat would impose upon a conquered and vassal people.

If you expect me to discuss this bill calmly, dispassionately, and impersonally, I must disappoint you. I must leave that to other members of our commission who have analyzed its details and who are of a more temperate frame of mind concerning it than I am.

I feel a sense of outrage.

I am one American who has an abiding faith in the institutions of our Government as founded by the fathers of the Republic.

I am firmly and unalterably opposed to the further despoliation of the States by the Federal Government.

We hear much in the way of lip service these days from Republicans and Democrats alike about State rights. The President of the United States, in his message to Congress, men in places of power and authority in both parties discuss in an abstract way the question of the rights of the States, but when the occasion offers, act and vote to destroy such rights as the States possess.

The present bill is an example. A similar measure has been introduced in the last three or four sessions of Congress. Each session the bill becomes more oppressive in its terms, more harsh in its language, and more contemptuous of the rights of the States. A way might be found to make the present measure more effective, so as to eliminate one of the sovereign States of this Nation from the Union, but I can not see how it could be accomplished.

One of the California Congressmen has publicly announced that it is his intention to introduce a measure to restore Arizona to the status of a Territory. That will not be necessary if this bill is passed and made effective. Arizona, as a State, will slowly deteriorate and die of malnutrition.

Our attorneys advise me that this bill proposes to deny to Arizona all future development unless she complies with the terms of this bill, if such development can be prevented by denying to our State the use of public lands, rights of way for irrigation works, or lines for the transmission of power. This bill proposes to harass, intimidate, browbeat, and starve Arizona into a surrender of her rights as a sovereign State of this Union and drive and compel her to accept the terms of a compact which would despoil the State of its heritage. Under the terms of this bill a town would not be permitted to build a pipe line across the public domain in order to get water, unless Arizona accepts the compact.

As the soul of France cried out against the Prussian theft of Alsace and Lorraine so shall our voice continue to ring out in passionate protest against the plundering of our Commonwealth. The voice of France was not raised in vain, and some day an Arizona Clemenceau will recover our rights if we do not consent to this wrong.

Is there reason or justification for such treatment of Arizona by the Congress of the United States as is proposed in this bill?

What outrage have we perpetrated that we should be treated as a pariah and unfit for the protection guaranteed by the Constitution of the United States?

Is she rebellious, as was charged by Mr. Hoover, of California? Is it necessary to reconstruct her by authorizing her territory to be governed and her resources apportioned by carpetbaggers?

What has Arizona done to merit such treatment?

So far as I can learn, we have refused to ratify a compact between seven States which will afford six of them protection but leave her with none.

Permit me to recite a few facts concerning this matter. I do not know all of them from personal knowledge, as I was in Siam at the time some of the events occurred.

In 1905 the Colorado River destroyed a heading and widened a canal built by the Imperial irrigation project, changed its course, caused damage and loss of property, and entered the Salton Sea.

The State of California has exhausted the entire unregulated low-water flow of the Colorado River. She can secure no additional water until storage is provided.

In 1920, because of a contract made with the Mexican Government by the promoters of the Imperial Valley reclamation project—and the exercise of the rights acquired under that contract by American millionaire owners of Mexican lands—the Imperial Valley found itself faced with a shortage of water. This same thing happened in 1924.

In order to improve these conditions in California, that State asked Congress to appropriate money to erect a dam to regulate the floods of the Colorado River, and to build a canal in California to provide for the irrigation of several hundred thousand acres of land in addition to what is now being irrigated.

Arizona did not oppose the passage of this legislation for the benefit of California. I am advised that the governor of the State at that time was sympathetic with the project, as were many of our citizens, and perhaps had I been Governor of Arizona then I would have interposed no objections.

But the States of Colorado, Wyoming, Utah, and New Mexico objected to any dam being built in the Colorado River—with Government aid or by private enterprise—until a compact was made which would discard the system of water laws which had been in effect in the semiarid States of the Colorado River Basin from the time of the coming of the Spaniards. The present law, briefly stated, is that he who first puts water to beneficial use and continues to use it has the prior right and title to its use. The States of Colorado, Wyoming, Utah, and New Mexico proposed to substitute in place of these laws a new doctrine which they called "equitable division of the water."

The upper States asserted that if regulatory, storage, or power dams were built in the lower basin and the water was put to beneficial use, that those States would be forever stopped from irrigating and cultivating their soil. They further asserted that the major portion of the water originated in their territory and that they were entitled to the use of an equitable share of it.

Therefore, the States of the upper basin were the original opponents of legislation which seeks to harness the Colorado River. They continue to remain the chief opponents of legislation to provide for the harnessing of the Colorado River, for the control of its floods, and to make the resources of the river available for use for agriculture or power, unless such legislation is predicated upon a compact which will assure to those States the right to use all of the water which they find possible to put to economic beneficial use.

Arizona does not criticize them for seeking to change a law which limits their development. We do deny their right to form a confederation of States to destroy the sovereignty of Arizona and appropriate her resources.

Arizona, as a State, standing alone and in equal and fair competition with all seven of the States, does not need a compact for her protection.

Arizona, as a State, standing alone and in equal and fair competition with the seven States in the basin, will be able to obtain adequate water for her needs.

In order to meet the demands of the States of Wyoming, Colorado, Utah, and New Mexico that there be reserved for their use an equitable amount of water, the seven States in the Colorado Basin, with the consent of Congress, agreed to enter into a compact to divide the water of the Colorado River among the seven States. A compact was negotiated at Santa Fe, N. Mex., which required the ratification of the legislatures of the seven States and the Congress of the United States. It did not comply with the provisions of the acts of the Legislature of Arizona or of any of the other States, or the act of Congress. These acts authorized the division of the water among the States. The Santa Fe compact created two artificial entities which they called "upper division" and "lower division" States, and divided the water between them instead of among the States.

At this point I became in part officially responsible for the action of Arizona. My position was a difficult one. I had been elected as governor in November, 1922, which was but a few weeks before the compact was negotiated. One of my first official acts was to submit the compact to the legislature.

In the short time at my disposal there was little opportunity afforded to inform myself on the merits of the treaty. When I submitted the compact to the legislature I limited myself to advising caution and that the legislature take time for study and investigation before the State was committed to this important treaty. I sought advice from many sources; I endeavored to maintain an open and unprejudiced mind until I had the facts. The legal advice and the engineering data furnished me convinced me that there was grave doubt that the compact afforded protection to Arizona, and that it probably jeopardized our interests beyond a point which any State should be called upon to go as a matter of comity and friendship between States. When some of the members of the legislature and others who were interested urged a policy of haste and immediate ratification, I urged the legislature not to ratify the compact. After one of the most intense battles in the history of our legislature, the resolution to ratify the compact failed to pass.

Arizona then entered upon a campaign in which the people were divided into three camps—those in favor of the compact, those against it, and those who were from Missouri and wanted to be shown. I was born in Huntsville, Mo., and I began an intensive drive to secure facts. I am advised the proponents of this measure are filling the record with extracts from some of the fervid speeches made by advocates of ratification of the compact at that time. This means nothing. They did not fully understand the question then, and most of them now admit it.

During the summer of 1923 the report of the Arizona Engineering Commission was filed. Our people also had an opportunity to compare the Santa Fe compact with the Swing-Johnson bill, and the "people from Missouri" were gradually convinced that the ratification of the compact meant the ruin of Arizona, and the great majority of the former advocates of the compact, four of whom are members of this commission, changed their minds concerning its adequacy to protect the interests of Arizona.

As soon as I was certain what was wrong with the compact drafted at Santa Fe, and how it could be fixed—this was late in the summer of 1923—I addressed a communication to the Governors of California and Nevada and invited them to appoint commissioners to meet with similar commissioners representing Arizona. I suggested that these commissioners should draft a supplemental compact which would apportion the water of the Colorado River, which would be physically availaible in the lower basin, after the needs of the upper basin States were satisfied, among the three States interested, and make a compact concerning hydroelectric power. The Governor of California refused to accept my suggestion. A few weeks later I appointed a committee of two citizens of our State to wait upon the Governor of California and to discuss with him a proposal for a tri-State conference, but the Governor of California refused to receive them.

The Governor of Nevada accepted both suggestions. Later he issued an invitation to the Governor of California to meet representatives of Arizona and Nevada at Los Angeles. The Governor of Nevada and I met, but the Governor of California did not put in an appearance. The correspondence substantiating these transactions is part of your records.

Under these circumstances you can not expect me to bear with equanimity the charge that Arizona has been an obstructionist.

In the summer of 1925, Arizona was informed that when we had withdrawn our opposition to the Boulder Canyon Dam we could have a conference of the lower basin States to discuss a tri-State compact.

Several conferences were held with representatives of California and Nevada during the fall of 1925 and the winter of 1926–27. During all the time the conferences were in session in Los Angeles the Swing-Johnson bill was being considered and debated in Congress. Representatives of California were assuring the Congress that California was making an earnest effort to adjust her differences with Arizona and Nevada.

The representatives whom I had appointed reported to me that the California commission at one time made a serious effort to find a basis of settlement, but upon orders from the representatives of California in Washington they withdrew their proposition while it was in process of being perfected to meet the constitutional provisions of the States.

In the spring of 1927 the Arizona commission visited all the States in the basin, beginning with California, and urged the governors to call a conference of the seven States in order to afford a forum to review the claims and needs of the States.

In compliance with that request, a conference was called at Denver, Colo., under the leadership of Governor Dern, of Utah. The

conference was attended by the governors and their advisers from all the upper-basin States. The Governors of California and Nevada attended the opening sessions of the conference and left commissioners in attendance to represent those States. Arizona was represented by her governor and the Arizona-Colorado River Commission, so that all seven States were represented in the conference at all times.

On behalf of the Arizona Commission, I offered at Denver a proposition which in all its essential features had been offered to California months before while the Swing-Johnson bill was under consideration in the Congress. It was as follows:

ARIZONA PROPOSAL AT THE OPENING SESSION OF THE COLORADO RIVER CONFERENCE AT DENVER, COLO.

Arizona has the following proposal to offer for your consideration as the basis for the preparing of a compact between Arizona, California, and Nevada which will be supplementary and subsidiary to the Colorado River compact adopted at Santa Fe:

(1) Arizona will accept the Santa Fe compact, if and when supplemented by a subsidiary compact which will make definite and certain the protection of Arizona's interests.

(2) That before regulation of the Colorado River is undertaken Mexico be formally notified that the United States Government reserves for use in the United States all water made available by storage in the United States.

(3) That any compact dividing the water of the Colorado River and its tributaries shall not impair the rights of the States under the respective water laws to control the appropriation of water within their boundaries.

(4) That the waters of the streams tributary to the Colorado River below Lees Ferry and which are inadequate to develop the irrigable lands of their own valleys be reserved to the States in which they are located.

(5) That so much of the water of the Colorado River as is physically available to the lower-basin States—but without prejudice to the rights of the upper-basin States—shall be legally available to and divided between Arizona, California, and Nevada, as follows:

(*a*) To Nevada, 300,000 acre-feet per annum.

(*b*) The remainder, after such deductions as may be made to care for Mexican lands allotted by treaty, shall be equally divided between Arizona and California.

(6) That the right of the States to secure revenue from and to control the development of hydroelectric power within or upon their boundaries be recognized.

(7) That encouragement will be given, subject to the above conditions, to either public or private development of the Colorado River at any site or sites harmonizing with a comprehensive plan for the maximum development of the river's irrigational and power resources.

(8) That Arizona is prepared to enter in a compact at this time to settle all the questions enumerated herein, or Arizona will agree to forego a settlement of items 6 and 7 and make a compact dividing the water alone, providing it is specified in such compact that no power plants shall be installed in the lower-basin portion of the main Colorado River until the power question is settled by a power compact among the States.

The governors of the upper States, after many days of negotiations, offered a proposal to Arizona, California, and Nevada to divide the water available for use in the lower basin. In an effort to be conciliatory and effect an agreement, the majority of the Arizona commissioners interpreted the proposal as it related to the Arizona tributaries of the Colorado River, but otherwise accepted the suggestion of the upper-basin governors. The details of this proposal will be discussed by other speakers.

California rejected the proposal made by Arizona and also the proposal of the upper-basin governors.

Arizona feels that the upper-basin governors made a splendid effort to effect an adjustment of the questions at issue and we are deeply appreciative of their efforts. Arizona objected to any provisions of the compact which would require that her projects on the Gila, Salt, Verde, Agua, Fria, and other streams be called upon to bear a part of the Mexican burden. Our pioneers had fought Indians, the desert, starvation, heat, lack of transportation, carpetbag officials, and many other difficulties, and I do not think they will now surrender, at this late day, the water rights they have perfected on Arizona streams for which pioneers have fought, bled, and died, in order to establish their homes.

I do not believe the farmers of Arizona would ever consent to open their dams on the Gila and its tributaries to let water down to Mexico, and, hence, we could not accept the suggestion of the governors or the provisions of the compact that this burden be assumed by Arizona for them.

The governors of the upper-basin States, in an effort to acheive an agreement, appointed a committee which prepared a resolution dealing with the Mexican problem. This resolution was agreed to and signed by the governors of all seven States. If no other progress was made at Denver, a unanimous opinion was arrived at on this resolution, the principles of which I consider to be of very vital importance if Arizona ever enters into a compact to set aside existing law. The text of the resolution will be filed with the committee.

The CHAIRMAN. Without objection it will be so ordered.

There was no objection.

(The matter referred to follows:)

MEMORIAL CONCERNING INTERNATIONAL RELATIONS RESPECTING THE COLORADO RIVER

(Adopted at Seven States Conference on the Colorado River in Denver)

Hon. CALVIN COOLIDGE,
President of the United States of America.

Hon. FRANK B. KELLOGG,
Secretary of State.

Whereas the prosperity and growth of the Colorado River States, namely, Arizona, California, Nevada, New Mexico, Utah, and Wyoming, are dependent upon present and increasing use of the waters of the Colorado River for domestic, agricultural, industrial, and other beneficial purposes, and the need of many regions of these States for additional water from that source already is extremely acute and will become increasing so; and

Whereas said river is an international stream between the United States of America and the United States of Mexico, with all of the water supplying the same coming from the United States of America, and the United States of Mexico is rapidly extending the irrigated area supplied from said river within her own boundaries, and great storage projects within the United States of America are in existence and in contemplation; and

Whereas said United States of Mexico, although having no strictly legal right to a continuance of the river flow for beneficial purposes, nevertheless may hereafter make some claim thereto; and

Whereas under acts of Congress of May 13, 1924, and March 3, 1927, a commission of three has been appointed by the President to cooperate with representatives of the United States of Mexico in a study regarding the equitable use of the waters of the Colorado River and other international waters for the purpose of securing information on which to base a treaty relative to international uses:

Now, therefore, and to the end that no unfortunate misunderstanding may arise between the United States of America and the United States of Mexico, and that no false encouragement may be given to present or future developments along the Colorado River in the United States of Mexico, we the governors of all seven of the Colorado River States, with our interstate river commissioners and advisers in conference assembled in the city of Denver on this the 26th day of August, 1927, do hereby in great earnestness and concern make common petition that a note be dispatched to the Government of the United States of Mexico calling attention of that Government to the fact that neither it nor its citizens or alien investors have any legal right against the United States of America or its citizens to a continuance of the flow of the Colorado River for beneficial purposes, and that the United States of Mexico can expect no such continuance except to the extent that as a matter of comity the two Governments may declare hereafter by treaty, and that especially under no circumstances can the United States of Mexico hope to use water made available through storage works constructed or to be constructed within the United States of America, or hope to found any right upon any use thereof. We believe, too, so great are the water necessities of our States, that any adjustment made with the United States of Mexico concerning the Colorado River should be based upon that river alone. We further earnestly suggest that a special commission be created by act of Congress for the Colorado River alone, a majority of the commission to be appointed from citizens of the Colorado River States, or that by act of Congress the present commission already referred to be enlarged to contain two additional members from the Colorado River States.

It is only by such precautionary measures, promptly taken, that our seven States with their millions of people can be given a basis of economic certainty, adequate protection, and a feeling of security pending the negotiation of an early treaty between the two Governments.

And your memorialists will forever pray.

GEO. W. P. HUNT,
Governor of Arizona.
C. C. YOUNG,
Governor of California.
WM. H. ADAMS,
Governor of Colorado.
F. B. BALZAR,
Governor of Nevada.
R. C. DILLON,
Governor of New Mexico.
GEO. H. DERN,
Governor of Utah.
FRANK C. EMERSON,
Governor of Wyoming.

Governor HUNT. Secretary Kellogg advised the governors that he thought it would not conform to the best public policy to make the changes in the commission, as suggested by the resolution, and that the commission which is now acting would undertake to safeguard the interests of the States concerned. The frank statement of representatives of our sister State of Texas, that it is the hope of that State that the desire of Mexico for water be satisfied from the Colorado River so that the water in the Rio Grande may be available for her use, gives us scant comfort in that direction.

THE POWER QUESTION

Now as to the power question. This issue was raised by the policy enunciated by California that Arizona, or Arizona and Nevada, when power was from a border development, would not be entitled to any revenue from hydroelectric power, if the project was constructed by the Federal Government. Representatives of California in this Chamber have made this declaration. California officials

have used even stronger language, as it was urged upon the Congress that Arizona had no rights in the Colorado River—that the resources in that river were the sole property of the Federal Government.

Arizona is under this direct threat in the pending legislation. It embraces a project which as it is designed is declared by many of our best engineers to be an economic crime. But we are under the still greater threat that if the so-called conservationists and public-ownership advocates have their way, the greater part of the 4,000,000 horsepower of potential hydroelectric energy in our State will be developed by the United States Government, alienated from our State to enrich another State and we will be denied any revenue from this great natural resource for the maintenance of our State Government.

Against this outrage we protest—vigorously and vehemently! To this protest you may answer—it is not the intention of Congress to build any projects with the exception of the Boulder Canyon project, and it is not the intention of Congress to go into the power business.

WHO IS GOING TO ANSWER FOR CONGRESS?

I find it easier to believe that if the bureaucrats in Washington are strengthened to the extent that this bill portends if made effective, it will cause them to try to induce the Government to go into the power business on a gigantic scale. They are already too strong. As popular as the policy of conservation was 10 years ago, I do not thing the Congress of the United States would seriously have considered such a measure as that now under consideration. I do not want to be understood as being against the conservation of our resources. I introduced the first measure for the creation of a forest reserve in Territorial legislation of Arizona may years ago.

Do you think the thirteen original States would have given such power over their resources as Congress is asked to authorize in the pending legislation? I think not.

I again repeat—who is going to answer to the States for the actions of Congress and assure them that the Government is not going into the power business? And I inquire—if this precedent is established what is to become of the rights of the States?

Are they to become the objects of charity of a paternal Federal Government which has robbed them of their resources by subterfuge and false representation—bolstered and sustained by legal quibbles? Are the States to be robbed of their resources under the distorted and perverted idea of conserving natural resources? Are the States to be robbed of their resources because of the advocacy of a policy of Government against private development? And I again want to assert that I believe in the conservation of our natural resources and I also am opposed to their exploitation for the benefit of a few.

The State of Nevada is also interested in the subject of deriving revenue from the natural resources of that State. In two brilliant and able addresses, made at Denver, Senator Key Pittman, of Nevada, made an argument for his State and argued the case of Arizona probably more effectively than her advocates could do it themselves. He introduced a resolution which was finally adopted by the representatives of six of the States. The Representatives of Cali-

fornia refused to vote either for or against the resolution, although they participated in the debates concerning it. The text of the resolution will be inserted in the record.

Because of the assertions of California statesmen that we have no rights in the power resources of the Colorado River, if the Government builds a project, Arizona asks the recognition of the right to derive a revenue from hydroelectric power generated by the use of the natural resources of our States. So there may be no question about it, we ask that if the project is a Government project that the State receive a revenue equivalent to what it would receive in taxes if the project was built and operated by private enterprise.

We demanded no fixed rate of compensation. California in one breath declared she would never recognize the right of our State to derive a revenue from the use of its natural resources and in the next breath declared she must know how much of the revenue is going to be demanded.

Upon the insistent demand of California, Arizona commissioners submitted a proposition establishing a fixed rate, the details of which will be discussed by other members of the commission. California commissioners then complained that the proposed rate was too high.

Arizona does not tax any of her mines, public utilities, or other industries out of existence. An effort is made to distribute our tax burden so as to encourage the development of the State. I am confident that in the matter of the taxation of power our tax commission would so regulate the valuation on the Colorado River power as to encourage the fullest and most complete development of the river. But California asks that rates be fixed now, and then complains that they are too high. She asks for special privileges and objects because the State undertakes to protect its interests in the future.

I have not endeavored to discuss the details of this problem, nor have I touched upon legal or engineering problems. We have commissioners here who are attorneys and engineers and who are competent to do that.

We are of the opinion that the Swing-Johnson bill, in addition to outraging every principle of the rights of the States, is economically unsound. That question will also be discussed by other speakers.

In conclusion, I repeat, Arizona is not the aggressor in this contest. California is asking for this legislation. The first protest against it came from the upper-basin States. This bill undertakes to give those States partial protection, at least, by giving the consent of the United States to a confederation of six States against the State of Arizona, and to deny to Arizona any protection whatever. Yea, it goes further and provides that Arizona must agree to the proposal to protect the upper-basin States, subject to dams on the Arizona streams, to the burden of supplying water to Mexico in the event of a drought, and forfeiting her natural resources. It provides that, in the event she fails to do so, that the departments of the United States Government which have control of the Indian lands, forest reserves, national parks, national monuments, oil reserves, power reserves, and public lands, which constitute 67 per cent of our State, are forbidden to grant any rights of way for canals or dams for the irrigation of any lands in Arizona, either from the main Colorado River or its Arizona tributaries, or any rights of way for lines for the transmission of

power for use in Arizona. It provides that, in order that California may be enabled to get Colorado River water and power, authority is given under the bill to the United States to condemn lands in Arizona by eminent domain for the necessary works and transmission lines in order to accomplish that end.

With this menace threatening the homes of our people we can not sit supinely by and watch on the side lines while Congress discusses this legislation. Our commissioners must devote every waking moment trying to arouse public sentiment against this monstrous and outrageous proposal. When we are free from its menace and not oppressed by its sinister and appalling threat our commissioners will be freed from this responsibility and will be able to resume and devote their time to treaty negotiations which were terminated by the efforts of California and the Boulder Dam lobby to rush through Congress this pernicious unmoral bill.

I understand some criticism was offered in the hearings before the committee of the House of Representatives because I suggested that the efforts of our commissioners would be fully occupied in opposing this outrageous bill and the suggestion was urged that our commissioners should cease their opposition and devote their time to negotiating with some of the Representatives of California, while the locust-like horde of lobbyists for this measure swarm around the Halls of Congress and its office buildings misrepresenting the facts concerning the project, villifying Arizona and her officials and conducting a campaign of slander and libel against those who have the temerity to oppose the bill.

I repeat—Arizona has sought an agreement for years. It was at our solicitation the conference was called at Denver. Arizona showed her good faith by making concessions. California did not indicate, to my mind, any intention of making an agreement at Denver, unless she was given everything she wants.

I want to close by asking this commission and the Congress of the United States——

Why should Arizona have the burden which this bill seeks to impose thrust upon her against her will and over her protests?

Why, if Congress decides to conduct a revolution against the States, should it single out one State and impose a burden upon her? Why not charge the burden of giving California what she is demanding, against all the States leaving the laws stand as they are concerning the appropriation and use of water? Why not force all the States to exempt their power project from State taxation, in order that the Federal Government may levy a tax on them and turn the proceeds over to the building of irrigation ditches in California? Has the Congress of the United States been converted to the propaganda that California has the only climate fit to live in, that it takes this method of trying to make it the only State which should grow and prosper?

Arizona does not come here as a penitent or a suppliant. We do not come cringing on bended knees. We come as Americans who are proud of their forefathers, their heritage; and hopeful for their posterity. We come as representatives of a State as proud and jealous of its sovereignty, prestige, and rights as the States of Virginia or Massachusetts. We do not have the eloquence of a Patrick Henry or a Daniel Webster to plead our cause. But we humbly and

respectfuly say to the Congress of the United States—if you do to the least of these States what you threaten in this bill, you have taken a long step forward toward the destruction of our free and representative Government and eventually the Government of our fathers, dominated and controlled by bureaucrats, will be more easily led to the next stage of destruction under an enterprising dictator.

In conclusion, I suggest this thought and warning to the advocates of Government ownership and to the zealots who have made a religion of conservation: If you establish the precedent that ownership by the Federal Government of power projects means the denial of revenue to the State governments, in my opinion you have laid the foundation for an opposition that will retard your cause more effectively than any policy which you can adopt.

Gentlemen, I have concluded. Others, better informed on the details of this problem than I am, will discuss the engineering and legal factors concerning it.

I thank you.

Senator ASHURST. Mr. Chairman, I ask that the documents referred to by the governor be printed at this juncture as a part of his remarks.

The CHAIRMAN. That has already been ordered. Do any members of the committee desire to propound any questions to the governor before he leaves the stand?

Senator DILL. There is one question I want to ask to see if I understand what the governor stated regarding the proposal made as to Arizona's attitude on revenue. Am I correct in my understanding that Arizona only asks a revenue equal to the State tax on the value of the dam and the works that will be built?

Senator ASHURST. Permit me, Governor, to ask that you take that under consideration and answer Senator Dill to-morrow. Will you do that?

Governor HUNT. Yes.

Senator MCNARY. I think the governor stated that plainly, and I assumed it would be his attitude from the position taken two years ago when we were in your delightful city of Phoenix. You would have no objection to the Government appropriating this money for the purpose of making the improvements provided a revenue would come to the State equal to the amount that would be received if the property were privately owned and taxed.

Governor HUNT. Yes; I think so.

Senator DILL. That is what I wanted to get clearly. That is the only revenue asked.

Governor HUNT. Yes.

Senator JOHNSON. Governor, will Arizona under any circumstances ratify the Colorado River compact?

Governor HUNT. Not unless she is protected.

Senator JOHNSON. If protected, as suggested in your paper, then Arizona will ratify the seven-State pact.

Governor HUNT. When she is amply protected.

Senator JOHNSON. Now, what would you say would amply protect her, in order to justify Arizona in ratifying the seven-State Colorado River compact?

Governor HUNT. Senator, we have offered through our commissioners to make a supplemental compact, but it has been refused.

Senator JOHNSON. No; I am not speaking of that. I am saying to you now, will you state, please, upon what terms Arizona will ratify the Colorado River seven-State pact.

Governor HUNT. Well, Senator——

Senator JOHNSON (interposing). Wait a moment, if you please, Mr. McCluskey. We are examining one witness at a time, and I think we ought to examine them in that way. I intend to examine very courteously the governor, and I wish him, if he will, to respond to my queries.

Governor HUNT. Senator, could I not respond to that to-morrow in writing?

Senator JOHNSON. Well, I ask you now can you respond to it at the present time, without consideration, in order to put in writing?

Governor HUNT. You know, Senator, this is a great question.

Senator JOHNSON. Yes.

Governor HUNT. It is a question that is a national question.

Senator JOHNSON. Yes; that is the way I regard it, Governor.

Governor HUNT. I feel on any important question asked, I should take it down and reply in writing.

Senator JOHNSON. That is perfectly satisfactory, but I want to know whether or not it is impossible for you at the present time offhand to reply to the question and that you desire time in order to submit in writing your views.

Governor HUNT. I desire time to submit them.

Senator JOHNSON. You could not at the present moment state them?

Governor HUNT. I do not think that I care to do so.

Senator JOHNSON. Very well, sir.

Senator ASHURST. Mr. Chairman, most respectfully I resent and take exception to the remarks of my learned friend, the Senator from California, for his unjust and rather heated reference to the governor and a member of this commission.

Senator JOHNSON. Oh, I beg your pardon. I have made no such statement.

Senator ASHURST. Let me finish.

Senator JOHNSON. Wait a moment. Now, my dear sir, there is not any occasion for any heat between you and me.

Senator ASHURST. There has been no heat.

Senator JOHNSON. Or between the witness and myself.

Senator ASHURST. I have been a member of various committees here for 16 years, and every Federal official that comes before any of the committees has two or three secretaries to sit by him and to assist him, but you oppose that privilege to the Governor of Arizona, and I resent and object to it.

Senator JOHNSON. I am seeking to ascertain the governor's views.

Senator ASHURST. Apply the same rule to Cabinet members and I am with you.

Senator JOHNSON. No; if he is unable to respond, that is all I ask.

Senator ASHURST. He is perfectly able to respond.

Senator JOHNSON. Then let him respond.

Senator ASHURST. He will in due season.

Senator JOHNSON. He does not need your assistance or Mr. McCluskey's assistance to respond.

Governor HUNT. Senator Johnson, I, of course, thank you for the courtesy, and I will reply to-morrow in writing.

Senator JOHNSON. Very well; there is no difficulty between you and me in respect to the matter.

Governor HUNT. No; because I have always had a very kindly feeling for the Senator from California ever since he overturned the power of the Southern Pacific.

Senator JOHNSON. That is very kind of you, sir, and I appreciate your view very much. There is not any occasion, Governor, for any difference between you and me.

Governor HUNT. Oh, no.

Senator JOHNSON. I am asking you the questions, and if there is the slightest thing in anything I ask, either that you do not understand or that you think is unfair, if you will kindly tell me so I will endeavor to amend it accordingly.

Senator DILL. Senator, do you think it is quite fair to object to the governor's secretary talking with him?

Senator JOHNSON. Yes; I do under these circumstances.

Senator DILL. I thought the Senator from Arizona was taking the proper position in his statement. We always allow those who come before the committees as witnesses to consult with their assistants.

Senator JOHNSON. That is quite so, but this is a very different situation which is presented here, which I do not care to argue at the present time, from that which is presented by a Cabinet officer who comes before us in behalf of certain legislation. I think that ought to be obvious.

The CHAIRMAN. I trust the colloquy will close now, because I think it is unnecessary to get into a discussion among members of the committee. Have you concluded with Governor Hunt?

Senator JOHNSON. No; there are some questions I desire to ask the governor. As I understand your position, you deny the power of the United States Government to indulge in this improvement at the Boulder Dam?

Governor HUNT. Without the consent of Arizona.

Senator JOHNSON. That is my understanding of your position?

Governor HUNT. Yes.

Senator JOHNSON. Do you deny the power of the Government to indulge in flood control in a stream?

Governor HUNT. Under certain conditions; yes.

Senator JOHNSON. Unless it has the consent of the State, is that what you mean?

Governor HUNT. Now, Senator, I will give you a written reply to that to-morrow.

Senator JOHNSON. Very well; I was trying to get your position, that is all.

Governor HUNT. My position will be explained to-morrow. I know I am discussing this with one of the powerful Senators of the Congress.

Senator JOHNSON. Please omit that because I do not claim to be powerful at all.

Governor HUNT. And I feel I am inadequate and my shield will probably be pierced by your arrows.

Senator JOHNSON. My dear Governor, I think you are equal as an antagonist to all of us, but we need not discuss that. If you can not answer me, that is all right.

Governor HUNT. All right; to-morrow I will.

Senator JOHNSON. I am not going to quarrel with you about the matter, so far as that is concerned.

Governor HUNT. And I am sure I shall not quarrel with you.

Senator JOHNSON. You claim, or Arizona claims, some sort of title to the river, is that correct?

Governor HUNT. Why, sure.

Senator JOHNSON. What is the claim that you make?

Governor HUNT. It runs 300 miles through our State.

Senator JOHNSON. Now, what do you claim as to your title to the river, please? What is your assertion in that regard?

Governor HUNT. Our title to the river?

Senator JOHNSON. Yes.

Governor HUNT. Forty-three per cent of the watershed of the Colorado River is in Arizona.

Senator JOHNSON. And do you assert that you own all the what—the water, the river, the bed, the bank, or what?

Governor HUNT. Well, Senator, let me be Yankee in my answer—what does California claim? She does not have it at all in her borders.

Senator JOHNSON. Concede anything you want in that regard, I am asking what your claim is as to the title of the Colorado River.

Governor HUNT. The title is for the protection of our State, from the 300 miles it flows through the State.

Senator JOHNSON. Do you claim the water?

Governor HUNT. We claim the bed of the stream. It is a navigable river.

Senator JOHNSON. It is a navigable river, is that correct?

Governor HUNT. That is one of the things; yes.

Senator JOHNSON. Is the river navigable throughout its entire length in Colorado?

Governor HUNT. It is navigable or has been navigable up to The Needles. It is now used in Utah as a navigable river, and we can use a portion of it in Arizona.

Senator JOHNSON. You deem it a navigable stream?

Governor HUNT. I certainly do.

Senator JOHNSON. And, deeming it a navigable stream, you claim the bed of the river; is that correct?

Governor HUNT. That is the law, is it not? Is not that the law?

Senator JOHNSON. Possibly; but I want to get your viewpoint, Governor.

Governor HUNT. You know the law better than I do.

Senator JOHNSON. Under those circumstances, do you deny the right of the United States Government to erect a dam in the river?

Governor HUNT. Provided we are protected.

Senator JOHNSON. That is, you do not deny it provided you are protected?

Governor HUNT. Yes.

Senator JOHNSON. All right; now that you have answered me that question, Governor, let us see under what circumstances you would consent to the erection of the Boulder Dam.

Governor HUNT. I will give you that reply to-morrow, Senator.
Senator JOHNSON. Is it impossible for you to give it to me now?
Governor HUNT. Yes.
Senator JOHNSON. All right. There are certain circumstances under which, however, you will consent to the construction of the dam as proposed by this bill; is that correct?
Governor HUNT. How is that?
Senator JOHNSON. There are certain circumstances and certain conditions under which you would consent to the construction?
Governor HUNT. Very likely; but then California would not consent to that.
Senator JOHNSON. That may be; but you would, under certain circumstances?
Governor HUNT. Under certain circumstances; certainly.
Senator JOHNSON. One of those circumstances involves the question that was asked you, I think, by Senator Dill, in respect of power, from which you would expect a certain amount of revenue.
Governor HUNT. Well, I object—or Arizona objects, to the Federal Government going into the power business.
Senator JOHNSON. You object to the Federal Government going into the power business. Just what do you mean? Do you object to the Federal Government erecting a generating plant; is that what you mean?
Governor HUNT. Is not that going into the power business?
Senator JOHNSON. Perhaps, and perhaps not; I do not know.
Governor HUNT. Well, we do not want any "perhaps" about it, we want to know.
Senator JOHNSON. This bill gives an option to the Secretary of the Interior to erect a generating power plant. Is that one of your objections to the bill?
Governor HUNT. That is one of the objections; yes.
Senator JOHNSON. If that were eliminated, you would be better pleased with the measure. Is that correct?
Governor HUNT. We would rather the Secretary of the Interior did not have anything to do with it, if our State would not get any revenue from it.
Senator JOHNSON. No; that there should be no power plant erected.
Governor HUNT. Well, I do not care for the Government erecting any plant anywhere for the producing of power to compete with private capital or State enterprises if it would deprive our State of revenue from its natural resources.
Senator JOHNSON. You do not wish that under any circumstances?
Governor HUNT. No, sir.
Senator JOHNSON. Do you have any such in Arizona?
Governor HUNT. We have power plants there.
Senator JOHNSON. Do you have any run by the Government?
Governor HUNT. No; we have not.
Senator JOHNSON. What is your plant running at Salt River?
Governor HUNT. That is run by the Reclamation Service.
Senator JOHNSON. Run by the Reclamation Service.
Governor HUNT. Yes.
Senator JOHNSON. Does it compete with private enterprise?

Governor HUNT. It is owned by the water users of Arizona. The only interest the Government has is in getting their return.

Senator JOHNSON. Yes; but it is a public enterprise?

Governor HUNT. The Government of the United States loaned us the money and Arizona is repaying it.

Senator JOHNSON. Certainly; and doing it by virtue of an electric plant that is run there.

Governor HUNT. They do not compete, though.

Senator JOHNSON. You say they do not compete. You do not mean that, Governor, do you?

Governor HUNT. I can not——

Senator JOHNSON (interposing). They compete with private enterprise in that territory, and successfully so, do they not?

Governor HUNT. I do not think so.

Senator JOHNSON. You do not think so?

Governor HUNT. No.

Senator JOHNSON. Do you know whether or not they are profitably operated?

Governor HUNT. I do not think any of the power companies in Arizona are suffering.

Senator JOHNSON. Do you know whether the Salt River enterprise is profitably operated?

Governor HUNT. Yes it is; it is reimbursing the Government, and when the Government is reimbursed the farmers of the Salt River Valley will own the project.

Senator JOHNSON. Is there any other enterprise of that sort conducted in Arizona?

Governor HUNT. I do not believe there is.

Senator JOHNSON. Do you know whether or not they contemplate the operation of one at Yuma?

Governor HUNT. I could not answer that question.

Senator JOHNSON. You could not answer that question?

Governor HUNT. We have Senator Winsor here from Yuma, who knows all about that end of the State.

Senator JOHNSON. There are certain circumstances under which you would ratify the Colorado River compact, are there not?

Governor HUNT. Well, that is a broad question, and as a broad reply I would say yes.

Senator JOHNSON. There are certain circumstances under which you would consent to the construction of the dam provided for by this bill, are there not?

Governor HUNT. That is a rather broad question, and I would say yes.

Senator JOHNSON. All right; that is all.

Governor HUNT. But I will give you a detailed reply to-morrow.

Senator JOHNSON. Very well.

Governor HUNT. I thank you, Senator.

RESPONSES OF GOV. GEORGE W. P. HUNT TO THE QUESTIONS OF SENATOR HIRAM JOHNSON, OF CALIFORNIA

Question. Will Arizona ratify the Santa Fe compact?

Answer. The Arizona-Colorado River Commission, of which I am chairman, has formally declared that it will ratify the Colorado River compact under the following conditions or subject to such other conditions in a supplemental compact as may be agreed upon:

(1) Arizona will accept the Santa Fe compact, if and when supplemented by a subsidiary compact, which will make definite and certain the protection of Arizona's interests.

(2) That before regulation of the Colorado River is undertaken, Mexico be formally notified that the United States Government reserves for use in the United States all water.

(3) That any compact dividing the water of the Colorado River and its tributaries shall not impair the rights of the States, under the respective water laws, to control the appropriation of water within their boundaries.

(4) That the waters of the streams tributary to the Colorado River below Lees Ferry and which are inadequate to develop the irrigable lands of their own valleys be reserved to the States in which they are located.

(5) That so much of the water of the Colorado River as is physically available to the lower basin States, but without prejudice to the rights of the upper basin States, shall be legally available to, and divided between Arizona, California, and Nevada as follows:

(*a*) To Nevada, 300,000 acre-feet per annum.

(*b*) The remainder, after such deductions as may be made to care for Mexican lands allotted by treaty, shall be equally divided between Arizona and California.

(6) That the right of the States to secure revenue from and to control the development of hydroelectric power, within or upon their boundaries, be recognized.

(7) That encouragement will be given, subject to the above conditions, to either public or private development of the Colorado River, at any site or sites harmonizing with a comprehensive plan for the maximum development of the river's irrigational and power resources.

(8) That Arizona is prepared to enter into a compact at this time to settle all questions enumerated herein, or Arizona will agree to forego a settlement of items 6 and 7, and make a compact dividing the water alone, providing it is specified in such compact that no power plants shall be installed in the lower-basin portion of the main Colorado River until the power question is settled by a power compact among the States.

Question. What does Arizona want in the way of power revenues?

Answer. Arizona stands for and has been advocating the principles so definitely stated in the Pittman resolution, which I filed with my remarks of January 17.

Question. Do you deny the right of the Government to build a dam at Boulder Canyon?

Answer. Arizona denies the right of the Government to build a dam at Boulder Canyon under the terms and conditions of the Swing-Johnson bill.

Question. Do you deny the right of the Government to engage in flood control?

Answer. That is a legal question. Our legal advisers inform me that the Government has no authority under the Constitution of the United States to engage in controlling floods as such, but may engage in controlling floods as an incident to improving navigation and by receiving the consent of the States to build dams and control floods under the terms of the United States reclamation act and the Federal power act.

Question. Do you claim title to the bed of the river?

Answer. Arizona considers the Colorado River a navigable stream and as such claims title to its bed.

Question. Do you claim to own the river, water, bed, banks, or what?

Answer. Arizona claims the Colorado River is navigable, that it owns the bed and banks to high-water mark and controls the appropriation and use of water within its State and an equal claim with other States upon its boundaries, subject to the decisions of the United States Supreme Court, and particularly the Colorado-Wyoming decision of that court.

Question. Do you deny the right of the Government to construct a dam?

Answer. Our attorneys advise me that the Government will have authority to erect a dam without the consent of the States of Arizona and Nevada, for the improvement of the navigation on the Colorado River. We do not believe anyone would seriously urge that the Government should expend $50,000,000 or more for that purpose. We do deny the right of the Government to erect the dam described in the Swing-Johnson bill unless it receives a permit from the States of Arizona and Nevada.

Question. Under what circumstances would you consent to a dam at Boulder?

Answer. In that connection our commission has no authority to speak. If a compact was arranged which was satisfactory to Arizona and approved by the legislatures of these seven States and Congress, the consent of the State of Arizona for a permit to construct dams would come from a legislative act, as is required under the laws of our State.

Question. There are certain circumstances under which you will consent to a dam at Boulder?

Answer. I do no believe the Boulder Canyon site is the proper place to construct a large storage reservoir. It is an excellent site for a power dam of medium height.

Question. The bill gives an option to the Secretary of the Interior to operate a plant at Boulder. Is that one of your objections?

Answer. I responded January 17 that I did not care to see the Government go into the power business in competition with private enterprise. I want to add to that. If it denies to the States the right to derive an equitable revenue or tax for the needs of the State. I have no objection to Government development as such, although I am opposed to the extension of Federal bureaus. I believe that the Federal power act is adequate, when supplemented by State legislation, regulation, and control, to amply care for the needs of the Nation, the State, and the consumer.

I think this answers the questions propounded by Senator Johnson.

Senator ASHURST. If there are no further questions to be asked Governor Hunt, the next witness to make a statement will be Hon. Mulford Winsor, who was a member of the Arizona constitutional convention and who has three times been and is now president of the Arizona State Senate.

Before Mr. Winsor commences I must not let this episode go by. It was so unfair to the governor I must explain the situation. Governor Hunt never requested or urged or knew anything about Mr. McCluskey coming near him. Mr. McClusky went over to sit by the side of Governor Hunt at the request of Hon. Dwight B. Heard, one of the prominent citizens of the State of Arizona and the editor of the leading Republican paper of the Southwest.

Senator JOHNSON. Mr. Chairman, this is an incident that ought not to take up any time of the committee at all. The fact that Mr. Dwight B. Heard is the editor of the leading Republican paper of the State of Arizona is a matter of complete indifference to me, because we are dealing here with an absolutely nonpartisan or unpartisan question, and the politics of the situation does not enter into it at all. The reason I desired to ask Governor Hunt these specific questions and to have Governor Hunt himself respond is because he has been the head of the commission, he has been the directing agent of the activities of Arizona, and it was appropriate therefore, because of his intimate connection with the situation that he be interrogated. It was for that reason I objected to any interference by any other person or any suggestions.

Senator DILL. Mr. Chairman, I want to say I think the Senator from California takes the wrong position. He has the right to take that position, but I do not want it to go down as a precedent in this committee that because a man is the head of some organization he can not have an assistant sit by him to help answer questions, especially when they involve legal questions such as were asked here, when the governor is not a lawyer. It has not been the practice of the committees in the Senate or in the House to forbid a man having some one sit with him and explain the details of proposals of this kind, and for one I do not think this was the proper procedure.

The CHAIRMAN. If you will permit the Chair, I think that is a question the committee should decide in executive session. The question has been raised, and I do not think we should enter into a wide discussion of the point at this time. At first the Chair was inclined to hold with the Senator from California. The witness was on the stand. He was well qualified to answer the questions that were propounded to him, and the Senator from California, as did the Chair, desired to have his unbiased expression and not the sentiment of his secretary or some other person present at the time. Now, I am willing to discuss this matter in executive session.

Senator ASHURST. Mr. Chairman, I am willing to let it drop, but I would have been grossly cowardly to have submitted to the episode without any reference to it.

Senator JOHNSON. Well, there was not anything in the episode——

Senator ASHURST. I am willing to let it drop.

Senator JOHNSON. All right; but you let it drop with the statement that you would have been cowardly if you had not referred to it. I can not for the life of me understand why any such thing arose. There was a most quiet, courteous suggestion that the witness himself respond. That is all there was to it. Now, my friends, the Senator from Washington says I am in error in that view. He may be right, but I believe——

Senator DILL (interposing). Does not the Senator concede that a man appearing as a witness has the right to have some one with him to assist him about some detail he is not informed upon?

Senator JOHNSON. But in this case he has not asked anybody, and we had just listened to a most vehement—I do not care to characterize it or to speak concerning it—a most vehement denunciation which apparently went into all these facts. The questions I asked were perfectly pertinent, and I think the interference was one I was justified in calling attention to and saying it ought not to occur.

Senator ASHURST. I am willing to let it pass. Let us hear Senator Winsor.

STATEMENT OF HON. MULFORD WINSOR, MEMBER AND SECRETARY OF THE COLORADO RIVER COMMISSION OF ARIZONA

Mr. WINSOR. Mr. Chairman and members of the committee, in confirmation of the introduction given me by Senator Ashurst, I will state for the record that my name is Mulford Winsor. My home is at Yuma, Ariz. I live at Phoenix, the capital of the State, since the governor fell into the habit of calling four or five special sessions of the legislature a year, and spend most of my time on the train going from one Colorado River conference to another. Socially, I am a farmer. By occupation I am a member of the Arizona Legislature, which tears down my standing with the public as rapidly as being a farmer builds it up. I am a member and secretary of the Colorado River Commission of Arizona, and in that capacity am appearing here.

Senator MCNARY. Did you appear before the Committee on Irrigation and Reclamation during the hearings held in the months of October and November, 1925, while the committee was in the State of Arizona?

Mr. WINSOR. No, sir; I did not. It so happened I was not in the State at the time, and very much to my regret was not able to appear. I have not explained how I make a living, the reason being that it is fully as great a mystery to me as it is to others. I am not an expert in Colorado River matters, being neither a lawyer nor an engineer, but I have lived on the river since 1895; have witnessed its floods in all their power and fury, and after a few ineffectual attempts at the end of a shovel to control them, took up the more exhilarating if less conservative policy of making speeches in condemnation of them. Apparently this method of control is not so impractical after all, for of late years, since my speeches set in as a counterirritant, the floods have been visibly reduced. If I do not run out of wind I have hopes that they will disappear altogether.

ARIZONA'S INTEREST IN COLORADO RIVER

But the people of my State evidently have not entire confidence in the potency of my voice to still the waves, as their interest in all phases of the Colorado River problem, including that of flood control, is unabated. Indeed, I believe that it is more intense than ever, for it is now what it has never been before—the interest of a practically united people, with a perfectly clear, logical, crystallized view. Whatever may have been Arizona's shortcomings in that respect in the past, she now has a definite, constructive policy, which may with confidence as to its authenticity be pointed to as the Arizona position—a position which must and I am certain will command the respect of the States of the Union.

From the very inception of the agitation for the development of the Colorado River, the people of all portions of Arizona have taken a most active interest in it. This may be attributed to the fact that the entire State, unlike any other State, lies within the drainage area of the Colorado River. Whatever affects the Colorado River affects all of Arizona. It has a bearing upon the development of all parts of the State and affects all of the people of the State. Particularly it affects every taxpayer. The reason is not hard to find.

To-day mining is Arizona's predominant industry. It is a great industry. The mines are rich in copper, silver, gold, lead, asbestos and other minerals, and they pay half of the taxes levied for the support of the State and county governments, for keeping the peace, for the maintenance of schools, for the building of roads and for the defense of the eighteenth amendment. It is a fortunate thing that the mines are able to do this, for there are all too few sources of public revenue in the State. Considerably more than half of its large area is nontaxable. It is covered by Indian reservations, national forests, national parks, national monuments, and withdrawn public lands. I am not saying this complainingly, for all of the objects for which these withdrawals were made are doubtless worthy ones, but they nevertheless place the State under a handicap. All of the well-watered areas of the State are embraced within the Indian reservations and the national forests. Returning to the mines, which under this state of affairs constitute the greatest portion of the State's taxable wealth, it is inevitable that they can not always be depended upon. To-day they are the chief financial sup-

port of the State, but one day they will be exhausted. They will play out, gradually of course, but surely. It is a way that mines have, and it can not be avoided. Then Arizona must either decline, or look to other resources. The greatest of her possibilities lies in agriculture and horticulture—an industry in which there has already been considerable development, but which is still in its infancy. The Lord endowed Arizona with marvelous agricultural potentialities, but He did not make the realization of them easy. He gave her large areas of fertile land in the valleys and on the mesas. He put in the soil properties which will make it very productive. He blessed it with a climate which gives the husbandman no rest, either summer or winter—but keeps things growing all the time and makes it possible to grow citrus fruits and other highly valuable products at seasons of the year when they can not be produced elsewhere. But He gave—except in those parts reserved for the Indians or covered by forest reserves—scant rainfall, and made it necessary to enlist the magic of the irrigator. Water must be conjured from the depths, or taken from the rivers and streams.

Now in Arizona, it so happens, these rivers and streams are solely and entirely the Colorado River and its tributaries. There are none other. So it falls out that in Arizona the Colorado River and the State's agricultural future are synonyms. They are one and inseparable. Without the Colorado River and its tributaries within the State agriculture can not develop, and the State can have no future worthy of the name. So it is that the Colorado is often referred to and is regarded, in Arizona, as the State's greatest undeveloped resource. Then, in addition to the necessity which exists for Arizona to look to the Colorado for water with which to reclaim her thirsting desert acres, which may be reached by this great river and its tributaries, in the Colorado's journey for more than 300 miles through Arizona's Grand Canyon, from the Utah line to where the Arizona boundary joins that of Nevada, there is over 2,500 feet of fall, and the possibility of developing four and one-half million horsepower of hydroelectric energy, and that is looked upon as a future asset to take the place of the diminishing mines.

These are the reasons why all of Arizona's citizens feel a vital interest in the Colorado River, and are personally concerned regarding the development and disposal of its vast resources.

These are the reasons why, despite the confusion caused by many schools of thought, both political and economic, and in fact out of that confusion, has grown a demand for the settlement of this great question—a just settlement, but a prompt one. It was in response to this demand that at the last regular session of the Arizona legislature, the Colorado Commission of Arizona was created, to give to the State an official, authorized body, vested with the responsibility of representing Arizona and joining with the other interested States in a constructive, practical effort to arrive at a solution of the vexing problem.

COLORADO RIVER COMMISSION

The Colorado River Commission of Arizona was, I think, a distinct achievement—not merely because I am a member of it. It has still other points of merit. I have spoken of the confusion which has prevailed in Arizona with respect to the Colorado River. Every-

body was interested, because they all felt that they had a direct, personal interest in it, but there were many schools of thought. Political considerations vied with economic ones, and sectional views with engineering. The people were so torn with conflicting ideas that it was not possible to present to the country or to Congress an Arizona plan, for there was none, or to state the Arizona position, because Arizona had no authoritatively official position. There was not a sufficient crystallization of view. This has been changed.

The Colorado River Commission of Arizona consists of eight members. Four of these are representative of the executive department of the State government—the governor and three members appointed by him. Four are representative of the legislative department—the president of the senate, the speaker of the house, and two members appointed by them. Because the members of this commission do represent both departments of the State government; because they represent the several schools of thought with respect to the Colorado River; because they represent all sections of the State; because they represent the two political parties and the different elements of those parties; because they constitute a very fair cross-section of the State—but mainly because they were willing to submerge all minor considerations for the purpose of accomplishing the thing for which the commission was created, and became they had the assistance of many able advisors, it has been possible to bring order out of the chaos which has heretofore prevailed. The members of the commission, representing, as I say, practically all of the principal schools of Colorado River thought, have brought their own views into substantial accord, and the natural consequence has been a general crystallization of Arizona thought. That the Colorado River Commission has the support of almost all of the people is evidenced by the following resolution of indorsement, which was adopted by the Arizona Legislature, with no dissenting vote in the house, and only one in the senate:

RESOLUTION

Whereas the Colorado River Commission of Arizona was created by act of the eighth legislature (chapter 37, session laws, regular session), approved March 7, 1927, "for the purpose of encouraging and promoting the development of the Colorado River, and of protecting the rights and interests of the State of Arizona in said river and its tributaries"; and

Whereas on April 6, 1927, the said commission met and duly organized, and from and after said date has functioned in accordance with law; and

Whereas the task assigned to said commission is of the greatest proportions and its fulfillment fraught with vital importance to the State of Arizona; and

Whereas the difficulties by which the said commission is confronted, in the performance of the duties assigned it, are extremely difficult if not indeed almost impossible by reason of the great political power and influence exercised by the State of California, and the facilities possessed by said State for the dissemination of propaganda and the extreme activity with which, during the past several years it has disseminated propaganda in favor of legislation in Congress inimical to Arizona's interests and violative of the sacred rights of the States of the American Union; and

Whereas it is the belief of this legislature that the members of said commission have labored loyally, faithfully, and untiringly in the interest of Arizona, and in the face of the great obstacles and difficulties referred to have achieved remarkable success, if not as yet in the bringing about of an agreement which will facilitate the development of the Colorado River, at least in the correction of much of the misunderstanding which has prevailed with respect to Arizona's attitude, in the enlisting of powerful support for Arizona's

contentions and in the creation of widespread sympathy for Arizona's just claims: Now, therefore, be it

Resolved by the senate of the eighth legislature, the house concurring, That it is the sense of this body that the Colorado River Commission of Arizona, and its several members, are entitled to the warmest congratulations and commendation for the ability, the energy, and the loyalty they have displayed in the performance of their duties; and be it further

Resolved, That the Legislature of Arizona hereby heartily indorse the work which thus far has been performed by the said commission, and express the utmost faith and confidence that the commission's further labors will be marked by similar courage, fidelity, and skill, and that Arizona's rights and interests, and the rights of all of the States of the Union as they are affected by the questions involved in the development of the Colorado River, will be effectually defended and protected; and be it further

Resolved, That the Legislature of Arizona hereby calls upon all loyal citizens of Arizona to strongly support and second the efforts of the said Colorado River Commission of Arizona, to the end that the world may be shown that in this conflict, in which rights most sacred to the American people are at stake, they are a united people.

ARIZONA'S POSITION

I think, therefore, that I am safe in saying that the declaration of principles enunciated by the Colorado River Commission soon after its creation, and by the light of which its efforts have been directed, represents the crystallized Arizona view. It defines Arizona's position with respect to the Colorado River.

In order that time may be saved, I will ask permission to have this statement of principle placed in the record and will not take the time to read it. I think it is something that all of the Members will wish to read.

The CHAIRMAN. Without objection it is so ordered, unless some one desires to have them read now.

Senator JOHNSON. No; but was it placed in the record of the former hearing?

Mr. WINSOR. No; I believe not. It is embraced in six paragraphs, and these six paragraphs I think contain the just and legitimate claims of the State of Arizona with respect to an equitable, comprehensive, and economical development of the river. It is more or less general in its terms as a statement of almost all principles must be.

Senator MCNARY. It goes into the record here, does it not?

Mr. WINSOR. Yes; and it embodies principles which can easily be translated into a concrete proposition, either as legislation or as a treaty between the States.

The declaration of principles is as follows:

ARIZONA PLATFORM

1. The development of the Colorado River should be predicated upon a comprehensive plan by means of which the river's destructive floods may be curbed and which ultimately will insure the utilization of all of the river's flow for irrigation or domestic uses and every foot of the river's fall for the creation of hydroelectric power.

2. Such a plan should contemplate and guarantee the use of all of the stored waters of the Colorado River on United States soil or for the use and benefit of American cities and towns, and if any rights to waters of the Colorado River shall hereafter be accorded to the Republic of Mexico by treaty or otherwise such rights should relate only to the unregulated normal flow of the main stream and in amount not in excess of that which has been applied to beneficial use in that country.

3. The right of the Colorado River States, as of all of the so-called "appropriation" States of the arid West, as enunciated in their water laws and recognized in the Federal reclamation act and the Federal water power act, to control the appropriation, use and distribution of the waters within their respective borders, should not be impaired nor modified except with the consent and approval of such States.

4. In whatever agreement may be reached respecting a division of the waters of the Colorado River, or of that portion of such waters available to the State of the lower basin, Arizona should be assured such amount as may be necessary to reclaim her arid lands, which may be ascertained and determined by competent investigation to be susceptible of practical reclamation from the Colorado River.

5. The States of the lower basin should have the right, respectively, to consume for beneficial purposes such of the water in the tributary streams flowing in their several States as can be put to use prior to the water entering the main channel of the Colorado River.

6. The fall of the Colorado River within Arizona's boundaries susceptible of utilization for the creation of vast stores of hydroelectric power is a natural resource and the right of Arizona to derive an equitable revenue from this source should be recognized.

These six paragraphs, in language which we trust will appear neither radical nor unreasonable, embody what the Colorado River Commission regard as Arizona's just, legitimate claims, and contains all of the elements of a constructive, equitable program of Colorado River development. General in its form, as principles ordinarily must be stated, it nevertheless forms a definite policy, and may easily be translated into concrete propositions—equally applicable to a treaty between the States or independent legislation.

OBJECTIONS TO SWING-JOHNSON BILL

It follows from this statement of principles—from this enunciation of policy—that Arizona earnestly protests the passage of S. 728, the so-called Swing-Johnson bill. That measure, according to the Arizona view, is in direct contravention of the Constitution of the United States and the established law of the land, and violates every principle of equality of the States and of fair dealing and justice between them. It would gravely menace Arizona's future, if not virtually destroy her opportunities for growth, and favors the State of California at the expense of Nevada and Arizona in a manner wholly unnecessary and uncalled for.

Reduced to specific terms, Arizona objects to the Swing-Johnson bill for the following reasons:

1. Because, although professing to adopt the provisions of the Colorado River compact (sec. 4) and professing to be supplemental to the national reclamation act (sec. 13), it would deny the right of regulation and control by any State within its boundaries of the appropriation, use, and distribution of water," an essential right claimed by every Western State, including California, and recognized in the Colorado River compact, the national reclamation act, and the Federal power act—a right which no State can afford to surrender without adequate compensation—and would ignore the method provided by the compact for the determination of controversies between the States.

2. Because its effect would be to deprive Arizona of water necessary for her future development and growth, and for the reclamation of her arid lands.

3. Because it would usurp or confiscate, for the practically sole and exclusive benefit of California, a resource of great value belonging to the States of Nevada and Arizona, without compensation therefor.

4. Because it would predetermine, or seriously influence, the plan of development of the Colorado River within Arizona, without that State's consent.

5. Because, in the absence of a binding treaty with Mexico, or of effective notice to Mexico, it would create a storage and effect a stabilization of the river's floods which would quickly be taken advantage of by owners of land in Mexico to increase their irrigated acreage and thus establish what might be regarded as a moral right to the continued use of the water so applied to a beneficial use, to the detriment of development in the United States.

6. Because, while precluding the States of Nevada and Arizona from securing a revenue from a national resource belonging to them, it would burden the power developed through the use of that resource to subsidize a California reclamation project.

7. Because it would still further discriminate against States by giving to California districts canals and power plants developed in them while withholding from the States of Nevada and Arizona the ownership of dams built in them by the Federal Government.

8. Because, violating as it does right vital to the States whose resources it imperils and appropriates, and probably violating the Constitution of the United States, its passage could only result in endless litigation and the consequent deferment of Colorado River development.

9. Because, by making the Federal Government party to a compact affecting the interests of seven States upon its acceptance by four, it would in effect impose a boycott upon such as might not subscribe to the agreement, and particularly upon the State of Arizona, thereby making of it both a confiscatory and a coercive measure.

This bill of particulars might be elaborated at great length. I shall cover the ground as briefly as I can.

The measure denies the right of "regulation and control by any State within its boundaries of the appropriation, use, and distribution of water" by providing for the storage of the flood waters of the Colorado River within the States of Arizona and Nevada, without their consent, and for the absolute control of their stored waters (sec. 5) by the Secretary of the Interior. It goes further, and while giving recognition to the principle that appropriations of water must be made in accordance with State laws (sec. 8) ruthlessly bars the door to all States not parties to the Colorado River compact. Hence, it becomes a coercive measure.

Senator McNARY. Do you proceed upon the theory that the Colorado River is a navigable stream?

Mr. WINSOR. Yes, sir; but that is not the full basis of our claim of sovereignty. We claim the right to control and regulate the appropriation, use, and distribution of water within the State regardless of its navigability.

Senator McNARY. I appreciate that.

Senator ODDIE. And you contend that the Federal Government through the Reclamation Service should deal with the State of Arizona on that question of the appropriation and the control of the water?

Mr. WINSOR. I do, sir; and I think the Reclamation Service always has. That is the reclamation law.

Sentaor McNARY. Do you not find that as a provision in the bill?

Mr. WINSOR. Not an effective provision so far as it relates to Arizona. It provides that the State of Arizona, or any State not a party to the compact, can not appropriate any of the stored water.

Senator McNARY. I had something to do with the amendment in the Johnson-Swing bill covering that very item when it came before this committee two years ago. At that time I thought we made completely effective any development on the Colorado River that came within the provisions of the act of 1902 and amendatory acts

thereof. I would be very much disappointed if that bill denies to Arizona any rights under the reclamation act that it guarantees to any other State in the Union, and whenever that is pointed out to me I shall feel like apologizing to the people of Arizona; but I want you to point it out more clearly and distinctly than you have now.

Mr. WINSOR. I shall try to do that as I proceed, and if I fail satisfactorily to point it out I shall be glad to have you question me upon it; but I think that what I shall have to say will make it clear.

While professing to adopt the Colorado River compact, this measure nullifies that document by ignoring the provision contained therein for the adjustment of just such differences between the States as the one raised by the proposed development. Article VI of the Colorado River compact reads as follows:

> Should any claim or controversy arise between any two or more of the signatory States * * * (*d*) as to the construction or operation of works within the Colorado River Basin to be situated in two or more States, or to be constructed in one State for the benefit of another State * * * the governors of the States affected, upon the request of one of them, shall forthwith appoint commissioners with power to consider and adjust such claims or controversy, subject to ratification by the legislatures of the States so affected.

This provision of the Colorado River compact, which constitutes the formula upon which Arizona has zealously endeavored to bring about an adjustment of the differences between the States, is utterly ignored, and in its place is put the rule of confiscation.

Arizona would be deprived of water necessary for her future development and growth, and for the reclamation of her arid lands, in several different ways:

First, after destroying all incentive for Arizona to become a party to the Colorado River compact, she would be denied the right to appropriate any of the stored water without first approving the compact. Section 8 reads as follows:

> SEC. 8 (*a*) All appropriations of water from the Colorado River, incident to or resulting from the construction, use, and operation of the works herein authorized, shall be made and perfected in and in conformity with the laws of those States which may or shall have approved the Colorado River compact ratified in section 12 of this act.

Second, it would in effect deprive Arizona of water (*a*) by placing all stored water under the control of the Secretary of the Interior and authorizing him (sec. 5) "to contract for the storage of water * * * and for the delivery thereof * * * for irrigation and domestic uses," (*b*) by providing (sec. 4) that—

> before any money is appropriated or any construction work done or contracted for, the Secretary of the Interior shall make provision for revenues, by contract or otherwise * * * adequate * * * to insure payment of all expenses or operation and maintenance * * * and the repayment * * * of all amounts advanced * * *";

(*c*) by binding the United States (paragraph b, section 8) and thereby limiting the Secretary of the Interior in the making of contracts, to the terms of the Colorado River compact; (*d*) because the Colorado River compact in effect limits the lower basin States of California, Nevada, and Arizona to an average flow of 7,500,000 acre-feet at Lee Ferry; (*e*) because California has already exhausted a large part of this allocation and according to the testimony of its witnesses is able to apply the entire amount to a beneficial use; (*f*)

because the measure subsidizes the all-American canal and would enable California, for this and other projects, to enter into contracts with the Secretary of the Interior long before Arizona could do so, even though the latter were not barred by failure to ratify the Colorado River compact; (*g*) because of the very grave danger, if not the certainty, that Mexican lands would absorb and thereby establish a "moral" claim to, all of the remaining flow of the river, equated by storage and used for the generation of power at Boulder Dam.

A natural resource of the greatest value to the States of Nevada and Arizona would be confiscated, by utilizing a site lying between those States, and belonging to them by virtue of the navigability of the stream, for the storage of water and the generation of power, without adequate provision for their compensation; and this would be done for the exclusive benefit of districts in the State of California.

The plan of development of the Colorado River in Arizona would be predetermined, or seriously influenced, by the arbitrary creation, without consulting Arizona's views or wishes, of a storage reservoir which would flood several Arizona dam sites.

By the complete stabilization of flow which would come with the generation at Boulder Dam of 550,000 firm horsepower, lands in Mexico which may quickly be reclaimed would, in the absence of a treaty or of formal notice that no recognition would be given to any claim of that country for stored waters, become the beneficiary of storage, and an equal number of American acres would be denied reclamation.

Under the terms of the measure, the all-American canal, distinctively a California project, might be paid for by receipts from the power generated at Boulder Dam—amortization, operation and maintenance, and interest. Whether or not it is the intention that the first two items should be included in the burden upon power, unquestionably the interest is to be, and this subsidy of a California project in view of the use of a Nevada and Arizona resource to make it possible, without any provision for revenue to those States.

Section 6 provides that the "title to said dam, reservoir, plant, and incidental works," to be built on Nevada and Arizona soil, and to utilize Nevada and Arizona resources, "shall forever remain in the United States, and the United States shall always control, manage, and operate the same;" while the second paragraph of section 5 provides that "after the repayment to the United States of all money advanced with interest, charges shall be on such basis and the revenues derived therefrom shall be disposed of as may hereafter be prescribed by Congress."

In contrast with this studied failure to recognize the States whose resources are to be used for the benefit of another State, section 7 provides that "the Secretary of the Interior may, in his discretion, when repayment to the United States (which repayment may be made out of power resources) of all money advanced, with interest, shall have been made, transfer the title to said canal and appurtenant structures to the districts * * * having a beneficial interest therein * * *," and in addition to that, "the said districts * * * shall have the privilege at any time of utilizing * * * such power possibilities as may exist upon said canal * * *" and

"the net proceeds from any power development on said canal shall be * * * credited to said districts * * *." It were difficult to conceive of a broader discrimination than this in favor of the favored States given this subsidy and against the States whose resources it is proposed to take and utilize to make the subsidy possible.

It is scarcely conceivable that Congress, after authorizing the formulation of a treaty between the seven States—a treaty which was to divide the water of the Colorado River Basin between them individually, and to become effective only when approved by all of them and ratified by Congress—would consent to such a treaty affecting all of the States but to become effective when approved by only four, especially since that treaty instead of dividing the water between the States, as was originally intended, divides it between the upper and lower basins. By so doing, Congress would become a party to a measure both coercive and confiscatory. By so doing, it would become a party to a boycott. It would obligate the United States to administer the river, under the terms of the Swing-Johnson bill, in favor of the States ratifying the compact and against the States declining to do so. It would obligate the Secretary of the Interior to limit the use of stored waters (section 8) to ratifying States; it would obligate the Secretary of the Interior to limit contracts for the delivery of water in the lower-basin States to 7,500,000 acre-feet per annum (paragraph (a), Article II, Colorado River compact, and paragraph (b) section 8, Swing-Johnson bill), which, according to the testimony of California witnesses, could be exhausted by California; it would subject the Federal Power Commission to the terms of the compact, and thus, under the terms of the Swing-Johnson bill (paragraph (c), section 12), would discriminate against the applications of nonratifying States; it would subject water rights necessary for the reclamation of entered public lands in nonratifying States to the terms of the compact (paragraphs (c) and (d), section 12), and would make the water necessary for such reclamation liable for use to make up a deficiency in Mexico. Indeed, all of the unappropriated water in Arizona's tributaries, to the extent that the Federal authorities could control it, would be subject to depletion as "surplus" water unallotted by the Colorado River compact, for the purpose of supplying any water which might by treaty be allotted to Mexico.

If this measure, violating rights which Arizona regards as vital to her welfare, were to be passed and signed by the President, the State of Arizona, aided by States concerned for the principles involved, would have no recourse but to apply for relief to the courts. This litigation would inevitably result in the deferment for many years of Colorado River development.

Arizona sincerely trusts that no such delay may occur, nor occasion for it. For that reason, she agrees with the upper basin States that prior to development and prior to the enactment by Congress of legislation providing for development there should be an amicable understanding joined in by all seven of the Colorado River Basin States—an understanding which will remove all occasion for disagreement and make possible the inauguration of development on a basis of justice and fairness.

Naturally, the question will be asked, why, if Arizona favors a seven-State agreement, she has not ratified the Colorado River compact drafted at Santa Fe, N. Mex., in 1922.

I should be prepared to answer this question, for I was an original and ardent advocate of ratification, devoting myself as assiduously to the cause as any other man in the State. Now, when the hallmark of foresight and wisdom in Arizona is the ability to show that one assisted in the prevention of ratification of the compact by our legislature, I can only assert that I acted sincerely and in good faith in advocating the approval of that document; and I deeply regret that the California champions of the legislation which is now being pressed have, by their attitude and actions, proven so conclusively that my judgment was not what it should have been.

In 1923, when it was first laid before the legislature for action, the Colorado River compact failed of ratification but by a single vote in either house. At that time there was a strong disposition on the part of the people of Arizona to accept the treaty and thus to give the signal for a development of the river which they were led to believe could be brought about in no other way. Doubts arose, however, as to the protection which the instrument afforded to Arizona's interests, and time has shown that in the absence of certain safeguards these doubts were well founded.

But passing for the moment the causes for Arizona's failure to ratify the document drafted at Santa Fe—an action, or failure to act, which at the moment was most disappointing to many, both within and without the State—it scarcely will be contended that Arizona was not well within her rights, moral as well as legal. It must be admitted that if Arizona would be seriously injured by adherence to the compact it was not only her right, but her unquestionable duty to decline to become a party to it. The act of Congress authorizing the negotiations, the acts of the several legislatures and the compact itself each contained a provision that the instrument would not become effective unless and until its ratification by the legislatures of all of the States and by the Congress of the United States. That was just as sacred a provision as any other one in the act of Congress or in the compact. It was itself in the nature of a solemn and binding agreement between the States, for each of them, acting dependently to be sure, but in response to a common understanding, had legislated to that effect. No one will contend that there was in the back of the head of Congress any mental reservation that if any of the States failed to ratify the proposed agreement it would be made effective any way, or that the State or States not ratifying would be subjected to ostracism or any other form of punishment. The provision must have presupposed, if it meant anything at all, that any State might, in the exercise of its judgment, decline to accept the agreement, and no moral obligation should attach. There was no intimidation of force in any of the legislation, and I dare say no thought of force in the minds of those who framed or passed the legislation, and if any such idea had been expressed it would have been condemned as an unworthy proposition.

Passing on to the question of why Arizona failed to ratify the compact, out of the many objections which were offered to the compact it is now easy to select those which were valid, and of such moment as gravely to endanger Arizona's future.

The first of these relates to the division of water, the paramount purpose for which the compact was formulated. As is well understood, the authorization given by Congress for the negotiation of a

Colorado River treaty provided that the water should be divided between the States. This was fraught with such difficulties, however, that the commissioners at Santa Fe finally decided to divide the water between the upper and lower basins, the lower division States being California, Nevada, and Arizona. To these States collectively, therefore, was allocated 7,500,000 acre-feet of water per annum, and to them was left the task of dividing it between them. This apportionment was not sufficient for the reasonable, legitimate uses of the lower division States. That fact was recognized from the beginning by persons acquainted with conditions, by those who favored ratification as well as those who did not. I was aware that it was not an adequate apportionment, and often so stated. It was the belief, however, of ratificationists that the upper States would not for a great many years, if ever, make use of the amount of water allocated to them, and that this water, plus the water flowing in the river over and above the allocations to the upper and lower basins, could be made use of, and rights to the same acquired subject, of course, to the superior right of the upper division States to such of the water as constituted a portion of their allocation. Had that liberal interpretation of the compact been the correct one, the provision for the allocation of water, inadequate as it was, could probably have been accepted. But studies of the compact by able water lawyers led to the conclusion that under its terms the lower States would be limited in their right to the use of water by the amount specifically allocated to them. This view, I find, is concurred in by eminent water lawyers of the upper States who have intimate familiarity with the compact. This is one of the things which convinced the people of Arizona that without some additional safeguard it would not be wise to approve the treaty.

The second thing was fear of the allocation to Mexico of a quantity of water so great as to preclude the reclamation of the arid lands of the lower States, and particularly those of Arizona, and the further fear that under the terms of the compact, this allocation to Mexico would chiefly, if not entirely be drawn from the Arizona tributaries of the Colorado.

A large amount of land in Mexico is susceptible of irrigation from the Colorado River—in round figures, some 800,000 acres or more. Paragraph C, Article III, of the compact, provides:

> If, as a matter of international comity, the United States of America shall hereafter recognize in the United States of Mexico any right to the use of any waters of the Colorado River system, such waters shall be supplied first from the waters which are surplus over and above the aggregate of the quantities specified in paragraphs (a) and (b); and if such surplus shall prove insufficient, then the burden of such deficiency shall be equally borne by the upper basin and the lower basin, and whenever necessary the States of the upper division shall deliver at Lees Ferry water to supply one-half of the deficiency, so recognized, in addition to that provided in paragraph (d).

Many looked upon this provision in the light of an allocation of water to Mexico. Of course, it was not, but it was a recognition of the likelihood that there will be such an allocation, in an amount to be determined. In the uncertainty as to that amount lies a real peril, but a greater peril, so far as Arizona is concerned, lies in the danger that Arizona's tributaries may be called upon for much, if not all, of the allotment, what ever it may be. Although the upper basin States

are ostensibly limited by paragraph (a), Article III, to the use of 7,500,000 acre-feet of water per annum, the only real limitation upon them is the provision (paragraph (d), Article III), that they shall never permit the depletion of the river below 75,000,000 acre-feet in 10 consecutive years, reckoned in continuing progressive series, or an average of 7,500,000 acre-feet per year. So long as this requirement, which is just equivalent to the allocation to the lower States from the main stream, were met, the upper States could not be called upon to supply any water for Mexico, until all of the water arising below Lees Ferry—except 1,000,000 acre-feet referred to in paragraph (b) Article III—should be exhausted for that purpose. All of the water below Lees Ferry, except the 1,000,000 acre-feet, is, under the compact, " surplus " water, and practically all of it is Arizona water. California furnishes none. Hence, since the surplus water of the Colorado River system is first to be drawn upon to supply Mexico, Arizona might easily be called upon to bear practically all of the Mexican burden.

This is why Arizona asks for a clarification of the Mexican situation—why she asks that in the absence of a treaty, notice be given to Mexico that in whatever agreement may be entered into with that country its rights shall be limited to the normal or low water flow of the river, and that water stored on American soil shall be for the benefit of American lands. It is why she desires to know, also, where the water which may be allocated to Mexico is coming from, and that the burden is going to be equitably borne.

If the two reasons I have given are the principal ones why Arizona failed at first to ratify the compact, the reason she did not do so later is entirely attributable to the attitude assumed by California.

Although it was well understood that the compact attempted to do nothing further than to effect a division of water—and even that merely between the basins, leaving a division between the States to be effected later—and left all such things as plans of development, location of dams sites, division of power benefits, and so forth, to be determined by the means provided in Article VI, California saw fit to ignore this plain provision and this clear understanding. Without waiting for the completion of an agreement, her representatives brought, and have continued to bring, all possible pressure to bear upon Congress to conclude legislation which would not only remove all incentive for our State's participation in an agreement, by predetermining all of those important questions which it was expected would be determined in orderly manner, as provided by the compact, by participation of the interested States, but would so divide the water allocated to the lower basin States and the benefits flowing out of development as to leave nothing for Arizona. This is the very excellent reason why Arizona has not as yet remedied its failure to ratify the compact.

And, incidentally, it strikes me as being pertinent to inquire why Arizona should be visited with condemnation for failure to ratify the compact, when the State of California occupies a similar position. It is true that the California Legislature did at one time ratify the compact, but at a subsequent session, when the State of Arizona was most strenuously endeavoring to bring about a supplemental treaty which would make it possible for her to join the seven-State

agreement, and through its legislature had definitely offered to do so, the California Legislature rescinded its previous action, and then, as though that State's repeated refusals to enter into negotiations were not sufficient notice of contempt for Arizona's claims, it agreed to enter a six-State compact, leaving Arizona out, if Congress would authorize the construction of a great dam for California, build a great power plant for California, dig an immense canal through the sandhills for California, and otherwise insure to California all of the resources of the Colorado River that the compact contemplated should at least be equitably divided between the lower basin States.

Now, if it were right and proper that California should withhold its adherence to the compact, and be neither penalized nor reproached for doing so, why visit the wrath of God or of the Congress upon Arizona? And if it is perfectly all right that California's ratification of the compact should be based upon a lead-pipe cinch, why not accord to Arizona the same privilege? Without a doubt if our State were to be permitted to write into her ratification conditions which would insure to her interests the sort of protection demanded by California as the price of her affirmative action, not a voice in all Arizona would be raised in protest.

In the hope, however, that she could be afforded the protection which her rights and interests demand, Arizona prepared and has earnestly endeavored to bring about an agreement between the States of the lower division—Arizona, California, and Nevada—which, supplemental to the Colorado River compact, would make it possible for Arizona to ratify that instrument and to join wholeheartedly in a movement for the systematic development of the Colorado River.

For two years California declined to enter into any form of negotiation with Arizona, and after she did consent to sit down at the conference table she has not dispelled the impression that her chief reliance still is not in an agreement but in legislation which will grant her wishes without the consent of any State whose resources she covets.

Last August the Governors of the upper basin States of Wyoming, Colorado, Utah, and New Mexico called a conference, Arizona being responsible, in part at least, for the call, and invited the representatives of California, Nevada, and Arizona to participate, in the hope that with their help an agreement between the lower States might be effected. The results of that conference will be reported to you, I dare say, by its chairman, Gov. George H. Dern, of Utah. It was a notable gathering and productive of much good, though no final agreement was reached.

Upon the opening of the conference Arizona presented as the basis upon which she would be glad to negotiate a supplemental compact the following:

Item 1. That Arizona will accept the Colorado River compact as agreed upon at Santa Fe, N. Mex., if and when the same is supplemented by a subsidiary compact which will make definite and certain the protection of Arizona's interests.

Item 2. That before regulation of the Colorado River is undertaken, Mexico be formally notified that this country reserves for use in the United States water made available by storage within the United States.

Item 3. That any compact dividing the waters of the Colorado River and its tributaries shall not impair the rights of the States under their respective water laws to control the appropriation of water within their boundaries.

Item 4. That the waters of the tributary streams of the Colorado River system entering the river below Lees Ferry, and which are adequate to develop their own valleys, be reserved to the States in which they are located.

Item 5. That the water of the main Colorado River which is physically available in the lower basin (but without prejudice to the rights of the upper basin States) shall be legally available to and divided between Arizona, California, and Nevada as follows:

(*a*) To Nevada, 300,000 acre-feet.

(*b*) The remainder, after such deductions as may be made to care for Mexican lands which may be allotted by treaty, shall be divided equally between Arizona and California.

Item 6. That the rights of the States to secure revenue from and to control the development of hydroelectric power within or upon their boundaries be recognized.

Item 7. That encouragement will be given subject to the above conditions to either public or private development of the Colorado River at any site or sites harmonizing with a comprehensive plan for the maximum development of the river's irrigational and power resources.

Item 8. That Arizona is prepared to enter into a compact at this time to settle all of the questions enumerated herein, or Arizona will agree to forego a settlement of items 6 and 7, and make a compact dividing the water alone, provided it is specified in such compact that no power plants shall be installed in the lower basin portion of the main Colorado River until the power question is settled by a compact between the States.

This conference is still in technical existence, and Arizona's representatives are ready to resume the negotiations where they were left off. It may be said, however, that they do not feel like resuming while their State is under the threat of legislation which would render an agreement futile or which, in the event of California's continued refusal to effect an agreement, would force her to appeal to the courts for succor.

Following the taking of a recess at Denver, representatives of the lower-division States met at San Francisco, with their engineers, in an effort to reach an agreement with respect to a division of power benefits. This also resulted in nothing definite, but elicited much clarifying information.

Arizona wishes it made clear that she is not an obstructionist. Arizona earnestly desires the development of the Colorado River. If it can be developed in an orderly, systematic manner, with a view to the utilization, as economic conditions warrant, of all of its resources, and with a view to the recognition of the rights and equities of the chiefly interested States, it will mean more to our State than to any other. To that end we favor a continuance of the efforts being put forth to bring the States into accord, and until that is done Congress should impose no threats of arbitrary legislation. Coercion does not provide a healthy atmosphere for negotiation, and in any event there is no occasion for coercion. Arizona desires to be just, as she desires to be dealt justly with.

Senator ODDIE. Assuming that Boulder Dam is constructed as planned, would it preclude Arizona from building dams farther up the river, which would furnish enough water to irrigate large quantities of new land?

Mr. WINSOR. Certainly not, Senator, if those sites were higher up than the storage basin created by the Boulder Dam.

Senator ODDIE. Even assuming that Arizona should ultimately agree to the construction of the Boulder Dam project, there would remain adequate sites on the upper reaches of the river for the con-

struction of dams which would give Arizona ample water for her lands?

Mr. WINSOR. Well, I don't think there is any doubt about that, Senator; but there is something involved besides the mere question of a place to divert water. The full utilization of the flow of the water is involved in the adoption of a comprehensive plan.

Senator ODDIE. Well, looking at it from the physical standpoint?

Mr. WINSOR. Well, that has to do with the physical standpoint, very much to do with the physical standpoint.

Senator ODDIE. Now, Mr. Chairman, at this point, I did not know that there was an understanding that the questions should be asked the witness after completion of his statement, so I think it would be well to have my questions and the witness's answers follow the statement of the witness.

The CHAIRMAN. Yes, sir.

Mr. WINSOR. You understand personally I have not the slightest objection to answering at any time any questions Senators may desire to ask.

The CHAIRMAN. Let them go in there.

Senator ODDIE. That is perfectly all right, if it is agreeable with the witness.

Mr. WINSOR. I have no objection.

Senator ASHURST. Mr. Chairman, it is apparent that the Senator can not conclude at this time. I ask that he be permitted to resume at 2 o'clock, when we can reconvene.

Mr. WINSOR. I shall then have something more to say, and it may be that you will wish to ask me some questions.

Senator ASHURST. You can resume when we meet at 2 o'clock, if that is satisfactory.

The CHAIRMAN. That is entirely satisfactory.

The committee will stand adjourned now until 2 o'clock, when we will meet at the Commerce Committee room, on the gallery floor of the Capitol Building.

(The committee thereupon stood adjourned until 2 o'clock p. m., Tuesday, January 17, 1928.)

AFTER RECESS

(The committee convened at 2.30 o'clock p. m., pursuant to recess.)

The CHAIRMAN. The committee will come to order.

Senator Winsor, will you resume the stand and continue your remarks?

STATEMENT OF MULFORD WINSOR—Resumed

Mr. WINSOR. Mr. Chairman, I shall have very little more to say voluntarily. I shall be very glad, however, to attempt to answer questions that any of the Senators may wish to propound, and if I can not answer them, I shall be very glad to say so.

When the committee recessed, I believe we were making some reference to the efforts that had been put forward by Arizona to bring about an agreement between the three States in the lower basin. I referred to the circumstances that to some extent at least, at the request of Arizona, there had been a conference held in Denver last

August in an effort to iron out the difficulties between the three States. As an evidence of Arizona's good faith and willingness to enter into such an agreement, on the opening day of the conference Arizona presented the points upon which Arizona would be willing to negotiate. The governor has stated those points, and I have also, but I should like, for the purpose of emphasis, to reread the first one:

> Arizona will accept the Colorado River compact as agreed upon at Santa Fe, N. Mex., if and when the same is supplemented by a subsidiary compact which will make definite and certain the protection of Arizona's interests.

That, of course, was in the way of a preamble, but the other points which followed elaborated upon it and disclosed the particulars in which Arizona would ask for an agreement. It appeared many times at the Denver conference that agreement could be reached, that, in fact, an agreement was approaching. Certainly Arizona felt that she was leaving no stone unturned to bring that about. A report of that conference will doubtless be made to you officially by its chairman, and it will be very interesting to you. Later, during the recess of the conference, representatives of the lower basin States, accompanied by engineers representing them, met at San Francisco in an effort to ascertain the facts with respect to prospective power development, and, if possible, to arrive at an agreement with regard to a division of the benefits that would flow out of it. As in the case of the Denver conference, no definite result was achieved, but I think that information of great value was elicited and to some extent, at least, the States were brought more closely together.

That, in a general way, is the contribution that Arizona has made to the effort to ratify the Colorado River compact. We will not say that the Colorado River compact is, in all respects, what the State of Arizona would like it, but desiring very much to have an amicable agreement reached, desiring very much that the development of the river may be begun, the State is willing to ratify the compact if she can feel that through the medium of a subsidiary compact between the three States her legitimate interests and rights are protected, and we are led to believe by the results of the Denver conference that it can be done.

The chief thing that Arizona is interested in is a fair and equitable division of the waters of the river and full protection in the right to those waters, just as the upper States are amply protected by the terms of the compact. The other thing that we are most deeply concerned in is recognition of Arizona's right to a fair revenue from the benefits that will flow out of the development of power created by means of what Arizona solemnly regards as her resources.

I repeat that Arizona very much desires that it be understood that she is not here in the attitude of an obstructionist. There is no State in the Colorado River region that is more interested than Arizona in the development of the river, if it can be done in a way that will accord her recognition of her rights and the protection of her interests—if it can be done in a way that will prove an economical, sound development of the river, to the end that all of the flow of the river may be utilized for the creation of power, and all of the water of the river may be utilized in the irrigation of our arid lands. We have ample arid lands in this country to use all of the water of the Colorado River, and we are very much interested in its being applied

to lands in the United States rather than to lands in Mexico, and when it comes to a division of the water we think that Arizona is entitled to her share for the reclamation of her arid lands.

We feel that in a settlement of this matter Congress should impose no threat upon Arizona. It is very difficult to negotiate under the shadow of a gun. Coercion is not healthy to sound negotiations, and we feel confident and certain that Congress has no thought or intention of coercing us.

Just as a last thought, I should like to point out the difficulty that Arizona has been under through all of this discussion in placing her attitude before Congress and before the people of the United States. This, as a matter of fact, is the first time that Arizona has been heard in Congress—not through any fault of this committee, nor through any fault of Congress, but perhaps through her own. Arizona has not been heard officially, for there has been no official agency which authoritatively could state the Arizona view. As a matter of fact, there has been no Arizona view, for the State has been going through a period of discussion. There were so many different views, so many different schools of thought, that there had to be an opportunity for a crystallization of thought before it could be said, here or elsewhere, that this is the authoritative, authentic Arizona view.

The CHAIRMAN. Senator, you are not overlooking the fact, are you, that the Committee on Irrigation and Reclamation, by a large majority of its membership, visited Arizona for the purpose of conducting hearings, and at that time, a little over 2 years ago, gave full opportunity to everyone to be heard, and to express Arizona's viewpoint?

Mr. WINSOR. Yes; Mr. Chairman, I am absolutely aware of that, and I take that into account. What I was trying to point out was that before any individual in Arizona—I know the committee was very liberal in that matter and heard every witness that wished to be heard, and doubtless would have heard others—but what I was trying to convey was that there was no authoritative Arizona view, and she has been very much handicapped by inability to present a crystallized Arizona view, something that could be accepted as Arizona's attitude. We are now able to do that, and we hope the Arizona attitude will be considered not an obstructive one, nor a destructive one, but a constructive one.

The very reverse of our situation has been true as to California. All of the State of Arizona, as I remarked before, is deeply interested in this question because of the fact that the whole State lies in the Colorado River Basin. The question affects all the people of the State, and they were and are intensely interested in it. California, in this little discussion between the two States, has been very much more advantageously situated. Only two districts in the whole State of California are interested in Colorado River development. Outside of the city of Los Angeles and those smaller cities surrounding it, which may be grouped together, and outside of Imperial Valley, the balance of the State of California knows little or nothing about this question, and cares little or nothing about it. I may say they care no more about it than the State of New Jersey or any other State that is interested, if at all, only in the fundamental principles involved.

Senator JOHNSON. I think, Senator, you must permit me to correct you on that. I believe you are in error there.

Mr. WINSOR. Well, possibly I am. I will state that merely as an expression of a view, Senator.

Senator JOHNSON. That is all right. That is your opinion of it; but you are in error in that regard. You see, I come from the northern part of the State and my colleague comes from the northern part of the State. I know that I am intensely interested in this legislation, and I know he is as well; and our whole congressional delegation in like fashion are interested.

Mr. WINSOR. Certainly there can be no way of determining the accuracy of my statement; but I express that as a view.

Senator JOHNSON. You are entitled to your view; but I just wanted as a matter of fact to tell you the fact.

Mr. WINSOR. The view I hold is the result of my observations, the result of certain discussions I have had with a good many Californians who reside in districts outside of the two mentioned. I was pointing out that it was comparatively easy for those two districts to consolidate the views of their people by holding up to them visions of a project represented to be, and designed to be, for their especial benefit. That is the thing, selfish interest is the thing, which animates people more quickly, more effectively than anything else. It was comparatively easy under such circumstances to consolidate, to crystallize the sentiment of these two California districts, and then to put the project out to the people of the country as an all-California proposition. It was made still easier—this consolidation, this crystallization of view—from the fact that the work was in the hands of small organizations, the Imperial irrigation district officials in Imperial Valley, and the bureau of power and light in Los Angeles. It was an easy matter for them to place before the people a concrete proposition which would naturally appeal to them, and then but a step to introduce the scheme to the Nation in the guise of a gigantic engineering enterprise. The people of the country accepted it as such, without any realization that any other State was interested in it, without appreciating that there were considerations of justice and right and equity as between the States involved at all. It simply came to them as a tremendous engineering enterprise, which it undoubtedly is, as it would, if accomplished, be an unparalleled engineering achievement.

The effect of this has been to embarrass Arizona, which has had no resources or facilities for propaganda—no national mediums of publicity, and no international news syndicates at her disposal.

Senator JOHNSON. Have you forgotten the Republican that was spoken of this morning?

Mr. WINSOR. I shall have to apologize to Mr. Heard. But I was convinced by that very incident that if the Republican has an international circulation, it doesn't extend to California; it doesn't reach Senator Johnson's constituency.

These are some of the difficulties under which Arizona has been laboring, and I wished to explain them simply in order that you may have some comprehension of the reasons for the delays which have occurred in the presentation by Arizona of any concrete, constructive suggestions, or plans.

So far as the particular development proposed is concerned, Arizona has interposed no objection to that. We have asked merely for the recognition of certain principles, which would apply wherever the development might occur. The purposes for which the legislation is designed are doubtless beneficial, benificient, and worthy. Many of our people have an idea that there are uneconomic features to that particular plan. We do not say whether there are or not. We do say, however, that there should be an economic plan for the development of the river worked out, to the end that all of the great resources of the stream may be realized, for the benefit of all of the States.

The Governor of Arizona said that we were not appearing here on bended knee. That is true. But I do not consider it beneath our dignity to tell you that we have a feeling that you will give to a weaker State of the American Nation such consideration as this great Government is likely to accord to a weaker nation. There seems to be a current of thought running through the minds of all those who are considering this development that the Republic of Mexico will be very fairly dealt with. We want her to be fairly dealth with; but I think Arizona is entitled at least to equal consideration with the Republic of Mexico, and that in whatever determination of this matter is had, not merely legal considerations, but considerations of justice and equity will be observed.

There were one or two things that came up this morning that I wish to refer to before the Senators ask me, if they see fit to ask me, any questions. Reference was made to the development of power in Arizona by a governmental agency. There is, as a matter of fact, power being developed by the Salt River Water User's Association, under a project which was initiated and constructed by the Government, and the State of Arizona is receiving much benefit from that project. It is entirely within the State of Arizona, and if the project which you are proposing were entirely within the State of Arizona and Arizona were receiving the indirect benefits of if, it is not likely that you would hear anything from us regarding our right to receive a revenue from it.

Senator JOHNSON. What do you mean by "indirect benefit"?

Mr. WINSOR. The benefits which arise out of development. The Salt River Valley development has brought such benefits to Arizona.

Senator JOHNSON. Did you tax it?

Mr. WINSOR. I am not certain that it is taxed directly by the State, but the wealth it creates is taxed.

Senator JOHNSON. I mean, is there a direct taxation of the Salt River project?

Mr. WINSOR. I think not; but I really can not answer definitely as to that.

Senator JOHNSON. I think you are correct in that.

Mr. WINSOR. If the benefits, direct and indirect, were to come to Arizona from the development which is now proposed, we would not be so deeply concerned over the matter of a revenue from the power created. But it is being proposed to come into our State for the development of resources which we consider belong to us, for the benefit not of our State but of another State, which creates a very different situation.

Arizona, to use an old and familiar phrase, wants her place in the sun, and we can not have that if these resources which are so vital to us, so vital to our future, are taken away from us.

I am sorry the Senator is not here who questioned me as to Arizona's protection under the terms of this bill. I think that during the course of my discussion I have answered that, but in the event it should not be made clear to him, I wish an opportunity to do so. It is well understood, of course——

Senator JOHNSON (interposing). May I say that he is a member of the committee whose report is being discussed by the Senate now, and that is the only reason he is not present this afternoon?

Mr. WINSOR. I can understand why a Senator would be absent, when a matter of so much interest is up in the Senate, but this is a vital point. It developed in the hearings in the House that the author of the bill in that body had stated that the purpose of the bill, one of the purposes of the bill, was to protect Arizona's interests. Now, if the bill did that, it is obvious that Arizona's objection to it would be removed, but it also developed, I think, that if that were the object of the author in his preparation of the bill he had fallen far short of his purpose.

As I have pointed out, the State would be denied the right to regulate or control the appropriation of water. That would be in the hands of the Secretary of the Interior. The Secretary of the Interior, under the terms of the bill, would be required to contract for the storage and delivery of water before any work could be done there or any appropriation made. Arizona would not be in a position to make those contracts and California would be. Arizona, as a nonratifying State, would be denied the privilege of making a contract or of appropriating any of the water stored behind the Boulder Dam. If those facts do not constitute a failure to protect Arizona's interest in the division of the water, then I am unable to interpret the terms of the measure.

The CHAIRMAN. Senator, you are aware of the fact that one of the main purposes of the bill is to provide flood control?

Mr. WINSOR. Yes, sir.

The CHAIRMAN. And Arizona's lands need and require flood control, which you are now attempting to provide in a rather different manner and to which, of course, the Federal Government has been extending some aid. But are you familiar with the acreage of the lands in Mexico now irrigated by the waters of the Colorado River?

Mr. WINSOR. I am not an authority, Senator, but I would say there has been some 300,000 acres at one time or another under cultivation there, and some 230,000 under cultivation at this time.

The CHAIRMAN. Do you know how much of that acreage was brought under cultivation during the past two and a half years since this committee visited that section, went into the Imperial Valley, down the river, and through Arizona?

Mr. WINSOR. There has been some increase each year, but I think the main increase has been by permitting lands which previously had been under cultivation to lay out, and bringing in new lands.

The CHAIRMAN. As a matter of fact, each year's delay in erecting this dam and constructing the All-American Canal, if that is proven a feasible project, and it has been so reported, will enable Mexico to

develop her acreage and thereby fortify her claims during low flow from the river?

Mr. WINSOR. Possibly, to some extent, but certainly not to any great extent, since the low-water flow has been exhausted, and the only way Mexico can make any appreciable accretion now to her cultivated area is by allowing the lands to lie out that have been cultivated and had water applied to them, and apply that water to new lands. The danger of an increase of cultivated lands in Mexico under present conditions is certainly nothing as compared with the opportunity she would have if the flow of the river were equated.

The CHAIRMAN. But the plan of the All-American Canal would mean a diversion from the present route whereby Mexico's claim for one-half of the water taken out of the stream just below Yuma would be disposed of, and the water going through the All-American Canal would be returned to the stream at a point where it would be practically impossible for Mexico to use it for the purpose of irrigating the land that has been developed.

Mr. WINSOR. I must confess to having no faith in that, Senator. In order to develop the amount of power that is proposed to be developed at Boulder Dam, some 10,000,000 acre-feet of water will have to flow over that dam in an equated flow, and a large portion of that will go down the main channel of the Colorado River, and not be carried by the All-American Canal. I think the danger in Mexico would be greatly increased by the equated flow of water, in the absence of a treaty or in the absence of a notice to Mexico.

Senator JOHNSON. You spoke of the indirect benefit from the Salt River electric project. State what those indirect benefits are, will you please?

Mr. WINSOR. Yes, sir; the creation of wealth, the development of industries, the cultivation of land—the creation of taxable resources.

Senator JOHNSON. Generally speaking, development?

Mr. WINSOR. Yes.

Senator JOHNSON. That is, power that is generated on the Salt River project gives you those benefits in Arizona?

Mr. WINSOR. The power and the irrigational advantages.

Senator JOHNSON. If those were to flow to you from the development at Boulder Dam, your objection would be partially reduced?

Mr. WINSOR. If the benefits would flow from that dam into Arizona, our objection would be partially removed.

Senator JOHNSON. Well, in great degree, would you say?

Mr. WINSOR. Yes, Senator; I would say in great degree.

Senator JOHNSON. So that if indirect benefits in the matter of development of Arizona in irrigation, reclamation, bringing new lands in, and the like, and greater taxable property came from the power project, or from Boulder Dam, then you would have all the benefits, I assume, that come from the Salt River project?

Mr. WINSOR. Yes, sir; but if it were a project designed for the bringing in of those benefits to Arizona, of course, it would be a project of our choosing.

Senator JOHNSON. Not necessarily of your choosing. You don't mean that. They might come without your choosing. They might flow from the project itself.

Mr. WINSOR. We would probably seek a project that would bring those benefits to us.

Senator JOHNSON. If they did actually come from the Boulder Dam project, you have stated it would remove much of your objection, and perhaps all of it; is that correct?

Mr. WINSOR. Yes; but I would not care to have the inference drawn from my answer that I concede that a proper amount of benefit to Arizona would flow out of that project under the existing circumstances.

Senator JOHNSON. My question is predicated wholly upon the proposition that benefits of like character, proportionately in like amount, that come from the Salt River project would come from the Boulder Dam project to Arizona. I am not asking you to designate what the benefits are, but I am asking you, if those benefits actually did come, then your objections would be removed, would they not?

Mr. WINSOR. If the utilization of Arizona's resources were for Arizona's benefit, we would be in favor of it.

Senator JOHNSON. Will you not answer my question, if you know?

Mr. WINSOR. I don't know that I can, Senator. I tried to answer it my way.

Senator JOHNSON. I am perfectly willing you should answer it your way, but at the same time I want an answer to the question, too. You are willing that power should be generated at Salt River. That is not taxed, because of the indirect benefits that come to you from developments, and the like. That is correct, is it not?

Mr. WINSOR. Yes.

Senator JOHNSON. Now, if the same sort of benefit, in greater proportion, proportioned to the amount of power, came from Boulder Dam to Arizona, then your objections would be removed—your objections to Boulder Dam?

Mr. WINSOR. If we felt that was the case.

Senator JOHNSON. Do you think cheap power would be of any benefit to Arizona?

Mr. WINSOR. That would depend upon whether or not it was power that could be utilized by Arizona, so that it would really be cheap power.

Senator JOHNSON. What is your opinion as to whether or not cheap power could be utilized by Arizona?

Mr. WINSOR. That is an engineering question.

Senator JOHNSON. Can you answer it?

Mr. WINSOR. Not with any degree of intelligence.

Senator JOHNSON. Then I will not press it. From the Boulder Dam project, as you understand it, would there be any reclamation and irrigation of lands in Arizona?

Mr. WINSOR. Not under the terms of the bill.

Senator JOHNSON. Not under the terms of the bill?

Mr. WINSOR. No, sir.

Senator JOHNSON. If there were irrigation or reclamation of lands, could the dam not be utilized to a very great extent by Arizona?

Mr. WINSOR. Yes; there are physical conditions under which the dam could be utilized by Arizona.

Senator JOHNSON. Let us eliminate your conception of the bill for a moment, and let us assume the purpose of the storage at Boulder Dam is for the reclamation of such lands as are susceptible of reclamation in Arizona. Would you not have very vast acreage in Ari-

zona that could be reclaimed and worked from the storage capacity there?

Mr. WINSOR. Well, Senator, may we assume also in that question that Arizona's rights and interests in water sufficient for that reclamation would be safeguarded?

Senator JOHNSON. I am going to come to that in a moment, and I will give you ample opportunity to respond as you wish, but there are lands adjacent to the Boulder Dam project in Arizona that are susceptible of reclamation and irrigation, are there not?

Mr. WINSOR. There are lands in Arizona that could utilize water stored at Boulder Dam.

Senator JOHNSON. A great acreage, would you say?

Mr. WINSOR. That is more or less an enginering question, but I am under the very distinct impression that we have somewhere near a million acres of land in Arizona that would be susceptible of reclamation.

Senator JOHNSON. I mean from the Boulder Dam project alone, if the storage were there?

Mr. WINSOR. Just what do you mean by the Boulder Dam project?

Senator JOHNSON. I mean if the storage capacity there is back of the Boulder Dam as designed by this measure, and under the engineer's report. The storage capacity, as I recall it, is about 27,000,000 acre-feet.

The CHAIRMAN. I think it is 20,000,000 at the 550 foot height, isn't it? Not less than 20,000,000 acre feet.

Mr. WINSOR. Well, the storage capacity is sufficient for almost anything, so far as that is concerned.

Senator JOHNSON. Do you think under that 1,000,000 acres of land could be irrigated and reclaimed in Arizona?

Mr. WINSOR. I think if it were possible for Arizona to get the water legally, if she were insured the water for that purpose, that that amount of land could be watered from the stored waters.

Senator JOHNSON. That would be a tremendous advancement and improvement and development to the territory, would it not?

Mr. WINSOR. Undoubtedly.

Senator JOHNSON. And one that you would look forward to, of course, with pleasure and with profit to the State of Arizona?

Mr. WINSOR. I apprehend what you are building up, Senator, and I can answer it all at once.

Senator JOHNSON. I don't think you do apprehend what I am building up—pardon me—because I am not building up anything.

Mr. WINSOR. Very well. It would be of great benefit to Arizona to irrigate that much land.

Senator JOHNSON. Now, you are willing to make an agreement as to division of water with the three lower basin States, but isn't that conditioned upon the determination of the power that shall be developed?

Mr. WINSOR. It is conditioned upon either an agreement as to the benefits—a division of the benefits that would flow out of the power—or we are willing to make a water agreement independently of the power, conditioned upon there being no power development until an agreement on that is reached.

Senator JOHNSON. But if there be any power development at all—and we think it is essential to pay for the project—if there was to

be power development at all, you would not make a division of the water until there was a determination of that power.

Mr. WINSOR. If there were to be power development by the use of our resources, we would want that deferred pending an agreement as to a division of the benefits.

Senator JOHNSON. Of the power?

Mr. WINSOR. The power. The water division could be independent of that.

Senator JOHNSON. Isn't it a fact that your commission has determined, and you stated, that you would not, if any power were to be developed at all, enter into an agreement with reference to a division of the water until there was a determination with reference to a division of the power?

Mr. WINSOR. No; you misstate that to some extent.

Senator JOHNSON. I would be glad to have you correct me.

Mr. WINSOR. Item 8 of the proposition submitted at Denver was that "Arizona is prepared to enter into a compact at this time to settle all of the questions enumerated herein (which embraced power, of course), or Arizona will agree to forego a settlement of items 6 and 7 (which relate to power), and make a compact dividing the water alone, provided it is specified in such compact that no power plant shall be installed in the lower basin portion of the Colorado River until the power question is settled by compact between the States." The water can be settled entirely independently of any power compact.

Senator JOHNSON. Provided there were no power development at all.

Mr. WINSOR. Exactly.

Senator JOHNSON. Of course, and that is exactly what I asked you; and you said I was mistaken. I asked you, if there were power development, then you declined to settle a division of the water until that power was determined.

Mr. WINSOR. If there were power developed.

Senator JOHNSON. Certainly.

Mr. WINSOR. I misunderstood you. I beg your pardon.

Senator JOHNSON. Do you speak officially for the State of Arizona and for the commission?

Mr. WINSOR. If I do not make any mistakes, I do.

Senator JOHNSON. Of course, that is something I should assume.

Mr. WINSOR. Well, if I make any mistakes I dare say some one will correct me.

Senator JOHNSON. Generally. What I am getting at is this; without any attempt to befool you or the committee or anybody else——

Mr. WINSOR. It would not be any credit to you to fool me, Senator. I am too easy to fool.

Senator JOHNSON. I would not attempt it. This thing is too serious for anybody to attempt to fool anybody else. What I am trying to get at is—I want some one who will speak now authoritatively to this committee and state just what it is you want with respect to power. If you can do it, do it. If you can not, tell me the gentleman who can and I will ask him.

Mr. WINSOR. I think that is a very fair question. We tried to present at Denver our views as to what we thought was right and just with respect to power. Our fundamental proposition was that

we considered that the States of Arizona and Nevada were entitled to, as a fair benefit, at least the equivalent of what the States would receive by the taxation of that development if it were constructed by private parties.

The CHAIRMAN. May I interrupt there? I would like to know whether or not that includes the cost of the dam constructed, or only supplemental works, the power house, and transmission lines?

Mr. WINSOR. Well, that is a legal question. The interpretation of that, I imagine, would be a little bit too deep for me. All of our resources are taxed by the taxing authorities of the State under State laws, and a power development on the river would be taxed in the same way. I doubt if it is possible to state in exact terms what the amount of that taxation would be. However, at the request of California, Arizona did suggest a figure. California representatives claimed they were not interested in abstract propositions, and while they did not concede the principle that the State had a right to derive any revenue from a project developed by the Government, if they were willing to pay how much would it be; and the State of Arizona made a concrete suggestion.

Senator JOHNSON. And that was how much, if you please?

Mr. WINSOR. One mill per kilowatt-hour to be divided equally between the States of Arizona and Nevada.

Senator JOHNSON. And in dollars and cents, if you have that translated?

Mr. WINSOR. It is my recollection—I believe it amounts to $3.28 per annual horsepower.

Senator JOHNSON. Do you mean on 550,000 horsepower?

Mr. WINSOR. I suppose that would be the amount of firm horsepower. That is my understanding. But that suggestion was offered without prejudice to our proposition that what we expected was at least the equivalent of taxes, and was only made at California's request for a definite statement.

Senator JOHNSON. That woould be about $1,750,000 a year.

Mr. WINSOR. I suppose that is close enough. Those questions you can ask of some of the other witnesses.

Senator JOHNSON. Tell me who it is who will be able to answer?

Mr. WINSOR. Mr. Maddock, I think, will be able to discuss the figures.

Senator JOHNSON. I will not trouble you, if you prefer I should not.

Mr. WINSOR. I am perfectly willing to give you the best information that I have.

Senator JOHNSON. That is what I am seeking, of course.

Mr. WINSOR. But I would much rather technical question be answered by technical men, who can speak with greater authority.

Senator JOHNSON. Did you participate in any negotiations with regard to power?

Mr. WINSOR. I participated in negotiations at San Francisco.

Senator JOHNSON. Were you in San Francisco during these negotiations?

Mr. WINSOR. Oh, yes.

Senator JOHNSON. Then you know something about it.

Mr. WINSOR. Oh, I know something about it in a general way; but I am not an expert.

Senator JOHNSON. What were the figures in San Francisco? How much did you want?

Mr. WINSOR. We wanted whatever it developed——

Senator JOHNSON. Can't you tell me in dollars and cents? If you can't, don't; we will get it from some other direction. But if you can, I prefer you would.

Mr. WINSOR. I doubt if you will get it from some other direction, because there was nothing arrived at in San Francisco.

Senator JOHNSON. Was there a tentative figure named?

Mr. WINSOR. The same tentative figure was named as has been suggested at Denver, and the studies of the engineers was designed to arrive at what the cost of Colorado River hydropower delivered in California would be, and the cost of steam power developed in California.

Senator JOHNSON. Is it impossible for you to state to me what it was, approximately, that Arizona asked in reference to the power in dollars and cents?

Mr. WINSOR. The one definite thing Arizona has asked is the equivalent of what she would receive from direct taxation.

Senator JOHNSON. Of course, it is impossible for any of us to ascertain what that would amount to in dollars and cents. What in San Francisco did you gentlemen suggest as the sum you expected or ought to receive, approximately?

Mr. WINSOR. We were in hopes that we would be able to show that the States of Nevada and Arizona could receive the revenue we had suggested at Denver without unduly burdening the power.

Senator JOHNSON. How much was that in dollars and cents?

Mr. WINSOR. The figures that I gave you a while ago.

Senator JOHNSON. About $1,800,000. Is that $1,800,000 for each?

Mr. WINSOR. No.

Mr. MATHEWS. Yes; it is.

Mr. WINSOR. Mr. Mathews is wrong about that.

Mr. MATHEWS. I am right.

Senator JOHNSON. You will have an opportunity to say so, then. There is a dispute as to whether it was for each or both. We will settle that subsequently. Somebody is in error there unquestionably. Now, if that sum were received—that is, about $900,000 for Arizona, I take it. That is correct, I take it?

Mr. WINSOR. I believe I am going to allow you to ask Mr. Maddock those questions, Senator Johnson, because he is an engineer and is thoroughly familiar with it, and would be able to give you much more accurate information than I can.

Senator JOHNSON. You would rather I did that?

Mr. WINSOR. Yes.

Senator JOHNSON. Then I will not burden you with that.

Mr. WINSOR. Very well.

Senator JOHNSON. But if Arizona received the sum that Arizona asked for power, then Arizona would not have objected to this bill; is that true?

Mr. WINSOR. So far as it relates to the power.

Senator JOHNSON. No; I mean so far as it relates to the Boulder Dam project.

Mr. WINSOR. No; so far as it relates to the power. That has nothing to do with the division of water, Senator.

Senator JOHNSON. But subsequently let us assume you made your division of water as you desired, in accordance with the wishes of Arizona, then you would receive an amount of $900,000, or whatever it may be subsequently testified to is the sum; you received that sum. Then Arizona would have no objection to the Boulder Dam project.

Mr. WINSOR. If Arizona received a fair division of the water and a fair revenue from the power developed, I think that would remove Arizona's objections to the development.

Senator JOHNSON. And under those circumstances Arizona would sign the seven-States compact.

Mr. WINSOR. Under the terms laid down in our basic points, and of a supplemental agreement with the States of Nevada and California.

Senator JOHNSON. Wait a moment. Would you sign the seven States Colorado River compact as it has been written, and as it has been signed by the upper basin States?

Mr. WINSOR. Oh, yes. That was the proposition. Shall I read you that provision?

Senator JOHNSON. No; I am just asking to get this straight.

Mr. WINSOR. That was the proposition we submitted at Denver.

Senator JOHNSON. The difficulty that exists, and the things that are essential in order to clear up this controversy, or the difficulty that may be between my brother from Arizona and myself is: First, that there should be a division of water between the lower basin States.

Mr. WINSOR. Yes, sir.

Senator JOHNSON. That you deem to be just.

Mr. WINSOR. Yes, sir.

Senator JOHNSON. Secondly, that you should receive $900,000, or whatever the sum may be, for the generation of power at the Boulder Dam. That is correct?

Mr. WINSOR. That we should receive recognition of our right to an equitable revenue, the amount to be agreed upon in the treaty between the States.

Senator JOHNSON. Well, the amount that you stated at San Francisco in your negotiations. I don't want to pin you down to that, because you said you preferred somebody else to testify about it.

Mr. WINSOR. Yes, sir; and there was nothing agreed upon.

Senator JOHNSON. But there was a sum you tentatively suggested. Now, if those things were done, then we would have the execution of the Colorado River compact, and objections withdrawn to the Boulder Dam bill. That is correct, isn't it?

Mr. WINSOR. I believe that is a little too broad a question to ask an answer to.

Senator JOHNSON. Well, substantially it is so.

Mr. WINSOR. I think substantially it would remove Arizona's objections.

Senator JOHNSON. Now, you very earnestly and emphatically expressed yourself concerning the compact to-day, and concerning what the division of the water, according to the compact, does to Arizona. You believe it to be unjust, do you not?

Mr. WINSOR. Yes, sir.

Senator JOHNSON. And unfair.

Mr. WINSOR. Yes, sir.

Senator JOHNSON. And you feel that the development of the Colorado River with this compact, unfair as it is, is a violation of the rights of Arizona?

Mr. WINSOR. Under the terms of the bill; yes, sir.

Senator JOHNSON. Well, any development of the Colorado River, not by Arizona alone, you would think was unfair to Arizona, would you not?

Mr. WINSOR. You are not asking that seriously.

Senator JOHNSON. Well, I don't know your position in that regard.

Mr. WINSOR. No. Arizona seeks a comprehensive development of the river to the advantage and benefit of all the States that are interested and concerned, and Arizona does not want to see her particular rights overlooked in the distribution of benefits.

Senator JOHNSON. Do you know the particular territory where the Boulder Dam is situated?

Mr. WINSOR. In a way.

Senator JOHNSON. Do you know whether the land upon each side of the river is privately owned or publicly owned?

Mr. WINSOR. I dare say it is Government land.

Senator JOHNSON. Do you know whether it has ever been devoted to any particular purpose by the Government of the United States?

Mr. WINSOR. No; I couldn't say as to that.

Senator JOHNSON. Are you familiar with whether or not it has ever been set aside for reclamation purposes?

Mr. WINSOR. I am familiar with the terms of the enabling act to which you refer.

Senator JOHNSON. You are familiar with the enabling act to which we are referring?

Mr. WINSOR. Yes.

Senator JOHNSON. Well, I was not referring to the enabling act, but I am delighted to have a divination of my thought by you.

Mr. WINSOR. My thought was that you were referring to the enabling act and the constitution of Arizona.

Senator JOHNSON. Well, I will refer to them if you wish me to.

Mr. WINSOR. I was endeavoring to shorten the cross-examination.

Senator JOHNSON. Let me say to you that if you will not endeavor to say what I am thinking of, you and I will get along, and infinitely more quickly. It is quite unnecessary. I recognize your powers in that direction, but let us eliminate them temporarily. Do you know whether any power sites have been set aside on the Colorado River?

Mr. WINSOR. Set aside by whom?

Senator JOHNSON. By the United States Government or any department of it.

Mr. WINSOR. No; I can not say.

Senator JOHNSON. Have you ever favored the development of the Colorado River under a compact?

Mr. WINSOR. I favored the Colorado River compact, and I supposed that that would bring about a development of the Colorado River under terms that would be agreeable to the interested States.

Senator JOHNSON. And by whom did you wish the improvement and development of the Colorado River made?

Mr. WINSOR. That was a question that did not arise in the discussion of the compact. The compact, in my opinion, would have taken care of the situation. The agency by which development should occur is not mentioned in the compact.

Senator JOHNSON. Do you recall writing to Harry T. Southworth, commander of the American Legion, in reference to this matter?

Mr. WINSOR. Yes, sir; very well.

Senator JOHNSON. On August 24, 1923. Do you recall that letter?

Mr. WINSOR. Very well.

Senator JOHNSON. Do you recall you said in that letter:

The Colorado River compact is the key to the development of the Colorado River's resources. As such, it constitutes a proposition so clear, so simple, and so understandable and fairly stated, that it affords grounds neither for doubt not fear, nor occasion for hesitation.

Do you recall that?

Mr. WINSOR. Yes, sir; I wrote that.

Senator JOHNSON. You remember that?

Mr. WINSOR. I do.

Senator JOHNSON. Did you say in that letter:

It is a treaty—a frank and fair understanding for mutual and common benefit—to which the States of the Colorado River Basin and the Government of the United States are parties. It was authorized—as treaties between States are required to be—by act of Congress, and formulated, after full discussion, by the legally chosen representatives of all parties to it. Whatever its imperfections—and no work of human minds and hands but has them—it is a sound, logical, workable agreement, according recognition to every just claim, protective of every substantial right—as nearly perfect, in all human probability, as any treaty that could ever secure the unanimous consent of the contracting States and the approval of the Federal Government.

Do you recall that?

Mr. WINSOR. Yes, sir.

Senator JOHNSON. Do you recall writing concerning the development of the Colorado River, the reclamation of lands, and the project of electricity under the compact?

Mr. WINSOR. Well, Mr. Swing read them to me the other day, so that my mind is refreshed.

Senator JOHNSON. Do you recall what you said concerning the Federal Government in that?

Mr. WINSOR. Substantially.

Senator JOHNSON. Do you recall this:

A very small part of the power of the Grand Canyon of the Colorado will prove the source and basis of a growth to Arizona beyond the pretensions of optimism.

Do you recall that?

Mr. WINSOR. Yes. I was very earnest about that.

Senator JOHNSON. Not only earnest, but very eloquent. Let me read to you:

In the interior and favored valleys it will lift water out of the ground, and cause fields and orchards and vineyards—hundreds of thousands of acres of them—to spring up, to supplement if not to exceed the areas reclaimed by direct diversion, and the homes of people to dot these fertile lands. Out of the air it will draw at low cost the huge supplies of nitrogen so necessary to agricultural productivity and vitally important throughout the wide compass of chemistry. It will insure lessened costs for the production of mineral wealth stored in 10,000 hills, and make practicable the opening of many of these storehouses of nature. It will stimulate the search for oil. It will render feasible

the rearing of manufactories for the conversion of Arizona raw products—of herd and field, mine and forest—into finished articles, in part at least for use at home, thus lowering the cost of living and supplying materials for future growth. It will cause towns to multiply, cities to expand, markets for Arizona products to enlarge. Transportation enterprises thus fed will span the State and join its farther quarters with electrical ribbons of steel. Wealth will be created and wealth will be attracted, as like ever serves as a magnet to like. The eyes of the East and West, the North, and the South will be turned Arizonaward, and her beckoning hand, suggestive of opportunity, will persuade men of means, of labor, and of science. Population will multiply. Prosperity will reign. Arizona will come into her own.

Do you recall that?

Mr. WINSOR. Yes. I wish, Senator, I could get you to read all my speeches.

Senator JOHNSON. I assure you I could not read a better speech in a better cause.

Mr. WINSOR. Well, I made a speech similar to that all over Arizona, Senator Johnson.

Senator JOHNSON. Did you, really?

Mr. WINSOR. Yes; and I was very much in earnest about it, but I could not get by with it with the people of Arizona. They thought the picture was wonderful, but they told me that under the terms of the Swing-Johnson bill, which was the particular interest that California had in the ratification of this project, all of those benefits would go, not to Arizona, but to California.

Senator JOHNSON. I see.

Mr. WINSOR. That I just had my geography wrong.

Senator JOHNSON. And they just convinced you you were wrong?

Mr. WINSOR. They didn't convince me, but California did.

Senator JOHNSON. Do you recall this:

This is an imperfect picture—an incomplete and inadequate listing of the benefits that must inevitably spring from the harnessing of the Colorado's mighty power. But it should be sufficient to commend the constructive movement which calls it forth.

Do you recall that?

Mr. WINSOR. Yes. I know it all by heart. Mr. Swing read it to me the other day.

Senator JOHNSON. I am trying to get it by heart to use on the floor of the Senate. Let me ask you if you said this in relation to the Federal Government——

Mr. WINSOR. Senator, not desiring to hurry you——

Senator JOHNSON. You are not going to hurry me.

Senator ASHURST. This will come out of Senator Johnson's time.

Senator JOHNSON. Do you recall this in relation to the Federal Government?

Mr. WINSOR. I wanted to say something with reference to the quotation you have already read.

Senator JOHNSON. You are welcome to do that.

Mr. WINSOR. I wish that you could understand, Senator, and this is said seriously, that in the view that I held with respect to the benefits that would come from the ratification of the Colorado River compact, I was not contemplating the Swing-Johnson bill at all. I was contending at that time that all of the things that California proposed to predetermine through the medium of the Swing-Johnson bill would be determined in an equitable, amicable manner under the provisions of the compact, with the machinery set up by the compact,

after that agreement had been ratified, and I would not have held this roseate view of the benefits to Arizona had I contemplated that California was going to assume the attitude that she did.

Senator JOHNSON. Did you contemplate it was going to be supplied by the National Government?

Mr. WINSOR. Not necessarily.

Senator JOHNSON. All right. Let me ask you if you said this:

The development of the Colorado River is a national matter, in which, to be sure, the more directly interested States may and should participate or cooperate, but nevertheless it is primarily a national matter. Its interstate aspects, its colossal magnitude, the economic necessity for unified development, the general demand that the river's vast resources be conserved for the people—all these considerations, and others, join to make it a national undertaking. National undertakings require for their accomplishment legislation by Congress—legislation carrying huge appropriations. Such a program calls for the support of every western Senator and Representative, and that may only be secured on the basis of a mutually agreeable treaty. The members from the upper basin States have frankly said so.

Furthermore, the interests of the Federal Government itself are more than theoretical. They are direct and practical. They are not merely the interests of a parent government, seeking the welfare of its children and the adjustment of their differences. Laying aside the international aspects of the case and ignoring the legal status of the Colorado as a navigable stream, the Federal Government's interests are those of an owner and as well the custodian of a national policy. The United States owns every site in the lower basin of the Colorado River adapted for the construction of works for the controlling of floods, the storage of water for reclamation or the development of hydroelectric power. This phase of the situation is absolutely controlling.

Do you recall that?

Mr. WINSOR. Yes, sir; and there is only one way I can get around the legal proposition laid down in the last part of the quotation, Senator, and that is that I have changed my view. I repudiate that opinion absolutely. It was my impression that the United States owned those sites; that the States had no rights in or control over them. I have changed that view altogether.

Senator JOHNSON. You have changed the view that was expressed in this letter altogether, have you?

Mr. WINSOR. That particular point. That is the only one I refer to.

Senator JOHNSON. Practically all of them?

Mr. WINSOR. No. Some of them California changed for me, but that particular one I changed for myself.

Senator JOHNSON. Do you recall a paragraph of that letter relating to Arizona's responsibility?

Mr. WINSOR. In a general way.

Senator JOHNSON. Have you changed your view in that regard?

Mr. WINSOR. I think the answer I have already given will cover that. I shall be glad to have you read it if you like to do so.

Senator JOHNSON. I do like it. I think it is fine.

And here in Arizona there should be a serious realization that in the final analysis, whatever the last measure of this State's technical and legal rights may be—or might be determined to be if pursued to a long-drawn-out conclusion—we have no right to prevent development, to impede progress, to lock the wheels of industry. From the strictly local and selfish point of view, Arizona has no right to obstruct the development of these vast resources now going to waste. Her own interests and the interests of her people, suffering from depression and growing under the burdens of excessive taxation, demand prompt and constructive action. No possible losses that might be suffered

under the compact, even though the objections offered by its critics were valid, could equal the losses of indefinite delay. Arizona's duty to posterity itself—a name that has often been taken in vain by objectors to the compact—calls for the bequeathing to those who shall come after, not a wild and tumultous torrent, but a river harnessed and controlled, doing the bidding of man, contributing to the blessings of life—a productive and not a destructive agent. But in a much larger sense and a very proper one, a disposition to consider Arizona alone—even though the disposition be conscientiously and sincerely inspired—is to be deplored.

By no means must the representatives of Arizona forget Arizona, but it is a question if that fault might not be more forgiveable than that Arizona should forget and fail of her responsibility as a progressive, enlightened, and broad-minded Commonwealth. To take the ground that the Colorado's development should be viewed by Arizona solely as a matter of her own concern would be to put a blot upon our boasted progressiveness. For if progressiveness means not humanitarianism it means nothing, and humanity's interests and humanity's rights are at stake on the Colorado. The future of the whole Southwest hangs in no small degree upon the realization of the tremendous potentialities of the Colorado River, and there should be no regret in Arizona—there should be elation—if the States surrounding us, and the men and women of our blood and bone who live in them, come to enjoy something of the widespread benefits of its development. That will not harm us—it will help us; but on the other hand it will harm us immeasurably—industrially, socialy, yes, and spiritually—to play the part of a dog in the manger.

Do you recall that?

Mr. WINSOR. Yes. I haven't changed my mind at all about that.

Senator JOHNSON. Do you recall this:

What the form or extent of congressional action may be can not be foretold. That will be influenced by the Representatives of no State more than by Arizona's. But there is strong basis for a feeling amounting to certainty that the first unit of development on the Colorado River will be a Federal project—either direct and outright or by cooperation—and without a doubt it can be made cooperative if Arizona, as well as she might be, should be interested in the enterprise. Furthermore, the first unit of construction will be in the lower basin—within the State of Arizona, at a site to be determined—and designed jointly for the control of the river's floods and the development of power. For while a widespread belief, a thoroughly awakened consciousness—

Sentiments with which the Members of Congress are themselves imbued—

that the resources of the Colorado River must be made productive for the benefit of humanity constitute the great driving force behind the compact, the spur that is most effectively impelling to early action is an appreciation of the necessity for prompt action to save lives and property from destruction.

Do your recall that?

Mr. WINSOR. Yes, sir; and I still stand by it. It was, and is, my theory that the development would be at a site to be determined, not by the State of California, and not without the consent of the States interested.

Senator JOHNSON. It is the United States Government and the Congress that will determine this thing, and determine whether such a bill will be presented and passed. You understand that?

Mr. WINSOR. Oh, certainly. But it is our view that our State has the right to be consulted even by the Congress of the United States.

Senator JOHNSON. You are exactly right. That is why you are being heard to-day, just as witnesses for my State will be heard. Every State will be heard before the committee. The lands on both sides of the Boulder Dam project are wholly public lands, are they not?

Mr. WINSOR. I believe they are.

Senator JOHNSON. For how long a distance from the Boulder Dam do these public lands extend?

Mr. WINSOR. I do not know the exact distance.

Senator JOHNSON. Substantially can you say, approximately?

Mr. WINSOR. You mean how far do the public lands extend?

Senator JOHNSON. Yes.

Mr. WINSOR. Oh, for a great ways. I do not know how far.

Senator JOHNSON. The storage capacity of this dam will be upon lands in your State?

Mr. WINSOR. The storage capacity is in the States of Arizona and Nevada.

Senator JOHNSON. The public lands extend, you may say, without getting it down to exactitude, many, many miles from the Boulder Dam, do they not?

Mr. WINSOR. I think that is true.

Senator JOHNSON. Do you know the particular territory, its wildness, its peculiar scenic beauty, its singularity? Have you been there?

Mr. WINSOR. Yes.

Senator JOHNSON. You have been at the proposed site?

Mr. WINSOR. Yes.

Senator JOHNSON. It is a particularly wild territory, is it not?

Mr. WINSOR. Yes; it is.

Senator JOHNSON. There is no question on that score.

Mr. WINSOR. No.

Senator JOHNSON. Have you been in the river there?

Mr. WINSOR. I have been down to the river.

Senator JOHNSON. No; I don't mean that. Have you been in the river? In a boat on the river?

Mr. WINSOR. No.

Senator JOHNSON. I asked you that preliminary to a question relating to navigation. Have you an opinion as to whether or not the river is navigable?

Mr. WINSOR. I know the river has been navigated to a point as high as Colville.

Senator JOHNSON. How many years ago?

Mr. WINSOR. A good many years ago. It may be navigated still.

Senator JOHNSON. Is it navigable now?

Mr. WINSOR. I dare say it is.

Senator JOHNSON. Does your commission regard it as a navigable or a nonnavigable stream?

Mr. WINSOR. As a navigable stream.

Senator JOHNSON. Do you deny the rights of the United States Government in that stream to erect flood-control dams?

Mr. WINSOR. As such, yes.

Senator JOHNSON. Do you deny the rights of the United States Government to erect under any circumstances works for flood control? I am not asking you this for the purpose of unnecessarily quizzing you, but if your committee has reached a conclusion in that regard, you can give it quickly.

Mr. WINSOR. Yes; that is a legal question, it seems to me, and we feel that the United States Government has no right to construct works under the guise of flood control which are designed for purposes the United States Government has no right to engage in.

Senator JOHNSON. I am not asking that. I am saying purely flood control. I am not asking you what your opinion may be of these works. Has your commission reached any conclusions, or have you any opinion to express, as to whether or not the United States Government has a legal right to construct works for flood control?

Mr. WINSOR. No; not as such.

Senator JOHNSON. It hasn't the right?

Mr. WINSOR. No.

Senator JOHNSON. Have you reached an opinion as to whether or not the United States Government has the right to construct a dam such as proposed at this site, under the Boulder Dam project?

Mr. WINSOR. If it were for the purpose of aiding the navigability of the river, you would undoubtedly have the right.

Senator JOHNSON. Then the United States Government has the right?

Mr. WINSOR. Yes.

Senator JOHNSON. That is all.

Senator ASHURST. Mr. Chairman, I have no questions, but owing to the line of interrogatories propounded by my learned adversary, Senator Johnson, I will say that Senator Winsor needs no defense.

Senator JOHNSON. Nobody is assailing him.

Senator ASHURST. He fairly and frankly, before he arose to make his statement, told us his views of the past.

Senator JOHNSON. Do you want to argue this matter now?

Senator ASHURST. I wish to make an observation.

Senator JOHNSON. We will argue the testimony, if you wish.

Senator ASHURST. I do not wish to.

Senator JOHNSON. If you wish to argue——

Senator ASHURST. Senator, will you please let me make my statement.

Senator JOHNSON. If you do, then I will argue, too. That is what I was going to call your attention to.

Senator ASHURST. I do not want to be unkind, but let me finish my statement.

Senator JOHNSON. Certainly; but in all courtesy, let me say to you, I was calling your attention to the fact that if you want to argue the testimony of a single witness now, we will do it, but I think it would be better to argue it subsequently.

Senator ASHURST. I am commenting on the manly attitude he adopted in revealing to the committee his change of mind.

Senator JOHNSON. Aren't you commenting——

Senator ASHURST. Will you please pardon me until I finish.

Senator JOHNSON. But you said you were not commenting on his testimony, Senator.

Senator ASHURST. We will get along better if you will let me finish.

Senator JOHNSON. I am glad to.

Senator ASHURST. I don't care what you say about me or him after I finish.

Senator JOHNSON. I don't want to say anything.

Senator ASHURST. I wish Senator Johnson and others would yield to testimony when it is before them. I wish they would follow the example of Mr. Winsor.

Senator JOHNSON. That is all right, I have no objection to that.

The CHAIRMAN. Any further questions?

(Witness excused.)

Senator ASHURST. The next witness, Mr. Chairman, is Mr. Thomas Maddock, who was State engineer at the time the river compact was written, and while he was not a member of the commission that wrote it, he has always opposed the compact, and was the first who argued that a supplemental compact should be made.

The CHAIRMAN. State your full name, address, and occupation for the record, and for the information of the members present.

STATEMENT OF THOMAS MADDOCK, PHOENIX, ARIZ.

Mr. MADDOCK. My name is Thomas Maddock. I am an engineer; Phoenix, Ariz.

The CHAIRMAN. You are a member of the Arizona commission, Mr. Maddock?

Mr. MADDOCK. Yes, sir.

Senator SHEPPARD. What commission, Mr. Chairman?

Mr. MADDOCK. The Arizona-Colorado River Commission. I might say in that connection, Mr. Chairman, Senators, ladies and gentlemen, that I have been a member of every commission that Arizona has had on the Colorado River question. We had some maps that we were going to put up, but they are not here, and I think these small maps will, perhaps, help, if I make reference to certain things.

Gentlemen, the State of Arizona knows that you are tired of this question. You have considered it a long time. In the House committee the other day they impressed us with the fact that they were tired of it and wanted to get through with it. I don't blame you, but I doubt if hardly anyone has grasped the magnitude of the question that is before you, and I think if it had taken five or ten times the amount of your time it has taken it would be worth while.

We are talking about distributing assets that are going to amount to $14,000,000,000 or $15,000,000,000 and we are setting precedents for so much money, the creation of so much new wealth, that I don't believe that I can estimate it. Senator Johnson touched upon the fact of whether or not Arizona would accept a compact, would accept the bill if we were going to get some of the benefits. Naturally, that is true. There are about four and a half million horsepower in the lower basin, and it is going to develop $2,000 worth of wealth for each horsepower. That is 9,000,000,000. There are about four and a half million horsepower that are going to be worth about $300 per horsepower installed before very long, and that is worth $1,350,000,000. There are going to be about 3,000,000 acres of land irrigated at $200 an acre, which is worth $600,000,000, and every time you irrigate an acre of land and develop a dollar's worth of wealth, indirectly you create about five other dollars of wealth or $3,000,000,000 in the surrounding property. If you total those up, it runs to $13,950,000,000.

The figures are startling. They startled me when I first heard them quoted by Mr. Scattergood, the engineer for the city of Los Angeles, but they are right. If anything, they are too small.

If Arizona wins what she is contending for, in Congress, the Supreme Court or by whatever method we finally win, and we intend

to do that, of that $14,000,000,000, we will get in future assets about $3,800,000,000. We will get the value of the horsepower installed, the wholesale value. We will get half of the acreage developed. We will get the property that will develop with that acreage, and probably we will take out of the Colorado about 10 per cent of its power, for retail development in utilizing and building up industrial resources in our State. We believe that nearly 90 per cent of the power is going to the adjoining State of California because of ocean transportation facilities.

Now, if we get what we ask for we will get about 30 per cent of the wealth that is going to be created. If we get only what this bill gives us, we will get about 2 per cent of it, and the rest, the 98 per cent of the river assets that we think that we have more interest in than the adjoining State, will go over to California, so I think I can answer the question that you asked Mr. Winsor; if we get out of the Colorado those things that we think we are entitled to, that only constitute 30 per cent of those things that are going to be, we will be satisfied, but we are not going to be satisfied, no matter where it comes from, no matter who decides it, with something that gives us but 2 per cent of our river's benefits.

Check the figures.

I want to make you a challenge. If you will give us the opportunity to present our case to Congress, we will convince you of the justness of our cause. Why do we make you that challenge? Because we went into the upper basin, the upper portion of this river basin, and presented our case to the men who had previously taken action against us, and we received at their hands the recognition of the righteousness of our position. They changed their former opinion. The large predominance of opinion changed. We know that. We could not have been at Denver without finding that out, and we believe we can do the same thing here if we can get the opportunity to meet the men of Congress who are fair and uninterested.

I think the way we changed those men was to say, "What would you do if you had our job down here in Arizona? What are we doing that is wrong? What are we asking for that you do not ask for?"

Gentlemen, on this power question I told them as one member of the Arizona committee, as one-eighth of its membership, that I would close my eyes and sign on the dotted line any proposition in regard to power that the four upper basin States' governors would submit, provided just one thing: That they make their proposition regarding the handling of the power apply to their own States in every particular, just as it was to apply to ours, because I know they are going to protect themselves, and that is all we want—just the same equal protection that they are asking for. That is not unfair, and that is why we convinced the upper basin. That is why we believe we can convince you.

This is only a small river. It is only 11 per cent of the Columbia. It is only 8 per cent of the Ohio. It is only 9½ per cent of the St. Lawrence. Gentlemen, you haven't started to take up the water question, even, if you attempt to settle it overriding the protest of the State of Arizona.

We went to the uper basin and met six States which had signed an agreement just like this bill, which would crush our State. We left there when five of these States, every one but our sister State of California, had signed a resolution which, if they live up to it, and if they believe in it they will live up to it, which will give our State everything that we have contended for. We went there and criticized this measure because it did not protect us, because it did not protect the whole United States from the Mexican danger. Before we left there seven States had signed the Mexican resolution, but we came to Washington but can not find in any of the bills introduced months afterwards any provision that will give us the protection which all seven States demanded at Denver.

As to the hydroelectric development in the United States, the latest geological survey figures were that there have been developed 9,000,000 horsepower. Their estimate was that there is 55,000,000 future horsepower in the United States. I know that is low. I don't know how long, but I know in the State of Arizona they estimated a little less than two-thirds of what is actually in the State, so I presume there is more in the rest of the States accordingly.

This power that you gentlemen are trying to handle in this bill is less than 1 per cent of the potential electric horsepower of the United States. If you try to settle it this way, you have 99 times as much work yet to do, and therefore no member of this committee and no member of the House committee can afford to be tired, because you have just begun your work. You haven't started when you settle the water question on the main Colorado River. You haven't touched the Gila. That has three States interested. You haven't touched on the San Juan, and there are three States interested in that, just as deeply, just as selfishly interested perhaps as Arizona has been thought to be in the Colorado. You haven't touched on the Green, with three, and the Grand, with two States, and then when you get those matters adjusted, you have only finished with one river basin. You will have to take up every interested stream in the West. If you handle this bill this way, you have invited them all to come and lay their troubles on your doorstep. You will have to take up the question when every community in the United States that wants cheap power in order to grow and prosper comes to you and asks that you take the resources of some other people in order to give them the thing they want. There are a lot of communities that want to grow. I don't blame Los Angeles. They are doing what is natural when they seek our resources. But Arizona is doing nothing but what it is natural for humans to do, when we resist them. Some one must decide who is right.

You must investigate the arguments here. You have investigated some of them. Take one of the principal claims that was put up to you, that this bill must be passed in order that you might save life. Even if it runs over all the rights of all the States you might be justified in taking action to save human life, but, gentlemen, you know now that that argument is not true. That was just good oratory. Every river in the southwest dries up, or practically so, each year. But the people know that. The stream beds are there—they are obvious. When it rains the water courses down those dry washes they become raging rivers.

So far as the portion of the Imperial Valley that is contained in the United States is concerned a flood would be nothing but water running down in a stream bed already prepared for it, so to save lives are involved is unfair. It is outrageous. It is a mistake, as perhaps it might induce one to think that there is somethng else the matter with this bill. That it is a bill people were trying to put over on other false arguments.

The proponents of the bill promise silt control, that the Boulder Dam is going to stop silt entering into the Imperial Valley. I wish it were true. They have a terrible silt problem there, but the dam there is not going to do it, not for many years can it possibly do it, because there is a lot of silt, miles and miles, and millions and millions of tons of silt are in the 300 miles of river between the Boulder Canyon and the Imperial Valley.

It is suggested that the dam is for the purpose of eliminating drought. We admit it, but there is idle land right now in the Imperial Valley when there is plenty of water available, so that drought is not the only trouble there.

The bill is said to be for flood control. We admit that. Those two arguments are good, but flood, drought, and silt control have been offered in every proposition we have made to California. Therefore, life and drought and flood and silt are not arguments for this bill at all, and something you really should not be concerned about, because the other states have offered their reservoirs that they may be filled with water and filled with mud in order to preserve property in the State of California.

Then, what is the real issue here? There is just one. The real issue is, "Shall the people of a State or outsiders have the benefit from the development of a State's resources?"

A municipal corporation can be just as oppressive as a financial corporation. I believe the people of Owens Valley would testify to that, yet I know nothing about their quarrel. If I am robbed, it doesn't make any difference to me whether a single rich rascal robs me or I am robbed by a mob. If what I had is gone, it is immaterial.

This problem is caused by a State, a community—not all of the State, just part of the State, asking that resources in another State be nationalized.

Do you suppose that Pennsylvania would want her coal nationalized, or would tolerate it? Do you suppose the States producing gasoline would want that nationalized, or the wheat, the corn or the iron? Would they want their products nationalized and exempt from state taxation? Yet, all these things are necessary and pass in interstate commerce from one State to another. They carry, in their going, a taxation imposed upon them in the States in which they originated. Why is the same not true with Colorado Power?

Let us consider a similar problem. On the Great Lakes and the St. Lawrence there are eight States, Minnesota, Wisconsin, Michigan, Indiana, Ohio, Pennnsylvania, Illinois, and New York. Suppose you should have introduced in Congress a bill to deny New York the right to tax hydroelectric development on the St. Lawrence, but to have a United States royalty or tax on it, and then used these national receipts to make the St. Lawrence navigable to carry the

commerce that now comes through the port of New York, around that State to the sea. Suppose you said each of these eight States should be bound by a compact approved by five of them, what would happen to New York? I can see a more exact parallel. Suppose you took those same States that are interested in navigation on the lakes and permitted them to say that the city of Chicago should take so much and no more water out of Lake Michigan to run through her drainage canal. Then would New York and Illinois do as we are doing? I wonder if Cabinet Members would call them rebellious if they resisted? And yet, I can not see any difference, except that they are big and strong and powerful, and we are little. Suppose you put this same proposition to Indiana and Kentucky. You are just building between those two States a dam to develop navigation, a legitimate national act. Suppose you say to those two States they shall not receive any taxation from the incidental hydroelectric power that is to be developed there, but that the benefits of that shall go into a great fund to build levees down where they are needed, and where we admit they are needed, in Louisiana and Mississippi. What would Indiana and Kentucky do?

I want to take up the question of the land and water for it. It has been stated by numerous people from our adjoining State that Arizona has been offered her tributary. This is incorrect. We must speak of this now because I presume our opponents will close their arguments before you with that assertion.

The portion of the tributaries in Arizona on those maps that you see that lie in the Gila watershed, is now all appropriated by the people of the State. No one can give it to us. No one can take it away from us. It is already ours. Lying above that, we have another region. It is about eight times as large as the part of the basin that lies in California. It is a mountainous region. Down from the mountains come canyons into the larger Grand Canyon that most of you have seen. That water is not available for irrigation in the tributaries' own valleys. It could be stored in the main river and used below on Arizona's land, but under every proposition that the State of Arizona has made in the last year or so, we have even said that our tributary water could be added to the main river supply and come on down for the use of all the States of the lower basin. Our water of this kind amounts to between 2,500,000 and 3,000,000 acres. I can not prove that statement, and no man on earth can deny that statement. No one knows there is an increase of river water from that part of our watershed of one and two-thirds million acre-feet a year in some 460 miles. There is a decrease in another part of the river of about 1,400,000 acres a year in 200 miles below. The latter is due to the evaporation, but evaporation is also going on in the region in which the water coming in exceeds that lost by evaporation, so that there are about 2,500,000 to 3,000,000 feet in the northern part of Arizona. We have offered to divide this with California. When they tell you they have given us our tributary, it is not correct. It is far from correct.

Now, the statement is also going to be made to you that Arizona can only irrigate a little land by gravity, but they do not tell you

where they mean to begin this so-called gravity. On the map over here the blue represents the highest contour on the Parker Gila project.

Senator ASHURST. On the right of the map, you mean?

Mr. MADDOCK. The very dark blue. Maybe it is purple. It represents the highest contour. Looking westwardly and north along the river, there are 1,400,000 acres of irrigable land, every acre of which can be irrigated by gravity from the Boulder Canyon Reservoir, not from any reservoir away up in Colorado or Wyoming; that highest blue contour is 600 feet, and the base of the Boulder Canyon Dam is 647 feet. So every bit of that 1,400,000 acres can be irrigated by gravity. Gentlemen, we can go above Boulder and develop in our State, if we take a higher dam site, three or four million acres of land by gravity. When some one tells you that our land can not be irrigated by gravity they mean if you come down to the lower part of the river to make the diversion that then water will not run on to much of Arizona's land. And they are right. But ask them where thew mean to gravitate this water from. Considering that we will have some local return with ordinary pumping projects, 3 feet of water in Arizona is sufficient per acre. The consumptive use will be 3 feet. You can figure on 4 mills per kilowatt-hour for power. You can make the farmer do things that you can not make anybody else do, you can have him work irrigating, when you need power for something else he can take the off-peak power, which is cheap, you can put the water on this 1,400,000 acres of Arizona land at an average pumping cost of about 4.68—not per acre-foot, but per acre per year. Add your ordinary distribution-system interest costs and your operation and maintenance charges and you have less than $8.50 total.

We could irrigate this land by gravity from Boulder or a higher dam, but there is a lot of rough country between the Boulder Canyon Dam and the irrigable area of the State of Arizona. We can go to the Laguna Dam, already in, and pump from that and deliver three feet of water to our land for less than $8.50 an acre. The average lift is 250 feet. The highest lift is 450 feet. You see, the latter is not advisable to irrigate immediately. We are talking about future land, what we have that will come in competition with upper basin land with California land, etc., not by immediate development, but looking into the future say 50 years or so. It is practical, by pumping, to put water on that land, or it will be practical very soon. Just as long as the farms in Iowa pay no money to the owner we can not irrigate that land. Whenever agriculture is back on its feet and pays anywhere in the United States, this land in Arizona can compete with it.

You have before you now a bill for an irrigation project on the Columbia River, to which we have no objection. The engineer's report these suggests that their best proposition is a pumping one, rather than by gravity with a long canal across several States. There are a great many questions involved that you are probably better acquainted with than I, on the Columbia River, for instance, the international situation.

The CHAIRMAN. Mr. Maddock, if I may be allowed to suggest, the committee heard all that is desired to be heard on the Columbia River Basin project, heretofore.

Mr. MADDOCK. All right, sir.

The CHAIRMAN. The point developed was that one engineer favored the pumping proposition, and all of the others were unanimously in favor of the gravity development.

Mr. MADDOCK. I want to use this proposition for comparison, Mr. Chairman. The Government engineers' 1927 report on the Columbia was concurred in by a majority of the States. They said the water would have to be lifted 630 feet. Two hundred feet of that was supposed to be by a dam, which left a pump lift of 430 feet. Twenty per cent of the land must have a 200-foot additional lift, which meant an average of 40 feet more, which brings it up to 470. The contention has been made that the dam can not be 200 feet high but only 156 feet which would add another 44 feet. Yet the Government report gave this possible pumping lift of an average of 514 feet as preferred to a gravity canal. You have therefore but recently discussed a Government project in which the average pumping lift is twice that of the lands of Arizona shown on the map here. The Columbia average lift is higher than our highest lift, and we are speaking now of our lands that may not be irrigated for the next 40 or 50 years. I offer this comparison, because it is something by which you can judge quickly that our land is feasible of irrigation. Los Angeles has suggested pumping water six times as high as we need to raise our water. California water on many projects now is costing many times as much as it would cost to irrigate our land. The Sacramento to San Joaquin Valleys proposed transfer of water is estimated at half again as much as this, and yet they consider it feasible. I insist, and have a reason for it, by statements put out by the bureau of public works of California, that they expect to use Colorado River water over on the coastal plain. They hope to irrigate 750,000 acres with Colorado water, and I am frank to tell you that I believe, in the course of a little while, they could economically do so, but I do not think it is right; I do not think it is just or feasible to consider their irrigation proposition involving the lifting of water 1,500, 1,600, or 1,700 feet. This bill permits it.

I make this other statement: You are figuring in this bill for an all-American canal: On making a subsidy to the State that is most feared by the other six as a competitor under the present law of competing for water by developing land. It is most feared by the upper basin. In this bill you did not suggest giving them a Government subsidy to further advance their ability to take water under the law of prior appropriation. You give no subsidy to Arizona yet it has been asserted that Congress is not interfering, not changing conditions by passing such an act, and Arizona would not be hurt any. If you grant the State of Arizona an equal subsidy, we can develop more land than California can under the all-American canal and do it cheaper. Suppose we suggested that because our land needs water, that the Government should go into the power business, deny the States the right of taxation on power projects but let the Government tax them and bring the money from, say the Sierra Mountains in California to irrigate land in the State of Arizona. I am afraid everyone would laugh at us, but I can not see the difference between these two propositions. To me, they are exactly identical.

This all-American canal has been estimated by the Secretary of the Interior as costing $31,000,000 plus its portion of the interest

during construction, which will bring it up to $36,000,000 or $37,000,000. His estimate is about one year old. I find that the all-American canal is estimated in the Fall-Davis report at $31,000,000, just as the Secretary gave it, but I find in addition that about $11,000,000 or $12,000,000 is estimated for the purpose of the "A" canal, which intercepts the all-American and runs into the Coachella Valley. It is about 85 miles long.

Now, the all-American canal estimate of $31,000,000 is included in the figures made up by the Secretary, with the $41,500,000 necessary for the construction of a dam 550 feet high and the $31,500,000 necessary to develop the power there and the $21,000,000 for interest during construction, a total of $125,000,000. I find right in your figures in the bill the same amount. Somewhere between them the last and the present Secretary lost the estimate for the "A" line canal which is $11,000,000 or $12,000,000, because if you follow their own figures here they have only $31,000,000 for the all-American canal land. That other canal will have to be constructed—and I do not for a moment say that it should not be constructed—in order to comply with the bill's provision to take water to Coachella Valley. There is something the matter here with the bill or the Secretary's estimate.

They say this is just a contest that the Federal Government must settle. That unless the Federal Government does settle these States can throttle one another. That is not true. Perhaps California might throttle us in this bill but we can not throttle California, because we have no monopoly of either water or power. There is less than half of the potential water power in the State of Arizona that there is in the State of California, so we can not throttle them on power. Any time we try to impose an unfair tax, all they have to do is to go into their own wonderful mountains and develop their own streams. They have only about 2,000,000 horsepower developed out of 9,000,000; yet, because we have happened to have some power that can be produced cheaply, they are coming over into our State asking for it. Don't you see we have not got them by the throat at all?

Now, on water, the Colorado River Basin is usually estimated to produce about 17,000,000 acre-feet of water each year. It looks like a big territory and a big river, but the State of California, outside of any of the Colorado water, has four times the amount of water within her own borders that there is within the entire Colorado River Basin. The estimate is 72,000,000. That is in round numbers the acre-feet of water in that State. I believe it has 58,000,000 acre-feet which can be applied to irrigation; so they alone have four times as much water as this whole basin that we are quarreling about. One-half of the Colorado River water roughly is going to the upper basin. We are asking for half of what is left. That would be one-quarter. Please look at the map of the seven States and judge if 25 per cent is unfair. Gentlemen, if you add Arizona's and California's total water together,—and give Arizona just exactly what she is contending for here, and no more, we would only get nine per cent of the total water of the two States, just nine per cent. Does that look like an excessive demand? If you give us what the governors offered us in Denver, we will get less than that. They will tell you that we are asking for 60 or 70 per cent of the river,

which is incorrect. We made California an offer, a real 50–50 offer. It is the only 50–50 offer that has been made. We took Government figures of annual flow equal to 9,385,000 at Yuma. We figured Nevada wanted 300,000 acre-feet. We figured that if we made a real development in Arizona, that with the normal amount of return flow from the Gila River, that probably Mexico would not need over 500,000 acre-feet additional from the main stream. That left 8,585,000 to be divided between Arizona and California. We divided it by two, which gives 4,292,000 to each State. Figure 600,000 acre-feet of that for the city of Los Angeles. This is less than what she says she needs, but added to her own waters, Los Angeles would then have water sufficient for a population of over 10,000,000 people. You would still have left for irrigation in the State of California 3,692,000 acre-feet. The total acreage irrigated from the Colorado in one year in California thus amounted to but 421,000 acres of actual irrigation. The 923,000 acres they could irrigate under our offer less the water for 421,000 acres which they have already irrigated would permit them to irrigate 502,000 more land than they have ever done before.

The California bureau of public works reports say they need 4 feet per year, which incidentally is 33 per cent more than would be needed to irrigate the land in Arizona, because they admit they can not take advantage of the return flow. Arizona projects are economically better than California projects because more acres can be irrigated in the United States if you develop the land in Arizona than if you develop that in California, because we require only three-fourths of the water which they would need. If you gentlemen are going to look at this question only from a national standpoint, ours is the better proposition. With 3,692,000 acre-feet available, allow them their 4 feet, and you will permit them to irrigate 923,000 acres. The last year that I can get their correct published records on, was 1925. In that year there were 370,000 acres irrigated in the Imperial Valley. I am quoting these figures from mimeographed copies of the reports that were sent out by the Imperial irrigation district. There were also 15,000 acres irrigated in the Yuma Valley and 36,000 acres irrigated in the Palo Verde Valley. Therefore, you can take the plan that Arizona has offered, that they say is so unrighteous and so unfair and so throttling to their State that you must intervene between this big State and our little State and protect the big State from the aggression of the small one, you can give Los Angeles her needed water, you can provide for present irrigation, and you will still leave enough to irrigate 502,000 acres of new land, which is bigger than any irrigation project in the United States. We have not said to the Imperial Valley or California, "You shall have no future." But, I would like for you to show me any future for Arizona in the bill that they have introduced. We have offered to double their acreage. We said, "You may grow." We know that people want to grow, but what have they done with us? I can not find any hope for Arizona in their bill at all. Maybe they do not mean to stifle us, but that is the way the bill reads.

I want to tell you some of the concessions that Arizona has made. It seems to me that they have criticized our governor because he is unyielding, and they criticized the president of our senate because

he is too changing. I do not know just what we can do to please them. Arizona believes in the present law of prior rights, and yet we met with the other States when the upper basin asked for a compact. We were against the compact as written. Even to-day, the majority of our commission think that it has many things which should be corrected. I am speaking of the Santa Fe, the main compact; but for five years now—five years in January—we have suggested that a supplemental compact be made by the three lower States, so that the seven-State compact which the four upper basin States desired, might become effective. We have eight times the area in the basin that California has, even outside of the Gila River. Yet we offered to divide the water of the main river equally with California. We hardly think this is right to our State, but we thought that it was so right that anyone else outside could not deny it. We asked for 50 per cent of the river at Denver, California offered us 36 per cent. The upper basin governors made a compromise proposition, they suggested what amounted to an average of these two, or 43 for Arizona and 57 for California.

We finally agreed if California would quit harrassing us but leave us alone to go ahead and develop, without being threatened, that we would take it, we did not believe it was right. There was not a member of our commission that said it was right. Some of us did not even vote for it, but the majority of the commission said we had better accept this offer in hope that our fairness would bring the other basin States to our support. Some of them appreciated our concession; some just called on us for additional sacrifices. We believed that the natural way to divide the power question was on the fall of the river. I have never heard any other way discussed. International arrangements based on the fall of the Niagara River were suggested as to Canada. Nevada did not think that a power division according to fall was right; she did not think it would give her enough, so we said, "Alright." If Utah will do the same thing on our northern boundary that Nevada is asking to the west, we will give Nevada a 50–50 split, even though under the fall theory she is only entitled to 18 per cent of the power benefits. We were against Boulder Canyon. We believed that it was uneconomical. We believed it was the wrong place to store water. Frankly, we still believe so. But we said this: "Other people believe in it. We will forget our objection to this Boulder Canyon and allow the dam construction to proceed in whatever place may be determined by economical things if you divide the water and power beforehand." I mean, we said wherever people want to come in and develop the river, as far as we are concerned, we will let them go ahead, either private or public.

We believe that we should be taxed by our tax commission, that our legislature should have the power of taxation over everything in the State, just like every other State has. California asked us for a specific tax instead of a tax that would be determined like every other tax, large or small, as the needs of the people and the times demanded it. We tried to get together with them on the theory of a definite, specific tax. We failed at San Francisco to settle the amount of this tax. We came to Washington from San Francisco in order to try to stop the bill California introduced here while we

were negotiating there. Frankly, we are of the opinion that this is not a good time to bring in a lot of more land by governmental activity. We do not want to restrain any individual activity, but we thought it was not advisable for the Government to bring in much more land at a time when our farmers were struggling to try to sell the produce that they now grow, and yet we consented that if we could get the other necessary adjustment made, that the Government might subsidize land by power and bring in more produce in California to compete with our own.

We have done all this; yet they say we are unreasonable; that we make no concession. Let us see what concession others have made. Have the upper basin States suggested that they, too, would contribute something out of their power resources to subsidize California irrigation ditches, city waterworks, etc.? Ask them if they will consent to such a program. Have they receded one iota from the stand that they took over five years ago at Santa Fe? If so, let them tell you where. How about California? She has made some concessions, we admit; but they are small. I am going to tell you just exactly what they are. Under the original compact plan we would have gotten out of the river for sure about 5 per cent of the total land developed, that is, the Indian lands which were entitled to water by treaty. I am speaking now of the percentage of water as between the two States. We might, by an extraordinary effort, have gotten about 14 per cent of the water if you include in our possible quickly irrigable area the river bottom lands proper, which amount to about 280,000 acres, and if we had had the private capital or the State been able to finance it. After they refused for two years we met with California and they offered us 25 per cent of the water that our two States were going to get. I wish you would look at that map, so that you can understand this offer. It was California that offered Arizona 25 per cent of the water that the two States were going to get. Of course, we refused and then we met again and they offered us 30 per cent, and 31 per cent, and then 32 per cent. These were after weeks and weeks of tiresome and harrassing negotiations, and then one day Nevada said, "We will give up 100,000 acre-feet of our 300,000, if California will offer Arizona one-third of the river." And they made that offer, and that is where we were, gentlemen, when you were in session last year. At Denver, the Governor of California made a new proposition for California, which amounts to offering us 36 per cent of the river water. The governors in their wisdom split the difference between the 36 per cent California offered and the 50 per cent we requested and suggested that we take 43 per cent. California refused this offer, so the limit of the concession of California, so far as water is concerned, is to give us a third of the river water that is to be divided between us, when we have eight times the land in the drainage area that they have.

California offered us a tax on power. They first offered us a tax that was a dollar per horsepower generated. That does not mean much to you, perhaps. Let me give you some to compare it with. Witnesses from Los Angeles, in your hearings or those of the House, claimed that they had made out of their city electric activities $2,500,000 in 1924, and $3,000,000 in 1925. That money went into

the city's general funds—into the streets and schools, police protection, fire, and everything that a city needs. It was a revenue like that coming from any tax. It was an indirect tax levied on the power consumers. I asked the man running the Los Angeles power department, "How many horsepower does this represent?" and he told me, "120,000." If that figure is correct, it means that in 1925 Los Angeles had an indirect tax on each horsepower of $25. Last month, in San Francisco, Arizona and Nevada were offered $700,000 per year by California. This is less than half of the tax that the city of Los Angeles has already collected from her own people, or an insignificant amount of hydroelectric power. She has established the precedent of power taxation. Los Angeles also pays taxes to other California counties on the right of way of her Owen River Aqueduct even when it is on Government land.

The CHAIRMAN. May I ask at this point how long it will take you to conclude, Mr. Maddock?

Mr. MADDOCK. I have been talking about 50 minutes, I believe. I can stop any time. Whenever you are convinced, Mr. Chairman, I shall be glad to do so.

The CHAIRMAN. Of course, we had the benefit of your testimony in the hearings two years ago, which are available and in the record here.

Senator JOHNSON. I suggest you give Mr. Maddock the opportunity of concluding in the morning. That is all right with me.

Mr. MADDOCK. I thank you. Allow me to add this. I will consult my colleages, they may suggest that some better speaker be substituted for myself.

Senator JOHNSON. You may do that, if you wish.

The CHAIRMAN. Do you desire to have this witness return, that we might ask him some questions?

Senator JOHNSON. If you please.

The CHAIRMAN. We will then confer in the meantime. This is a call for an executive session. I think it is proper that we should adjourn at this time and meet at 10 o'clock to-morrow morning in the other committee room, in the Senate Office Building.

(Thereupon, at 4 o'clock p. m., Tuesday, January 17, 1928, the committee adjourned to meet to-morrow morning at 10 o'clock in the Senate Office Building, room 128.)

COLORADO RIVER BASIN

WEDNESDAY, JANUARY 18, 1928

UNITED STATES SENATE,
Committee on Irrigation and Reclamation,
Washington, D. C.

The committee met, pursuant to adjournment of yesterday, at 10 o'clock a. m., in room 128, Senate Office Building, Senator Lawrence C. Phipps presiding.

Present: Senators Phipps (chairman), Jones, McNary, Oddie, Johnson, Shortridge, Kendrick, and Ashurst.

Present also: Senator Hayden.

STATEMENT OF THOMAS MADDOCK, ESQ., OF PHOENIX, ARIZ.—Resumed

The CHAIRMAN. Mr. Maddock was the witness on the stand when we adjourned. You may proceed, Mr. Maddock.

Mr. MADDOCK. Mr. Chairman, Senators, and gentlemen, I spoke yesterday and just touched on the fact that we think there are some fundamental errors in the Santa Fe compact. We think these can be corrected so we could exist under it, but we would like to point out to you what we think is a real, fundamental error.

There are two apparent allocations or dividers of water in the bill. There is one that says the upper basin must send down to the lower basin 75,000,000 acre-feet in any 10-year period, which is an average of 7,500,000 acre-feet.

As against this, there is a provision in the Santa Fe compact that there is allocated to the lower basin each year 7,500,000 acre-feet, and then later, another 1,000,000, or a total of 8,500,000. Naturally, you would think the 8,500,000 allocation is larger than the 7,500,000, but the contrary is true. This is because they anticipated that the Gila amounted to 1,000,000 acre-feet. If that were true it would be all right. As a matter of fact, there are over 3,000,000 acre-feet in the complete Gila. Perhaps, eventually there will be 4,000,000, but we can easily see 3,000,000 acre-feet at the present time. This is appropriated and practically being used right now.

When we subtract the 3,000,000 acre-feet of the Gila from the 8,500,000, it means there is only 5,500,000 acre-feet that we are allowed in the lower basin to use out of the main stream, despite the fact that the compact says the average of 7,500,000 acre-feet shall come down to us.

This means there are 2,000,000 acre-feet of water in the main stream that are unallotted. In addition to this, there is another unallocated amount of water spoken of and contemplated in the bill,

which is the amount of water there is in the river in excess of the amount that was divided at Santa Fe.

Senator JOHNSON. That is in the compact, you mean?

Mr. MADDOCK. Yes; the compact. I beg your pardon.

Senator JOHNSON. That is all right, sir.

Mr. MADDOCK. It has been estimated by the Geological Survey that there are 9,385,000 acre-feet that could arrive at Laguna. So this would mean that in the river there is 1,850,000 in excess of the 7,500,000 allotment of the compact plus the 2,000,000 unallocated water which exists because of the peculiarity between the 8,500,000 and the 7,500,000 clauses of the Santa Fe compact or there is a total of 4,300,000 acre-feet unallocated in the lower basin.

It seems peculiar that an 8,500,000 allocation should be less than a 7,500,000, but it is because of the fact that the amount of water in the Gila River was greater than they anticipated at Sante Fe or greater than they allowed for at Santa Fe.

The way we can get around this, in our sincere desire to accept a compact, is this. If that water is unallocated, and we can not legally take possession of it, we might be able physically to take possession of it. if no one else can take it.

This is why Arizona has requested a notification to Mexico, because if we notify Mexico we are going to use the water we develop in the United States, and there exists the physical limitation on the upper basin to take any more than 7,500,000 acre-feet—and we believe that physical limitation exists—then the lower basin is protected by physical facts on one hand and by a legal notice to Mexico on the other hand, and then regardless of the written danger of this portion of the compact we can tolerate it and exist under it.

We want to try to let you understand how we feel with respect to the matter of notification to Mexico, for this reason. In the West, under our laws or under the laws of any of the appropriation States, if you start a project and file on the water and build a dam and start to develop your land with the increased amount of water available for irrigation, under the law no one may come in and use the water that you have created before you yourself can put it to use on your land. In other words, if by your own activity you increase the amount of water, impound it, and store it, some one else may not take it hurriendly before you can, within a reasonable length of time allowance, put it to use on your own land.

All we are asking of Mexico is that the Mexican citizen be merely subjected to the same restriction that an American citizen is subjected to. We want them notified that United States construction of reservoirs constitutes an action on the part of the United States preliminary to putting all of this water created by storage in the United States on United States soil.

Senator MCNARY. It appears now that you are more tender of the rights of Mexico than you were when we were out in Arizona two years ago. Then it was vociferously claimed that Mexico had no rights in the Colorado River under any circumstances.

Mr. MADDOCK. I think if you will check my former statement——

Senator MCNARY (interposing). I am not checking up your statement; but that was the general claim made when we were out there. I do not dispute the proposition. I am just wondering why this softening now toward Mexico.

Mr. MADDOCK. We have not softened, I believe. Every one improves. We know more about this bill to-day than we did two years ago.

Senator MCNARY. I am not referring to the bill.

Mr. MADDOCK. I mean the whole matter.

Senator MCNARY. Neither am I quarreling or disagreeing with you. I am just making an observation.

Mr. MADDOCK. All right, sir.

The proposition is frequently brought up that we want to tax Government investments. We do not. We do not want to tax post offices or anything that belongs to the Government, but we look on this not as an investment, but as a matter that is guaranteed or presumed to be guaranteed. We look upon this as a mortgage. The Government is to advance the money and take the equivalent of a mortgage back. This is the way we look upon it, and if this is true it should not be exempted from taxation any more than any other mortgaged property.

Senator MCNARY. You are speaking of the physical property involved in the improvement now—the dam and the equipment, and so forth?

Mr. MADDOCK. Yes, sir.

In this regard we want to say that the Government justly permitted the lands and property that it owned in the East to pass into the hands of the people of the East. The Government, justly and no doubt rightly, retained the assets of the West until those communities could be built up through a State spirit or desire, something like you have in the East, or did have, to see that these State matters were handled righteously, and as the majority of us are no longer merely working in the West for a grub stake, that is the desire which would animate all the governments of the West.

It has been a great burden on us to get along with the Government owning most of the property. We have expected, under the various laws that the Congress has passed, that the property in the West would gradually pass into the hands of private individuals; but now when we are ready to take this over legitimately, apparently the Government is going to place us in a position where they will forever retain western assets, rather than allowing us the same conditions that prevail in the East.

Senator MCNARY. Now, Mr. Maddock, you always make yourself clear, and Governor Hunt made it clear to me yesterday, and it is a most interesting proposal, if I see it right, that when this money is expended to complete this development, it shall be taxed as though it were private property, and the income derived through taxation shall go to the State of Arizona.

Mr. MADDOCK. And Nevada.

Senator MCNARY. Yes; and Nevada. That is your proposition. Now, assuming that the dam and appurtenant structures would cost the Federal Government $100,000,000, your tax rate, we will say, is 2½ per cent upon a full value?

Mr. MADDOCK. No; not that high.

Senator MCNARY. Two per cent?

Mr. MADDOCK. I would not know just what rate to say, including county and State taxes, because this is the situation. In those

counties in which there is the greatest amount of property, the rate is least.

Senator McNARY. I do not mean for you to give it so accurately, but approximately—we will say the rate is 2 per cent?

Mr. MADDOCK. I would say that after a dam was constructed and the value of that property brought in, the rate would be nearer 1 per cent or say 1½ per cent.

Senator McNARY. Say 1½ per cent and from the calculation which I made yesterday that would bring into the two States $1,500,000, half of which, of course, would be $750,000, which would annually accrue to the benefit of Nevada and Arizona. Has there not been a proposal considered, at least, based on a division of certain charges per kilowatt-hour, that aggregates about the same figure?

Mr. MADDOCK. Even higher. There have been innumerable figures and proposals on power. I will touch on that in a moment, Senator.

Senator McNARY. Very well.

Mr. MADDOCK. I want to mention a few other matters.

I want to make a statement that a majority of the engineers——

Senator McNARY (interposing). Pardon me, but I think this is a very important matter. I am not quarreling with your proposal to exact from the Government a sum of money equal to the money that would be derived from taxation if it were privately owned, but would you write that into the bill? How would you consummate that situation, the property being public and consequently untaxable? How would you arrive at a scheme for procuring this revenue which is based upon the hypothesis of taxation?

Mr. MADDOCK. Well, I think there are numerous ways that that could be legally handled. If Congress would enunciate the theory we were entitled to it, I think the subsequent working out of it would be very easy. You see, Senator, we did not want to settle the old question of private as against governmental ownership here.

Senator McNARY. No; I understand that.

Mr. MADDOCK. We say we do not care which goes in. We have no controversy, as a State, between those two theories of activity. We were perfectly willing that either should come in and develop our State.

We do not want the Government to say no to the State of Arizona as it did when we made application to construct a dam a few years ago—not that I am justifying the application—but we made applica- a few years ago and the Government of the United States said: "No; your request will not be granted"; also a few years ago a private corporation in the State of Arizona made application and the Government said: "No; your request is not granted."

Now, we have an outside State, practically, under the guise of a governmental activity coming in and making application for the same thing, and apparently there is more inclination to give it to an outside State than there was either to a private or public applicant from the State of Arizona.

Senator KENDRICK. Mr. Maddock, would a question at this point interrupt you?

Mr. MADDOCK. No, sir; I have some notes here and I can drop back to them.

Senator KENDRICK. As I understood you yesterday, you made the statement that your objection to the construction of the dam, without return to Arizona, was on the basis that the benefits largely accrued to a neighboring State.

Mr. MADDOCK. Yes, sir.

Senator KENDRICK. Have you thought anything of the way the present reclamation law is applied in connection with the employment of the reclamation fund as a common fund and without regard to the source from which it is derived?

Mr. MADDOCK. Yes, Senator, and I have looked at it from many angles. Frankly, I think something that was intended to be very fair and very wonderful has not been fair.

Senator KENDRICK. Yes.

Mr. MADDOCK. I think your State of Wyoming illustrates it. To my mind, they have taken the resources of your State from you, thrown them into the General Treasury of the Government and then used your own resources for your destruction, in your natural competition with a neighboring State.

Senator KENDRICK. That is exactly the way the law has operated, in part at least, toward Wyoming. It occurred to me that the spirit of the Congress in enacting that law was undoubtedly fair. It intended, of course, to apply the law so that one State might well make sacrifices in the interest of other neighboring States, and that is the way it has worked, I think, in a good many ways, but in some cases there have been inequalities, and I wonder if the situation does not appeal to the people of Arizona because of the fact they have received very much greater benefits from the reclamation fund than they have contributed.

Mr. MADDOCK. That is true, Senator, and we recognize that, and we are very appreciative to the Federal Government for it, but here is our position. Eventually, every dollar that we receive without interest (which is really quibbling)—but eventually, every dollar we receive from reclamation and irrigation must go back to the United States Treasury, but at the same time the Federal Government is making to the other State, the State of California, for instance, appropriations for harbors and rivers, removing debris. Innumerable other appropriations are going into all parts of the United States, and we say if you are going to consider the money we have received from the Federal Treasury you should also consider the other funds the other States have gotten for their purposes, because they largely offset them.

Senator KENDRICK. That is only part of it, Mr. Maddock. She has up to the present time fared rather favorably, do you not think?

Mr. MADDOCK. Undoubtedly; we admit it.

Senator KENDRICK. And it has been shown here by your own testimony, in the questions that were answered yesterday I think very frankly by yourself, that under the construction of this dam Arizona would profit immeasurably in lands that could or would be reclaimed, very naturally, under the measure.

Mr. MADDOCK. I would not say naturally under this measure, but would naturally under a fair measure.

Senator KENDRICK. It seems to me that might very well influence the people of Arizona. Then I want to ask one other question while

it is in my mind. Have you or have the people of Arizona considered a plan of securing a return on this investment after the Government's investment has been returned to the Government?

Mr. MADDOCK. Yes, sir; that has been considered, and we have many people who advocate that we shall forego any present taxation in order to quicker pay off the Federal Government.

Senator MCNARY. I beg your pardon, but are you through on that point, Senator?

Senator KENDRICK. I simply want to indicate more clearly what I have in mind. In order to promote this development, and I think we are all agreed that there is need for it, and I think the Government has a responsibility there—I do not believe anyone will deny that—in order to induce the Congress to take this action there must be no unreasonable delay, so far as we can foresee, in the return of the money to the Government. Anything that would interfere with that, of course, is an obstacle in the plan of development.

Mr. MADDOCK. Have you a question, Senator?

Senator MCNARY. I perhaps misconstrued Senator Kendrick's statement. I have not read the bill this year, but as I recall, all this legislation is proceeding upon the theory that the money should be returned to the Government within a period of 50 years at a low rate of interest, and the title to the property in perpetuity rests with the Federal Government.

Mr. MADDOCK. Just a part of the property. The part in Arizona and Nevada goes in perpetuity to the Federal Government, and the part in California is to go to the people of the Imperial irrigation district.

Senator MCNARY. I am talking about the improvement in the river.

Mr. MADDOCK. I am talking about the bill.

Senator MCNARY. But is it not true that if the Government expends $100,000,000 there in the impounding of this water by the construction of this dam, as well as the power houses and the equipment, the title for all time is in the Government?

Mr. MADDOCK. Under the bill; yes, sir.

Senator MCNARY. That is what I said. I thought the intimation was being given out that when the money was returned, the dam itself and the investment became private property, which it does not.

Senator KENDRICK. No; it does not become private property under the terms of the bill, as I understand it; but when the money had been returned to the Government and it had received its construction charges and its interest so that it was without investment, then and there, it seems to me it would be entirely consistent for Arizona to insist upon either owning a part of the dam and the improvement or immediately coming into her own in the way of the collection of taxes on it.

Senator MCNARY. But you understand the bill proceeds on a different theory. By reason of the low rate of interest, it is thought the losses the Government would suffer thereby would quite justify retention of the title as against private investment. That is the theory of the bill.

Senator KENDRICK. Yes; that is one theory, but, Senator McNary, you will agree that as long as the Government receives interest on the investment in exact proportion to what it pays for money itself,

or even in excess of that, the Government would not sustain any particular loss.

Senator McNARY. I am not quarreling with you, Senator, but am simply trying to analyze the matter to see whether I understand the present bill. I am speaking of the difference between the Government lending this money at 4 per cent and private investors who would have to get it at 5½ or 6 per cent. It is for this reason it has been thought the Government has the right to retain the title. Is not that your understanding, Mr. Chairman?

The CHAIRMAN. That is correct, except I would not agree on the interest rate which private enterprise would have to pay. I do not think the rate would be in excess of 5 per cent.

Senator McNARY. Maybe not; but I am trying to get at the principle here rather than the rate of interest.

The CHAIRMAN. Yes.

Mr. MADDOCK. May I answer those questions? That idea has been expressed in the State and it has been suggested it might be advisable to do that. As against that there are people who say that the State, at this time, on account of its necessity for growing, is in a different situation. To-day, in our State, we are growing very fast. We are the fastest-growing State in the Union, or were between the last two censuses. We are growing so fast we have the burden on our taxpayers, not only of maintaining our Government, but of growing, which is extremely hard, and because of that some people think the State might receive some remuneration at present, and, perhaps, take the major portion of its benefits later.

Of course, if a private company were to build the project, we would get the taxation on the property just like any other property. For instance, if a private company came into our State with a proposition that was going to be beneficial to all our people, and should ask the State of Arizona to be forever exempted from taxation, our State would not grant that, and yet, here is a proposition where the major portion of the benefit will go elsewhere. Seventy per cent will go to California under any circumstances and 98 per cent will go to California if this bill goes through, and yet they are asking for an exemption from taxation which we would not grant to a company coming into our own State for its exclusive benefit.

Senator KENDRICK. Mr. Maddock, that argument is sound as far as it goes, but it is at least in disregard of this common interest of the States that I mentioned a while ago.

Mr. MADDOCK. Yes; we recognize that, and I am just giving this as a principle where we might make some conciliation, because we do not want to stop this construction.

We are not raising any tax barrier here to keep this thing from going through, but here is our position:

The contract specified in the bill will be negotiated between the Secretary of the Interior, who may I say at present, at least, is antagonistic to our State, and a purchaser in California. Arizona has no way in the world of controlling or having any influence over the sale of this power. This group may negotiate this power at so cheap a price that the repayment to the Government may be indefinitely postponed, and we would never secure any benefit.

The CHAIRMAN. There is a limit in the bill.

Mr. MADDOCK. Fifty years, but, Senator, 50 years is not going to interest very many people that are now alive in the State of Arizona as far as returns are concerned.

The CHAIRMAN. Of course, one of the difficulties there is that the power produced at the dam will of necessity have to compete with power produced at other places and by other means than hydroelectricity.

Mr. MADDOCK. Yes, sir.

The CHAIRMAN. Taking into account the development of power through steam, for instance, which is quite fully covered in the House hearings.

Mr. MADDOCK. Yes, sir.

I want to cover some of the points I have noted down here as I go along, and in that way I may get through a little quicker.

A majority of the engineers of the United States are against this project as now laid out. You have four departments, principally, of the Government that have given some expression on it.

You have the Reclamation Service, which is favorable, but as against that there is your Army construction forces, as represented by the only Army engineer's expression that has been given, and your Geological Survey, as represented by its engineer's expression, and your Federal Power Commission engineers, constituting three departments that are against it.

Senator ODDIE. May I ask a question right there in regard to the attitude on this question by the Geological Survey? Is not that based on the report of just one engineer, Mr. La Rue?

Mr. MADDOCK. No; La Rue and also Stabler.

Senator ODDIE. Is not that based largely on an economic computation?

Mr. MADDOCK. Yes, sir.

Senator ODDIE. Did you read the Senate hearings of last year?

Mr. MADDOCK. Senator, I have read every word of everything that happened here.

Senator ODDIE. Do you not think that in the Senate hearings those conclusions were pretty thoroughly overthrown and shown to be ill-advised and incorrect in some cases?

Mr. MADDOCK. No; I did not draw that conclusion, sir.

May I say there is an engineering council which has presented an adverse resolution; a list of its member organizations is printed in the House hearings. It is composed of the greatest engineering societies of the United States, and they recently went on record, within the last week or so, as being against this measure.

I want to point out another thing——

Senator JOHNSON (interposing). Pardon me, but in order that I may identify that report, is that the one that also went on record as against Muscle Shoals?

Mr. MADDOCK. I do not know, Senator.

Senator JOHNSON. Can you tell me whether it was upon the theory of the allowance of an option to the Secretary of the Interior or to the Government to erect a generating plant?

Mr. MADDOCK. In the resolution that was not mentioned. The reasons were not mentioned. It was just simply that they were against it. I just had an opportunity to glance at the resolution before it went into the House hearings.

Senator JOHNSON. I have not read it and that is the reason I have asked you about it. I saw a newspaper account of it.

Mr. MADDOCK. I did not see that, sir.

Senator JOHNSON. I think that carried the idea—I am not sure I use the exact term—that it was a socialistic scheme in taking the Government into business, and for that reason the organization opposed it. I am not trying to be accurate in my statement, because I saw only a newspaper account of it.

Mr. MADDOCK. This engineering council is represented by the American Institute of Electrical Engineers, and I am not quite certain about the society I belong to now being a member, but I know the American Society of Engineers is the greatest association of civil engineers in the United States, and as to the other organizations, they are the best that we have in the United States which belong to this engineering council.

Senator ODDIE. May I interrupt just a minute to perhaps clarify a question I asked a few minutes ago or the conclusion I stated? I do not want to be on record as questioning the geological conclusions of the representatives of the Geological Survey, because I have a particularly high regard for those men and for their geological work, but I do question their conclusions on the economic problem that they discussed in regard to this question. I think that was a little outside of the Geological Survey, and I think there were influences in that respect.

Mr. MADDOCK. It was my understanding that the Reclamation Service was really, originally, and, may be even yet, technically a portion of the Geological Survey.

Senator ODDIE. They used to be under the same head, and they are still a part of the Department of the Interior.

Mr. MADDOCK. Of course, the Geological Survey has gone far beyond just geology. I believe the best information we have on water comes from them. I know they measure more of the streams in the United States than any other organization.

Senator ODDIE. As to the economic conclusions, I took issue with them.

Mr. MADDOCK. I see.

Senator ODDIE. But I have a high regard and high respect for them as geologists and men, and I wanted that to go in the record.

Mr. MADDOCK. It is possible for the Government, or for the Congress part of the Government, to make a decision here that might give California 75 per cent of the water simply by advancing her economic ability to take it over that of Arizona. On the other hand, it is possible that the State of Arizona might go into the Supreme Court, and there, under a finding of that tribunal, be allotted the water of her own State that she can control.

Both of these things are possible should the Supreme Court decision follow out the theories of the Pittman resolution. California would only get about 25 per cent of the water, because that is the amount of the water that she is now using, speaking now of percentages as between the two States and not of the basin. They are using to-day and have prior right to about one-fourth of the water.

So, under one line of activity, congressional, California might get 75 per cent, and under another line Arizona might get 75 per

cent; and it was because of that we said that a 50-50 division—"a peace without victory"—might be the best solution of this question.

I do not see how anyone can say that Arizona has not land available. At Denver we asked the four upper governors, between our second and third Denver meetings, to send their engineers down into our State so that we might prove to them, by actually showing them, the land we had available. It was possible for only one State to comply. The State of Utah sent a man down to our State, and he has made a report to the governor, and that report, as I read it, including his supplemental report, indicates there is far more land feasible of irrigation in Arizona than there is in California.

The CHAIRMAN. You are speaking now of Arizona lands that can be watered by gravity flow from the proposed Boulder Canyon dam?

Mr. MADDOCK. Feasible would include that; yes, sir. We have far more land—we have millions of acres of land that could be irrigated by gravity under some schemes if water were available; but we have land that could be irrigated by gravity from Boulder alone, of some 1,400,000 acres, and that 1,400,000 acres would take up all the water we are asking for on a 50-50 division.

Senator JOHNSON. While you are on that subject, if it will not interrupt you——

Mr. MADDOCK. No; not at all; only I am afraid I am taking up too much time.

Senator JOHNSON. I have a note here of a question I want to ask you in that regard. What amount of lands in Arizona would you say are capable of irrigation and reclamation from a construction such as is contemplated in the Boulder Dam project.

Mr. MADDOCK. How many acres?

Senator JOHNSON. Yes, sir.

Mr. MADDOCK. As I recall it, there are about 280,000 or 290,000—say, roughly, about 300,000 along the river, very, very close, that might be termed bottom land or bench land, right adjacent to the river; and in addition to that, there would be 1,100,000 up in the valley of the Gila that might be reached by pumping, or by a gravity canal.

Senator JOHNSON. So that by the construction of the work with the storage capacity planned by the Boulder Dam project, in Arizona there would be about 1,400,000 acres susceptible of reclamation and irrigation.

Mr. MADDOCK. But not under the bill, sir.

Senator JOHNSON. I am not speaking of the bill, I am speaking of the construction of a dam such as——

Mr. MADDOCK (interposing). Physically.

Senator JOHNSON. Feasible—you used that word and I think it is a good word.

Mr. MADDOCK. Yes, sir.

Senator JOHNSON. What is the condition of this 1,400,000 acres of land at the present time?

Mr. MADDOCK. Of that 1,400,000 there is probably not over 75,000 or 80,000 acres, or something under 100,000 acres, in cultivation. The rest of it is desert.

Senator JOHNSON. It is what we term waste and desert land.

Mr. MADDOCK. I would not say waste, it is just waiting there for water.

Senator JOHNSON. Desert land.

Mr. MADDOCK. Desert land just like the California land was desert before they put the water on it.

Senator JOHNSON. But there the development has proceeded and made of the desert a garden spot.

Mr. MADDOCK. Yes, sir.

Senator JOHNSON. The land that thus could be reclaimed and irrigated is soil that I think may be described as being very excellent soil, could it not?

Mr. MADDOCK. Yes, sir.

Senator JOHNSON. And that soil would be capable of producing all of the fruit and all of the products that are the pride both of your State and of ours.

Mr. MADDOCK. Yes; in that particular latitude and under those heat conditions—semitropic.

Senator JOHNSON. Semitropic fruits, grapefruit, all citrus fruits, garden truck and the like—all of that could be produced on this land?

Mr. MADDOCK. Yes, sir.

Senator JOHNSON. And that land of yours now, unless there is development of the Colorado River—I am speaking not of the bill, but of the development of the Colorado River—will remain desert, will it not?

Mr. MADDOCK. Without development, yes, sir; absolutely.

Senator JOHNSON. Now, from the Boulder dam site; that is, from back of Boulder Canyon, how much land is now under irrigation or reclamation?

Mr. MADDOCK. Senator, I would have to refer to some notes to answer that.

Senator JOHNSON. I am just asking you approximately.

Mr. MADDOCK. Not very much; a little land around Parker—you are speaking of Arizona?

Senator JOHNSON. Oh, yes.

Mr. MADDOCK. A little around Parker and Mohave and Cibola Valleys is about all.

Senator JOHNSON. And that little is a negligible quantity?

Mr. MADDOCK. In comparison with what is proposed here, it is insignificant.

Senator JOHNSON. And that has been the condition existing there, of course, for many years in the past or continuously in the past?

Mr. MADDOCK. Yes, sir.

Senator JOHNSON. With storage at Boulder Canyon all of that land contiguous to the river between Boulder Canyon site and the Yuma irrigation project would be capable of irrigation and reclamation, would it not?

Mr. MADDOCK. You mean with development but not necessarily with this development?

Senator JOHNSON. I am speaking of "with development."

Mr. MADDOCK. Yes, sir.

Senator JOHNSON. So with a high dam at Boulder or Black Canyon——

Mr. MADDOCK (interposing). Yes, sir; or anywhere else in the canyon.

Senator JOHNSON. And a storage capacity such as we indicate——

Mr. MADDOCK. Yes, sir. I might say that if that development came immediately, I can not even say that all of this bottom land would come in immediately. It will come in as fast as it is economically possible to produce something on it that can be sold to advantage.

Senator JOHNSON. I am not discussing farm conditions or that sort of thing at the moment; I am speaking of the development of the country.

Mr. MADDOCK. There can be no more development, practically speaking, anywhere in the lower basin until there is some regulation of the river. The present flow is wholly appropriated; in fact, it is overappropriated.

Senator KENDRICK. Just one question there. Would not that mean that the development would have this particular possibility in Arizona—to irrigate and reclaim land to the extent of 1,000,000 acres?

Mr. MADDOCK. About 1,400,000 acres altogether. The Senator spoke of the land lying right along the river.

Senator KENDRICK. But this 1,400,000 acres would be possible of development as a direct result of the building of the Boulder Canyon dam.

Mr. MADDOCK. Yes; or any other dam, but part of it is right along the river, bottom and bench land, and part of it would either have to be irrigated by a gravity canal or by pumping back up into the adjoining large valley of the Gila that comes down and joins on to the Colorado Valley.

Senator JOHNSON. Could you segregate those two amounts?

Mr. MADDOCK. Roughly, I have, Senator.

Senator JOHNSON. Yes; 300,000 and 1,100,000.

Mr. MADDOCK. Yes; understand, that is very rough.

Senator JOHNSON. Yes; I recall you did do that.

The CHAIRMAN. It might be interesting at this point to know what would be the necessary pumping lift to reach the 1,100,000 acres.

Mr. MADDOCK. The average, I as said yesterday, would be about 250 on the total in the State. The highest of that would be 450, if you were going to use the pumping system.

The CHAIRMAN. And what is the lift at the Mesa unit of the Yuma enterprise at the present time—less than 100?

Mr. MADDOCK. I think it is 73, but I do not like to testify about that exactly, because I am depending on my memory.

The statement has been made that the Boulder Canyon Dam is the only possible dam. As against that we want to point out that no one can say that, because the other sites have not been drilled, and therefore anyone who testifies to that is doing so without the facts. As long as the foundations are as important a factor in a dam, as they are, when you have not made the drillings at a dam site, you can not say this or that dam is better than any other; but I will not go into that feature and will leave that for another speaker.

Senator ODDIE. In that connection, Mr. Chairman, I think the other factors are of exceeding importance—the proportion of storage space and the consequent silt settlement factor.

Mr. MADDOCK. Senator, allow me to say this: We do not think that the Boulder Canyon Dam is the most economical or the best, yet we are reconciled to it if you want it and other people want it, if we can get the other matters in the bill cleared up.

Senator ODDIE. I can understand your position in that regard, but I think there ought not to be any reflection in the record upon the physical characteristics of the canyon where the dam will be built, and when it is mentioned I think the storage space should be mentioned too, showing that the Boulder Canyon Dam will provide a much larger storage area than the other.

Mr. MADDOCK. Well, it is practically identical with Glenn——

Senator ODDIE. Do you mean that the storage capacity is as large in Glenn Canyon?

Mr. MADDOCK. They are practically identical. There are only three big storage sites.

Senator ODDIE. In acre-feet of water?

Mr. MADDOCK. Yes; for equal heights. For 100 feet, 200 feet, etc., Glenn and Boulder are practically identical. I could go into that question, but it is going to take so much time, Senator, I would rather not. I have a little table I will furnish you, with the ravine sections and storage capacities, which makes it very easy to compare them.

Senator ODDIE. The Boulder Dam would catch a great deal of silt, which the Glenn Canyon would not, coming from tributary streams.

Mr. MADDOCK. That is true, but we have another way of regulating that by a dam in the Little Colorado that would cut off that. Are you going to force me to go into this question? Senator Hayden told me to hurry and get through, and I am trying to comply with that request.

Senator ODDIE. That may be true, but I want to have the record show that Boulder Canyon site is a most excellent one.

Mr. MADDOCK. We agree with that.

Senator ODDIE. There may be some others.

Mr. MADDOCK. If we were going to put in only one dam in this river forever, the logical, economical place to put it is Boulder Canyon; but our contention is this: While it is the logical, economical place for one dam, it does not fit in with a comprehensive scheme for the whole river. It would take me some time to explain that to you, but that is our opinion.

Senator ODDIE. It does not necessarily bar Arizona from building one higher up?

Mr. MADDOCK. I am going to have to go into this question.

Senator ASHURST. No, Mr. Maddock; do not go into that.

Senator ODDIE. Later on I would like to have that explained for the record, Senator, because it is a very vital question.

Senator ASHURST. That has been done so often—I beg the Senator's pardon.

Senator ODDIE. Then we can refer to that portion of the former record.

The CHAIRMAN. The statement you said you could furnish giving the relative capacity, and so on, of this dam—will you furnish that for the record?

Mr. MADDOCK. It is really just a condensation of Government reports.

The CHAIRMAN. You can furnish that later.

Mr. MADDOCK. All right, sir. I will be glad to do that.

(The tabulation referred to is as follows:)

Table of capacities of reservoirs for various heights above low water

Name of dam	Name of river	Height and capacity						
		100 feet	200 feet	300 feet	400 feet	500 feet	600 feet	Capacity at various heights
		Acre-feet	*Acre-feet*	*Acre-feet*	*Acre-feet*	*Acre-feet*	*Acre-feet*	*Acre-feet*
Topock	Colorado	4,488,000	15,780,000					[1]22,000,000
Boulder Canyon	do	382,000	1,950,000	5,350,000	11,125,000	20,175,000	33,425,000	[2]34,000,000
Glen Canyon	do	362,000	1,496,000	3,900,000	8,609,000	17,155,000	31,240,000	[3]72,045,000
Diamond Creek	do	44,000	225,000	641,000	1,360,000	2,428,000	3,870,000	[4]5,008,000
Bridge Canyon	do	18,000	96,000	311,000	773,000	1,566,000	2,742,000	[5]6,238,000
Roosevelt	Salt	160,000	1,160,000					[6]1,637,000

[1] 243 feet. [2] 605 feet. [3] 773 feet. [4] 665 feet. [5] 793 feet. [6] 230 feet.

Mr. MADDOCK. There is an idea that the larger preponderance of population in the Colorado River Basin is against Arizona in this matter. You know I can not recall any good-sized town or any city—I tried to this morning—in this Colorado River Basin outside of the State of Arizona. There is a lot of area in other States.

Arizona, Utah, and Colorado have over three-fourths of the water, over three-fourths of the population in those three States, and over three-fourths of the area. This means more to Arizona, California, and Colorado, and Utah, and all the other States combined by three times.

I feel sometimes that the Senate has not been really seriously considering this bill. I do not believe you are going to pass it the way it is. I have too much love and regard for our Government to believe that you are going to do it. Also, I do not think it is right to jockey with it or to try to frighten a State into agreeing on something against her interest by threatening legislation. To my mind this is undignified.

Frankly, as a State, we do not oppose a project that is the equivalent practically of all the other reclamation projects that have ever been built; but we do not want to pay for it exclusively. Our portion of the Federal Government taxes we will gladly pay, even if it is going to benefit an adjoining State, but we do not want to have to pay for all of it as this bill provides, by a levy on our resources.

If we are going to irrigate some of our land on our mesas by pumping the water, we do not think our farmer when he pays his electrical pumping charge should pay the cost of the irrigation system for his competitor over in California. We do not think it is right for the mining industry of the State of Arizona or the mining industry of the State of Nevada to pay for the irrigation ditch of the farmer of California.

There is another matter I want to speak of which is more of a personal objection. I think a wrong was created in this bill. It was in the first paragraph or the first section of the original bill, but it

has now been relegated to a later portion of the bill. This bill is held out as something for the ex soldier, sailor, and marine. I think this is unfair, and as one of them, I frankly—and this is personal—resent it. I resent its being played up that they are going to get land here when practically all of California land proposed to be irrigated is already in private or corporate ownership. I resent the fact that you are going to build a canal parallel with the Southern Pacific, which owns, through land grants, large acreages, and then have the word go out to the soldiers that they are going to get this land or have an opportunity to get it. I do not think this is right. It is like the bonus that was held out to these men. I did not agree with the bonus idea, but it was held out to the men for years and then was taken away from them. I do not think Congress should do this. I do not think we should make something out of patriotism that is false and unfair.

There is another thing in the bill I do not like which is apparently a concession, and yet it is not.

The bill says that so far as "practicable" ex soldiers, sailors, and marines shall be given consideration when men are to be employed. What does this mean? It does not mean anything in the world. It means that any man who happens to be there hiring men can use his own sweet judgment.

Senator ODDIE. Right at that point, let me make a remark. I will take one illustration, the Bureau of Public Roads. There is a provision in the law requiring a certain preference to be given to ex-soldiers.

Mr. MADDOCK. Yes, sir.

Senator ODDIE. And in this case the preference has been given and a very large majority of the men employed in an engineering capacity or in a laboring capacity have been ex-soldiers, and the Bureau of Public Roads has been able to do a good service to the ex-soldiers in this way.

Mr. MADDOCK. That is true; but I do not see why we do not meet this issue fairly and squarely. You just leave it up to some subordinate to hire or not, as he sees fit. If he is against the ex-soldier, the ex-soldier is given no opportunity. If he is for him, he does just like we did in our State, and I would say that one time 90 per cent of our State highway crew were ex soldiers, sailors, and marines. We ought to meet this issue squarely. If you think 5 per cent, 50 per cent, 90 per cent of the workers should be service men why not say so definitely. If you believe in the soldiers, say it. This is just as if a captain in the war who would announce to his men, "Go forward just as far as practicable." You ought to meet the issue. If the soldiers had not met the issue any better than Congress is attempting to in this case you would not be here, perhaps, as a Congress, but we would all be working under a government the edicts of which would come from Potsdam. The soldiers met their issue. If you mean to give them something, be fair and say just what you intend to give them. Also if you think Arizona needs water say how much.

I told the Senator I would go into the power question just a little. It is possible to postpone this power question, and when we made the suggestion at Denver it was not made with any other idea except

to be fair in that matter. To delay while the minds of men were getting in accord.

It is to take seven years for this dam construction, it will take some three years to put in the foundations, and it will be at least that time before you need to do anything at all with the power question.

If it is the desire that you shall settle the water question first as the upper basin requested us to do, it can be done. When we agreed to that it was with a knowledge that some three years might intervene and there would be no delay in construction while this power question was being settled. We could never agree to let California secure our power by refusing to discuss it.

There are innumerable estimates of the difference between steam and hydroelectric costs. All we want you to do is to establish a principle of the State right of taxation. Arizona did not seek to impose any specific tax for all time on power dams and plants. We do not believe in it. We know that money values change. What might be a right tax to-day would not be right before the expiration even of the 50-year terms of this bill. So we do not want to make the tax definite. It was at the suggestion of California that we did suggest a definite tax, and when we did that we put on the same tax that exists in this bill against the State of Arizona.

The all-American canal cost, plus the eleven or twelve million dollars for the "A" line, will impose a tax of 1 mill on every user of the power from the Boulder Canyon Dam under the provisions of this bill. Every man in Arizona that bought power would have to pay a tax to an adjoining State, and if it is provided in the bill that we pay a 1-mill tax to a State that does not own the resources, we think it is more than just, if the project will sustain it, that the project should pay a tax to the States that really possess the assets.

So we had ample precedent for our suggestion of 1 mill. The all-American canal is estimated at $31,000,000, and $11,000,000 for the A line makes $42,000,000, and when you put the interest on during construction you run it up to $50,000,000. Five per cent of that—4 per cent return to the Government and 1 per cent to amortize it in 41 years—gives you $2,500,000; add $500,000 for maintenance and operation, and another $100,000 for that project's portion of the cost of handling the irrigation water through the dam, and you get $3,100,000 per year as the cost of the all-American canal. Divide this by the 3,168,000,000 kilowatt-hours that will be developed and transmitted, allowing 12 per cent line loss, and you get a cost of 0.98 of 1 mill against every user of power in the States of Arizona and Nevada as a tax. If we impose such a tax it is a "tax," because the asset lies in our State; but with the Federal Government imposing it, it is a royalty which we must pay to the great State of California because that State does not possess the property which produces the power.

Therefore, if there is a royalty in this bill, it goes not to the State of Arizona but to the State of California.

In closing, I want to say we are the youngest and fastest growing State in the Union. This Nation wants a lot of good States. I am a Republican and I believe in a strong, central government, but I believe in a strong State government just as much as I believe in a strong central government. Do not try to stunt our growth. Give the State of Arizona a chance, and we will make a great State out

there for the Nation, because, as the Arab says, "The son of the house is not the servant forever." I thank you.

The CHAIRMAN. Are there any questions?

Senator JOHNSON. Mr. Maddock, how water comes into the——

Senator ASHURST (interposing). Pardon me, Senator Johnson, just a moment. Time is becoming such an element I wish to know against whom the cross-examination is to be charged?

Senator JOHNSON. It is a matter of indifference to me, really.

Senator ASHURST. It is becoming important to us.

The CHAIRMAN. Of course, it is rather difficult to keep the time accurately, but I think the clerk of the committee will endeavor to make an estimate. We have spoken of that.

Senator ASHURST. All right; thank you.

Senator JOHNSON. How much of the water of the Colorado is due to tributaries that flow through Arizona?

Mr. MADDOCK. It is almost impossible to answer that question. If you mean water that finally arrives, there is much of Arizona's water that never reaches the Colorado, yet in the Santa Fe compact the consumption within the basin is considered. It must be considered. We have a river, like the Santa Cruz, that comes down in torrents at times, yet never reaches the Gila or Colorado Rivers on the surface.

Senator JOHNSON. I do not expect exact figures, but I am asking you, approximately, what is the contribution of the tributaries of the Colorado, in Arizona, to the flow of the Colorado?

Mr. MADDOCK. The Gila is practically exhausted or is in process of being exhausted, so you might say there will be no contribution.

Senator JOHNSON. How much water flows from the Gila into the Colorado?

Mr. MADDOCK. On the average, it runs about a million acre-feet a year. Understand, that is after the development took place.

Senator JOHNSON. What other tributaries are there that flow into the Colorado?

Mr. MADDOCK. Outside of the Gila system?

Senator JOHNSON. Yes.

Mr. MADDOCK. How large tributaries do you want me to include?

Senator JOHNSON. I mean those that contribute substantially to the stream.

Mr. MADDOCK. Well, up in the Grand Canyon——

Senator JOHNSON. I am not speaking of that, but of those coming through Arizona and below, say, the site of the Boulder Dam.

Mr. MADDOCK. Below the site of Boulder, the only thing of consequence is the Bill Williams Fork.

Senator JOHNSON. In making the division of 50–50 you spoke of, you claimed all the waters of the tributaries of the Colorado, did you not?

Mr. MADDOCK. No, sir; I was trying to make the statement that that is exactly what we were "not" claiming.

Senator JOHNSON. You did not claim that?

Mr. MADDOCK. No, sir.

Senator JOHNSON. You included the tributaries with the flow of the Colorado in your proposition of 50–50.

Mr. MADDOCK. Those that flow from our mountains in through our canyons, that can not be used in their own valleys for irrigation purposes would be included in the main Colorado.

Where the trouble is, Senator, the Colorado has an evaporation going on and the Arizona tributaries in the northern part of the State mostly offset that evaporation. Until lately it was not recognized how large our contribution was, because the evaporation is going on while these tributaries are coming in. Our tributaries produced so much more than the evaporation as to make an increment of about 1,600,000 acre-feet per year between Lee's Ferry and Topak, and there is much evaporation through the Mojave Valley above Topak.

Senator JOHNSON. Will you state whether or not Arizona has claimed all the waters of the tributaries?

Mr. MADDOCK. I will state, as I did yesterday, that for over a year——

Senator JOHNSON. No; won't you just state the fact? Is it not a fact that Arizona claims the waters of the tributaries of the Colorado that flow through Arizona?

Mr. MADDOCK. No, sir. Over a year ago we submitted to California a proposition that those of our tributary waters that could be developed in their own valleys belonged to the State, but those that could not be developed within their own tributaries and went into the main channel could not be claimed by Arizona down below, but should become an indivisible portion of the main stream.

Senator JOHNSON. Do you couple that with the claim that all of them could be developed within their own State?

Mr. MADDOCK. I am afraid I did not follow you on that last question.

Senator JOHNSON. What I am trying to get at, and if you do not understand me, it would be just as well to say so, and if you do, I would be very glad for you to answer me—Arizona has claimed the tributaries. We will take, first, the Gila River, that is claimed, is it not, by Arizona?

Mr. MADDOCK. Yes, sir; we claim we have that appropriated now.

Senator JOHNSON. The other tributaries are in like situation, are they not?

Mr. MADDOCK. No, sir.

Senator JOHNSON. Any of them?

Mr. MADDOCK. Any of the other tributaries?

Senator JOHNSON. Yes.

Mr. MADDOCK. Some of them can be used, but not all of them are appropriated like the Gila.

Senator JOHNSON. When you talk of a 50–50 division, you refer to the main stream of the Colorado without reference to the tributaries, do you not?

Mr. MADDOCK. No; I mean the main stream practically, as considered from the Gila.

Senator JOHNSON. From the Gila?

Mr. MADDOCK. Yes.

Senator JOHNSON. That is, with the Gila excluded.

Mr. MADDOCK. Yes; on this little map there is a division between the Gila and the other.

Senator JOHNSON. You said there were some things in the compact that must be corrected.

Mr. MADDOCK. No, sir.

Senator JOHNSON. Did you not—I thought you did.

Mr. MADDOCK. I say there are some things in there that "ought" to be corrected—in the original document—but we believe that the physical limitation on the upper basin and a specific verbal or written notice to Mexico will overcome that, so that we could tolerate and take the Santa Fe compact.

Senator JOHNSON. Then you could take the Santa Fe compact with a notice to Mexico; is that correct?

Mr. MADDOCK. We could take the Santa Fe compact with a notice to Mexico and a division of the water of the lower basin among Arizona, Nevada, and California.

Senator JOHNSON. Then if there were that division you would be willing to execute the Santa Fe compact?

Mr. MADDOCK. Yes; with notification to Mexico and an agreement in regard to power.

Senator JOHNSON. That agreement in regard to power would be one that would recognize the principle for which you have contended here and of which you have spoken?

Mr. MADDOCK. Yes, sir.

Senator JOHNSON. Will you state that principle again, very briefly?

Mr. MADDOCK. That principle is that Arizona feels that from her natural resources, if developed by the Federal Government for the benefit of another State, we should have a return in taxation equal to what we would secure if they were developed by private or corporate activity.

Senator JOHNSON. When would that taxation under a Government project begin?

Mr. MADDOCK. It would be limited, but just when it would begin——

Senator JOHNSON (interposing). Let us take this as an actual fact. Say the Government went ahead with the Boulder dam project, when would you wish to begin to tax it?

Mr. MADDOCK. We would wish, and we so stated in the proposition we submitted to California, that the taxation should start when it was able to pay; that there should be no taxation until construction was complete.

Senator JOHNSON. That is, until the construction was complete you would have no taxation?

Mr. MADDOCK. That is the provision, briefly, we outlined.

Senator JOHNSON. And that is the great principle that is at stake with you in this measure?

Mr. MADDOCK. How do you mean, sir?

Senator JOHNSON. That is the big principle.

Mr. MADDOCK. You mean taxation?

Senator JOHNSON. Yes.

Mr. MADDOCK. There are two. The water and the power are about equal, sir. The water probably means more to our State, but I would say power means far more to your State than the water does.

Senator JOHNSON. I am speaking of your State now.

Mr. MADDOCK. Eventually, if we got our contention, which would give us 30 per cent of the future benefits that would come to the lower basin, I would say our water, probably, exceeds the power benefits. I can look that up.

Senator JOHNSON. The division of water would exceed the power benefits?

Mr. MADDOCK. I would rather refer to my notes on that, but there is about three times the value of the power resource created that there will be from water, but Arizona's proportion of power eventually used will be so much less than California's, that I believe we will probably benefit more by the water, including the indirect benefits that come with the water, than from the power.

Senator JOHNSON. And you could only benefit from the water in case there was development on the Colorado River?

Mr. MADDOCK. Admitted.

Senator JOHNSON. And you could only benefit by power in case power were developed upon some great works in the development of the Colorado River?

Mr. MADDOCK. Yes, sir.

Senator JOHNSON. That is admitted, of course.

Mr. MADDOCK. Yes; but we know we will have a development if you will just leave us alone.

Senator JOHNSON. That is self-evident.

Mr. MADDOCK. You mean the latter?

Senator JOHNSON. No; not the latter, because up to this time there has not been this development by Arizona.

Mr. MADDOCK. But we are growing faster than anybody else.

Senator JOHNSON. I understand. I would not detract from the growth or prosperity of Arizona under any circumstances. Recently there was an appropriation of $3,000,000 that came before the Senate for the Coolidge Dam, and I was very glad to be a party to passing that appropriation.

Mr. MADDOCK. And we want to thank you for it.

Senator JOHNSON. You do not need to thank me. It was a matter of absolute justice to you; that is all.

Mr. MADDOCK. But we want to say something more—may I make a statement there?

Senator JOHNSON. I do not like the idea that has been suggested, if you will pardon me for saying so to you very courteously, that we are endeavoring to do something that is unjust to Arizona. We are submitting to the Congress a measure here which is an appropriate matter, of course, of argument among us, but it is far from any design of mine—I do not know what any other man may have in view, but it is far from any purpose of mine to do an injustice to any State in the Union. I am viewing this from a national aspect, and perhaps our viewpoint may be different in that regard. Pardon me for injecting this into this examination.

Mr. MADDOCK. May I make just one remark here?

Senator JOHNSON. Yes; make any remark you want.

Mr. MADDOCK. We recognize California's fair action in regard to the Gila, but we do not entirely separate a selfish interest from a generosity there, because we know the Gila is the river that entered your own valley to the destruction of it.

Senator JOHNSON. That may be; but here was a great work that you wanted upon your river, and you wanted this for the construction of your Coolidge Dam, and you were entitled to it.

Mr. MADDOCK. Yes; and, Senator, I venture to suggest that our Senators will vote for this proposition if it means taking $125,000,000 out of the National Treasury. They will vote for it for the adjoining State of California.

Senator JOHNSON. I am trying to find out on what theory you will vote for it, because it is a national undertaking, in my opinion, that ought to be carried out. I am perfectly willing to go more than halfway with you in an endeavor to do so. If you would leave this thing to your two Senators and to me, I believe we could reach some conclusion in regard to this matter, but the unfortunate part of it is that neither they nor I have either the power or the authority or perhaps the ability to determine it; but, pardon me, that is a digression.

You have abandoned the high-line canal, have you not?

Mr. MADDOCK. Senator, I never owned it. I could not abandon it.

Senator JOHNSON. Oh, no; but Arizona presented it with a great deal of fervor and enthusiasm.

Mr. MADDOCK. I beg your pardon.

Senator JOHNSON. I listened for a long time to gentlemen from Arizona who were presenting it, and I assumed that Arizona was in favor of it.

Mr. MADDOCK. I do not believe any official representative of Arizona ever presented that to either the Senate or the House committee.

Senator JOHNSON. Then I am in error as to my recollection of the record in that regard, and we will let it go at that. However, you have no interest in that?

Mr. MADDOCK. None at all. I want to say this, however, that radical and far away as it may be, the high-line canal is just as tenable as the idea of lifting water 1,500 feet and irrigating—as I think you intend to do under this bill—the coastal plain of California.

Senator JOHNSON. That is domestic water.

Mr. MADDOCK. I do not understand that.

Senator JOHNSON. Are you not talking about the design of taking domestic water into Los Angeles and the coastal cities?

Mr. MADDOCK. Does the bill say "domestic water"?

Senator JOHNSON. No; but is not that the thing that is contemplated?

Mr. MADDOCK. Not to my mind, Senator.

Senator JOHNSON. Then, let me disabuse your mind about that, because that is the theory, and you can leave the plans of Los Angeles to the engineer who sits here and who is familiar with the situation with respect to any plan of that sort.

Mr. MADDOCK. Will you permit me to read something out of a California bureau of public works document? It is called, "Water resources of California," bulletin No. 9, page 14. This will only take a moment.

Senator JOHNSON. I will be very glad to have you do anything you wish in that regard.

Mr. MADDOCK (reading):

A further survey of southern California conditions in the fall of 1924 corroborates the findings of the 1923 report and also indicates that, instead of expansion being limited to 250,000 acres, about a million acres of new lands may be furnished domestic, irrigation, or industrial supplies by coordinating local development with the importation of water. Three thousand cubic feet per second would eventually have to be obtained. There being no near-by source of additional supply, great works to bring in water from a distant source will be necessary. Preliminary reconnoissance indicates that such a supply may be had from the Colorado River.

Senator JOHNSON. Well, what of it? What has that to do with what we were talking about? However, we can pass that. Is the Colorado River a navigable stream?

Mr. MADDOCK. I wish you would ask our attorney that. To me the thing is a legal paradox.

Senator JOHNSON. That it is navigable?

Mr. MADDOX. No; I mean this: The idea that some river is navigable and the Federal Government has a control over it through the provision conferred upon the Government that give it the right to control commerce, but——

Senator JOHNSON. I am speaking of the fact, not of the law.

Mr. MADDOX. I can not understand why, if the Federal Government is given some right over navigable waters and none over unnavigable waters, that the State should have more rights over navigable streams than over nonnavigable streams.

Senator JOHNSON. I quite agree with you as to the paradox, but is it, in your opinion, navigable, as a fact? You are an engineer.

Mr. MADDOX. You would have to define "navigable" to me better than I can read it in the law. I can not answer the question. It may become navigable.

Senator JOHNSON. Is it your opinion now that it is navigable?

Mr. MADDOX. I would say it is navigable in the simple, primitive methods, which at one time were considered navigation; but, to-day, I would say it is not a navigable stream as we would mean in an ordinary conversation, but as to the legality of it, I do not know.

Senator JOHNSON. I think that is a perfectly fair answer. It is navigable like Niagara Falls is navigable by the individual who goes over it in a barrel.

Mr. MADDOX. A little better than that, Senator.

Senator JOHNSON. However, that is a question upon which there may be disagreement between individuals as to whether it is or is not navigable.

Mr. MADDOCK. And my legal opinion is just about as good and no better than that of the other 120,000,000 people in the United States.

Senator JOHNSON. You say you do not quarrel with the Boulder Dam proposition if you could get some things in this bill corrected; is that correct?

Mr. MADDOCK. I think it is an economic mistake, but in a desire to be conciliatory it may be possible to work things out so that our State would accept it.

Senator JOHNSON. You think that is among the possibilities, still, do you?

Mr. MADDOCK. I think it is among the probabilities.

Senator JOHNSON. That is all, Mr. Maddock.

The CHAIRMAN. Are there any other questions of the witness? If not, we thank you, Mr. Maddock.

I understand the next witness to appear is Mr. John L. Gust.

Senator ASHURST. Mr. Gust is the attorney for the Salt River Valley Water Users Association and is one of the most prominent lawyers of Arizona. He is a thorough master of irrigation law, water law, in all of its various phases.

STATEMENT OF JOHN L. GUST, ESQ., OF PHOENIX, ARIZ.

The CHAIRMAN. Mr. Gust, will you kindly add to what the Senator has just stated by giving your full name, address, and present occupation.

Mr. GUST. John L. Gust, Phoenix, Ariz.; engaged in the practice of law. I hardly claim the high honors that Senator Ashurst insists upon heaping upon me.

I want to discuss with the committee some constitutional questions that I think arise out of the proposed Swing-Johnson bill.

The first question I want to consider is this:

Under the Constitution of the United States Congress can not enforce the terms of a compact entered into by several States within a State that is not a party to the compact.

On this question I do not expect to present any precedents. No similar or analogous case to this has ever been presented in the years we have operated under our Constitution.

The original thirteen States, prior to the adoption of the Constitution, possessed the full powers of sovereignty. Among such powers is included the power of entering into treaties, compacts, and agreements. By the Constitution the States conferred the power of making treaties, compacts, and agreements upon the National Government and expressly prohibited the making of treaties to the States. The States, however, reserved to themselves the power of making compacts and agreements subject to the limitation that such compacts and agreements could not be made without the consent of Congress. The power of making compacts and agreements with each other is thus a sovereign power inhering in the States, which the States may exercise with the consent of Congress, or refrain from exercising at their pleasure. Congress has no control over the power, except to consent to its exercise, and to veto its exercise in any particular case by withholding its consent.

Exercising this sovereign power, the seven States of the Colorado River Basin, by their commissioners, prepared the Colorado River compact, apportioning the waters of the Colorado River, and submitted the same to their respective legislatures. The legislatures of six States approved it. The legislature of the remaining State did not approve it. The compact, therefore, has not become effective and the waters of the Colorado River remain unapportioned, to flow as ordained by nature subject to appropriation under the laws of the respective States and to ultimate equitable apportionment among the seven States by the Supreme Court. But the six States that had approved he compact, evidently not satisfied to permit rights in the river to be determined by nature and the law of the land, attempted to apportion the water of the Colorado River by act of six States.

This so-called six-State compact is merely an approval of the original seven-State compact, with a declaration that it shall become binding upon the States executing it when approved by six States. The State of California went further, and by the resolution authorizing the execution of the so-called six-State compact, declared that the Colorado River compact should become binding upon California when the President of the United States should certify that the Congress of the United States has exercised the power and jurisdiction of the United States to make the terms of said Colorado River compact binding and effective as to the waters of said Colorado River.

Now, this declaration shows that it is the purpose of the State of California to induce Congress to enforce, by some means, the agreement of the six States within the territory of the seven States. It proposes that Arizona's rights in the Colorado River and the waters thereof shall be governed and determined, not by its own acts and laws nor yet by the acts and laws of Congress, but by the acts of the other six States of the Colorado River Basin.

The Swing-Johnson bill proposes to carry out the purpose so clearly expressed by California. Section 1 of the bill provides that the Boulder Canyon Dam shall be constructed subject to the Colorado River compact, which means the compact approved by six of the States. Section 4 (a) provides that no work shall be begun and no money shall be expended under the act until the Colorado River compact shall be approved—I am speaking now of the bill as it is in the House. In the Senate here, I believe it is a little different, but in substance it is this—by California, Colorado, Nevada, New Mexico Utah, and Wyoming.

The approval of Arizona is not required. Why is this? Arizona lies wholly within the Colorado River Basin. The other six States lie only partly in the basin. If the approval of any of the basin States is necessary or proper, certainly the approval of that State which lies wholly in the basin is necessary and proper. There is only one reason why the approval of Arizona is omitted from the bill. That is because it is known that Arizona does not approve the compact, so it is proposed to enforce the compact against her and without her consent. It is desired to enforce the compact against her because by the compact she surrenders to the other States rights that she would continue to possess if there were no compacts.

I want to suggest that the Swing-Johnson bill is a conditional enactment. For all practical purposes it becomes effective only when the condition of approval of the compact by the six States is fulfilled. It is competent for Congress to pass legislation upon a condition, but the condition must be a reasonable and proper one. It would be entirely proper for Congress to provide that the bill should take effect upon the approval of all of the States interested therein. But it is not proper to provide that the bill shall take effect upon the approval of certain of the States interested, because under the Constitution all of the States are equal, and it is not competent for Congress to provide that legislation affecting a number of States shall become effective upon the approval of one State rather than another State. All of the States may act for their common benefit. Within the limits of its powers Congress may act for all the States or any of them. But California or Nevada or New Mexico or Colorado or Wyoming can not act or legislate for Arizona.

Proceeding with the consideration of the Swing-Johnson bill, section 6 provides for the satisfaction of present perfected rights in pursuance of the Colorado River compact. Section 6 also provides that contracts may be made for the generation of electrical energy by the use of water within a State that has approved the Colorado River compact. Section 8 (a) provides that all appropriations of water shall be made and protected in conformity with the laws of those States that approve the Colorado River compact. Section 8 (b) provides that the United States, its permittees, licensees, and contractees, and all users and appropriators of water shall be subject to and controlled by the Colorado River compact in the construction, management, and operation of reservoirs, canals, and other works and the storage, diversion, delivery, and use of water for the generation of power, irrigation, and other purposes. Here is a plain provision that construction work, water diversion, and water delivery within the State of Arizona shall be governed not by the laws of Arizona, not by the laws of the United States, but the act of the legislatures of the other six basin States.

In section 12 (a) the Colorado River compact as ratified by the six States is approved by Congress. In section 12 (b) the rights of the United States in the Colorado River and its tributaries, however claimed or acquired, as well as the rights of those claiming under the United States, are made subject to and controlled by the Colorado River compact. In section (c) all rights of way and grants and licenses which the Federal Government has power to issue in Arizona are made subject to the condition that the right of the recipients or holders thereof to the waters of the Colorado River or its tributaries and the use of such waters shall be subject to and controlled by the Colorado River compact. Bearing in mind that the whole of Arizona is in the Colorado River Basin and that Arizona has no water except that of the Colorado River and its tributaries, these provisions come very close to declaring that citizens of Arizona shall not take a drink of water from an Arizona stream except subject to the fiat of the other basin States, as expressed in the Colorado River compact, which is the act of the other six basin States, or perhaps, as matters now stand, five of those States. I do not believe that that can by any possible stretch of constitutional power be held to fall within the terms of the Constitution of the United States.

It is not strange that there is no precedent for the situation we are considering. If such a bill as the Swing-Johnson bill had been introduced into Congress in the early years of our Constitutional history, it would have rocked the very foundation of the Union. If it were offered to-day against one of the old and powerful States it would create considerable commotion even to-day. The fact that it is directed against a young and weak State makes it dangerous. If the principles upon which it is based should become established, Congress could force any State into any kind of compact with another State or with a foreign power—because the power of making compacts is just as broad with respect to foreign powers as it is with States with respect to each other—by providing that until such compact was approved each State should receive no Federal aid for road construction, no forest-reserve funds for roads or schools,

no money for harbor improvement, no public buildings, and no water from its own streams. That is the extent to which this bill goes, if I read it aright, and I think I am not mistaken as to its provisions, and I feel confident that such broad powers as that do not exist in Congress under the Constitution under which this Nation exists.

The whole theory of the Swing-Johnson bill is that Congress may deprive any State of its Constitutional right of freedom of contract, which, as the Supreme Court has declared, includes the right to refrain from entering into a contract by exercising the powers conferred upon Congress for the benefit of the Nation in wanton discrimination against such State.

This, we feel satisfied, the Constitution does not permit. In Coyle *v.* Oklahoma (221 U. S. 559, 573) the Supreme Court declared that "equality of constitutional right and power is the condition of all States of the Union, old and new." In Kansas *v.* Colorado (206 U. S. 48, 97) it was declared that:

> One cardinal rule underlying all the relations of the States to each other is that of equality of rights. Each State stands on a same level with all the rest. It can impose its own legislation on no one of the others and is bound to yield its own views to none.

In Hammer *v.* Dagenhart (247 U. S. 273) it is stated:

> There is no power vested in Congress to require the States to exercise their police powers.

It would appear to be equally true that there is no power vested in Congress to require the States to enter into compacts.

The whole theory of this bill is based upon the doctrine that Congress may use all of the powers it possesses to force that compact upon the State of Arizona, perhaps also upon the other States which are no longer subscribing to it.

In Trenton *v.* New Jersey (262 U. S. 185) it is stated:

> The State undoubtedly has power and it is its duty to control and conserve the use of its water resources for the benefit of all its inhabitants.

In Hudson Water Company *v.* McCarter (209 U. S. 356) the court said:

> We are of the opinion that the constitutional power of the State to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use or speculation as to future needs. It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one reason for its will.

For these reasons, we are of the opinion that the proposed Swing-Johnson bill, if enacted by Congress, will be unconstitutional and void upon the ground that it is an attempt to deprive a State of its sovereign right to refrain from entering into a compact which it believes will deprive it of resources that it is instituted to conserve and protect for its inhabitants, and upon the further ground that it is an attempt on the part of Congress to enforce a compact of States within the territory of a State not a party to the agreement. Also upon the further ground that it is an attempt to deprive a Sate of that equality of right among the several States which is a fundamental basis of the Constitution.

Now, it has been said repeatedly that if this is true, that Arizona can not be forced into the compact and that she can indefinitely post-

pone development of the Colorado River. I think it has been explained to you that that is not the attitude of Arizona; but I want to show you, by legal grounds, that, if Arizona were so disposed, the other States, in my mind, are not without remedy. There is a procedure that is mapped out by the Constitution by which this matter can be settled and adjusted in an orderly way if the States can not agree. That is this: If the several States of the Colorado River Basin can not agree upon an apportionment of the water of the river, application may be made to the Supreme Court for such apportionment. Now, I am aware of the fact that there is a dictum in the case of New Jersey *v.* Sargent (46 Supreme Court Repts. 122, 126) to the effect that there must be an actual invasion of rights before a cause between States will be entertained by the courts. I have heard it said that, on that theory, there could not be an application to the Supreme Court to adjudicate the divide waters of the Colorado River as they now stand. If that dictum is correct, I think the conclusion follows, but that dictum was in no wise pertinent to the discussion before the court at the time when it was made, and I do not believe it represents the final conclusion of that court.

In Kansas *v.* Colorado (206 U. S. 48) the court said:

> Sitting as it were as an international as well as a domestic tribunal we apply Federal law, State law, and international law as the exigencies of the particular case may demand.

It is evident from this statement and from the general discussion of the court in said case that in cases between States, the Supreme Court is not limited by the rule of the common law limiting consideration of controversies to actual invasions of rights, and that if it is made to appear to the Supreme Court of the United States that an upper State is in danger of losing the water to which it is rightfully entitled for future use by prior appropriation in a lower State, or that proper development in one State requires a partition of water with a neighboring State, said court can and will take jurisdiction of the case and apportion the water. In other words, I believe the correct view is this: That the water of the Colorado River may be apportioned among the States under the provision of the Constitution which admits of compacts and agreements. If it is done in this way, Congress must give its consent. That is all that Congress has to do with the apportionment of water, but there is no power anywhere in the Constitution to compel any State to make an agreement that it does not want to make, any more than there is any power existing in our Government anywhere to compel any one of us individuals to subscribe to a contract that we do not wish to subscribe to; but if a State unreasonably refuses to make an agreement, then the proper way of apportioning the water is by appeal to the Supreme Court, and that remedy will be found adequate to meet every case and to meet this case.

What the Swing-Johnson bill proposes to do is to use the incidental powers, or the other powers that Congress possesses, for other purposes, to coerce the State of Arizona into a compact which it does not want, and, in fact, it goes so far as to undertake to put that very compact into operation in the State without its consent; and I deny the power of anyone to do that under our Constitution. So much for that proposition.

I want to refer briefly to the suggestion that the proposed Swing-Johnson bill can not be sustained as an exercise of the power of regulating interstate commerce. It is very plain to me that it can not be sustained. I do not want to go into that question at length, because I think it has already been covered. The whole question is most ably discussed in the report of the subcommittee to the Committee on the Judiciary of the United States Senate of the Sixty-second Congress, which I think has been filed or, if it has not been filed, it will be filed in this matter.

Senator ASHURST. Do you offer it here?

Mr. GUST. I haven't it here.

The CHAIRMAN. We will look it up, and if it has not already been filed, it may be admitted as an addenda.

Mr. GUST. I think it has not been in this proceeding before, but it has been, of course, before this body.

The CHAIRMAN. May I suggest at this point that it is necessary for the committee to adjourn in about five or seven minutes, and, as you have your statement prepared there, evidently, in very complete form, would it be possible for you to conclude by filing so much as you are unable to read within the time allowed?

Senator ASHURST. I suggest that we adjourn and that Mr. Gust resume at 2 o'clock over in the other room.

The CHAIRMAN. We do not have to adjourn for a few minutes yet. We can go along for five minutes or more. I am merely making that suggestion. It is for the witness to decide.

Mr. GUST. This statement is not written out in the form in which I am giving it to you.

The CHAIRMAN. Very well, sir.

Mr. GUST. I only wish to discuss in this particular matter the difference between the views of the majority and the minority in that report and the particular application of that question to this particular bill.

The test of the navigability of a stream—that question was asked here some time ago—is the capability of use by the public for purposes of transportation and commerce. A river having actual navigable capacity in its natural state and capable of carrying commerce among the States is within the power of Congress to preserve for purposes of future transportation. That is set forth, among other cases, in Economy Light Co. *v.* United States (256 U. S. 122).

Senator DILL. Did this report of the committee say that the river could be improved in this way for purposes of navigation? What was the conclusion as to that?

Mr. GUST. I propose to state what the majority conclusion is in just a moment here. This is the report here. I do not know your procedure as to how to present this.

The CHAIRMAN. It would go in as an addenda, supplementing your statement. The clerk will check it up.

Mr. GUST. I do not want to go into the question as to whether the Colorado River is navigable or unnavigable. I do not think it is of sufficient importance to warrant that discussion here, assuming that it is navigable at least as far as Boulder Canyon, where this dam is proposed to be built. This answers the question you now asked. Congress may authorize the construction of a dam in a navigable

stream to preserve or increase its capability for carrying commerce between the States, and, if the primary purpose of Congress is to preserve or increase its navigability, the United States may authorize the production or lease of hydroelectric power produced at the dam; but if Congress authorizes the construction of a dam on a navigable stream primarily for the production of power, its authorization operates merely as a license—the primary authority to authorize such construction resides in the State. Now that is in the majority report of the subcommittee and is in substance as I have stated, on page 19. In other words, Congress may, of course, under the power of regulating commerce, go upon a navigable stream and build a dam there within the exercise of its legitimate power; and the majority report says if it does build that dam legitimately for the primary purpose of making the river navigable, it is entitled to the profits from the power. The minority report reaches a different conclusion, and I will discuss that very briefly also. The Swing-Johnson bill is not a bill that can be referred to the power of regulating United States commerce. That is to me clear beyond a doubt. Article IV of the Colorado River compact declares:

> The Colorado River has ceased to be navigable for commerce—

and, further, that—

> the use of its waters for purposes of navigation shall be subservient to the uses of such waters for domestic, agricultural, and power purposes.

Now, this provision of the Colorado River compact: The Colorado River compact is approved without reservation by section 12 of the Swing-Johnson bill. So, there is a correct declaration in the bill itself, and, of course, it would be true even if it were not a declaration, because it is a fact that the Colorado River has ceased to be navigable for commerce, and the use of its waters for purposes of navigation shall be subservient to the uses of such waters for domestic, agricultural, and power purposes. So this bill is not a bill to make navigable the Colorado River, but is plainly a bill for irrigation, domestic, and power purposes, and that is all it is. Section 6 of the bill provides that the dam and reservoir shall be used—first, for river regulation and flood control; second, for irrigation and domestic uses and satisfaction of present perfected rights in pursuance of Article VII of the compact; and, third, for power. Now, it might be to a casual observer that it would look as this "first, for river regulation and flood control" was intended to make the main purpose the navigability of the river, but that is not true, because it is the whole bill that shows that the primary purpose is to carry out the Colorado River compact, and the Colorado River compact declares that the river has ceased to be navigable for commerce, and declares that navigation shall be subservient to all other purposes. It is plain that the river regulation and flood control is not for purposes of navigation but for the other primary purposes specified in the Colorado River compact. In other words, that this flood-control and river regulation is a flood control to protect agricultural lands and to make it possible to irrigate lands and to make it possible to more efficiently produce power. There is no pretense in this bill anywhere that its purpose is to maintain navigability of this river; and, under the

majority report of the distinguished members of the subcommittee, as well as the authority of numerous cases and the plain language of the Constitution itself, the primary authority to construct the dam and to receive the revenue from the power to be produced thereby rests in the States, unless its construction by the United States can be referred to some other power than that of regulation of interstate commerce.

I want to call attention to the fact that the assertion of the majority of the committee that if the primary purpose of a dam is to control the navigability of a stream the United States may control the production of hydroelectric power by the water flowing over the same and receive the revenue therefrom, is challenged by the minority. The committee was a most distinguished committee. The minority argue that the exercise of the power is limited by the purpose for which the power is granted. Congress may erect a dam on a navigable stream for the purpose of maintaining the navigability of the stream, and if power is produced by the water flowing over such dam, the water which is an asset of the State, enters into the production of the power as well as the dam over which it flows, and then the State is entitled to be compensated for the use of its water, as well as its land, upon which the dam rests in the production of such power.

This minority view is also the view taken by the Pittman resolution, adopted at the Denver conference. None of the existing cases decides this difference of opinion between the majority and minority views. Whatever may be the ultimate decision of the Supreme Court on the question in those cases where the dam constructed by the United States is not increased in height or character for power purposes, and the power produced is merely an incident of the works constructed for the control of navigation, we feel confident that where the dam is added to in height or otherwise, where the flow of the water is regulated to increase the production of power, the construction of a dam must be authorized by the State and the State will be entitled to an equitable proportion of the power profits. This power question is destined to become one of the great questions in the interpretation of the Constitution of our country, and I am satisfied that the contest is going to rage right around the difference between that majority and minority report, as far as this Swing-Johnson bill is concerned, it makes no difference which view you take; because under both reports that dam, under that bill, as outlined here, can not be built upon the soil of Arizona and Nevada, and the water flowing into and within those States can not be used as they are proposed without the consent of those States. I do not think that you will find any authority anywhere to deny that proposition.

Now, the next question I want to take is——

The CHAIRMAN (interposing). Now, Mr. Gust, the time for adjournment has arrived. I think you can readily conclude in the afternoon, when the committee will be pleased to hear you again, commencing at 2 o'clock; but we will use the other committee room, the Commerce Committee room, on the Senate gallery floor.

(Whereupon, at 12 o'clock noon, the committee adjourned to meet at 2 o'clock p. m., Wednesday, January 18, 1928, at the Commerce Committee room.)

AFTER RECESS

The committee reconvened at 2 o'clock p. m., pursuant to recess.

The CHAIRMAN. The committee will come to order. Mr. Gust, you may proceed.

STATEMENT OF JOHN L. GUST—Resumed

Mr. GUST. Lest I be misunderstood in making an argument of this kind, I think I would like to state to this committee I am regarded as a conservative Republican. I am not a State's rights man, but I realize the fact that every good principle has an end somewhere, and while I am a conservative Republican I maintain this position, that when John Marshall made the statement that the Federal Government was supreme there was with that the statement, "the Federal Government, though limited in its powers." And I am not forgetting the fact that under the Constitution the Federal Government has certain proper defined limits to powers.

Now, resuming the discussion of this morning, I want to take up next this proposition, that under the principles of the reclamation act Congress has power to appropriate waters and construct reservoirs and other irrigation works within a State only with the consent of the State and in pursuance of its laws.

Section 8 of the reclamation act provides that the Secretary of the Interior in administering the act shall proceed in accordance with the laws of the States. If this provision should be eliminated it would still be true that the Secretary could administer the act only with the consent of the States. There is no express provision delegating to the United States control over the irrigation of arid lands. The authority for the reclamation act is found in section 3 of article 4 of the Constitution, giving Congress the power to dispose of and make all needful rules and regulations respecting the territory and other property of the United States. This is a proprietary and not a governmental power. (Kansas *v.* Colorado, 206 U. S. 48.)

The control over the waters of the State is a sovereign power. It is vested in the State. The Federal Government possesses no sovereign control over such waters except that which is given it by the commerce clause of the Constitution. It does, however, have rights as the owner and proprietor of lands riparian to or irrigable from a stream to the utilization of such waters subject to the sovereign control of such waters by the State. This is the necessary effect of the decision of the Supreme Court in Kansas *v.* Colorado, 206 U. S. 48; Boquillas Land & Cattle Co. *v.* Curtis, 213 U. S. 339; Wyoming *v.* Colorado, 259 U. S. 419, and many other cases. We are aware that it is contended by certain officials of the Reclamation Service that the control of the States over their waters is permissive only and that Congres may withdraw the permission as to unappropriated waters at any time. This conention was made in Kansas *v.* Colorado, 206 U. S. 48, and was not accepted by the Supreme Court. The case of Winters *v.* United States, 207 U. S. 575, is frequently cited to support this doctrine. The case is based wholly on disposal of the water during territorial day by an Indian treaty and has no bearing whatever upon the power of the States to control the appropriation of water. The question has been fully discussed in previous

hearings by Mr. Bannister, advocating State control, and by Mr. Hamele, advocating national control. Mr. Bannister is undoubtedly right. We call attention to the fact, however, that Mr. Hamele's theory of national control of appropriation of waters is the only theory giving any kind of a basis to uphold the Swing-Johnson bill. Should the bill become a law the Reclamation Service would vigorously urge that it must be upheld on this ground, and, if the Supreme Court should be persuaded to take that view, State control over the appropriation of waters would be gone forever.

I wish particularly you Senators from the Western States, where you feel it is essential to the preservation of your States to retain State control of your waters, would investigate carefully this bill and see if I am not absolutely correct in my statement that if this bill becomes a law the only feasible constitutional ground upon which it can reasonably be contended it should be upheld is this theory Mr. Hamele has advanced, and the contest will be precipitated over that question. In view of the serious consequences to the Western States over such theory prevailing, I feel that this point can not be too much emphasized.

Incidental to this question there is a further question, the question of riparian rights. Riparian rights do not enter into the distribution of the water of the Colorado River. They have never existed in any of the Colorado River Basin States except California. (See Boquillas Land & Cattle Co. *v.* Curtis, 213 U. S. 339, and Wyoming *v.* Colorado, 259 U. S. 419.) California, in so far as the Colorado River is concerned, by her actions wholly repudiates the doctrine of riparian rights. Under that doctrine she could not carry any of the waters of the Colorado River out of the basin to her coastal plains cities, nor even to the Imperial Valley. None of such lands are in the Colorado River Basin.

The next question is the question of taxation by the States of hydroelectric power produced at the Boulder Canyon Dam.

The power to tax is the power to destroy, is the principle exempting the property of the Federal Government from taxation by the States and likewise exempting the property of the States from taxation by the Federal Government. It applies both ways, to the States as well as to the National Government, the principle being, that the National Government must not be in a position to destroy the States and the States must not be in a position to destroy the Federal Government. That is the fundamental basis of the constitution.

No one will deny that as a legal proposition any property held by the Federal Government necessary or useful in performing the functions vested in the Federal Government by the constitution is exempt from State taxation. A wholly different question arises when the Federal Government goes into a private business such as the production and distribution of hydroelectric power either directly or through lessees. It was held in South Carolina *v.* United States, 199 U. S. 437, that where a State assumed to conduct a private business, the performance of which did not fall within the ordinary and usual functions of a State, the business was not exempt from taxation by the Federal Government merely because it was conducted by the State. It was said by the Supreme Court in Hammer *v.* Dagenhart, 247 U. S. 275, that the maintenance of the authority of the States

over matters purely local is as essential to the preservation of our institutions as the conservation of the supremacy of the Federal power in all matters intrusted to the Federal Government by the Federal Constitution.

This being the case, it would seem to follow since the Federal Government may tax private business conducted by the States, the States may also tax private business conducted by the Federal Government, and that such will be the rule is asserted in the dissenting opinion in the case of South Carolina *v.* United States, 199 U. S. 437.

We are at present concerned, however, not with what is the strict right of the United States in this respect, but rather with what is the equitable thing that Congress should do in the matter. The exemption of Federal property from taxation by the States may be waived by Congress. Both the legality and good policy of such waiver are firmly established. Thus Congress permits the taxation of national banks by the State at the same rate as other State property is taxed and with the consent of Congress such taxation is legal. (Owensboro National Bank *v.* Owensboro, 173 U. S. 664; Bank of California *v.* Richardson, 248 U. S. 476,483.)

So also with certain lands granted to railroad companies. (Central Pacific R. R. Co. *v.* Nevada, 162 U. S. 512, 521; Northern Pacific R. R. Co. *v.* Myers, 172 U. S. 589,597.)

Such taxation is also permitted under certain conditions by acts of Congress of lands in irrigation districts and of lands held in trust for certain Indian tribes in Oklahoma.

As a matter of fair dealing between States, Congress should permit the taxation by Arizona and Nevada of the power at Boulder Canyon Dam. The dam will be situated wholly in Arizona and Nevada. So will also be the reservoir. It is expected that but little land in Arizona and Nevada will be irrigated from the reservoir and no great quantity of power from the dam will be used in either of said States. Only an insignificant strip of California lies in the Colorado River Basin.

I think there is a map up here somewhere that shows that. There is just a very little strip, while for all practical purposes the whole of Arizona is in the Colorado River Basin.

It is proposed to build a canal for the Imperial Valley lands at a cost of $31,000,000, and to pay the interest for a long term of years and, perhaps, also the principal of the cost of such canal from the proceeds of the sale of the power produced at the dam. It is proposed to pump a vast quantity of water over the mountains to supply the California coastal plains cities with water by means of the cheap power that will be produced at the dam. Most of the remaining power will be conducted by transmission lines to Los Angeles. This water and this power will create billions of dollars of taxable wealth in California out of the construction of a dam and reservoir on the soil of Arizona and Nevada and from the use of water that nature has placed in Arizona and Nevada.

It is thus a case of where Arizona and Nevada resources are to be used to transfer other Arizona and Nevada resources to the State of California. In other words, you take Arizona and Nevada water and pump it out of Arizona and Nevada by the use of Arizona and Nevada power into another State.

California realizes that without the aid of the Federal Government she can not accomplish her purpose. As a State on an equality with any other State she can not enter into Arizona to build dams or create power. Without such dams or power she can get no more water of the Colorado River than she has now appropriated. Furthermore, if Arizona did permit her to enter and build a dam and other works she would certainly be subject to taxation by Arizona. California, therefore, comes to Congress and says: "Use for our benefit the powers vested in you for the benefit of the Nation and build for us a dam on Arizona and Nevada soil. Produce hydroelectric power by the use of Arizona and Nevada resources to make a profit that will help build our all-American canal and that will pump the water that by nature belongs to Arizona over the mountains to our coastal plain and prostitute your power of exemption for taxation to our benefit so that we may have cheap power for our industries."

I do not intend any reflection whatsoever on the State of California. The State of California has a vast territory down there and a large city that she wants to develop. Naturally she wants to get what she needs for the development of those resources where she can. I am speaking of it from the standpoint of the State from which those things are to be taken, and that State is entitled to just as much consideration before the National Government as is the State of California, though perchance it may be much younger and weaker.

We have heard it stated that in no event should Congress consent to the taxation of a Government-constructed dam until the construction cost is paid. That principle is correct where the dam is constructed for the benefit of the State where the dam is situated, because in such case the State collects taxes from the taxable wealth created by the Government investment. But where the dam is built in one State against its wishes and for the benefit of another State that principle does not apply. In the latter case for the Federal Government to insist on its exemption from taxation is simply robbing one State for the benefit of another. It is said that we are one Nation and State lines should be disregarded in the development of resources. If State lines were disregarded for all purposes, no injustice would result. But since State lines are regarded in imposing a large part of the burdens of Government they can not be disregarded in the development and distribution of resources without stripping the poorer States for the benefit of the richer States.

You must bear in mind that under the Constitution States were not destroyed. If they had been and we had been made entirely one nation, without separate sovereign States, the proposition that you disregard State lines in developing a river such as the Colorado River would undoubtedly be sound. But the Constitution did not do that. It retained the sovereign States. For a great many purposes State lines are regarded. One of those is for taxation purposes. Now, since Arizona can not tax property in California, we can not disregard State lines in developing property in California by taking the resources that nature has placed in the State of Arizona or in the State of Nevada.

But it is said that the project will not stand the extra cost of taxation.

Sometimes that statement is made. I do not profess to be advised on the economic situation, but I say this, if it is worth so little to California that taxes can not be paid on the development it should not be presently undertaken; it should be left to Arizona to utilize in her future development, because there is no question whatever that in the future the development of the power resources of the Colorado River will come.

Arizona has not surrendered her right in the Colorado River by accepting the provisions of the enabling act of New Mexico and Arizona.

We have seen an opinion written by Arizona attorneys which assets that Arizona has practically no rights in the Colorado River because of certain provisions in her enabling act. In our opinion such is not the case. Section 28 of the enabling act of Arizona reads as follows:

> There is hereby reserved to the United States and excepted from the operation of any and all grants made or confirmed by this act to said proposed State all land actually or prospectively valuable for the development of water power or power for hydroelectric use or transmission, and which shall be ascertained and designated by the Secretary of the Interior within five years after the proclamation of the President declaring the admission of the State, and no land so reserved and excepted shall be subject to any disposition whatsoever of said State, and any disposition whatsoever of said State, and any conveyance or transfer of such land by said State or any officer thereof shall be absolutely null and void within the period above named; and in lieu of the land so reserved to the United States and excepted from the operation of any of said grants, there be and is hereby granted to the proposed State an equal quantity of land to be selected from land of the character named and in the manner prescribed in section 24 of this act.

In our opinion said provision does not affect the legal status of the Colorado River. It makes no reference to the Colorado River nor to any river. It refers only to grants made or confirmed by said enabling act. A grant is a transfer of real property. (1 Bouvier Law Dictionary, p. 900.)

Referring to said enabling act, it appears that the only transfers of real property mentioned in that portion of the act relating to Arizona are the grants of public land made by the United States to the State of Arizona in sections 24 and 25 of the enabling act, viz, sections 2, 16, 32, and 36, granted or confirmed to the State for common-school purposes, and the right granted to the State to select acreage for institutional and other purposes. The grants referred to do not include the beds of navigable streams. In Shively *v.* Bowlby, 132 U. S. 1, 58, the Supreme Court of the United States, after a thorough review of the subject, reached the conclusion that—

> Grants by Congress of portions of the public lands within a Territory to settlers thereon, though bordering on or bounded by navigable waters, convey of their own force no title or right below high-water mark and do not impair the title and dominion of the future State when created.

Undoubtedly the same rule applies to grants by Congress of portions of the public lands to a State for school, institutional, or other purposes.

Since the grants referred to in the above extract from the enabling act do not include the beds of navigable rivers, it follows that the exception from such grants can not include the beds of such rivers, because by its very nature an exception from a grant must be

carved out of the grant and can not extend beyond the limits of the grant. Neither can the reservation to the United States include any lands not included within the terms of the grants referred to because the lands reserved are the lands excepted. There is nothing whatever in such provision to indicate that the reservation to the United States was intended to be broader than the exception from the grants. That said reservation is not broader than the grants is made conclusive by the words:

> And in lieu of the land so reserved to the United States and excepted from the operation of any of said grants, there be and is hereby granted to the proposed State an equal quantity of land to be selected from land of the character named and in the manner prescribed in section 24 of this act.

In connection with this subject, the disclaimer by the inhabitants of the State of all right and title to the public lands within the State contained in section 20 of the enabling act must also be considered. Said disclaimer reads as follows:

> That the people inhabiting said proposed State do agree and declare that they forever disclaim all right and title to the unappropriated and ungranted public lands lying within the boundaries thereof.

This disclaimer, unlike the reservation from section 28 above set forth, did not make its first appearance in the Arizona enabling act. In a slightly different form it originated in a resolution of the Continental Congress adopted September 6, 1780. It was inserted in the enabling act of Alabama when that State was admitted into the Union, and construed by the Supreme Court of the United States in the year 1844 as not including land in the bed of a navigable river in Pollards, Lessee, *v.* Hagan, 3 Howard, 219, 224.

The enabling act of the State of Oregon, adopted February 14, 1859, required that the people of Oregon should provide by ordinance irrevocable without the consent of the United States that said State shall never interfere with the primary disposal of the soil within the same by the United States or with any regulation Congress may find necessary for securing the title in said soil to bona fide purchasers. The Legislative Assembly of Oregon accepted this condition by act of June 3, 1859. Notwithstanding this condition and the acceptance thereof, the title of the State of Oregon to tidewater lands is unquestioned—Shively *v.* Bowlby, 152 U. S. 1, 58—and the title of said State to the beds of navigable rivers rests upon the same basis. (Johnson *v.* Knott, 10 Pac. 418 (Ore.); Brewer Elliott Oil Co. *v.* U. S., 260, U. S. 77.)

The disclaimer above quoted from section 20 of the Arizona enabling act is evidently taken almost verbatim from the enabling act of North Dakota, South Dakota, Montana, and Washington, approved February 22, 1889. Article XVIII of the Constitution of Washington adopted in pursuance of said enabling act expressly asserted the title of the State to the beds and shores of all navigable waters in the State up to and including the line of ordinary high waters, and the title of the State so asserted has never been questioned. (Eizenback *v.* Hatfield, 26 Pac. 539; Yesler *v.* Commissioners, 146 U. S. 646; Port of Seattle *v.* Railroad Co., 225 U. S. 56.)

The same disclaimer is found in the enabling act of Oklahoma, and Chief Justice Taft has recently declared that Oklahoma has title to the beds of navigable rivers within its boundaries. (Brewer Elliott Oil & Gas Co. *v.* United States, 67 Law Ed. 140.)

The above decisions conclusively establish that the disclaimer of title to the public lands contained in section 20 of the Arizona enabling act does not apply to lands in the beds of navigable streams. It is impossible to reasonably argue that the reservation in section 28 of the enabling act has any broader application. It follows that the said reservation does not affect the title to the beds of navigable streams. But if there were any doubt upon the question, that doubt would have to be resolved in favor of sustaining the title of the State to the beds of such streams for the reason stated by the Supreme Court of the United States in the following language:

> The United States early adopted and constantly has adhered to the policy of regarding lands under navigable waters in acquired territory while under its sole dominion as held for the ultimate benefit of future States, and so has refrained from making any disposal thereof save in exceptional instances when impelled to particular disposals by some international duty or public exigency. It follows from this that disposals by the United States during the Territorial period are not lightly to be inferred and should not be regarded as intended unless the intention was definitely declared or otherwise made very plain. (United States *v.* Holt States Bank, 70 Law Ed. 213.)

In an earlier case this rule of a construction in favor of equality among the States was asserted by the Supreme Court of the United States as follows:

> It is impossible to suppose that by such indefinite language as was used in the enabling act Congress intended to differentiate Nebraska from her sister States, even if it had the power to do so, and attempt to impose more onerous conditions upon her than upon them. (Bolln *v.* Nebraska, 176 U. S. 83.)

It has been suggested that if said reservation does not include the beds of navigable streams, it was a vain and useless act. Such is not the fact. The unnecessary prohibition upon the State's power of disposal found in the provision indicates that the main purpose of Congress in inserting the provision in the enabling act was to prevent valuable power sites from being acquired by private individuals through purchase from the State. This purpose has been fully achieved. With the ownership and control of the lands bordering on the Colorado River vested in the United States, neither the State of Arizona nor private individuals are in a position to develop or exploit the river without the approval of the United States.

We are of the opinion that the said reservation would be unconstitutional if it were construed so as to reserve to the United States the beds of the navigable waters within the State. In general, new States when admitted into the Union are admitted with all of the powers of sovereigny and jurisdiction which pertain to the original States, and such powers may not be "constitutionally diminished, impaired, or shorn away by any conditions, compacts, or stipulations embraced in the act under which the new State came into the Union which would not be valid and effectual if the subject of congressional legislation after admission." (Coyle *v.* Oklahoma, 221 U. S. 559, 573.) Construed as merely a reservation of the public lands subject to the disposition of the United States the said reservation is undoubtedly within the powers of Congress. Construed as an attempt to deprive the new State of the right to control the beds of navigable streams for the public benefit of the State, it clearly deprives the new State of that "equality of constitutional right and power" which is "the condition of all States of the Union, old and new." (Coyle *v.* Oklahoma, 221 U. S., 575.)

In the case of Pollard *v.* Hagan, 3 Howard 219; it was intimated that the United States had no power to dispose of lands under navigable waters but must hold them in trust for the future State. This was later modified in Goodtitle *v.* Kibbs, 9 Howard 471, and in Shively *v.* Bowlby, 152 U. S. 1, the rule was declared that—

> Congress has the power to make grants of lands below high-water mark of navigable waters in any Territory of the United States whenever it becomes necessary to do so in order to perform international obligations or to effect the improvement of such lands for the promotion and convenience of commerce with foreign nations and among the several States or to carry out public purposes appropriate to the objects for which the United States hold the Territory.

This rule was again considered by the Supreme Court of the United States in a case arising in Oklahoma involving a conflict between a grant by the United States of the bed of a portion of the Arkansas River to the Osage Indians before the admission of Oklahoma as a State, and certain oil leases made by the State of Oklahoma under the claim that the Arkansas River was a navigable river and the State the owner of the bed thereof. Chief Justice Taft, after stating the rule laid down in Shively *v.* Bowlby, supra, says:

> If the Arkansas River were navigable in fact at the locus in quo, the unrestricted power of the United States, when exclusive sovereign to part with the bed of such a stream for any purpose asserted by the circuit court of appeals, would be before us for consideration. If that could not be sustained, a second question would arise whether vesting ownership of the river bed in the Osages was for "a public purpose appropriate to the objects for which the United States hold territory." (Brewer Elliot Co. *v.* U. S., 67 Law Ed. 145.)

It seems clear that even if the question thus left open by Chief Justice Taft were decided in favor of the unrestricted power of the United States to dispose of such lands before the admission of the State, under the rule laid down in Coyle *v.* Oklahoma, supra, the power of the United States to reserve to itself the title to lands under navigable water by a provision in an enabling act, could be exercised only for a purpose which would be a proper subject of congressional legislation after admission. Thus, Congress might, perhaps, have reserved the lands within the bed of the Colorado River for the purpose of maintaining the navigability of the river, for the purpose of building bridges, for post roads over the same, or even for purpose of flood control or the reclamation of arid lands, but the reservation in question is plainly for the purpose of producing and transmitting power. The production and transmission of power is not a function vested in the Federal Government by the Constitution. The Federal water power act, and other similar acts, recognize this fact by being so drawn as to bring the same within some of the recognized powers of the Federal Government, with the production of power as an incident.

It is therefore clear that the State of Arizona has the same rights in the Colorado River, including the land under it, as have the other States through which it flows, and the same rights in the Colorado River, including the land under it, as have other States in similar rivers which flow through them. If this proposition is accepted, it follows (*a*) that the State of Arizona may negotiate with the other States with reference to the Colorado River on an equality, and (*b*) that the State of Arizona may properly urge

Senators and Representatives of other States to oppose the Swing-Johnson bill or any other bill that disregards the rights of Arizona in the Colorado River, upon the ground that the passage of such act will establish a precedent extremely dangerous to other States.

Now, I want to say one thing more with regard to the six States compact, because of the fact that certain views have been advanced with regard to that compact that I think are wholly erroneous. They should be corrected in some way, and I think perhaps the proper place is here.

The Colorado River compact was written as the agreement of all of the seven States in which any part of the river is situated. It purports to define and determine the rights of each of said seven States in the river. It is based upon the fundamental idea that each of the said States has some kind of right in the river and the waters thereof. One of the seven States having failed to approve the proposed compact, the other six by resolutions purporting to waive the requirement that the compact should be approved and executed by the seven, declared that the compact should become binding when approved and executed by six.

It is true the resolution declares it should be binding upon the States ratifying it, but the language remains the same, and the effect of it purports to be just the same as it was before, that the waters of the Colorado River will be apportioned, just like it was intended they should be apportioned by the consent of the seven States, but by this six-State compact they are to be apportioned in the same way, without the consent of the seventh State. To my mind, as a matter of law, it is one of the most remarkable propositions I ever heard of. It is, in effect, saying, "Here are a number of us people. We are going to get together and make a compact." One says, "I won't make it." The others say, "We will make it and divide the thing under consideration just the same as if you were a party to it."

An interesting question is thereby presented, whether the seven-party agreement can function with only six signers. We have heard able lawyers assert that not only can the compact function without Arizona joining therein, but that California by joining in the compact without Arizona becomes bound as a guarantor of Arizona's part of the agreement. This assertion was exceedingly interesting, but we doubted it, and every consideration of the question increases our doubt. In the first place California has expressly declared in her resolution conditionally approving the six-State compact that—

> The Colorado River compact shall not be binding or obligatory upon the State of California by this or any former approval thereof or in any event until the President of the United States shall certify and declare * * * (b) that the Congress of the United States has exercised the power and jurisdiction of the United States to make the treaty of said Colorado River compact binding and effective as to the waters of said Colorado River.

How the President can make such certification unless the United States possesses absolute control over the waters of the Colorado River does not appear. And since the same able attorneys assert that the States and not the United States are vested with the control of the waters of the Colorado River we presume the President will never make such certification, and California will never become bound by the Colorado River compact. Furthermore, we do not presume that the President will certify that "the Congress of the

United States has exercised the power and jurisdiction of the United States to make the terms of said Colorado River compact binding and effective as to the waters of said Colorado River" unless Congress has effectively done so. And, of course, if Congress has effectively subjugated Arizona to the Colorado River compact, there is no longer necessity that Arizona's performance be guaranteed by California. If California is making any guaranty by the resolution in question, she has made the United States the principal obligor and California is merely the surety for the United States.

But even if California had not added her rider to her ratification of the six-States compact she would not guarantee any water to the upper-basin States against future appropriations by Arizona. It is an elementary principle of law that if parties enter into a written contract the court will interpret the contract as it is written and will not undertake to write a new contract for the parties. Looking to the provisions of the compact, we find in it no guaranty on the part of California or any other State. We find in the apportionment of water, in Article III, no covenant or agreement binding the lower basin to see that the upper basin gets the water allotted to it. There is a provision in subdivision (f) of Article III binding the upper basin not to reduce the flow at Lee Ferry below a certain amount. And we think that not even this express covenant could be construed into a guaranty on behalf of each upper-basin State for the whole upper basin.

In view of the more recent action of Utah in that respect, that may become an interesting question to some of the upper-basin States.

However that may be, there is no such covenant on behalf of the lower basin. Further, in Article VIII of the compact it is declared, "Present perfected rights to the beneficial use of waters of the Colorado River system are unimpaired by this compact." Hence, by express declaration of the compact if that instrument should become binding upon all of the seven States except Arizona and Arizona should acquire future appropriations to the surplus waters flowing through the lower basin the upper basin could not call upon California to surrender one drop of water from its appropriations existing at this date, and I do not think it could from future appropriations either.

It was, however, asserted that Arizona could never appropriate any considerable quantity of water from the Colorado River. We venture the prophecy that if Arizona is not deprived of the water by other States she will eventually utilize more water from the Colorado River for irrigation than any other State. But it is quite unnecessary to consider that question. Arizona with her hundreds of miles of Colorado River Canyon wholly in her own borders is surely able to appropriate all water flowing therein for power purposes and an appropriation for power purposes is just as effective against any appropriation in the upper basin as an appropriation for agricultural purposes.

There is only one theory upon which the upper basin States would be protected under the six States' compact and the Swing-Johnson bill and that is the theory that Congress and not the respective States controls the appropriation of water within the States. We do not believe that the power of regulating the appropriation of water

within a State is vested in Congress and we know of no representative of the seven States who will declare that Congress does possess such power.

It is perhaps dangerous for a lawyer to enter into the field of prophecy, but I feel that if this bill is passed in anything like its present form all it will do will be to precipitate into the Supreme Court of the United States the question which was discussed so fully between Mr. Bannister and Mr. Hamele at the former hearing over this bill as to whether Congress or the States controlled the appropriation of water. While I feel that the States must prevail, as one living in the Western States, knowing that the life of the States must depend on the fact that the States must control their own water, I do not want to see that conflict come.

In our opinion the Colorado River compact if executed by six but not by seven States will be wholly void for the following reasons:

First. Considered as a contract, it is legally impossible of performance when made.

Second. Considered as a contract, it is illegal because it is a plain attempt on the part of the States that are parties to the agreement to control he propery and resources of another States for their own benefit.

Considering the proposition first above stated, it is a principle of the law of contracts that contracts impossible of performance when made are void. The Colorado River compact purports to divide the water of the river between an upper basin and a lower basin which are both included within the boundaries of seven States. Each of those States has a right in the waters of the river. This is established by Kansas *v.* Colorado (206 U. S. 46) and Wyoming *v.* Colorado (259 U. S. 419).

One of the States having a large interest in such waters declines to enter into the compact. Thereupon the remaining six purport to execute the compact and carry it out exactly as written for the seven. In other words these six purport to apportion the water just as it was proposed to be apportioned by the act of the seven.

This means that the six undertake to divide the water among the seven without the consent of the seventh. Manifestly this can not be legally done. Arizona can not be bound without its consent, and if Arizona is not bound the agreement simply will not work. The six States are undertaking to do something wholly beyond their power.

Considering the second proposition, it seems plain that any attempted agreement on the part of six States to parcel out the property and rights and prerogatives of seven States without the consent of the seventh States is necessarily illegal. Can the law recognize and uphold an agreement in which certain States undertake to dispose of the property and rights and prerogatives of another State to suit their own pleasure and for their own profit and against the will of the other State? It can not be said that the six-States compact does no undertake to dispose of Arizona's property rights. By its express terms it applies to the property rights of Arizona as well as to the property rights of the other States.

Moreover, the California resolution adopting the six-State compact declares it shall not become binding on California until Arizona

is subjected to the compact by the power of the United States. Said resolution is a proposition by the State of California to enter into a conspiracy with the United States for the purpose of depriving Arizona of her constitutional rights.

I use the term "conspiracy" not in any invidious sense, but strictly from a legal standpoint. Senator Johnson, in all I have said I am talking from the legal standpoint and with no reflection upon your State whatever.

Senator JOHNSON. And in complimentary fashion.

Mr. GUST. There is one thing more and I am through. It was repeatedly asserted, and I think will probably be asserted before this committee, that the State of California adopted a fair attitude in the Colorado conference by agreeing to arbitrate the difference of opinion between the two States or proposing to arbitrate the difference of opinion. I will not enter into discussion of the proposed terms of that arbitration, which I do not think could be accepted by Arizona anyway, but I objected to it at the time, and we feel we ought to object to it at all times, for the reason that I conceived to be true that no governor, commission, or anybody else can assume on behalf of a State to enter into an agreement by which the State agrees to be bound by the act of somebody else in taking away some of its resources. That can only be done in a constitutional way by a compact, by the act of the sovereign power of the State through its legislature. I feel this was necessarily known by the able lawyers representing California, and that, therefore, the proposition was offered only for the purpose of making a seemingly fair proposition and with the knowledge that if it was accepted it would not mean anything. Arizona and California can not arbitrate the rights to the waters of those States. If they do agree to such an arbitration, it means nothing, and the State against whom the decision goes when it comes before its legislature will refuse to accept the arbitration, and when you have a board of arbitrators appointed who know that will be the result, they are not arbitrators at all; they are mere negotiators; and all that you would do would be to transfer the question of negotiating an agreement between the States, and Arizona felt that this negotiation could be carried on by the representatives of the upper States at Denver, and they were so carried on, and I feel sure everybody is satisfied Arizona dealt absolutely fairly with these upper States in this negotiation.

I think that is all I want to say, because I want to confine myself to the strictly legal questions.

The CHAIRMAN. Mr. Gust, do I understand you to take the attitude that the lands of the Imperial Valley do not lie within the Colorado Basin?

Mr. GUST. Yes; I think that is correct.

The CHAIRMAN. On what theory are they not part of the Colorado River Basin?

Mr. GUST. Well, I think the basin of the river is that territory that drains into the river. Imperial Valley does not drain into the Colorado River. I think that is true, Senator.

I think this is true, Senator, that the Imperial Valley lands should be considered in disposing of the water of the Colorado River, because they are physically able to avail themselves of the water of that river, but I don't think they are within the basin of that river.

The CHAIRMAN. It is true, part of them do lie below the level of the river bed, but there is quite an extent of land that is generally looked upon as being a part of the Imperial Valley district that is well above the high-water mark of the Colorado River.

Mr. GUST. My understanding is that that land drains into the Salton Sea and not the Colorado River. That is the distinction I made. I think legally the lands of the Imperial Valley are in the same situation as Denver, and equitably entitled to consideration, although not technically within the basin.

The CHAIRMAN. Perhaps you get a diversion by gravity flow, so is not theirs a better case than the city of Denver would have? However, there isn't much to that point. I merely wanted to call your attention to it. Is it your understanding that under the provisions of this bill the cost of construction of the all-American canal, together with interest on that investment, until repaid, is to be paid for out of revenues derived from the production of hydroelectric power?

Mr. GUST. I don't know. I think it could be under the provisions of the bill. Just what would be done I am unable to say, but I think the provisions of the bill are broad enough to permit that. In this way, Senator; that the procedure would be this; the lands in the Imperial Valley would have to assume the obligation to pay for the construction of the canal, yet the entire project is treated as one project, and it is undoubtedly the general practice of the Reclamation Service under the reclamation law that all revenue from a project go to a fund for the benefit of that particular project. If the revenue should be sufficient to pay for the entire cost, of course, the landowners might not be called on to pay anything. It could work out that way so far as the bill is concerned, if that is the intent, but I have understood the interest would be paid out of power profits and the principal would be paid by the owners of the land. But that is only what somebody has told me.

The CHAIRMAN. Well, I don't take that interpretation of it myself.

Senator JOHNSON. Is the canal made a charge against the land?

Mr. GUST. I think it is, perhaps.

Senator JOHNSON. Well, you think it is, do you not?

Mr. GUST. Oh, yes.

Senator JOHNSON. We can dismiss that subject, then.

Mr. GUST. No, Senator; you can not dismiss it with that.

Senator JOHNSON. Pardon me. I won't say you can, but I can. I understood you to say that the control of a State over its waters is of sovereignty, and not proprietorship. Was I correct in that?

Mr. GUST. Yes. I made that statement. Of course, I had reference to this particular question. Of course, a State might also have proprietary control where it owns lands.

Senator JOHNSON. In this particular instance is the control of Arizona over its water that of sovereignty or proprietorship?

Mr. GUST. Well, so far as affects the points under discussion in this bill, it is that of sovereignty, and it is also that of proprietorship in respect to the subjects on which I have filed an opinion here, which I did not read.

Senator JOHNSON. Then, I misunderstood you, because I thought you made the distinct definite statement that the control of the State over its water was that of sovereigny and not of proprietorship. If I misunderstood you——

Mr. GUST. I don't think I put in the part "not of proprietorship." I didn't desire to limit it to sovereignty.

Senator JOHNSON. You don't mean to limit it to that?

Mr. GUST. No.

Senator JOHNSON. Now, if seven States have an interest in a river, can not six of them bind themselves so far as their own interests are concerned?

Mr. GUST. Yes.

Senator JOHNSON. Isn't the fact then that the seventh State, not bound by what the six States do, is not prejudiced thereby?

Mr. GUST. If that were the effect of the agreement, I would agree with you, Senator.

Senator JOHNSON. I am not asking you that. I am asking you whether that can not be done?

Mr. GUST. It could be done, but it has not been done.

Senator JOHNSON. Very well. There could be seven States interested, with six States agreeing, the six agreeing in respect to their various interests. The seventh State, then, of course, would not be prejudiced. That is possible, isn't it?

Mr. GUST. That is possible; entirely.

Senator JOHNSON. And quite likely, isn't it?

Mr. GUST. My argument here was to the effect that that had not been done.

Senator JOHNSON. That is a matter of argument, as you say.

Mr. GUST. Yes.

Senator JOHNSON. You put in evidence here the report of a subcommittee of the Judiciary Committee of the United States Senate of the Sixty-second Congress. Let me ask you if you didn't say in your statement that there was a majority and a minority report of that subcommittee?

Mr. GUST. Well, that I don't know, Senator. I find in that book the Senate "Majority report," and then "Minority views." I don't know whether this minority were members of the committee or not.

Senator JOHNSON. Isn't it a fact that the subcommittee consisted of Knute Nelson, Elihu Root, and Mr. Chilton; that that subcommittee returned their views, and then the two members of the Judiciary Committee subsequently rendered their views, and that the views of the two members of the Judiciary Committee are printed, but the subcommittee was unanimous in presenting their views to the Senate of the United States?

Mr. GUST. That is probably true.

Senator JOHNSON. I think that is the fact. I was simply correcting your statement.

Mr. GUST. Not being familiar with your procedure here, I don't know what the situation was.

Senator JOHNSON. In your opinion, is the Colorado River navigable or innavigable?

Mr. GUST. I will say this: That I am not in possession of all the facts in regard to navigation on that river. I felt that the river was a navigable river, at least so far as Boulder Canyon, and navi-

gability, perhaps, might be restored by works to a certain extent. My point this morning was that it was not the purpose of this bill, and not the purpose of anybody in that country to restore navigability, but quite the contrary.

Senator JOHNSON. I am asking your opinion as to whether or not the Colorado River is a navigable stream.

Mr. GUST. That particular question I can not answer.

Senator JOHNSON. Will you define what a navigable stream is?

Mr. GUST. I think I gave a definition in the statement this morning.

Senator JOHNSON. I think you read a definition from one of the United States cases. Do you recall what it was?

Mr. GUST. I can not recall it. I can not quote it verbatim, and I would rather refer to that language.

Senator JOHNSON. It is a stream navigable, in fact; one fit, in reality, for commerce; is it not?

Mr. GUST. That was not the definition I gave. That is very often given, and is substantially correct.

Senator JOHNSON. That is not accurately quoting the words you gave, I grant you that, but it must be a stream under the definitions now wherein there may be transportation and commerce.

Mr. GUST. At the present time?

Senator JOHNSON. Yes, sir.

Mr. GUST. I don't know that that would necessarily be true, because I can conceive of a stream that might have been navigable in its natural state, and is not in condition where it can be navigated, and might be restored.

Senator JOHNSON. And I am asking you now as to the particular state of the Colorado River.

Mr. GUST. Yes; and I understand the Colorado River to a large extent was navigable in the early days. I understand it is being navigated to-day in certain places.

Senator JOHNSON. Do you mean navigable in that there is commerce transported upon it at Boulder Dam or that vicinity?

Mr. GUST. I do not know that there is at Boulder Dam.

Senator JOHNSON. Or in that vicinity?

Mr. GUST. No; I do not know that there is.

Senator JOHNSON. Or that it is capable of transporting commerce in that vicinity? There ought not to be any question between us as to these facts. I am not endeavoring to state them otherwise than I understand them, and if I am in error I am glad to be corrected.

Mr. GUST. Well, I don't know. I have not seen the Colorado River at a point near Boulder Canyon, and I am not advised as to the facts.

Senator JOHNSON. Very well; I won't trouble you.

Mr. GUST. I think we had better leave that to the engineers to discuss. My proposition here was based on the assumption it was navigable to that point, because if it isn't navigable, in many respects Arizona's control would be increased.

Senator JOHNSON. And in other respects the law would be different.

Mr. GUST. That would be true.

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Senator JOHNSON. Hasn't the United States Government the right by the erection of dams to provide for flood control, in your opinion?

Mr. GUST. That question is too broad to be answered.

Senator JOHNSON. I am eliminating the question of navigation entirely. I am speaking of flood control alone.

Mr. GUST. With no reference to navigation?

Senator JOHNSON. With no reference to navigation.

Mr. GUST. With no reference to reclamation of arid lands?

Senator JOHNSON. With no reference to anything but flood control.

Mr. GUST. I doubt it.

Senator JOHNSON. Could the United States protect its own property by the erection of dams in any stream?

Mr. GUST. I can't conceive there could be a situation where that would be true; but that such a situation exists on the Colorado River I do not admit.

Senator JOHNSON. I am not asking that. I am asking a legal proposition.

Mr. GUST. That may be true.

Senator JOHNSON. Well, then, can the United States, merely for flood control, erect flood controls in a stream?

Mr. GUST. Not unless you add something more to it.

Senator JOHNSON. Is it essential, in order to erect dams for flood control that it should have the consent of the State wherein the undertaking is had?

Mr. GUST. That depends. Flood control is not the ultimate purpose. The mere flood control is not one of the powers delegated to the United States, but there are many powers delegated to the United States. If for the purpose of exercising one of those powers delegated to the United States, flood control is necessary, Congress may give the flood control.

Senator JOHNSON. And one of these may be an instance where it might protect its own property, might it not?

Mr. GUST. That may sometimes be true; yes.

Senator JOHNSON. Wouldn't it always be true?

Mr. GUST. Well, that would depend on what that property was. There may be some insignificant piece of property somewhere which can not be made the basis to hang the whole question of flood control upon.

Senator JOHNSON. There is a very nice question that has arisen in the Mississippi River at the present time.

Mr. GUST. There is.

Senator JOHNSON. And upon that river the United States unquestionably will go forward, with the aid of all of us, in an endeavor to control the floods in the Mississippi.

Mr. GUST. Yes.

Senator JOHNSON. Solely for the control of floods. Do you question the right of Congress to do that?

Mr. GUST. I haven't said the Mississippi——

Senator JOHNSON. Let us take any river. I am asking your opinion simply of the legal questions.

Mr. GUST. I can say this, that I can quite conceive that a bill might be prepared by which Congress might control the floods of the Mississippi River.

Senator JOHNSON. I don't grasp what you say, when you say "might be under some circumstances."

Mr. GUST. I am not familiar with any proposed legislation existing at this time.

Senator JOHNSON. I take the Mississippi as pointing a specific instance for us at the present time. But take any stream where there has been devastating floods. The answer I want from you is whether, in your opinion, the Congress of the United States is without constitutional power to erect dams or do whatever else is essential to prevent those floods.

Mr. GUST. I think in the case of the Mississippi River the natural and logical thing that would first occur to anyone on which to base the flood control of that river would be interstate commerce. Such a river as the Mississippi has——

Senator JOHNSON. I am not talking of navigation at all. Leaving out any question of navigation.

Mr. GUST. Well, Senator, to my mind, you can not do that. You have to take the situation as you find it. The Mississippi River is a navigable river.

Senator JOHNSON. Then, you would say sometimes the Government might and sometimes it might not; is that it?

Mr. GUST. Yes.

Senator JOHNSON. That constitutional power exists in certain cases, and in some cases it does not?

Mr. GUST. Yes. I will answer it in this way: Some things the Government may do, and some things the Government may not do, because it is a Government of limited power, and those things that fall within its power it may do, and those that fall without it, it may not do.

Senator JOHNSON. Unquestionably true. That is a good lawyer's opinion anyway. That is all.

Mr. GUST. And I might say it is a good lawyer's examination.

The CHAIRMAN. Any further questions? Then, we will excuse you, sir.

(Witness excused.)

The CHAIRMAN. The next is Governor Dern.

STATEMENT OF THE HON. GEORGE H. DERN, GOVERNOR OF UTAH

Governor DERN. Gentlemen, before speaking for the State of Utah I desire to call attention to the fact that a conference between the governors, Colorado River Commissioners, and advisers of the seven Colorado River Basin States, by common consent, convened at Denver in August, 1927, for the purpose of bringing about a common accord among the seven States respecting the equitable division of water of the Colorado River between those States, and of removing all barriers to the prompt and efficient control and development of the river. The conference remained in session for a period of several weeks and is now in recess, subject to the call of the chairman, for the specific purpose of permitting representatives of the three lower basin States (Arizona, California, and Nevada) properly to consider the question of power development and to agree upon a common policy respecting that important and complicated phase of use of the waters of the stream.

The call for the Denver conference stated its purpose to be to devise ways and means of bringing about seven-State ratification of the Santa Fe compact. Since that was its sole purpose, and since seven governors and their advisers assembled and remained in session for more than four weeks, and are expecting to resume their deliberations, it is obvious that these States regard seven-State ratification as supremely important. While four States have authorized the completion of the compact on a six-State basis, it does not follow that these four States are fully satisfied with a six-State arrangement, or that it affords them full protection. I am sure they do not want the urgency of seven-State ratification minimized.

The upper basin States without exception have strongly desired seven-State ratification throughout the five years that this problem has been before them. They all ratified the Colorado River compact promptly and unconditionally, and have waited for the lower States to do likewise. Of the lower States, Nevada took the same action as the upper States, but Arizona and California are not yet in the compact. The upper States waited patiently for more than five years, and then, observing that no progress was being made, they concluded to do something more than sit and wait. They decided to use their good offices to bring Arizona and California into agreement, so that both might come into the compact, and so that the development of the river might proceed without injury to the upper States. In order to make sure that their proffers of assistance would be accepted, communications containing the suggestion were sent to the Governors of the three lower States. All of them cordially welcomed the idea, and agreed to attend. The Governors of the four upper basin States thereupon jointly issued the call for a conference to be held at Denver.

I realize that members of both branches of Congress have become impatient of the long delay in making the compact effective. For five years we have been asking that legislation be delayed until all the States shall have ratified the Colorado River compact, and we are here again to-day with the same request. May I, however, respectfully suggest that the situation now is very different from what it has ever been before? Up to the convening of the Denver conference no substantial progress had been made. In my opinion, this was due to an atmosphere of mutual distrust. Arizona and California had no confidence in each other's honorable intentions, and consequently they did little except glare at each other and call each other names. It was not until the governors of the upper States interposed as mediators, and assured both of a square deal, that headway began to be made. I am sure that the other three governors will concur in my assurance that very substantial progress was made, and that we regard the prospects for success as excellent, if free negotiations are continued.

I have stated that the purpose of the conference was to devise ways and means to bring about seven-State ratification of the Santa Fe compact. The first two days of the conference plainly disclosed the factors that would have to be taken into consideration in working out an agreement. It was obvious that the price of California's ratification is the Boulder Dam project and a satisfactory proportion of the lower basin water. It was equally patent that Arizona's demands were these three:

1. A satisfactory proportion of the water that the compact allocates to the lower basin.
2. Protection against increased use of water in Mexico.
3. Revenue from any development of the power resources of the river in Arizona.

The conference addressed itself to a consideration of these various items, all of which were deemed fair in principle.

We first took up the question of dividing the water. Arizona, California, and Nevada presented their propositions and supported them with voluminous data. After careful and thorough consideration, the governors submitted a proposal which, in the light of further discussion, was subsequently amended. The major item, providing for division of the main-stream water, was accepted by Arizona and rejected by California. Some other important items of the governors' proposal were rejected by Arizona. I shall not burden this committee with a detailed account of these negotiations or their present status. I think it will be sufficient to say that Arizona and California were wihin 400,000 acre-feet of an agreement. This difference is only 5 per cent of the water to be divided. I do not think either State will finally accept the odium of having prevented an agreement on account of so comparatively trivial a difference. That is why we feel justified in saying to this committee that on a division of the water satisfactory progress was made and an agreement seems certain.

Arizona takes the position that protection against Mexico is just as important to her and to the upper basin as is protection against California. That her point is well taken was recognized by the conference, which thereupon disposed of the Mexican situation to Arizona's satisfaction by adopting the following memorial:

MEMORIAL CONCERNING INTERNATIONAL RELATIONS RESPECTING THE COLORADO RIVER

[Adopted at Seven States Conference on the Colorado River in Denver]

Hon. CALVIN COOLIDGE,
President of the United States of America,
Hon. FRANK B. KELLOGG,
Secretary of State:

Whereas the prosperity and growth of the Colorado River States, namely, Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, are dependent upon present and increasing use of the waters of the Colorado River for domestic, agricultural, industrial, and other beneficial purposes, and the need of many regions of these States for additional water from that source, already is extremely acute and will become increasingly so, and

Whereas said river is an international stream between the United States of America and the United States of Mexico with all of the water supplying the same coming from the United States of America, and the United States of Mexico is rapidly extending the irrigated area supplied from said river within her own boundaries, and great storage projects within the United States of America are in existence and in contemplation, and

Whereas, said United States of Mexico, although having no strictly legal right to a continuance of the river flow for beneficial purposes, nevertheless, may hereafter make some claim thereto, and

Whereas, under acts of Congress of May 13, 1924, and March 3, 1927, a commission of three has been appointed by the President to cooperate with representatives of the United States of Mexico in a study regarding the equitable use of the waters of the Colorado River and other international waters

for the purpose of securing information on which to base a treaty relative to international uses.

Now, therefore, and to the end that no unfortunate misunderstanding may arise between the United States of America and the United States of Mexico, and that no false encouragement may be given to present or future developments along the Colorado River in the United States of Mexico, we the governors of all seven of the Colorado River States, with our interstate river commissioners and advisors in conference assembled in the city of Denver on this 26th day of August, 1927, do hereby in great earnestness and concern make common petition that a note be dispatched to the Government of the United States of Mexico calling attention of that Government to the fact that, neither it nor its citizens or alien investors, have any legal right as against the United States of America or its citizens to a continuance of the flow of the Colorado River for beneficial purposes and that the United States of Mexico can expect no such continuance except to the extent that as a matter of comity the two Governments may declare hereafter by treaty and that especially under no circumstances can the United States of Mexico hope to use water made available through storage works constructed or to be constructed within the United States of America, or hope to found any right upon any use thereof. We believe too, so great are the water necessities of our States, that any adjustment made with the United States of Mexico concerning the Colorado River, should be based upon that river alone. We further earnestly suggest that a special commission be created by act of Congress for the Colorado River alone, a majority of the commission to be appointed from citizens of the Colorado River States, or that by act of Congress the present commission already referred to be enlarged to contain two additional members to come from the Colorado River States.

It is only by such precautionary measures, promptly taken, that our seven States with their millions of people can be given a basis of economic certainty, adequate protection, and a feeling of security pending the negotiation of an early treaty between the two Governments.

And you memorialists will forever pray.

GEO. W. P. HUNT,
Governor of Arizona.
C. C. YOUNG,
Governor of California.
WM. H. ADAMS,
Governor of Colorado.
F. B. BALZAR,
Governor of Nevada.
R. C. DILLON,
Governor of New Mexico.
GEO. H. DERN,
Governor of Utah.
FRANK C. EMERSON,
Governor of Wyoming.

Nevada joined in Arizona's demand for revenue from any power development made on the river. This demand involves certain fundamental principles of the relationship between the States and the Federal Government. In order to bring these principles before the conference, Senator Pittman, of Nevada, drafted and laid before the conference a resolution, which has since been known as the Pittman resolution, and made two notable and convincing speeches in support of it. It was referred to a committee which included several distinguished lawyers, and was by that committee somewhat amended and recommended for adoption. It received the affirmative vote of six States. California did not vote either for or against the resolution, but asked to be excused from voting. The resolution as adopted was as follows:

RESOLUTION OFFERED BY SENATOR KEY PITTMAN ON BEHALF OF THE NEVADA COMMISSION TO THE CONFERENCE OF GOVERNORS AND THE COMMISSIONERS OF THE COLORADO BASIN STATES IN SESSION AT DENVER, COLO., AUGUST 29, 1927

Whereas it is the settled law of this country that the ownership of and dominion and sovereignty over lands covered by navigable waters within the limits of the several States of the Union belong to the respective States within which they are found, with the consequent right to use or dispose of any portion thereof, when that can be done without substantial impairment of the interests of the public in the waters, and subject always to the paramount right of Congress to control their navigation so far as may be necessary for the regulation of commerce with foreign nations and among the States; and

Whereas it is the settled law of this country that, subject to the settlement of controversies between them by interstate compact or decision of the Supreme Court of the United States, and subject always to the paramount right of Congress to control the navigation of navigable streams so far as may be necessary for the regulation of commerce with foreign nations and among the States, the exclusive sovereignty over all of the waters within the limits of the several States belongs to the respective States within which they are found, and that the sovereignty over waters constituting the boundary between two States is equal in each of such respective States; and

Whereas it is the sense of this conference that the exercise by the United States Government of the delegated constitutional authority to control navigation for the regulation of interstate and foreign commerce does not confer upon such Government the use of waters for any other purposes which are not plainly adapted to that end, and does not divest the States of their sovereignty over such waters for any other public purpose that will not interfere with navigation: Therefore be it

Resolved, That it is the sense of this conference of governors and the duly authorized and appointed commissioners of the States of Arizona, California, Colorado, New Mexico, Nevada, Utah, and Wyoming, constituting the Colorado River Basin States, assembled at Denver, Colo., this 23d day of September, 1927, that—

The rights of the States under such settled law shall be maintained.

The States have a legal right to demand and receive compensation for the use of their lands and waters except from the United States for the use of such lands and waters to regulate interstate and foreign commerce.

The State or States upon whose land a dam and reservoir is built by the United States Government, or whose waters are used in connection with a dam built by the United States Government to generate hydroelectric energy, are entitled to the preferred right to acquire the hydroelectric energy so generated or to acquire the use of such dam or reservoir to amortize the Government investment, together with interest thereon, or in lieu thereof agree upon any other method of compensation for the use of their waters.

We, the undersigned committee, to which has been referred the foregoing resolution, as presented to the conference on August 29, 1927, by Senator Key Pittman, having adopted certain amendments unanimously which are now incorporated therein, recommend that the resolution set out above be adopted.

KEY PITTMAN.
FRANCIS C. WILSON.
WILLIAM R. WALLACE.
CHARLES E. WINTER.
A. H. FAVOUR.
DELPH E. CARPENTER.

The principle of compensation having been recognized, it became necessary to take up the measure or amount of compensation. Negotiations in this direction were carried on for a few days, when it became apparent that the parties were not in possession of sufficient data to reach a conclusion. In order to permit the representatives of the lower States to gather the required information, and to carry on negotiations among themselves, the conference took a recess until December 7. As the date for reconvening approached, I was informed by Messrs. Malone, of Nevada, Matthews, of California, and Tally, of Arizona, that they had not been able to finish their work,

and they requested me to postpone the conference. I complied with their request, since the information that had reached me from time to time convinced me that negotiations were proceeding with proper speed and with marked progress. Comissioner Malone, of Nevada, who acted as chairman of these recent conferences, has verbally given me an encouraging report on what was accomplished, and he appears optimistic of the outcome.

In December I received notice that negotiations had been suspended. The pending hearings on this subject before the committees of Congress required the presence in Washington of many of the members of the seven-State conference, thereby preventing a reconvening of the conference.

In view of these developments, the governors and interstate river commissioners of the four upper-basin States (Colorado, New Mexico, Utah, and Wyoming), whose territory is the source of more than 80 per cent of the water of the Colorado River, met at Denver on December 19, 1927, for the purpose of discussing ways and means of bringing about the most expeditious settlement of all problems concerning the Colorado River and of agreeing upon a common policy and plan of procedure with reference to the pending legislation. After mature deliberation and after consideration of the existing situation, those present unanimously agreed that the best interests of all the seven States, and particularly of the upper-basin States, would best be subserved if an equitable apportionment of the use of the waters of the river precedes authorization or construction of works upon the lower river, and agreed to the following resolution:

> Whereas it is the conviction of the governors and interstate water commissioners and other representatives of the States of Colorado, New Mexico, Utah, and Wyoming, the four States of the upper basin of the Colorado River, that the interstate agreement embodied in form by the Colorado River compact as negotiated at Santa Fe, N. Mex., in November, 1922, should be completed and placed in full force and effect through approval and acceptance by the seven Colorado River States, in order that the way may be properly cleared for the orderly development of the Colorado River; and
>
> Whereas substantial progress has been made during the past few months toward the completion of the said compact and negotiations are now being carried on in a competent manner looking to such completion: Therefore be it
>
> *Resolved*, That it is firm belief of the representatives of the four said upper-basin States, as assembled at Denver, Colo., this 19th day of December, 1927, that no legislation proposing the construction of any project upon the Colorado River should be enacted by Congress or otherwise authorized by any Federal agency before the negotiations now in progress have been completed and every reasonable effort exhausted to reach such agreement between the seven States.
>
> W. H. Adams, Governor of Colorado; George H. Dern, Governor of Utah; Frank C. Emerson, Governor of Wyoming; Edward Sargent, Lieutenant-Governor of New Mexico; Delph E. Carpenter, interstate river commissioner for Colorado; William L. Boatright, attorney general of Colorado; Francis C. Wilson, interstate river commissioner for New Mexico; L. Ward Bannister, counsel for the city of Denver; M. C. Mechem, representing New Mexico.

In view of the foregoing history we believe we were fully justified in the resolution I have just quoted. It is the firm belief of the governors of the four upper States that Arizona, California, and Nevada can arrive at an early and satisfactory solution of the problems common to those three States, if negotiations proceed in good faith and without embarrassment. The results of the Denver conference justify this conviction. In view of the fact that Congress is

asked to create works of such magnitude and character as to involve the waters of all seven States in perpetuity, and by which, unless properly safeguarded, the waters of the river will be taken away from the States in which such waters rise, and given in perpetuity to States which furnish little or no part of the common supply, those States which furnish the water and must depend upon its use for their very existence, would view with apprehension an action by Congress authorizing such works until such time as the rights of the States shall have been fixed and determined by compacts between them. The justice of this request is self-evident when it is considered that the State which will be the principal beneficiary under the pending legislation furnishes no part of the water supply of the River, and that if Congress grants the request of this State by passing the pending legislation it will operate to invade the Territory of the other States, and may permanently deprive them of their most valuable resources without their consent, and over their earnest and timely protest. The fact that the States have relinquished their inherent right to protect their territory by force, and have reposed the duty of protection upon the National Government, only makes it the greater duty of Congress to proceed with deliberation, and in an orderly manner, in order that justice may be done.

My personal belief is that the passage of this bill will destroy the last hope of seven-State ratification and condemn us permanently to the hazard that I shall presently undertake to explain.

Passing now to a consideration of the interest of the State of Utah, with your indulgence I will address my remarks to the problem as it affects our State.

I am not here in my personal capacity, I am not here to present my own views and opinions as a private citizen. I am here in my official capacity as Governor of Utah, and what I shall say will be the official attitude of the State of Utah, so far as I may be able to state it. On behalf of the State of Utah, then, I express our appreciation for this opportunity. I hope I may succeed in my aim to present the case fairly, as of course I also hope that even at this late date the minds of the members of this committee are not closed, but that our views will receive thoughtful consideration.

I take the liberty of clarifying my official status. I am a State officer. The Senators and Representatives from Utah are national officers. My exclusive duty is to defend the interests of my State. Theirs is a double responsibility. They not only have to look out for the interests of their State in Congress, but they are parts of the National Government, and therefore have a voice in determining national policies. In this Union of States the governors speak only for the State viewpoint.

The distinction is important, and it has been recognized by some of those who have been active on one side or the other of the proposed Colorado River legislation. For example, the pending bills authorize the construction and operation of a hydroelectric power plant by the Federal Government. That, of course, is a question of national policy, and I, as Governor of Utah, have nothing to do with determining national policies. It is none of my official business whether the Government goes into the power business or not. It is, however, the business of the Senators and Representatives from Utah, but when they express an opinion on this phase of the subject they are

not speaking as officers of the State of Utah, but as officers of the National Government. An individual Senator or Representative may appropriately have views on an economic question affecting national policy.

I make this explanation in order to correct the erroneous impression that the State of Utah is opposed to the bills because they would put the Government in the power business. Some persons, whether ignorantly or maliciously, have misrepresented Utah's position in this respect. Some members of the Utah congressional delegation may object to the Government going into the power business, and that may be one of their reasons for opposing the pending bill; but I am sure they all have other and far more important reasons for opposing it. While I am trying to keep from infringing upon their proper prerogatives, I am confident that they will hold up my hands in the objections I shall here urge against the pending bill.

As Governor of the State of Utah, I protest against the passage of the pending bill and convey to you the definite pronouncement of the Utah Water Storage Commission, which is the official State body in charge of the State's water resources, and also a resolution passed by the Legislature of Utah, February 25, 1927, which reads as follows:

RESOLUTION PROTESTING AGAINST THE PASSAGE OF THE SWING-JOHNSON BILL, PENDING IN CONGRESS, OR OTHER SIMILAR LEGISLATION

Be it resolved by the Legislature of the State of Utah (the Governor concurring therein), That the State of Utah, through its legislature, hereby protests against the passage of the present Swing-Johnson bill, or any similar legislation, by Congress until provisions are made therein for an equitable apportionment of the waters of the Colorado River; and

Resolved further, That the Governor of the State of Utah forward certified copies of this resolution to the President of the United States, the Secretary of State of the United States, to the Senators and Representatives in Congress from this State, and to the Governors of the States of Arizona, Colorado, California, New Mexico, Wyoming, and Nevada.

When this resolution reached the Governor's office, Congress had adjourned. I therefore return the bill without my approval, saying, "I am not unsympathetic with the purpose of this resolution, but the emergency which called it forth has passed, and its enactment at this time will serve no useful purpose because the Swing-Johnson bill, against which it protests, is dead so far as the present session is concerned." I added that I had some fear that the resolution as phrased might cause the position of Utah to be misunderstood, and that it might lead to unnecessary embarrassment to give official expression to only one point of the State's policy, or to express opposition without giving the reasons. Moreover, although I did not say so, I was afraid this resolution would be regarded by California as a willfully unfriendly act, and I was desirous of cultivating the confidence of California, in the hope of assisting to bring about a settlement of the whole problem during the summer before Congress would convene again.

To my surprise, the legislature immediately repassed the resolution over my veto by a nearly unanimous vote.

I therefore have a clear mandate from my State to protest against the passage of this pending bill, which is practically the same as the Swing-Johnson bill of last session. Therefore, on behalf of the

legislative and executive departments of the State of Utah, I here and now formally, solemnly, and earnestly protest against the passage of this bill, which does not adequately protect the rights and future development of my State.

I suppose a State may be said to have three official mouthpieces, its legislature, its governor, and its congressional delegation. Two of these have now spoken, and there is no doubt that our Senators and Representatives will add their protests.

The foregoing presentation is necessary as a foundation for the next point. There has been a shameless and outrageous propaganda that the only objection to the pending bill comes from the so-called "power trust." The country has been deluged with stories about the vast sums that the power trust is going to spend in lobbying and propagandizing against the Swing-Johnson bill. Stories of that kind have the effect of making the people believe that all the opposition to the bill is the selfish interest of the power trust, and that this is a fight between the people and a giant monopoly. This propaganda acts as a smoke screen to hide our real objections to the bill, which Congress and the country ought to know. Unfortunately a great many worthy and well-meaning people have been misled by this campaign of misrepresentation.

The private power interests may be fighting this legislation, but the mere fact that they are against this bill is not a sufficient reason for any Senator or Congressman to be for it, so long as it invades the rights of the States.

Perhaps it will be helpful to this committee if I clarify the position of Utah and the rest of the upper-basin States in another respect. In some quarters it has been advocated that a mere flood-control dam for the Imperial Valley should be built at once by the Federal Government. I most earnestly object to that proposition, because it absolutely omits protection of the rights of the State of Utah; and I know the rest of the upper-basin States share my views. A flood-control dam, constructed before the Colorado compact is ratified by the seven States, would be scarcely less dangerous to the upper-basin States than would the proposed Boulder Dam. Any dam on the lower river that impounds the flood waters, and releases them in an equated stream, would enable diverters below the dam to put additional water to beneficial use, and thereby set up new claims of alleged prior rights against the upper States. The official position of Utah is that we are opposed to any and all development on the lower river in advance of completion of the compact. Utah has opposed development not only on the lower river but on the upper river as well; for a large dam and reservoir in the upper basin would, to some extent, equalize the flow of the lower river and make it possible to use additional water for irrigation in the Imperial Valley and Mexico, which would cause new claims of priorities to be set up against us. We have therefore protested against and held up the construction of a power dam at Flaming Gorge, on the Green River, in Utah. I am sure this is good evidence that we are in earnest in the position we have announced.

In opposing the pending bills, Utah is not fighting California. Entirely aside from our good will toward our sister State, Utah is a producing territory and her greatest need is a satisfactory market for her products. We are so far from the eastern centers of popu-

lation that the high freight rates, and the competition of the Middle West which we have to cross, shut us out of that great consuming territory. We are finding that the best outlet for our surplus is on the Pacific coast, and hence we have become directly interested in the growth and development of southern California. We have a selfish interest in seeing Los Angeles grow, because every additional inhabitant of Los Angeles is potentially another consumer of Utah products. As the population of California grows, Utah's market is enlarged.

Since our prosperity depends so largely upon the Pacific coast market, it would be suicidal for us unnecessarily to fight California and arrest her growth. In this controversy over the Colorado River, Utah and California are natural allies. As the logical friend of California, I have urged her representatives so to phrase their bill that we could afford to support it, but to our disappointment they have ignored the points that are absolutely vital to us.

We are not fighting the Boulder Dam, provided it is built on the right terms. Some two years ago, at a hearing of this committee, I stated Utah's position in the following language:

> We simply want our rights protected. We are justly entitled to as much of the water of the tributaries of the Colorado River rising in Utah as we can legitimately use. It is ours by every rule of right and equity, and our cause is just when we ask that it be reserved for our own use when we get ready to use it. As soon as we are given such a guaranty we shall be willing to let California or any other State go as far and as fast as she likes with the water that may be allotted to her, and we shall rejoice in her prosperity.

That has been exactly our position all the time. Give us the full protection to which we believe we are entitled, and we shall not care what the lower basin States do with their share of the water. If they can persuade Congress to build them the Boulder Dam, well and good. If they can persuade Congress that this is a good time to reclaim more land, well and good. If they want to pump part of their water over a mountain to Los Angeles, well and good. We have tried to be consistent, we have tried to be fair, and we have tried to be unselfish; but we must be protected.

If we wanted to be selfish, we could find some good reasons for opposing the Boulder Dam. For one thing, we might fear that the products of the new lands to be reclaimed by this project would glut the Los Angeles market and hurt our farmers. For another thing, we might fear that the extremely cheap power that Los Angeles expects to get from the Boulder Dam will attract new industries there and keep them from locating in Utah, thereby retarding our growth. Mr. Scattergood, of the Los Angeles Bureau of Power and Light, frankly told me that this advantage is one of their objectives. For still another thing, we might fear that this great new supply of cheap hydroelectric power will destroy a great potential market for Utah coal. For a final objection, I might cogently urge that Congress will be guilty of sectional discrimination if it takes money from the National Treasury, part of which is contributed by Utah, to give Los Angeles an industrial advantage over Utah cities, since that would amount to using the money of Utah taxpayers to their own hurt. By the same token we might ask why Congress should make a development for only one of the seven States and leave the other six out in the cold.

We have steadfastly declined to urge these selfish considerations against the Boulder Canyon project. We have said to our people that we must be scrupulously fair and unselfish, and that so long as we are just Congress will never deny our legitimate claims. I hope our faith is well founded.

I now turn to Utah's position on the needs of California. The pending measure is primarily a California measure. It can not benefit Utah in any respect whatsoever, except in so far as we might derive an indirect benefit from the growth of southern California cities and except as it may fulfill the obligations of the Colorado River compact after that compact shall have first been ratified by all seven States and by Congress. The Boulder Dam would be built far below the borders of Utah. None of the water impounded in the reservoir could be diverted to irrigate Utah land. The power generated at the dam would be too remote from the Utah market for economical transmission. We have great power sites on the Colorado and Green Rivers in Utah, much closer to the points of demand, with which Boulder Canyon power could not compete.

The Boulder Canyon project is designed to give California the following benefits from water furnished by the upper basin States:

1. Flood control for Imperial Valley.
2. Silt control for Imperial Valley.
3. Drought control for Imperial Valley.
4. Reclamation of additional lands in Imperial Valley and southern California.
5. The all-American canal for Imperial Valley.
6. An augmented domestic water supply for Los Angeles and other southern California cities.
7. An abundant supply of cheap electric power, chiefly for southern California.

I take the liberty of referring to these seven items seriatim.

FLOOD CONTROL

I have visited the Imperial Valley and have some first-hand knowledge of the flood menace. I agree that there is a flood menace which is a constant dread and source of expense to the people of the valley, and I hope they may be given relief as speedily as possible. The degree of speed is entirely in the keeping of California. The upper States have aleady approved the compact. The Imperial Valley lies below sea level, while the Colorado River runs along the crest of a ridge, of course, above sea level. At its flood stages there is danger that the river will break its banks and flow into the valley. But the flood danger in the Imperial Valley is quite different than the flood danger along the Mississippi River. When the Mississippi breaks its levees it immediately begins to submerge farms and homes, drown livestock, and destroy human life. If the Colorado River should break its levees, the water would soon find one of its old channels and flow into the Salton Sea. In finding such a channel there would doubtless be some local erosion and temporary flooding, but this damage would be relatively moderate. There might, however, be serious damage from destroying irrigation canals and ditches, so that crops would be destroyed by drought rather than by flood. We are not accustomed to the thought that a flood would

cause a drought, but that is a major danger. When the stream had once found its channel to the Salton Sea there would be no further damage until the level of the Salton Sea had risen high enough to submerge the lowest farms and towns. This would require nearly a year and if the people stood idly by to see what might happen it would take 12 to 14 years to fill the valley and cover all the towns. There would obviously be no danger to human life, notwithstanding some of the excited orators who are trying to create the impression that all the women and children in the Imperial Valley are going to be drowned. The Imperial irrigation district is much better equipped to repair a break than it was in 1905, and, of course, the repairs, though probably difficult and costly, would be made as promptly as possible.

I am not trying to minimize the flood danger nor the necessity for relief. I realize the constant dread under which the people live, the burdensome expense of protecting themselves, and the depreciating effect upon their land values. I merely make this explanation to impress upon the committee that there is no crisis impending which requires hasty action, even at the cost of overriding the equitable rights of other States. Utah, however, is in hearty sympathy with Imperial Valley's need for flood protection; and we are for it on any terms that will not infringe the rights of the upper States. I repeat that we are flatly opposed to the proposition that Congress shall authorize the construction of a mere flood-control dam at Gvernment expense, without first completing the Colorado River compact.

SILT ELIMINATION

The silt problem is responsible for the flood problem, for the deposition of silt constantly has a tendency to build up the bed of the river channel, thereby increasing the danger of a break into the valley. In order to control the flood menace the silt must be eliminated. Furthermore, the silt fills up the canals and ditches in the valley and this entails burdensome annual expense for ditch cleaning. The piles of silt along the canals seem to indicate that there is a limit to this method. Silt elimination will affect an enormous saving in the annual cost of maintenance of the irrigation system at the expense of storage of the silt in an artificial reservoir. Indeed, it is necessary,in order to insure the perpetuity of an irrigated district in Imperial Valley.

DROUGHT CONTROL

Imperial Valley is now dependent upon the natural stream flow of the Colorado River, and there is an occasional season when this does not furnish water enough to supply the irrigation demands. In Utah we have been having a cycle of dry years, and we know from bitter experience the hardships of the farmer who has not water enough to finish his crops. We therefore sympathize with the Imperial Valley's needs in this respect, and hope she may early place herself in a position to be insured a stabilized water supply for her existing irrigated acreage.

RECLAMATION OF ADDITIONAL LANDS

Whether or not it is wise to reclaim additional lands in the Imperial Valley is not Utah's problem, provided our share of the water is safely reserved to us. We still adhere to our original proposition:

> Give us the seven-state compact, so that we shall be secure in our opportunity for future development, and not deprived of our sources of revenue, and then we shall have no objection to any development the lower basin States may see fit to make with their share of the water.

In taking this attitude we are more than liberal. The country has been made to believe that the Imperial Valley is one of the finest and richest garden spots in the world. The effect of these extravagant claims is to create the impression that the water of the Colorado River can be used to better advantage in the Imperial Valley than anywhere else; but an acre-foot of water will produce more dollars in western Colorado or eastern Utah than in the Imperial Valley, hence there is no excuse for giving the Imperial Valley a preference over us. The reason why the Imperial Valley is so productive is that it has such a long growing season—not because an acre-foot of water will produce more there than elsewhere. The Imperial Valley is one of the most wasteful places in the United States in the use of irrigation water. This is due to two factors that can not be overcome. The first is that the excessively hot climate causes an exorbitant loss by evaporation. The second is that the valley lies below the river, and hence there can be no reuse of the return flow. The return flow now runs into the Salton Sea and is wasted into the air by evaporation; and this loss amounts to hundreds of thousands of acre-feet per annum.

In the negotiation of the Colorado River compact, therefore, the upper basin was very generous in consenting to the allotment of such a large proportion of the river to a territory where so much of the water must be wasted. But we have signed that agreement and are ready to abide by it.

THE ALL-AMERICAN CANAL

The supply canal of the Imperial Valley runs part of its length through Mexican territory, under a contract which provides that Mexico shall be entitled to half the flow, upon demand and at a price. I understand the Imperial Valley receives substantial revenues from this source. Under this arrangement Mexico is constantly increasing its irrigated area, and hence its claims upon water of the Colorado River. This has created an international problem, in which the upper basin States are equally interested with the lower basin States. Before I touch upon the Mexican situation per se, however, may I make just this observation about the proposed all-American canal? This is a problem of the lower basin States and the Federal Government, and will not concern the upper basin, after their rights are protected by compact. Until that time we have a most decided interest.

In so far as the canal would relieve the Imperial Valley from the annoyance and expense of maintaining its main canal in a foreign

country, we are sympathetic. In so far as it is necessary for the reclamation of additional lands, we are indifferent. In so far as it is expected to solve the Mexican problem, we can not conceive how it will have any such effect, all claims and arguments to the contrary notwithstanding.

MEXICAN PROBLEM

The Mexican problem is to delimit the claims or rights of Mexico to water from the Colorado River. It is said that already some 200,000 acres of land are being irrigated on the Mexican side of the international boundary, and hence Mexico is using a large quantity of water, to which she may be expected to claim an established right. If the compact were in effect, this claim would be a burden upon the river. In the absence of compact, it should be a burden upon California's water rights in the river. The Mexican burden was created by California, and California is solely responsible for it. The Imperial irrigation district, through a subsidiary Mexican corporation, made a contract with Mexico, whereby Mexico has a right to take half the water that flows through the canal. In other words, the Imperial Valley gave part of its water to Mexico for a canal right of way. I say the Imperial Valley gave away part of its water, not part of our water, for the upper basin States were not consulted about this trade, and never gave their consent. The Imperial Valley water filings are said to cover the entire low-water flow of the river, and in occasional dry years the valley has taken every drop of water out of the river to satisfy its claims and those of Mexico. In order to get their water to their lands the people of the Imperial Valley gave part of it away. Without the compact the water that is being used in Mexico should be a part of the Imperial Valley's water right.

As a direct result of its own bargain with Mexico, the Imperial Valley is now sometimes short of water. If she could have the entire stream she would always have ample, but after she has satisfied Mexico's demands, in certain seasons she is short.

The longer the completion of the Colorado River compact is delayed the larger Mexican claims may become, except that without storage they can never exceed half the low-water flow of the river. Since Mexico is part of the lower basin and is not in the compact, it is just as important to the upper basin to secure an agreement with Mexico as it is to secure California's ratification.

It is argued that the all-American canal will solve this complication, because the Imperial Valley will then abandon its Mexican canal, and will therefore be relieved from its contract to give Mexico part of its water. That sounds simple, but obviously Mexico is not going to let her lands burn up and abandon them. If she can not secure the use of the Imperial Valley's present diversion works at Hanlon Heading, I understand she can go down the river a few hundred yards and build new diversion works on her own soil. These works might not be as good as the present ones, but I am told they could be made to answer the purpose, and then, in default of any treaty, she will have in her own hands the control of all the water that comes past Laguna Dam, where the Imperial Valley's new diversion works will be situated. She may claim that she has established rights to a certain quantity of water. In doing so, the Republic of

Mexico is not going to deal with the Imperial Irrigation District, but with the United States of America, and as a matter of international comity Mexico's just claims will presumably be recognized. This will require a treaty, and the treaty will become the supreme law of the land.

All the Colorado River States have recognized the seriousness of this Mexican situation for several years, and have urged an immediate treaty with Mexico, definitely fixing and permanently limiting her rights. I am told that our Government has been trying for several years to negotiate such a treaty, but that Mexico will not treat. It is to Mexico's advantage to delay an understanding, because the longer she waits the more water she may claim, so she has adopted a policy of "mañana."

The advocates of the pending bill urge that the Boulder Dam project, by including the all-American canal, gives our Government immediate opportunity to bring the Mexican situation to a head. Some of them have suggested that when we have the Boulder Dam and the all-American canal we need only let down enough water to supply the all-American canal and may shut the water off from Mexico entirely for a couple of weeks; and that after her crops have been burned up, Mexico will come to time and negotiate a treaty. It is doubtful that the United States could pursue such an arbitrary course.

Other persons, who have a more reasonable view of international relations, concede that the Government of the United States would not descend to so low a point as wholly to deny Mexican lands water at any time, nor yet to deny them the water to which they are entitled, but they think we can say to Mexico, "You may have the water you are now using but no more." They add that the only way we can make that proposition stick is by the all-American canal.

For a while I was inclined to agree with this view, but upon analysis it does not appear to be sound. The trouble is that the Boulder Canyon project includes a great hydroelectric power plant. In fact, the whole scheme depends upon this power plant, for the Government's investment is to be repaid by the sale of power. The power plant will require much more water than it takes to supply the present needs of Imperial Valley and Mexico put together. An augmented and equated stream will therefore go to Mexico, enabling that country to enlarge her uses. Hence the Mexican situation will be made worse instead of better, by the Boulder Dam project. The only way to avoid it will be by shutting down the power plant, or running it at a fraction of its capacity. Will not that destroy the financial soundness of the whole scheme? Of what use is a power plant that can not be kept running? Can the Government hope to sell the power if it can not promise uninterrupted service? I have asked the California people how they expect to surmount this obstacle. One suggestion is that they will put the whole river into the all-American canal and dump the surplus into the Salton Sea; but even if the canal were built with sufficient excess capacity, this manipulation would be severely limited by the rising level of the Salton Sea, and would at best be an unsatisfactory makeshift. They also suggest that they will have to build stand-by steam plants to carry the load while the Boulder Dam is shut down. It would

hardly seem likely that Los Angeles will build a 500,000-horsepower auxiliary steam plant, hence this expedient does not look like a logical way out of the difficulty.

Taking these plain facts into consideration, it seems apparent that no single reservoir can solve the problems that the Boulder Canyon reservoir is designed to solve. The only way to keep the Boulder Dam power plant running, and thereby enable it to pay for the project, without giving more water to Mexico, is by building two dams and reservoirs instead of one. Put a reregulating reservoir below the Boulder Dam, and you will be able to manipulate the flow of the river so as to prevent an increased use of water by Mexico. In the absence of such a reregulating reservoir protection can only be had through an understanding with Mexico.

The Colorado River conference held at Denver during the past few months, after considering this phase of the problem carefully, reached the conclusion that the Boulder Dam and all-American canal would not automatically solve the Mexican problem. The conference was also aware of Mexico's unwillingness to negotiate a treaty at this time. It therefore decided that the only way to reach the situation without delay is to have the Government of the United States immediately serve notice upon Mexico that under no conditions shall Mexico ever be entitled to claim any water made available by storage works built within and at the expense of the United States. This idea was set forth in the memorial which was unanimously adopted by the seven States represented at the Denver conference, and which I have already read.

It was generally agreed that such a notice to Mexico would be effective. We think that notice should be served before any storage works are built on the river. We ask that our Government give us every possible protection.

WATER FOR LOS ANGELES

Utah is sympathetic with the needs of Los Angeles and other southern California cities for an augmented supply of domestic water. It might be appropriate, however, to call attention to the fact that such water will not only be taken entirely away from the basin of the river but the quantity is so great as to exceed the aggregate intermountain diversions which are now or ever will be made in the upper basin.

ELECTRIC POWER FROM BOULDER DAM

I have also referred briefly to the power-plant phase of the Boulder Dam project. The State of Utah has no objection to the construction and operation of this proposed power plant, provided it does not encroach upon our share of the water, and provided it does not set up any precedents that will prejudice our rights in the future. I will presently explain just what I mean by that. So far as the State of Utah is concerned, it is none of her concern whether the power plant is built by the United States or by private capital.

UTAH'S DEMAND

I have so far devoted myself to explaining some of the things that Utah is not contesting and to a discussion of California's needs. I now come to a definite statement of Utah's position on the whole matter. Utah is opposed to the pending bills. The official pronouncement of Utah's essential requirements in the solution and settlement of the Colorado River problem was made by the Utah Water Storage Commission, with my full approval, and consisted of the following points:

1. Seven-State ratification of the Santa Fe compact.
2. A treaty with Mexico preserving to the United States the rights to any water of the Colorado River made available through development in the United States, including equitable rights to the natural flow.
3. Acknowledgment that water within the State is the property of the State.
4. Acknowledgment that the State of Utah is the owner of that portion of the bed of the Colorado River which lies within its borders.
5. Full acknowledgment that the States have the right to demand and receive compensation for the use of their lands and waters.

The foregoing is an official statement of what we want. None of our claims conflict with the legitimate claims of any of our sister States. On the contrary, they were whole-heartedly indorsed by the States represented at the Denver conference, with the single exception of California. That conference, after prolonged consideration and careful study by eminent lawyers who have specialized in this branch of the law, adopted the Pittman resolution, which I have already read, and the phrasing of which, I am assured, follows the language of numerous decisions of the Supreme Court of the United States. I understand the resolution to be an authoritative statement of the law, made by experts, after thorough and diligent research. The principles embodied in the resolution are among the things that Utah asks.

The reclamation act specifically provides that before the Government can construct a reclamation project it must secure the necessary water right from the State in which the project is to be built. Consequently there never has been a Government reclamation project built without the consent, or over the protest, of the State in which it is situated. This question was definitely settled by the Supreme Court in Kansas *v.* Colorado (206, U. S. 46) and is no longer debatable.

The CHAIRMAN. Senator Oddie, what is the prospect of a call to tht floor of the Senate for 4 o'clock?

Senator ODDIE. Senator Walsh of Montana just started to read a statement on his resolution about 10 minutes ago.

The CHAIRMAN. There was no agreement to vote at any particular time?

Senator ODDIE. No; I do not know of any. Nothing was said about that.

The CHAIRMAN. May I inquire at this point, Governor Dern, how long it will take you to conclude your remarks?

Governor DERN. I am about two-thirds of the way through.

The CHAIRMAN. It is rather apparent that you can not conclude by 4 o'clock.

Senator JOHNSON. We do not want to hurry you or bother you, but we are thinking of getting on the floor for a few minutes. We might run on until 4 o'clock, and then adjourn. What do you say, Senators?

Senator ASHURST. That is very good, I think.

Senator KENDRICK. That is all right.

Governor DERN. Congress also recognized the sovereignty of the States over their waters in the Federal water power act, for that act provides that the United States Government shall not grant any permit to use the public lands for the building of a power dam until the applicant has first obtained a permit from the State wherein the dam is to be built, to use its waters and land and has otherwise complied with the laws of the State. The Representatives and Senators from the Western States have always been extremely jealous of the sovereign rights of the States in their waters, and up to this time they have impressed that principle upon every piece of Federal legislation affecting the waters of western streams. It is to be hoped that those in the present Congress will be equally vigilant.

The pending bills propose an entirely new and revolutionary national policy, and completely reverse the former position of Congress with respect to the waters of western streams. Never before has Congress gone so far as to attempt to appropriate water without the consent of a State. The West has always heretofore seen to it that its sovereign rights were respected.

Every State has the inherent sovereign right to control the uses of water, which is essential to its existence. To deprive a State of this right would be to destroy its autonomy. Moreover, the original States are conceded by everybody to possess full power to control their waters; save for the regulation of interstate commerce, and to deprive the newer States of this control would take from them that equality with the original States which was guaranteed them when they were admitted into the Union. The arid States in particular, whose water is their very life blood, should realize that if they would protect their autonomy they must resist the deliberate and constant pressure of certain enthusiasts for Federal usurpation of State powers.

We believe no greater catastrophe could befall the Western States than to let their waters fall into the hands of the Federal Government. In Utah we already have a State of autocratic and wasteful Federal administration of water. In Nevada the same is true.

The farmers of Utah may not be deeply concerned over State autonomy, but I am sure they do not want to take orders from Federal employees in irrigating their lands; and I presume the same spirit of independence and home rule is alive in the farmers of the rest of the Western States where irrigation is carried on.

The Federal Government already owns most of our lands. In Utah 74 per cent of the area of the State belongs to Uncle Sam; in Idaho, 67 per cent; in Nevada, 87 per cent; and so on. This Government land is exempt from taxation and does not help support the State government, except the proportion of leasing royalties, grazing fees, and power royalties that are turned over to the States in recognition of the right of the State to receive some benefits from

the resources situated within its borders. In Utah these payments are trivial. The result is that taxation in the public-land States is burdensome and oppressive, because only a small percentage of the land is in private ownership and must bear the entire cost of State, county, and municipal government. People of the Eastern States, where 100 per cent of the land is in private ownership and paying taxes, can not conceive the exasperating burden of making one-fourth of the State support the other three-fourths in idleness.

What we need for the relief of our people from the crushing burden of taxes is additional sources of revenue. The power resources of the Colorado River are a potential source of large revenue to our State, and that is one of the reasons why we are opposed to this bill, which will dash from the lips of our farmers and home owners the cup of relief from their tax burdens. We want the Colorado River developed in a progressive rather than in an oppressive spirit. In other words, we want the river handled for the benefit of the people who own it.

I have for many years been a strong conservationist. When I was a member of our State senate I fathered a State mineral land leasing law, which provides that when the State sells any of its land it sells only the surface. Any minerals contained in the land are forever reserved to the State, and can never be sold, but can only be leased on a royalty basis. This law has been in effect for a number of years, and has been efficiently administered in the interest of the people. The State imposes higher royalties than the Federal Government imposes in like cases, and there have been no discrimination or favoritism. Utah's administration of her State lands under this law is a complete answer to those who bawl that State administration is ineffective, and that all such matters should be handled by the Federal Government.

We are in favor of applying the same conservation principle to our water-power resources. Last winter, in my message to the Utah Legislature, I recommended that the title to all dam and reservoir sites on navigable streams be forever retained in the State, and leased on a rental or royalty basis. Thus we may derive some revenue from this source. Furthermore, if the State retains perpetual ownership, it can include regulation of rates in the terms of the lease from time to time.

I suppose this is a good place to quit.

The CHAIRMAN. Yes; I think so. We will adjourn for the day, having been in session for two continuous hours this afternoon. We will continue in the morning at 10 o'clock, in the other room, the Senate Office Building.

(Whereupon, at 4 o'clock p. m., the committee adjourned to meet Thursday, January 19, 1928, at room 128, Senate Office Building.)

COLORADO RIVER BASIN

THURSDAY, JANUARY 19, 1928

UNITED STATES SENATE,
COMMITTEE ON IRRIGATION AND RECLAMATION,
Washington, D. C.

The committee met, pursuant to adjournment of yesterday, at 10 o'clock a. m., in room 128, Senate Office Building, Senator Lawrence C. Phipps (chairman) presiding.

Present: Senators Phipps (chairman), Jones, McNary, Shortridge, Johnson, Kendrick, Dill, and Ashurst.

Present also: Senators Bratton and Hayden.

The CHAIRMAN. The committee will come to order. Governor Dern, you may proceed with your statement.

STATEMENT OF HON. GEORGE H. DERN, GOVERNOR OF THE STATE OF UTAH—Resumed

Governor DERN. Perhaps I ought to be more explicit in pointing out how pending bills are in conflict with the principle of State sovereignty. We all recognize that legislation may conflict with a principle of government, and yet not be repugnant to the letter of the Constitution, Federal, or State.

If it is claimed that State legislation is unconstitutional, it must be clearly shown that it violates some concrete provision of the State or Federal Constitution. In case of Federal legislation it must, of course, be clearly shown to violate some concrete provision of the Federal Constitution, or to be in excess of the limited authority granted to Congress by that Constitution. I suppose no lawyer could say positively that the Swing and Johnson bills, if enacted, would be unconstitutional; and we know that the Supreme Court will go to the utmost limit to sustain an act of Congress. My belief is that the bill violates the principle of State sovereignty in that it ignores certain rights of the State and proposed to accomplish the desired result as though those rights did not exist. Whether the authors of the bills have succeeded in clothing their real purpose with sufficient color of constitutional right under the limited powers of the Federal Constitution, is immaterial to the question of principle herein discussed. If the bill is passed, it will no doubt be attacked on constitutional grounds and protracted litigation will ensue, with a possibility that the Supreme Court will declare it null and void, so that its passage will prove a futile gesture. My own feeling is that the bill conspicuously violates the spirit of the Constitution, and even though it should be held constitutional, it will not thereby be vindicated from the standpoint of being in harmony with our American plan of Federal Union.

I understand the following propositions may be accepted as almost axiomatic:

(1) The title to the beds of navigable streams within the limits of the States, whether such streams form State boundaries or not, is in the respective States. This has been established by a long line of decisions of the Supreme Court of the United States. The State, as a matter of local policy and law, may adopt the riparian policy of regulating the use of water for the owners of the abutting upland, but in which case, however, such owners derive their title, not from the Federal Government, but from the relinquishment by the State of its own sovereign rights. So far as I am aware, none of the States within the Colorado River Basin have relinquished their sovereign title to the beds of the navigable rivers within their borders, or forming their boundaries.

(2) The right to divert, appropriate and beneficially use the public waters of a State within its borders, or along its boundaries, belongs to the State, and is subject to acquisition by private proprietors, or by any other State or body, or by the Federal Government, only through compliance with the laws of such State which create or recognize such right, except in the case of the Federal Government where it invokes the power to improve the navigability of navigable streams. This, I think, has been recognized by Congress, as well as by all Federal and State courts, ever since the Act of Congress of July 26, 1866, entitled, "An act granting right-of-way to ditch and canal owners over the public lands, and for other purposes." A recent confirmation of this right of the States is found in section 27 of the Federal water power act, of June 10, 1920, which provides:

> That nothing herein contained shall be construed as affecting or intending to affect or in any way to interfere with the laws of the respective States relating to control, appropriation, or distribution of water used in irrigation or for municipal or other uses, or any vested right acquired therein.

Furthermore, a licensee under such act is required to submit "satisfactory evidence" that he "has complied with the requirements of the laws of the State or States within which the proposed project is to be located with respect to the bed and banks and to the appropriation, diversion and use of water for power purposes." (Ib. sec. 9.)

Senator KENDRICK. May I interrupt you there, Governor?

Governor DERN. Yes, sir.

Senator KENDRICK. Your reference to the reservation of the right to the State moves me to ask if you do not believe that the decision of the Supreme Court in regard to prior rights established by beneficial use substantially nullifies those reservations? The courts have decided, as you know, that prior right to the water of any such streams is established by prior beneficial use, without regard to State lines.

Governor DERN. Substantially that.

Senator KENDRICK. And, I ask if you do not believe that those decisions substantially nullify that part of the reservation of these rights to the States under the other law?

Governor DERN. I suppose, to some extent, they do, Senator. I am not qualified to discuss the legal phases, because I am not a lawyer. I understand that the Wyoming-Colorado case decided that,

as between two strictly prior appropriation States, the law of priority obtains regardless of State lines. However, I do not understand that it was an absolute decision to that effect. It was only one of the factors that was taken into consideration in that decision.

Senator KENDRICK. My opinion is that it goes farther than anything else toward eliminating the control of the water heretofore held by the State.

Governor DERN. I think you are right, Senator. That was the only reason for negotiating a compact, because if that doctrine were accepted absolutely no State would be secure in having any part of the water, even the water that it contributes to the river, reserved for its own use; and it was for the purpose of protecting themselves against that decision of the Supreme Court that the compact was negotiated.

Senator KENDRICK. Mr. Chairman, if I might ask the Governor a question or two; I shall have to leave in a few minutes.

The CHAIRMAN. Yes, sir.

Senator KENDRICK. You would not mind if I ask you questions?

Governor DERN. No, sir.

Senator KENDRICK. Governor, do you not believe from that, it would be quite possible for, say, as many as five or six of these States to proceed upon a plan of agreement, that they considered equitable between themselves in dealing with their right and their interest in the waters of this river, without in any way destroying or interfering with the rights of the State that did not care to come in and sign the compact?

Governor DERN. I think, undoubtedly, such States could agree upon some principle or some method of control as among themselves; but, or course, that would not protect them against the other State that did not come into the agreement.

Senator KENDRICK. I know. It would not protect the States in the upper basin. Suppose Arizona, New Mexico, and Nevada came in with the States in the upper basin and agreed upon an arrangement under which they could cooperate to protect the States in the upper basin against endless expense and constand annoyance about the use of their water, do you not believe that those States could afford to join with any one or two or three States, if the others would not come in, as guaranteeing to them a certain measure of protection? Do you not believe it would be better for the upper basin States to meet the issue in that way, rather than jeopardize the entire situation?

Governor DERN. You mean——

Senator KENDRICK (interposing). If it became hopeless to induce these States to agree, would it not be better for those of us in the upper basin to secure what protection we can before this situation is hopelessly involved with power plants and with increased equities, as we are sure they are now increasing their equities in Old Mexico? Do you not believe it would be better to do something, rather than just allow this situation to drift along?

Governor DERN. Undoubtedly, Senator, some protection is better than none.

Senator KENDRICK. Yes.

Governor DERN. I have always conceded that we got some protection from the six-State arrangement. However, it is not full protection, and there is danger that by accepting partial protection we will destroy our chances ever to get full protection. We are not allowing the matter to drift, as pointed out yesterday. We are working on this matter very diligently, and I am not willing to admit failure in our effort to secure seven-State ratification. I am confident the seven-State ratification can be secured, which alone affords us the complete protection to which we are entitled. I am asking that this legislation be deferred until we can have more time to work out that seven-State agreement.

Senator KENDRICK. I understand that point exactly, and to some extent I am in sympathy with that. You understand these other charges are facing us and becoming more and more insistent, if I may say so, with every day's delay. Do you not think so?

Governor DERN. Oh, I think that has been somewhat exaggerated, Senator. Of course, there is some additional land being put under cultivation in Mexico from day to day. Otherwise, the situation has remained stationary, I think.

Senator KENDRICK. But we have been notified three different times, as I recall, officially by the Federal Water Power Commission, that only a new lease of life would be granted until a more reasonable time for reaching an agreement.

Governor DERN. That is the worst fear we have had during the past three years, the proposition that the Federal water power act was going to grant power licenses. That is the only reason we went into the six-State compact, because such action by the Federal Power Commission seemed to be impending; and therefore, so far as Utah is concerned, we thought we had better take what protection we could get in advance of that action.

The CHAIRMAN. There is an existing situation that will remain until the determination of the present Congress, or until Congress takes some further action, while the commission's hands are tied in the matter of granting or considering terms.

Governor DERN. Mr. Chairman, does not that embargo run until June, 1929?

The CHAIRMAN. Yes; I think so.

Governor DERN. Which is a year and a half from now. This embargo would protect us from that danger during that period, which I hope will be plenty of time to enable us to settle this matter.

The CHAIRMAN. Is that all, Senator Kendrick?

Senator KENDRICK. Yes, sir.

Governor DERN. This bill would seem to involve the acquisition of a right to the use of Arizona waters without the consent, and against the protest, of Arizona.

Utah is, of course, directly and vitally interested in the principle involved in Arizona's controversy, because if the Government can override the will of Arizona by construction of the proposed project within its borders, it can likewise, in the future, ignore or override the will of Utah as to a project within Utah. We are alarmed over the prospect of having such a precedent set up, which might be our undoing in the future. Undoubtedly, the States have some rights and title to the waters of the streams within their borders.

Senator KENDRICK. Governor Dern, I ask your pardon for interrupting you, but I shall have to go in about 5 minutes. If the chairman will permit me, I want to ask you a question there.

The CHAIRMAN. Certainly.

Senator KENDRICK. Do you not visualize an extreme danger here in establishing a precedent in connection with the levying of a tax upon construction built by governmental funds, in the development of Western States? Do you not believe that it will, to a certain extent, jeopardize the reclamation law itself?

Governor DERN. Senator Kendrick, my ideas on that are not very definitely worked out, but it seems to me that eventually this legislation should be amended so as to provide some sort of compensation to the State, in a manner similar to that provided in the leasing act, the water power act, etc.; some sort of percentage, in recognition of the rights of a State, whether it is a legal right of an equitable right, to receive some benefit out of the resources located in that State. Congress has specifically recognized that principle. It was not necessarily compelled to do so on constitutional grounds; but on equitable grounds Congress has given the States part of the mineral leasing royalties and part of the grazing fees.

Senator KENDRICK. If we may illustrate that with an almost parallel situation with this plant, if it should be constructed, we have the Muscle Shoals Dam. Muscle Shoals Dam was built entirely and completely with Government funds, for the benefit of States largely outside of the State of Alabama. If we proceed along these lines, shall we provide that a certain royalty per horsepower shall be paid the State of Alabama, because the Government has seen fit to make this great development there for the benefit of the people all over the country.

Governor DERN. For your information, Senator Kendrick, I might explain that I have urged Nevada and Arizona either to forego their power royalties or else to make them nominal, until after the Government has been paid. After the Government has been paid out, it seems to me, it would be appropriate for the profits to go to the States.

Senator KENDRICK. That is my attitude exactly.

Senator DILL. I wish the governor would answer your question. I am very much interested in your question.

Senator KENDRICK. Illustrating further, so as to complete the suggestion that is in my mind, we have at present between the States of Wyoming and Nebraska two of the most remarkable dams ever constructed under the principle and for the purpose of reclamation and storage—the Pathfinder Dam and the Guernsey Dam. Now that, as it has turned out, a greater part of the benefit of these two dams has accrued to a neighboring State, shall we say to Nebraska, "You must pay the State of Wyoming a certain royalty per year," or shall we proceed to encourage and promote, the best we can, the development under the reclamation law, which undoubtedly is producing more benefit to the West than it receives through any other governmental activity? That is the question in my mind.

Governor DERN. To be used for the generation of power, Senator Kendrick?

Senator KENDRICK. We proceeded, when that development was done, on the principle that the reclamation law is in behalf of

and in the interest of all the States, and we had an equal interest in the development of all the States. This, it seems to me, injects a new plan into the reclamation problem itself.

Governor DERN. Of course, I am in hearty sympathy with the reclamation law; and I do not think the law contemplates that a dam, simply built for the purpose of reclaiming land, should be taxed or be made a source of revenue to a State. The Boulder Canyou project differs from that, in that the power feature——

Senator DILL. Here is this question that Senator Kendrick asked a while ago about the Wilson Dam, which is very much in point. I would like to get again, if I may, the Governor's answer to this question, as I understood it, whether, if you establish this principle of taxing or getting revenues for the State out of the dam here at Boulder Canyon, that will not justify the demand of Alabama for revenue from the Wilson Dam, built there to produce nitrates for the farmers of the entire country?

Governor DERN. I think there is no doubt an analagous situation there.

Senator DILL. Yes; and I understood you to say you thought that they ought to be very nominal in their demand. But even nominal revenues would be establishing a precedent and a principle that would be hard to get away from.

Governor DERN. Of course, you are getting into the proposition of whether or not it is a proper function of the Federal Government to engage in the generation and sale of hydroelectric power. People urge that this is not a function of the Federal Government; that, if it wants to go into the power business, it ought to pay the State revenue equivalent to what the State might receive if the plant were built by private enterprise.

Senator DILL. You think that policy ought to be projected, whether or not that policy has been pursued up to this time? You would change the policy?

Governor DERN. Yes; I think the State of Alabama is entitled to some recognition of its claims there, if it is simply a commercial-power project.

Senator DILL. Although the State itself can not build it?

Governor DERN. If the plant is for constitutional governmental purposes, the State has no control whatever.

Senator DILL. Of course, we know that is there for power purposes.

Governor DERN. The present bill proceeds upon the hypothesis that no such rights exist, and that the jurisdiction of Congress is both complete and supreme. If the doctrine is sound as regards the States of the West, it is sound as regards the States of the East. The mere statement of such a doctrine is its refutation. It is utterly repugnant to our whole plan of Federal Union.

But we are further directly interested in the present problem, because the bill throughout proposes to adopt and make practically obligatory the terms of the Colorado River compact upon all the States in the basin, whether ratified by all or not. The bill requires ratification by any four of the States, including California.

Senator MCNARY. You are proceeding on the theory that the Western States own the legal title of the banks and beds of their navigable streams, and they are entitled to them?

Governor DERN. I recognize, of course, Senator McNary, there is a limitation to that doctrine. We claim that the Colorado River is a navigable stream, and the Federal Government has a right to regulate the flow of the stream in order to control navigation; but wherever the Government has not invoked that right we think the bed of the stream is the property of the State in its sovereign capacity.

Senator MCNARY. That is not a new subject to those who have been students of the law. I think your statement there is quite contrary to the opinion of the Attorney General regarding the rights of the States on navigable streams. His opinion is amply supported by a number of Supreme Court decisions. I quite disagree with the statement you made concerning the legal rights of the Western States. I want that to go into the record, that I do not agree with your legal conclusions at all. What might be the practical thing to do, and what you think the Government should do in the States, and what rights they may have among themselves with respect to division of power, is a different thing; but the legal proposition, I think, has been fully disclosed in the opinion to which I make reference, and which I made a Senate document a week ago.

Governor DERN. I am not prepared to argue the legal end of it, as I said. I think there is a principle involved that might be different from the legal phase of it. I think the Government ought to recognize that the States have an equitable right.

Senator MCNARY. Yes.

Governor DERN. Thus Utah may become a party to a compact, and the limitations therein imposed will be binding upon it, while Arizona may be entirely free to acquire rights adverse to the compact. As I view it, under the Johnson bill the essence of the compact idea is almost removed, and the Federal Government is given outright authority to divide the water of the river. That the division is to be made according to the terms of the Colorado River compact is a mere incident. The scheme is Federal division of the water, and the compact is no longer a compact, but merely a congressional formula. If Congrss at this session can divide the river according to this formula, then a future Congress, again succumbing to the pressure of intensive propaganda, may amend the law and divide the river according to some other formula, without consulting the States at all.

The pending bills pretend to allocate to the upper basin States in perpetuity the amount of water specified in the compact, but we question the authority of Congress to allocate water. However, if this act were predicated upon seven-State ratification of the compact, I do not think there is anything in the bill which takes any of that right away from Utah. The lower basin States, under this bill, are in a very different position.

The bill, by enforcing the terms of the compact, first grants the water, and then by the bill itself proceeds to take it away again. The bill provides that the Government shall furnish the money to build the dam; that it shall sell the water both for irrigation and generation of electricity on terms prescribed by the Secretary of the Interior; that it shall repay itself its investiment; that it shall retain the profits thereafter for its own disposal without reference to the States; and that the title to the dam, reservoir, and plant shall remain forever in the United States. A right of property is the right

to exercise dominion over a thing. Certainly by the Swing-Johnson bill the lower basin States forever lose dominion over the water of the reservoir, and hence over the water of the river, since the reservoir is to impound the whole river. They also lose dominion over the lands occupied by the dam and reservoir, as well as over the plant installed in connection with the reservoir.

This establishes a precedent as to the basis upon which the United States will lend its aid in the development of the Colorado River. In all other reclamation projects, when the Government has been repaid it steps out, but in this project it proposes to remain in control perpetually, instead of turning the project back to the States which originally owned the resource. This raises the question of whether the Government should engage in business for profit. In this instance that is not simply a question of national policy, because if the government engages in such business it will be at the expense of the States. That is to say, the government will appropriate a State resource, which is a potential source of revenue to the State, and keep it perpetually, to operate it at a profit, without allowing the State any compesation for the use of its resource. There might conceivably to good reasons, such as the international character of the stream, for leaving the title and management of the project in the Federal Government. On that point I do not commit myself. But I am convinced that when the government has been fully repaid with interest, then the profits should go to the States. The lord knows the States need the revenue.

California submitted figures at Denver to show that she alone could use practically all the water that the compact allocates to the lower basin. In her printed table she showed a possible consumption of 7,935,700 acre-feet without allowing anything for Los Angeles.

The CHAIRMAN. Did you read that correctly as to what California produces?

Governor DERN. No, sir; she claims she could use that quantity. Without allowing anything for Los Angeles, she claims she could use 7,935,700 acre-feet.

Senator MCNARY. You are speaking of water?

Governor DERN. Yes, sir.

Senator MCNARY. That includes mostly cities?

Governor DERN. No, sir; that is all for irrigation.

Senator MCNARY. Well, how many irrigable acres would that provide water for?

Governor DERN. I do not have the figures in mind, Senator McNary.

Senator MCNARY. I recall from our former hearing it was never in excess of 200,000 acres, the amount of land that might be called irrigable.

Governor DERN. Additional acres in California?

Senator MCNARY. Yes, in the Imperial Valley and the Coachella Valley. I remember the figures very well. There were 500,000 acres in the Coachella Valley. The high line of the so-called all-American canal reaches that which is not reachable under the present flow of the river, and takes it out where it is.

Governor DERN. Suppose now that this bill goes into effect on the basis of less than seven State ratification, leaving Arizona out. Arizona will be under no obligation to any other State, and no other

State will be under any obligation to Arizona. California will be at perfect liberty to take all the water that has been allocated to the lower basin. She claims that she can use it and her representatives demonstrated at Denver that they think they have a God-given right to irrigate every California acre that can possibly be reached by water from the Colorado River, and that if they yield one jot or tittle they are giving away their birthright. With that frame of mind, and with that legal situation of freedom from restraint, what is to hinder California promoters from going right along with her development until she takes all the water that the compact allots to the lower basin?

I am not accusing California of a deep and sinister plot in this respect, but that is the way it could work out in actual practice, whether California has planned it that way or not. And that is the joker in this six-State or four-State scheme.

Follow the operation a little further, and see what effect this has on the upper basin States. Arizona is not in the compact, any more than is Mexico. Arizona submitted data at Denver to prove that she, too, can use all the water the compact allots to the lower basin, especially if she is given the same amount of Federal aid that this bill gives to California. At Denver we conceded that Arizona can use at least 3,000,000 acre-feet from the main stream, and a great deal more if her fantastic high-line scheme were seriously considered. Just because California has used all the lower basin water, would Arizona stop?

Senator McNary. You mean the high-line scheme of Arizona which has taken out the water with less effort and is bringing into Arizona and practically supplying water for 2,000,000 additional acres? Is that what you term fantastic?

Governor Dern. I think there are about 80 or 90 miles of tunnel, etc.

Senator McNary. When the matter was presented in Los Angeles by a gentleman named Maxwell, an engineer of very considerable standing in the West, he made a rather interesting statement of the possibilities of that high line reaching into the heart of Arizona, but you seem to dismiss it as almost insignificant or fanciful.

Governor Dern. What information I have of it, Senator McNary, is that it would require 80 or 90 miles of tunnel and the cost would run up to $200 or $300 per acre of land reclaimed.

Senator McNary. I was surprised to see how lightly you dismissed it.

Governor Dern. At Denver, we did not consider it a feasible project. Just because California has used all the lower basin water, would Arizona stop her development? Manifestly not. She is under no limiting restrictions whatever, so she would go right ahead and take water from the river. Whose water would she take? Not lower basin water, for that is already being legally used by California. But there is plenty of water in the river without that, namely, the water that the compact allots to the upper basin, but which the upper basin has not yet put to use. Arizona is under no legal or moral obligation to restrict her uses, so she is at liberty to use all the water that California has not taken and leave the upper basin high and dry when the time shall come that it needs the water.

Under this six-State scheme California could take all the lower-basin water and Arizona could lay claim to all the upper-basin water. Both would be within their legal rights and neither would interfere with the other. I am familiar with the ingenious argument that under this bill California would underwrite the upper-basin allocation. I am not impressed by it. Utah wants no such flimsy protection.

I have shown that under the bill California could take all the lower-basin water and Arizona could take all the upper-basin water, if they both completed their development before the upper-basin States begin their development. I do not mean to say this is probable, but in order to understand a proposition it is helpful to state an extreme case; and, of course, legislation that is unfair in an extreme case must have an inherent element of unfairness.

Suppose, after the lower States have thus taken all the water, Wyoming wants to make a large development. I will say Wyoming instead of Utah because Wyoming is still in the six-State compact and entitled to the protection it is supposed to afford. Where is she to get the water? California will claim she had a legal right to appropriate the water by means of which she has now built up, say, a hundred million dollars of property value. Arizona will say that, in the absence of a compact to the contrary, water flowing through Arizona is legally open for appropriation, and she was within her rights when she took it and likewise created property values that must not be destroyed.

Laying aside legal technicalities, that is the common-sense view of the situation, and at best it opens the way for tremendous litigation. Wyoming, Colorado, New Mexico, and Utah want their water rights protected without having to resort to litigation. There can be no satisfactory protection except through seven-State ratification of the compact. The whole object of the compact is to obviate litigation.

Without settling the Mexican question beforehand, the situation is still more ominous for the upper States. Mexico is already using possibly 750,000 acre-feet, and it is claimed that she has lands on which American speculators want to use 1,500,000 acre-feet more, which would make a total use in Mexico of 2,250,000 acre-feet. At Denver the governors agreed that Arizona was entitled to 3,000,000 acre-feet from the main stream for her feasible projects, to say nothing of her more visionary ones. So between Arizona and Mexico the bulk of the water that is left after California takes the lower basin water will be gone. That is why the six-State compact gives us such meager protection that we are not satisfied with it. By every rule of right, reason, equity, and justice we are entitled to full protection. If we are entitled to it we ought to have it, and Congress ought to ask us to take anything less.

It has been urged that there are but two methods by which the waters of this great stream can be apportioned, the first being by agreement among the watershed States, and the second by court decree; and that if the first method can not be accomplished, then the enactment of this legislation will afford an opportunity to those who object to appeal to the courts. I am sure this suggestion has been made in good faith and deserves a respectful answer.

We agree that there are but two methods to divide the water, either by interstate agreement or by action in the United States Supreme Court.

We prefer the first method; namely, division by interstate compact. With all due respect to the courts, and without intending the slightest criticism, we do not want to get this matter into the courts. No matter how carefully and completely the case might be presented, the court could not humanly grasp and understand the situation in all of its ramifying details as well as could the people who have lived with the problem. We therefore believe a more equitable settlement can be reached by interstate negotiation than by court decree. Hence we respectfully protest against being forced into the courts, because we do not think the most satisfactory results can be obtained in that way.

We also protest against being forced into the courts on the ground of the expense. We do not understand that it is either necessary or wise for Congress to drive us into litigation that would be so tremendously expensive. Such litigation would be one of the most important and far-reaching cases ever tried in the history of the United States, for it would involve the future of an empire, and the States, could not afford to spare any cost to protect themselves. It would be a harvest for the lawyers, but it would be rough on the States.

We further dislike being forced into litigation on account of the delay. Competent attorneys whom I have consulted have told me that such litigation might take 10 years before a final conclusion was reached, and meanwhile the development of the river would be held up. It seems to me litigation is the last thing the lower basin States, and especially California, would want. We can certainly settle the question by interstate compact in less time than that. Forcing the controversy into the courts is therefore not a good way to expedite a settlement.

It must not be forgotten that a compact was signed at Santa Fe in 1922; that this Colorado River compact is agreeable to all seven States as soon as Arizona, California, and Nevada have settled their local differences respecting the use and disposition of the water allotted to them under the compact; that all seven of the States have unconditionally ratified the Colorado River compact except California and Arizona, and that they agree to ratify when the three-State compact shall have been concluded; and that the only delay is that brought about by California and Arizona, which are the only two States to benefit by the construction of the Boulder Dam. Surely it is not the intent of Congress to penalize the States which have done all in their power to settle the controversy for the sole benefit of those who fail to do their part toward settlement.

In conclusion permit me again most earnestly to urge that Congress defer action on all pending Colorado River legislation until we can complete our efforts to induce all seven of the Colorado River States to ratify the Colorado River compact; and on behalf of the upper States we earnestly entreat the three States of the lower basin speedily to conclude a subsidiary compact between them respecting their local problems, thereby to permit Arizona and California to join with the other five States of the basin in the early ratification of the Colorado River compact.

We are encouraged thus to urge a continuation of pending negotiations by assurances from the Governors of Arizona and California

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that, immediately upon conclusion of a three-State compact, special sessions of the legislatures of the two States will be called for the purpose of ratification. Upon a complete ratification of the Colorado River compact the upper basin States will take pleasure in joining the three States of the lower basin in support of all legislation necessary to the proper and speedy development of the Colorado River.

The CHAIRMAN. During your statement yesterday afternoon you made reference to the matter of disposing of the water that would flow from the dam and through the all-American canal, and I understood you to say that it would be wasted into the Salton Sea. Am I correct in my recollection of your statement?

Governor DERN. It was in connection with one of the suggestions that has been made for preventing the use of additional water in Mexico. It is proposed that the entire river should be put through the all-American canal and the surplus dumped into the Salton Sea.

The CHAIRMAN. Yes; but why would California desire to inundate productive country in order to take care of that overflow, when the surplus water going through the all-American canal could be passed on down to a lower point in the river and thereby put so far down that they would be unable to divert it for the acreage that is under cultivation at the present time and acreage which they propose further to irrigate?

Governor DERN. Of course I pointed out yesterday, Mr. Chairman, that that method of keeping water from going to Mexico was very severely limited by the very reason that you have just stated, to wit, that the level of the Salton would soon rise and submerge the valley.

The CHAIRMAN. Do you wish to ask any questions, Senator Johnson?

Senator JOHNSON. Yes.

How far is the boundary of Utah from the proposed site of the Boulder Dam construction, please?

Governor DERN. I do not know the exact distance.

Senator JOHNSON. Approximately?

Governor DERN. I should judge, one hundred to a hundred and fifty miles.

Senator JOHNSON. Is it not more than 200 miles?

Governor DERN. I do not know.

Senator JOHNSON. It is a very long distance, anyway; you can say that?

Governor DERN. Yes.

Senator JOHNSON. There has been a division, under the Colorado River compact, of waters of the Colorado between the upper and the lower basins. This division so far as the upper basin is concerned, can you state?

Governor DERN. I did not quite get your question, Senator.

Senator JOHNSON. What is the division so far as the upper basin is concerned?

Governor DERN. Seven and a half million acre-feet.

Senator JOHNSON. That is for what States?

Governor DERN. Wyoming, Colorado, New Mexico, and Utah.

Senator JOHNSON. All four States?

Governor DERN. Yes.

Senator JOHNSON. What division has been made among the four States of the waters of the Colorado River?

Governor DERN. None, at the present time.

Senator JOHNSON. Has any effort been made toward division among the four States of the upper basin of the waters of the Colorado?

Governor DERN. No, sir.

Senator JOHNSON. None at all?

Governor DERN. Because—shall I say why?

Senator JOHNSON. If you wish.

Governor DERN. Because, in the first place, they were all willing to ratify without a division, and that willingness probably was due to the fact that nature has pretty well taken care of the situation, and that it is almost impossible to use any water from Utah tributaries in any other State except Utah. It is impossible to use any Utah or Colorado water in Wyoming; and all the way round the situation by nature practically takes care of itself.

Senator JOHNSON. What amount of water is it that is to pass Lees Ferry, under the Colorado River compact, for the lower basin States?

Governor DERN. Seventy-five million acre-feet for each 10-year period.

Senator JOHNSON. If you are protected—I am not saying how—in the waters that have been allocated to you under the Colorado River compact; that is, the four upper basin States, that is all the protection you desire, is it not?

Governor DERN. That is the principal thing we have been contending for. We would also like to have the principle of compensation recognized.

Senator JOHNSON. I will come to that in a moment.

But so far as the water is concerned, if protection is accorded to the State of Utah under the Colorado River compact, that is all you ask for, is it not?

Governor DERN. Yes, sir.

Senator JOHNSON. Very well. You say, then comes the principle of compensation?

Governor DERN. Yes.

Senator JOHNSON. Will you state that principle again?

Governor DERN. As enunciated in the Pittman resolution, which I read yesterday, we claim that the beds of navigable streams belong to the State where the Government has not exercised its paramount right to use the stream for the purpose of regulating navigation; and we claim the water is under the sovereignty of the State and that the State is entitled to compensation for the use of its land and water.

Senator JOHNSON. That is, provided the Government does not exercise its paramount right?

Governor DERN. Yes, sir.

Senator JOHNSON. But if the Government does exercise its paramount right, you recognize that there is no such principle at all, do you not?

Govennor DERN. Certainly; we recognize that the Government's right is paramount to perform its constitutional functions.

Senator JOHNSON. And that it may perform that constitutional function and exercise its paramount right; and the States then, as a matter of principal, are not entitled to compensation?

Governor DERN. Of course there is such a thing as extending the constitutional rights in such a way that we think the extension may not be equitable.

Senator JOHNSON. That may be; I am assuming that it has the constitutional right which you have described, that it exercises that constitutional right; then under those circumstances, exercising its paramount right, there is no such principle as that, is there?

Governor DERN. None at all.

Senator JOHNSON. And no compensation would any State be entitled to at all?

Governor DERN. No; I believe not.

Senator JOHNSON. Quite so.

Do you consider yourself a mediator or arbitrator in this particular matter?

Governor DERN. Yes, sir.

Senator JOHNSON. As a mediator or arbitrator——

Governor DERN. Not an arbitrator. We have no powers of arbitration. We were simply there to extend our good offices in trying to get the States to agree among themselves.

Senator JOHNSON. But as you deem yourself as an impartial mediator in the differences that exist among the lower basin States?

Governor DERN. Yes, sir.

Senator JOHNSON. And in view of the paper that you have read here yesterday and to-day, do you say that you are an impartial mediator between those three States?

Governor DERN. Yes. sir.

Senator JOHNSON. Did you wire the Governor of Colorado asking to recall Mr. Bannister because of Mr. Bannister's testimony before the House committee?

Governor DERN. I sent Mr. Bannister a telegram——

Senator JOHNSON. You mean, the governor?

Governor DERN. Yes.

Senator JOHNSON. Asking him to recall Mr. Bannister?

Governor DERN. Not exactly. I said that unless he were recalled he would probably make the same kind of a statement here before this committee that he made before the House committee.

Senator JOHNSON. But did you not specifically request—I will have a copy of the telegram for you, I think, later—did you not specifically request that Mr. Bannister be recalled because of the testimony that he gave?

Governor DERN. No, sir.

Senator JOHNSON. You did not?

Governor DERN. No, sir.

Senator JOHNSON. Do you consider, still, that you are an impartial mediator in this matter?

Governor DERN. Yes, sir.

Senator JOHNSON. You did not like Mr. Bannister's testimony?

Governor DERN. Mr. Bannister's testimony was not in harmony with the program that the upper States had agreed upon.

Senator JOHNSON. Not in harmony with the program. Do you question its accuracy or its truthfulness?

Governor DERN. I question its accuracy. I do not agree with his arguments; and the statement of Mr. Bannister was practically an argument in favor of a six-State ratification. The only purpose of holding our conference in Denver at all, Senator, was to secure a seven-State ratification. I felt that he had practically renounced the whole object of our Denver conference and had very substantially undertaken to destroy all that we had accomplished.

Senator JOHNSON. Upon that ground you desired him recalled?

Governor DERN. Yes, sir.

Senator JOHNSON. And still you consider yourself an impartial mediator in this matter, do you?

Governor DERN. Absolutely.

Senator JOHNSON. You say in your paper, for instance—I do not quote you accurately—that the generation of power at the dam is not a matter of interest to you and not really a matter of concern, but that you might say—and then you recite every conceivable objection that there is, in pursuing your argument.

Do you deem that the attitude of an impartial mediator?

Governor DERN. I pointed out the fact that I might oppose the bill on entirely different grounds than those on which I am opposing it.

Senator JOHNSON. Oh, yes. With that kind of argument I think we are all more or less familiar. I am not criticizing you for it at all, but I am asking you, is there any argument against this proposition that you have ever heard that you have not endeavored to put forth to this committee.

Governor DERN. I have stated to this committee that I am willing to support the legislation if it is amended in certain particulars that I have specified, and I shall not oppose it for these other reasons that I said might be urged against it. In other words, I have endeavored to express my sympathy for the development of the river, notwithstading that there are a good many of my fellow citizens at home who are opposing it for entirely different reasons.

Senator JOHNSON. Without criticism, I can not appreciate that sort of sympathy, Governor. But that is neither here nor there.

The position you take is that no matter what the necessities may be, the United States Government is absolutely without power to rescue a community by flood control without some compensation to the States or the State wherein the flood control is undertaken and consent thereto. Is that correct?

Governor DERN. Not necessarily.

Senator JOHNSON. I am asking you, now, if that is your position.

Governor DERN. No, sir.

Senator JOHNSON. I understood your position to be that the United States Government had no power even over flood control by the erection of a dam in a stream, for instance. Is not that correct?

Governor DERN. I do not know that I exactly understand the question, Senator. Will you repeat it?

Senator JOHNSON. My question is, do you deny the power of the United States Government to afford any flood-control protection, constitutionally, by the creation or erection of any works in a stream within a State. Is that your position?

Governor DERN. I think, under a liberal interpretation of the constitutional provisions, Congress certainly has power to build flood-control works. For instance, on the Mississippi River, under the theory of improving navigation on the river, the Government, no doubt, has the right to provide flood-control works.

Senator JOHNSON. Then the United States Government does not need the intervention of the State or the permission of the State in order to erect flood-control works. Is that correct?

Governor DERN. Yes; I think that is correct, under conditions where a sufficient showing of constitutional authority can be made.

Senator JOHNSON. You do not deny the right, then, of Congress to erect flood-control works?

Governor DERN. Provided it can be made to appear that it is for the purpose of regulating commerce on the stream.

Senator JOHNSON. No; I am not speaking of commerce; I am speaking of flood control, pure and simple.

Governor DERN. Of course, Senator, I am not a constitutional lawyer. I do not want to get tangled up in a constitutional argument.

Senator JOHNSON. Then why do you devote so much of your paper to the constitutional questions, if you do not want to get tangled up in a constitutional argument? Why should you not omit that?

Governor DERN. The broad principles of the constitutional situation, it seems to me, are quite obvious, so they can be grasped by even a layman. I stated that I was not making my argument from a strictly legal standpoint, but more from an equitable standpoint.

Senator JOHNSON. I read to you from page 63 of your testimony before the House Committee, and I am reading verbatim:

> I do not understand that flood control is any constitutional Federal function. I do not think there is anything in the Constitution that gives Congress or the Federal Government any authority to control floods; and such a flood-control work as it goes into must be at the solicitation and at the request and with the permission of the States.

Did you so state?

Governor DERN. I think so.

Senator JOHNSON. You just now stated the reverse.

Governor DERN. I should have added, of course—unless it is to provide flood control as an incident to carrying out a constitutional function.

Senator JOHNSON. What do you mean by that?

Governor DERN. Such as regulating the navigability of the stream, and that incidentally provides flood control.

Senator JOHNSON. In your testimony thus far before the House and Senate committees, up to this moment, do you not deny the right of the Federal Government to erect works for flood control?

Governor DERN. Simply as such?

Senator JOHNSON. Yes.

Governor DERN. Yes; I think there is no other——

Senator JOHNSON. You deny it now, do you not?

Governor DERN. Yes; if it is simply for flood control, unless there is some other authority behind it besides providing flood control. I do not think there is anything in the Constitution of the United

States that plainly gives the Federal Government the right to provide flood control.

Senator JOHNSON. And there is no way in which the Federal Government can do anything in the way of flood control under those circumstances?

Governor DERN. Not unless it can find that power under some other constitutional authority.

Senator JOHNSON. Under some other constitutional authority? I do not know what you mean by that. Do you mean navigability?

Governor DERN. Yes.

Senator JOHNSON. Only navigability?

Governor DERN. I think that is about the only one.

Senator JOHNSON. So that unless the works are constructed upon the theory of the navigability of the stream, then Congress is without power to do any work of that kind. Is that so?

Governor DERN. I think that is probably substantially the case.

Senator JOHNSON. And that is your attitude?

Governor DERN. Of course I can not conceive of a case where flood control as such would be resisted by any State.

Senator JOHNSON. It is difficult for me, too; but that is exactly what you have said in your testimony, is it not?

Governor DERN. I do not think so. I am not opposing flood control. In fact, I spoke in favor of it.

Senator JOHNSON. Did you not say that you would object to any flood control at any time until the seven-State compact was signed?

Governor DERN. Yes.

Senator JOHNSON. You meant that, did you not?

Governor DERN. Yes.

Senator JOHNSON. You say it now, do you not?

Governor DERN. Yes.

Senator JOHNSON. So that until a seven-State compact were signed, dividing the waters of the Colorado River, you would object to any flood control of any kind or any character in the Colorado River?

Governor DERN. I would for the present, at least.

Senator JOHNSON. Neither in the upper basin nor the lower basin, no matter what the necessities might be of the Imperial Valley, you would not permit any flood control in the Colorado River until the seven-State pact were signed?

Governor DERN. I do not consider that there is any crisis in the Imperial Valley.

Senator JOHNSON. No matter what the crisis was, you would not permit it until the seven-State pact were signed?

Governor DERN. That is my present attitude.

Senator JOHNSON. That is exactly what I am getting at—your present attitude, the attitude you have described as being that of an impartial mediator in this proposition.

Governor DERN. Senator, I do not want to be put in the position of being opposed to flood control. I am very sympathetic with it. I hope that Congress can find some proper way of doing it. At Denver a way was suggested that would make it entirely feasible. Arizona, for example, offered to negotiate a three-State compact providing for the division of the water, provided that no power plant were built, and then to ratify the seven-State compact, which would

have removed that obstacle. There was a clear way pointed out there for California to secure flood control.

Senator JOHNSON. They would do it, provided nothing were done in respect to power?

Governor DERN. Yes.

Senator JOHNSON. No power generated?

Governor DERN. Yes.

Senator JOHNSON. No provision made for the generation of power. That is correct, is it not?

Governor DERN. Yes.

Senator JOHNSON. You know that the whole plan of this development of the Colorado River depends for its payment upon the generation of power, do you not?

Governor DERN. Yes, sir.

Senator JOHNSON. And it is the only way in which we can pay it. You realize that, do you not?

Governor DERN. Yes.

Senator JOHNSON. You recognize that it would be an impossibility to get an appropriation from the Congress of $100,000,000 for this improvement without reimbursement, do you not?

Governor DERN. I think so.

Senator JOHNSON. Do you not recognize that there is only one way in which that reimbursement can be had, and that is through power?

Governor DERN. What I had in mind in my testimony, of course, was the suggestion that has been made by some people that a mere flood-control project should be constructed at the expense of the Government without any provision for repayment.

Senator JOHNSON. Did that strike you as a good idea?

Governor DERN. No, it did not.

Senator JOHNSON. You would like to have a provision for repayment, would you not?

Governor DERN. Yes.

Senator JOHNSON. And the only provision for repayment that can be made is by the generation of power.

Governor DERN. We do not object to providing flood control at the expense of the Government. If Congress sees fit to do so, I do not want to be understood as opposing that, provided it is done without endangering our share of the water of the river.

Senator JOHNSON. But you did say that you did object to it until the seven-State compact was signed. Is that correct?

Governor DERN. Of course, since that involves the point of protecting our interest in the water of the river.

Senator JOHNSON. Let us get that accurately, please, because I thought—I may be in error—that you answered it both ways. You say that you do not object to flood control by the Congress if the necessity exists. Is that correct?

Governor DERN. That is the idea. I object to a flood control dam being put on the Colorado River in advance of protecting our water rights in the manner intended by the Colorado River compact. The whole thing is a matter of protecting our rights; and to build a flood-control dam would unfortunately set up a condition which might work irreparable damage to the upper States.

Senator JOHNSON. I take it the other way round. Then you do object to flood control. Is that correct?

Governor DERN. In the absence of protection of our interests in the river.

Senator JOHNSON. In the absence of the execution of the seven-State pact. Is that correct?

Governor DERN. Yes.

Senator JOHNSON. So that there can be no flood control upon the Colorad River, no matter what the necessities might be, until the pact were signed, according to your view?

Governor DERN. That is the position that I am taking at the present time.

Senator JOHNSON. All right. There is no misunderstanding of you in that regard, then.

Governor DERN. I would like to add that our position might possibly change if we were not successful in getting the compact ratified. It may be that after a time we might see fit to change our position.

Senator JOHNSON. Utah ratified the seven-State compact first?

Governor DERN. Yes.

Senator JOHNSON. Utah subsequently ratified the six-State compact?

Governor DERN. Yes.

Senator JOHNSON. Utah then rescinded her action in the ratification of the six-State pact?

Governor DERN. Yes.

Senator JOHNSON. Do you recall the circumstances under which that was done?

Governor DERN. The rescinding?

Senator JOHNSON. Yes, sir.

Governor DERN. On the opening day of the session, Senate bill No. 1 was introduced in the Utah State Senate, I believe, providing for the repeal of the act authorizing the compact to go into effect on a six-State basis, and during the course of the session the united congressional delegation of Utah addressed a telegram to the legislature urging that the bill be passed.

Senator JOHNSON. The united delegation in Congress addressed to the Utah legislature or to you a telegram stating that the interests of Utah could only be protected by rescinding that action in reference to the six-State compact. That is correct, is it not?

Governor DERN. I think that was the substance of it.

Senator JOHNSON. What were the interests of Utah at that time that were referred to? Do you know?

Governor DERN. They did not state in their telegram, but they felt that the interests of the State would be protected by passing that act.

Senator JOHNSON. Did you know what amendments were pending to the bill at that time?

Governor DERN. I did not.

Senator JOHNSON. Did you know that the only amendments that were really pending to the bill that had been offered by the representatives from Utah were what we term the Leatherwood amendments, relating to power?

Governor DERN. I was not familiar with the amendments.

Senator JOHNSON. Did you learn that subsequently?

Governor DERN. Yes; I heard a good deal about them, subsequently—those amendments ad other amendments that were offered by representatives in Congress from Arizona.

Senator JOHNSON. And those were offered after your action?

Governor DERN. I do not know.

Senator JOHNSON. But the amendments that the Utah delegation referred to could have been only those that had been rejected by the House committee that were the Leatherwood amendments relating to power? You realize that, do you not?

Governor DERN. I was not familiar with the exact situation in Congress at that time. I have been told that those were among the amendments on which our Utah delegation made their recommendation, but my recollection is that Mr. Leatherwood always contended for seven-State ratification.

Senator JOHNSON. And those were Mr. Leatherwood's amendments and they related to power. You have at least learned that, have you not?

Governor DERN. To a large extent, yes; I am not sure that that is the only purpose. Mr. Leatherwood, I believe, claims otherwise. But I understood that was the purport of one of the amendments.

Senator JOHNSON. Upon the telegram thus sent, then, because of these amendments, the Utah Legislature rescinded its action. Is that correct?

Governor DERN. Yes, sir.

Senator JOHNSON. Yesterday you expressed some indignation at the fact that it had been asserted that there was a power propaganda against this bill. Are you familiar with the literature that has gone out from various centers in regard to this bill?

Governor DERN. I did not express indignation over the fact that the power propaganda had been sent out against the bill, Senator Johnson. I expressed indignation against the fact that that propaganda had been allowed to becloud the objections that we are offering to the bill.

Senator JOHNSON. You knew the objections that Mr. Leatherwood presented, did you not?

Governor DERN. I appreciate the fact that private power interests are opposing this bill. I do not deny that at all.

Senator JOHNSON. You recognize that fact?

Governor DERN. Certainly.

Senator JOHNSON. You do not, then, take umbrage because we referred to the fact that private power interests are endeavoring to prevent this bill from passage?

Governor DERN. No, sir. You are within your rights in exposing that activity, and I am symphathetic with your attitude to a large extent; but I do object to setting that out as the only objection and thereby hiding our other objections which we think are much more important.

Senator JOHNSON. Are you familiar with an institution that is known as the Electrical Industry League? Do you know the joint committee of the National Utilities Association, with its office at 420 Lexington Avenue, New York City.

Governor DERN. I never heard of it, that I know of.

Senator JOHNSON. Have you received the publications, about a dozen of which I have in my hand, that have been sent out from that institution against this bill?

Governor DERN. No; I have not seen that one [indicating]. I think I have seen one like that [indicating]. Possibly I have seen those two [indicating].

Senator JOHNSON. Some have come to you, have they not?

Governor DERN. Yes, they have.

Senator JOHNSON. You realize, too, do you not, that the amendments that were presented by Mr. Leatherwood were the only amendments in the House, practically, that were pending and rejected in committee, and that they related wholly to power?

Governor DERN. That is substantially what you said a moment ago.

Senator JOHNSON. Immediately after their rejection you received this telegram from the Utah delegation, did you not?

Governor DERN. I think that is true. I do not remember exactly.

Senator JOHNSON. And immediately thereafter Utah rescinded its action in ratifying the six-State pact?

Governor DERN. I believe that is true.

Senator JOHNSON. Do you know an organization that is active, from your territory, called the Colorado River Fact Finding Commission of Utah?

Governor DERN. Yes; I know who they are.

Senator JOHNSON. Do you know from whom or by whom that organization is financed?

Governor DERN. That organization is not a State organization. It has no official standing. It was not created by the State and is entirely a self-constituted and voluntary organization.

Senator JOHNSON. You repudiate it?

Governor DERN. Yes.

Senator JOHNSON. I am glad to hear it.

Governor DERN. When it was organized it was without my knowledge. I was not consulted as to the desirability of creating such a committee and was not consulted in regard to its personnel. I do not know how they made their investigations nor how they formed their conclusions. Some of their conclusions are contrary to my own.

For example, by implication, at least, if not plainly, they advocate a mere flood control dam at the expense of the Government. I pointed out that a flood control dam would be dangerous to us in the same way as the Boulder Dam would be dangerous, in advance of the ratification of the compact.

They have also criticised the need of Los Angeles for an additional water supply. I have felt that that was in very bad taste for the State of Utah. I feel that the people of Los Angeles who will have to pay for this improvement can very much better decide whether they can afford it and whether they need it than can any committee in Utah.

They have also criticised the needs of the Imperial Valley and many other things. I have consistently taken the stand that, assuming that our water rights are protected, it is none of our business what the lower basin wants to do with its share of the water.

Senator JOHNSON. Governor, did you ever repudiate them in your own state?

Governor DERN. I have mildly expressed my disapproval of them.

Senator JOHNSON. You have expressed your ideas upon certain policies. Have you ever repudiated this particular organization?

Governor DERN. What do you mean by repudiation, in that connection, Senator?

Senator JOHNSON. Stating publicly that they do not represent the State or you or anybody else.

Governor DERN. Yes, sir.

Senator JOHNSON. You have done so?

Governor DERN. Yes.

Senator JOHNSON. Do you know whether or not its officers or its members are in good part from the Utah Light & Power Co.

Governor DERN. I was looking over a list of directors a short time ago—By the way: you asked me who was financing it. Ostensibly it stands for the Utah Association Industries and the Utah State Farm Bureau. I assume that it is financed by the Utah Associated Industries, although I do not know.

Senator JOHNSON. Can you state whether or not its officers are in great part from the Utah Light & Power Co.

Governor DERN. I do not know.

Senator JOHNSON. Do you recognize any of them?

Governor DERN. I have not a list before me, Senator. Have you a copy of the list?

Senator JOHNSON. I had, but I will have to look it up and give it to you.

The CHAIRMAN. I regret to announce that the committee members have been called to the floor of the Senate in order to make a quorum. Under the circumstances we will have to adjourn now until 2 o'clock this afternoon. We will meet in the room of the Commerce Committee, in the Capitol Building.

(Whereupon, at 11:30 o'clock a. m., a recess was taken until 2 o'clock p. m.)

AFTERNOON SESSION

The committee resumed its session at the expiration of the recess, Senator Lawrence C. Phipps (chairman) presiding.

Present: Senators Phipps (chairman), Johnson, Sheppard, Walsh of Montana, Kendrick, and Ashurst.

Also present: Senator William H. King, of Utah.

The CHAIRMAN. The committee will be in order. Governor Dern may resume.

STATEMENT OF HON. GEORGE H. DERN, GOVERNOR OF THE STATE OF UTAH—Resumed

Senator JOHNSON. Can you give me the date of the ratification by Utah of the Colorado River pact, approximately?

Governor DERN. The year, I suppose you wish? I do not know the exact date, but I think it was in 1923.

Senator JOHNSON. The date of the ratification of the six-State pact was what, if you please?

Governor DERN. That must have been in 1923. I guess they ratified the seven-State pact in 1921.

Senator JOHNSON. I think possibly the seven-State pact ratification was in 1923, and the six-State pact would be in 1925, I think.

Governor DERN. Yes.

Senator JOHNSON. The date of the action of the Utah legislative in rescinding the ratification of the six-State pact was February, 1927, was it not?

Governor DERN. I do not know the exact date, but is was during the session of the legislature in 1927.

Senator JOHNSON. When did you reach the conclusion that it would be absolutely essential, before there should be any development of the Colorado River, that all of the States ratify the Colorado River seven-State pact?

Governor DERN. When did I reach that conclusion personally, you mean, Senator?

Senator JOHNSON. Yes, sir.

Governor DERN. I will have to confess that when I entered office as governor I was not familiar with the Colorado River problem at all. I have made a progressive study of the subject ever since that time, and I suppose my views have undergone considerable change in the light of information as I have gathered it.

Senator JOHNSON. That is a perfectly natural thing; but when did you reach the conclusion that the seven-State pact must be ratified by all seven States before there could be any development upon the Colorado River?

Governor DERN. I do not know just when I reached that conclusion.

Senator JOHNSON. Probably February, 1927, when you rescinded the ratification of the six-State pact. Would that the your best recollection in that regard?

Governor DERN. Not necessarily.

Senator JOHNSON. What is your best recollection? That is what I am asking you.

Governor DERN. In fact, even at that time I think I had more confidence in the six-State pact than I had in the fall of the year, after I had made a trip to the Imperial Valley and Arizona, and had had time to devote myself intensively to the subject.

Senator JOHNSON. Then we can say that it was subsequent to February, 1927, that you reached that conclusion?

Governor DERN. Yes.

Senator JOHNSON. And now you are very firmly of the conclusion that until the seven-State pact, the Santa Fe-Colorado River pact, is ratified by the seven states there shall be no development of any kind upon the Colorado River. Is that the idea?

Governor DERN. That is my present impression.

Senator JOHNSON. Did your State pass any act construing the seven-State pact?

Governor DERN. It passed an act declaring that when Utah ratified the Colorado River compact it did not by that act renounce its ownership of the bed of the river as a navigable stream, or words to that effect.

Senator JOHNSON. I happen to have a copy of the act here, so I will not tax your recollection in the matter, but will read to you a portion of the act that I deem to be applicable, and see if you do not agree with me that it is accurate. This act was approved Feb-

ruary 26, 1927. It was by Mr. Auerbach, relating to the Colorado River compact.

Section 3—well, I will read it all to you:

Be it enacted by the Legislature of the State of Utah:

SECTION 1. Colorado River in Utah and Green River in Utah declared to be navigable streams: That the State of Utah does hereby declare that the Colorado River in Utah and the Green River in Utah from time immemorial and at the time of the admission of Utah into the Union as one of the States of the United States of America were and ever since have been and now are navigable streams.

SEC. 2. Title to bed of all navigable rivers vested in State of Utah, when—Exceptions: That the title to the beds of said rivers and of each of them, as well as the title to the beds of all other streams and lakes which at the time of said admission of Utah into the Union were navigable in fact, vested in the State of Utah at the time of its said admission into the Union and said title has at all times thereafter been and now is vested in the State of Utah, except such portion or portions thereof as may have been heretofore disposed of by the State of Utah pursuant to law, by express grant.

SEC. 3. Intent with respect to paragraph (a) of Article IV, of the Colorado River compact—Colorado River navigable for intrastate commerce: That the State of Utah does hereby declare that its adherence to paragraph (a) of Article IV of the Colorado River compact as set forth in chapter 5, Laws of Utah, 1923, which paragraph reads as follows:

"(a) Inasmuch as the Colorado River has ceased to be navigable for commerce and the reservation of its waters for navigation would seriously limit the development of its basin, the use of its waters for purposes of navigation shall be subservient to the uses of such waters for domestic, agricultural, and power purposes. If the Congress shall not consent to this paragraph, the other provisions of this compact shall nevertheless remain binding."

was not and is not intended as and shall not be construed to be, a relinquishment of waiver of any right, title, or interest of the State of Utah in or to the bed of the Colorado River in Utah.

Do you recall that statute?

Governor DERN. Yes, sir.

Senator JOHNSON. Was it presented by you to the legislature?

Governor DERN. I thought I had a copy of my message here, but I find I have not. I made a suggestion along that line in my message to the legislature.

Senator JOHNSON. Did you intend section 3 to be a construction of or a reservation to the seven-State Colorado River pact adopted at Santa Fe?

Governor DERN. I do not think it is a reservation, and I do not think that it changes our unconditional ratification of the compact. I have referred it to a number of lawyers, and they do not think that the compact itself intended any such thing as this denial seeks to cure. It is in perfect harmony with the compact.

Senator JOHNSON. So that the statute was a perfectly useless one?

Governor DERN. According to the advice I have received since——

Senator JOHNSON. Is that your opinion?

Governor DERN. The way the matter came up—we had some litigation pending between the State of Utah and the Federal Government, practically, with reference to the ownership of a strip of the bed of the stream.

Senator JOHNSON. Is it pending now?

Governor DERN. Yes.

Senator JOHNSON. Is it undetermined?

Governor DERN. Yes.

Senator JOHNSON. Does it involve the question of the navigability of the river?

Governor DERN. Yes.

Senator JOHNSON. Was this intended to make a declaration in regard to the navigability of the river by Utah?

Governor DERN. Yes.

Senator JOHNSON. And in what court at present, if you recall, is that litigation pending?

Governor DERN. I think the old action has about been dismissed, and we are seeking to get it into the United States Supreme Court as an original action, finally determining whether the river is navigable and whether or not the State therefore owns the bed.

It came about, as I started to say, in connection with some oil leases. The Colorado River cuts through several very promising-looking oil structures in eastern Utah; and if the structure should prove productive upon development, the section of the river bed that cuts through this structure might be very valuable. The State claimed that land by virtue of the fact that the river was navigable.

We received an inimation that the parties who had—by the way, I should explain that there were certain parties who had a lease which included that section of the river bed, from the Federal Government, and the State had granted another lease on the river bed; so they were in conflict, and litigation ensued.

We received an intimation that those who were disputing the State's ownership were going to raise the point that the State had waived its ownership by its ratification of the Colorado River compact, because the compact contains the language, "Inasmuch as the Colorado River has ceased to be navigable for commerce," which might possibly be construed as a declaration on the part of the State, or an acknowledgment on the part of the State, that the river was not navigable; and if the State had made that acknowledgment it might have lost its ownership.

That was a very important matter, and in order to straighten out that contingency I made the suggestion that the legislature ought to go on record so that there might not be any possible misconception of the State's attitude on that point.

Senator JOHNSON. Has this particular construction, reservation, or whatever you desire to term it, been submitted to the other States that were parties to the Colorado River compact?

Governor DERN. It was presented at the Denver conference and discussed to some extent. There was not any action taken on the matter.

Senator JOHNSON. No formal action has been taken and no formal presentation made?

Governor DERN. We had a discussion, and the lawyers present all agreed, so far as I remember, that it did not constitute a reservation.

Senator JOHNSON. I would like to know what it constitutes, then, although it makes little difference, so far as that is concerned, because it speaks for itself.

Governor DERN. I do not think it weaken Utah's ratification of the compact at all.

Senator JOHNSON. Suppose that any other State should disagree with the construction; then your compact is not ratified, is it?

Governor DERN. Perhaps not.

Senator JOHNSON. Suppose the United States Supreme Court should decide the pending case against you. What is the effect and what is the situation then?

Governor DERN. I take it that the declaration of the legislature would not cut any figure in that case.

Senator JOHNSON. How about the compact? Would you adhere to your seven-State compact then?

Governor DERN. Oh, yes.

Senator JOHNSON. I ask you these questions because you make the seven-State compact a condition precedent to the slightest development of the Colorado River. I am correct in that, am I not?

Governor DERN. Yes.

Senator JOHNSON. And you would not permit any flood control upon that river until this seven-State pact was agreed to, and yet your own State and your own legislature has construed a part of that compact, but never formally has that construction been accepted, at least by the other States, to date. You realize that, do you not?

Governor DERN. Yes. Of course if we find we do not own the river bed, that ends it. We still adhere to the compact.

Senator JOHNSON. No matter what construction is placed by your legislature upon it?

Governor DERN. Yes. This declaration was made simply for the protection of what we conceive to be our property rights. If we have no property there, the question is removed.

Senator JOHNSON. How much water in Arizona is at the present time taken from the Colorado River for beneficial use and put to beneficial use?

Governor DERN. I do not know, Senator. That was submitted at Denver, but I would not undertake to state it.

Senator JOHNSON. How much water in the State of California is taken from the Colorado River and put to beneficial use?

Govenor DERN. About 2,000,000 acre-feet, or such a mattter.

Senator JOHNSON. How much land in the State of Arizona is now, from the water of the Colorado River, reclaimed or irrigated?

Governor DERN. From the main stream?

Senator JOHNSON. The main stream I am speaking of; yes.

Govenor DERN. So far as I know, there is no land being irrigated from the main stream except the Yuma project, which is a very small acreage.

Senator JOHNSON. How much land, from the Colorado River, is reclaimed and irrigated in the State of California?

Governor DERN. If I remember correctly, it is 515,000 acres. It is not all under cultivation at the present time, but has been under cultivation.

Senator JOHNSON. Do you know how much is under cultivation at the present time?

Governor DERN. No.

Senator JOHNSON. We can say some hundreds of thousands of acres, and I will furnish the exact amount subsequently.

Did you receive a letter from Governor Hunt saying that he would not negotiate in this matter until this bill was indefinitely postponed?

Governor DERN. Yes, sir. I tried to dissuade him from that position.

Senator JOHNSON. I do not doubt that at all; but some of us are difficult to dissuade. You may have succeeded, or you may succeed hereafter, for aught I know; but, at any rate, you did receive that communication in writing?

Governor DERN. Yes.

Senator JOHNSON. I ask you whether or not at the Denver conference you made this statement in reference to the California position?—

California has unequivocally notified us that she will never ratify the compact unconditionally. She states that her ratification must always be predicated upon adequate storage.

I want to say here and now, without any mental reservations, that I think California's position in this respect is reasonable and that she is justified in this demand. If I were a Californian, I should take the same stand. I can see no reason why California should ratify the compact without being assured of storage. She is already using the whole river at low water and has a prior right to-day without any compact, and a compact will not improve that right, so far as natural stream flow is concerned. Therefore the compact means nothing to California. But California wants more water than she can get from the low-water natural stream flow. The only way she can get it is by impounding flood water. It is only in order to get this flood water that she has any interest in the Colorado River pact.

Do you recall that?

Governor DERN. Yes.

Senator JOHNSON. Is that correct?

Governor DERN. Absolutely.

Senator JOHNSON. And that expresses your view at the present time?

Governor DERN. Yes, sir.

Senator JOHNSON. Do you recall the speech that was made by Mr. Leatherwood in the city of Salt Lake before the time that the legislature rescinded its ratification of the six-State pact?

Governor DERN. My attention was called to it the other day before the House committee. I did not hear the speech. I think I saw some newspaper account of it at the time, but I did not remember whether it was before or after the action of the legislature.

Senator JOHNSON. But his statement was predicated wholly upon the theory that this bill was taking the Government into the power business, and that that could not be tolerated, was it not?

Governor DERN. I understand that is what he was talking about; yes, sir.

Senator JOHNSON. That was prior to the action by the Legislature of the State of Utah. You recall that, do you not?

Governor DERN. It was so pointed out by Mr. Swing the other day.

Senator JOHNSON. In relation to your views as to flood control and flood-control work, you expressed yourself so very clearly before the House committee that I will read you the following questions and answers and ask you if they still constitute your views:

I am reading from page 64 of the transcript of the House proceedings:

Mr. SWING. Are you here to-day to say to this Congress, to this committee and to Congress, that they are helpless to proceed in any manner that can possibly be worked out by them to save the lives of important communities on the lower Colorado River by constructing flood-control works on that river?

Governor DERN. They are, without the consent of the State; yes, sir.
Mr. SWING. And you withhold that consent now?
Governor DERN. I do, until you do it on the right terms; yes, sir.
Mr. SWING. The right terms consist in meeting the demands of Arizona so that Arizona will feel like coming into the seven-State compact? Is that not the necessary conclusion?
Governor DERN. We will have to come to some agreement; yes.
Mr. SWING. And Arizona's demand is 1 mill per kilowatt-hour, is it not?
Governor DERN. I don't know.
Mr. SWING. It is $3,600,000 a year.
Governor DERN. I don't know anything about that.
Mr. SWING. To Arizona and Nevada. You know, she is demanding revenue?
Governor DERN. Yes.
Mr. SWING. Demanding it now when the project starts, before the Government is paid back the money that the project owes the Government?
Governor DERN. Yes.
Mr. SWING. And you want California to agree to that?
Governor DERN. Yes.
Mr. SWING. And if she does not, then you want Imperial Valley and Yuma Valley to be without flood protection?
Governor DERN. Yes, sir.

Do you recall those questions and those answers?

Governor DERN. I can not say that I recall them word for word. I remember the——

Senator JOHNSON. Do they accurately state your position?

Governor DERN. I think it ought to be amplified considerably to make my position clear.

Senator JOHNSON. All right. I will give you that opportunity. But, first, you do not deny that those questions were asked you and those answers made?

Governor DERN. No.

Senator JOHNSON. They are here in the transcript. I have read them, I think, accurately.

If you desire to make any explanation of them, that is your right, in my opinion, and you can go ahead and do it.

Governor DERN. The question of flood control, of course, is only one of the purposes of this bill. As a matter of fact, one might have sat through the Denver conference without discovering that there was any problem of flood control. It was hardly mentioned at Denver, and there did not seem to be much importance attached to it there. It seems to me that California, by the reservation that she put on her ratification, practically refused to accept flood control. She specifically refused to accept it except by means of one particular project that she herself had selected. It seems to me she practically estopped Congress from giving her flood control except through that one particular project, which Congress might conceivably have found to be unwise. Therefore it seems to me that California has not——

Senator JOHNSON. How does that explain your answers here?

Governor DERN (continuing). That California has not exhibited very deep concern over flood control.

Senator JOHNSON. How does that explain what you say here? These were your views, not California's views. These were the views that you expressed on flood control. Whatever the views of California or California's representatives might have been, whether they were erroneous or whether they were extravagant, or the reverse, these were your views.

Governor DERN. My views are based on the general declaration that was made in the Pittman resolution, which I have explained here, which is to the effect that the Government has no power to do anything on the Colorado River except for the purpose of improving navigation in the interest of interstate commerce. I became convinced, after hearing the speeches of Senator Pittman and others, that this is the only cloak of constitutionality which could be thrown around this bill to enable the Government to go in and do flood-control work.

I do not find anything in the Constitution which delegates to the Federal Government directly the power to do flood-control work, and the Government, in my opinion, so far as I am able to understand the Constitution, can only do that sort of work in behalf of a State under the cloak of constitutionality of some other function.

Senator JOHNSON. Is that your explanation of these answers?

Governor DERN. Yes, sir. That is what I meant when I said the Government had no power to go in there.

Senator JOHNSON. Did you mean that you did not want any flood control for the Imperial Valley or for Yuma Valley until money had been paid by California to Arizona?

Governor DERN. No; not necessarily. I would be very glad to have Arizona and Nevada waive their demands, and I would like very much to see flood control——

Senator JOHNSON. If they did not waive them you insisted that money should be paid to them?

Governor DERN. I did not see how we were going to get out of it. It seemed to me that it was their property, and if they did not want to give it away I did not see how we could force them, Senator. If you can find some constitutional way of doing that, I would be delighted to have you go ahead.

Senator JOHNSON. You would really be delighted, then?

Governor DERN. Yes.

Senator JOHNSON. So that if we could convince you of the constitutionality of a bill of this sort, you would be perfectly willing to agree to it?

Governor DERN. Certainly, without jeopardy to our interest in the river.

Senator JOHNSON. I will take that up with your distinguished junior Senator, for whom I have a very high regard, and then he will convince you, and then you will be for the Swing-Johnson bill. I am delighted at last to learn that you will be for it.

Governor DERN. Yes. That is pretty nearly the last sentence that I read this morning.

Senator JOHNSON. All you want removed from your mind is the question of the constitutionality of this act?

Governor DERN. We want—you mean in this whole bill?

Senator JOHNSON. Yes.

Governor DERN. We want it predicated on seven-State ratification, of course.

Senator JOHNSON. Of course; but the constitutionality of the act, outside of that, is the only thing that troubles you in the slightest degree?

Governor DERN. That is the point.

Senator KING. You are referring now to flood control?

Senator JOHNSON. No; I am referring to the Swing-Johnson bill, not to flood control.

Senator KING. I think the governor stated that he must have also the protection of the seven-State pact.

Senator JOHNSON. Yes; but he says, with the seven-State pact and with the constitutional objections removed——

Senator ASHURST. And Arizona's objections removed.

SENATOR JOHNSON. No; he is not saying anything of the sort—then he would be for this bill.

Governor DERN. We were discussing my objections to flood control. I think the bill ought to be predicated on seven-State ratification, and I said, just before luncheon, that the principle of compensation ought to be recognized. I am in favor of the principles enunciated in the Pittman resolution which I read here. I do not know whether as a legal proposition we have those rights as legal rights, but I think we have them as equitable rights, and we would like to have them recognized.

Senator JOHNSON. What is the principle of compensation that you insist on?

Governor DERN. That we own the water and the river bed and are entitled to something for the use of them.

Senator JOHNSON. How much for the use of it?

Governor DERN. I do not know.

Senator JOHNSON. What do you think ought to be done?

Governor DERN. I have no very definite ideas on that, Senator, because the Boulder Dam from that standpoint does not concern Utah. We could not expect to get any revenue from the Boulder Dam, because it is not situated in our State, and I have not attempted to figure out what would be fair compensation, and so I am not prepared to say.

Arizona, however, at the Denver conference, made the statement that she would be satisfied with revenue equivalent to taxation on the property if it were built by private enterprise.

Senator JOHNSON. Taxation on what amount?

Governor DERN. I do not think she specified.

Senator JOHNSON. Have you any idea in your mind as to what ought to be paid or what ought to be done in order to get this work started?

Governor DERN. No; I have not formed an opinion on that.

Senator JOHNSON. I ask you these questions because you told me this morning that you were a mediator in this matter, and I assumed that you knew something about the points of difference.

Governor DERN. I am only a mediator, Senator, so far as trying to get Arizona and California together. The governors are not there merely as mediators, but also as interested parties. We have our own interests in the river which we are trying to protect, and while we are using our good offices to get the lower States together, the upper States also have their own point of view. When we insist upon our own rights, it does not signify any lack of impartiality as between Arizona and California.

Senator JOHNSON. The thing that concerns you and Utah is the seven-State pact, is it not?

Governor DERN. Yes, sir.

Senator JOHNSON. If you were assured that any measure could give you the full protection of the seven-State pact your opposition to it would be withdrawn, would it not?

Governor DERN. Substantially, yes. As I said, we would like to have the compensation principle recognized.

Senator JOHNSON. Whatever differences might exist among the States of the lower basin, you would let them determine them as they saw fit?

Governor DERN. Yes.

Senator JOHNSON. And if any measure could be devised by which you would be given the protection of the seven-State pact you then would withdraw your opposition to this bill?

Governor DERN. Yes, sir.

Senator JOHNSON. Thank you, sir. That is all I desire.

Governor DERN. I have stated that Utah's position is, first, that we want seven-State pact ratification; second, we want an understanding with Mexico, because Mexico is just as dangerous to us as California; and then we want recognition of the fact that we own the river bed and the water, and are entitled to compensation for their use.

Senator JOHNSON. Let us see just a minute about the dangers to you. You will let how much water go by Lee's Ferry?

Governor DERN. Seven million five hundred thousand acre-feet.

Senator JOHNSON. Unless it passes Lee's Ferry, you are not in danger, are you?

Governor DERN. Possibly, in the absence of a compact. If you build Boulder Dam without a compact and put in a power plant, that power plant presumably acquires a prior right to the water that runs through it.

Senator JOHNSON. If you will put over Lee's Ferry only the amount of water that is provided for by the compact, then that contingency does not arise, does it?

Governor DERN. What are we going to do with the rest of the water.

Senator JOHNSON. I am not speaking of that for the moment. But you comply with the compact at Lee's Ferry, and your water goes down the stream, then. Then the upper basin States——

Governor DERN. Not only your water, but our water, too.

Senator JOHNSON. That is all right. We can not quarrel with Arizona and Nevada about it.

Governor DERN. I mean, Utah's water.

Senator JOHNSON. That is not your quarrel.

Governor DERN. But our water, which has been allocated to us, will go down for many years.

Senator JOHNSON. How many years do you think it will be before Arizona could utilize the water of the Colorado?

Governor DERN. I do not know. It depends on——

Senator JOHNSON. You have watched the growth of the country.

Senator ASHURST. If California had her way, Arizona would never utilize it.

Senator JOHNSON. You are quite wrong about that, and I resent it.

When do you think you would use that water? When would you use it?

Senator ASHURST. Are you addressing that question to me?

Senator JOHNSON. Yes.

Senator ASHURST. When we get ready.

Senator JOHNSON. That is it; and you would let it go to the ocean and you would let it waste until you got ready.

Senator ASHURST. We would use it quickly if we were getting a subsidy such as California is asking.

Senator JOHNSON. There is no subsidy for California here, and we do not ask any subsidy in this bill.

I am asking you, now, how long it will be before this water can be put to beneficial use in Arizona?

Governor DERN. I would not make a guess as to the number of years. I think Arizona is in large measure a slow development State, like the upper basin, and it would take her a good many years.

Senator JOHNSON. That is all.

Senator KING. May I ask a question, Mr. Chairman?

The CHAIRMAN. Certainly.

Senator KING. Suppose the Federal Government should make an appropriation of twenty-five to fifty millions of dollars or a hundred millions, to put in a dam near Green River, in Utah, for the irrigation of the lands in that vicinity, and for power purposes, how long would it be before Utah would utilize a considerable portion of the water allocated to her by the seven-State pact?

Governor DERN. There is a very large possible project there, which could be reclaimed if we had the money to do it. However, I am not in favor of starting any large new reclamation projects in Utah at this time, and we are not asking the Government for any money for that purpose. I think it is a poor time to bring in new land, in our part of the country, at least. We can not get the settlers. The farmers are having a hard time to make a living as it is, and I am not in favor of putting more land in competition with them.

Senator KING. If the Federal Government should construct a dam near Jensen, in Utah, some distance above, at a place where a dam is practicable and feasible, and which would generate tens of thousands of horse power, would not that dam also serve the purpose of irrigation upon the east side and the west side of the Green River?

Governor DERN. Yes; there are large areas in that part of our State that could be reclaimed.

Senator KING. Are you familiar with that tract of land sometimes called the Dead Man's Bench, as well as the territory between it and the river, and north of that and and south of that, on both sides of the line separating Utah and Colorado?

Governor DERN. I am familiar with it from maps. I have not been on it, but I know there is a tract of two or three hundred thousand acres of very excellent land that can be irrigated from the Colorado River.

Senator KING. I think the surveyors have told me that there are in the vicinity 700,000 acres, and then below, in Carbon and Emery Counties there are several hundred thousand acres of very valuable land which could be made exceedingly productive by irrigation from Green River.

Are you familiar with that land, too?

Governor DERN. Yes. In my statement, for the sake of brevity, I did not enlarge upon Utah's interest in the river nor her possibil-

ities. I have assumed that everybody would take that for granted. Half of the State of Utah is in the Colorado River Basin, and over half of our water resources are in that basin. We have a very tremendous interest in that part of our State. Our future development largely must be made there. We have vast areas of fine land and our tributaries of the Colorado River will supply ample water if it is reserved to us by the Colorado River compact. The future growth of Utah will largely be in the Colorado River Basin if our water resources are not taken away from us.

Senator KING. Would the chairman and the committee permit Governor Dern to amplify his statement in respect to the importance of that part of the State?

Senator JOHNSON. I have no objection.

The CHAIRMAN. He may be permitted to submit a paper. Our time has been taken up by so many interruptions, so that it is going to be difficult to finish in the time that we had set.

Senator KING. I wanted the record to show that Utah is vitally interested in obtaining a compact that would protect and preserve her rights for water, for power, and for agricultural purposes. I do not want the record to be silent upon that point, because we have hundreds of thousands of acres of the finest land that can be found in tne world which can be irrigated from the Colorado River, and we are vitally interested in the protection of our rights.

Senator JOHNSON. May I suggest that the governor be permitted to submit a statement, if you desire, as a portion of his remarks.

Senator KING. I will collaborate with him, and I may ask the privilege of reading it before the hearing has concluded.

Governor DERN. I might read just a couple of paragraphs from a speech that I made at Colorado Springs, on December 7, 1926, in which I said:

> Utah contributes a large percentage of the water of the Colorado River. The snows and rains that fall in Utah are nature's gift to us. If the water, or so much of it as we can economically use, does not rightfully belong to us, then we are woefully deficient in our sense of equity.
>
> One-half of the area of Utah is in the Colorado River drainage, and probably more than half of the State's water resources are in that area. Only one-fourth of our agricultural development, however, has been made in that drainage. Three-quarters is on the other side of the mountains, in the Salt Lake Basin. We have, therefore, great agricultural potentialities in the Colorado River Basin. We are not ready to develop them. Agriculture is depressed, and the time is not propitious to start new reclamation projects. Capital does not look favorably upon such schemes, and even if they were built, settlers could not be obtained. There must be an improvement in the condition of the farmer before we can hope to bring in new projects. None of us, I am sure, has lost faith in the future of the United States. The country is going to keep on growing, and the time will come when we shall want to reclaim our thousands of fertile acres, and make room for new home builders. When that time comes we do not want to wake up and find that we have plenty of land but no water with which to irrigate it. We do not want our future growth stunted. We are entitled to our place in the sun as well as are California and Arizona.

Senator KING. Was there any other explanation that you desired to make with reference to the questions that have been propounded by Senator Johnson, or in the light of the questions that have been propounded by him or others?

Governor DERN. No, I do not think so. I want to make it clear that personally I am simply interested in the things that I stated a

moment ago. I shall be very glad to see legislation of this kind go through as soon as those conditions are met.

The CHAIRMAN. I will call on Mr. Wilson, of New Mexico.

STATEMENT OF FRANCIS C. WILSON, REPRESENTING THE GOVERNOR OF NEW MEXICO, SANTA FE, N. MEX.

The CHAIRMAN. Will you state your full name, residence, and occupation for the record and for the benefit of the members of the committee?

Mr. WILSON. My name is Francis C. Wilson. I live in Santa Fe, N. Mex., where I have practiced law for the last 20 years, and I am here by appointment of Governor Dillon, of New Mexico, to represent him in this matter.

In presenting New Mexico's attitude toward the legislation pending in Congress I think it would be well if I prefaced my remarks by giving a brief description of the stake which New Mexico has in the Colorado River.

The San Juan River, which has its source in Colorado, flows south through the northwestern corner of New Mexico. At Ship Rock it has an annual average mean flow of about 3,000,000 acre-feet. That is twice the flow of the Rio Grande, at Buckman, 20 miles north of Santa Fe, and is greater than the total capacity of the Elephant Butte Dam and project.

The State engineer of New Mexico has made fairly intensive studies of the possibility of the San Juan River in New Mexico, and a feasible project exists by virtue of which approximately 687,000 acres could be irrigated by the construction of one large dam and two auxiliary dams.

That project is therefore fairly comparable with the Imperial Valley, and the cost of the construction, including drainage, would be approximately $66,000,000.

The territory through which the canal system and the distribution system would run has the advantage of a natural drainage channel in the Charco River, and all in all the project, at an approximate cost, including drainage, of $96 per acre, could be built and constructed according to his figure and estimates.

New Mexico has also a stake in the Gila River. At present approximately 5,000 acres are actually irrigated on the Gila River in New Mexico. There is a power site on the river which has very good possibilities.

There are some possibilities in the sources of the Little Colorado in New Mexico; the Zuni River, partly utilized at the present time by the Indian Service, and the Puerco River.

This is the stake which New Mexico therefore has in the Colorado River and which we have endeavored to protect by means of the Colorado River compact.

Our interest in the compact is predicated upon the fact that the development of a project of that magnitude must necessarily be postponed for probably a long period of years. Some people have estimated 25 years, and some 50 years. But due to the rapid development of the lower basin and the possibilities which grow out of a project like the Boulder Dam project, for the utilization of the

river flow, for use of the lower river, it becomes imperative for New Mexico to protect its probable future use of the river by some such means as the compact.

New Mexico feels that in presenting her views on the situation here those views must depend upon whether the legislation now pending before Congress is a constitutional exercise of the power and authority of Congress in that connection.

It has seemed to me that we could best state our attitude by first stating our views upon that point.

Arizona has twice admitted here that she considers the river navigable. I assume that she means navigable in fact. There are some people who seem to think that the construction of that project upon the theory that the river is navigable in fact is something of a subterfuge, and I have had very well-informed people ask me if that were not true.

In the case of Economy Light Co. *v.* United States, a decision of the Supreme Court reported in 256 U. S. 113, seems to me to answer that question. I am going to read some excerpts from that case into the record, because it is most material to what I shall thereafter say concerning New Mexico's position.

That was a case brought by the United States to enjoin the construction of a dam across the Des Plaines River in Illinois. The prayer for relief asked that the construction of this dam be enjoined for the reason that it would be an obstruction in a navigable river and because the defendant company had not applied for approval to the Secretary of War, had not submitted his plans and specifications and had not asked for authority from the State Legislature of Illinois.

The lower court sustained the contention and granted an injunction, and the defendant was restrained.

It went to the circuit court of appeals and from there to the Supreme Court of the United States. The district court found that there was no evidence of actual navigation within the memory of any living man, and that there would be no present interference with navigation by the building of the proposed dam.

The Supreme Court of the United States said:

> Both courts, however, found that in its natural state the river was navigable in fact and that it was actually used for the purpose of navigation and trading in the customary way, and with the kind of craft ordinarily in use for that purpose on rivers of the United States from early fur-trading days (1675) down to the end of the first quarter of the nineteenth century.

That was the statement of fact which, to my mind, has a comparable position with the situation on the Colorado River at this day.

Then the court said:

> Since about the year 1835 a number of dams have been built in the Des Plaines without authority from the United States and one or more of them still remains; besides, a considerable number of bridges of various kinds span the river. The fact, however, that artificial obstructions exist capable of being abated by due exercise of the public authority does not prevent the stream from being regarded as navigable in law, if, supposing them to be abated, it be navigable in fact in its natural state.
>
> The authority of Congress to prohibit added obstructions is not taken away by the fact that it has omitted to take action in previous cases. Nevertheless when the navigation serves commerce among the States or with foreign nations Congress has the supreme power, when it chooses to exercise it, and is not

prevented by anything the States may have done from assuming entire control of the matter. Congress may exercise its authority through general as well as through special laws, its power in either case being supreme.

And the court applied this test to the question of whether a stream would be navigable in fact so as to be navigable in law:

Whether a river in its natural state is used or capable of being used as a highway of commerce over which trade and travel is or may be conducted in the customary mode of trade and travel on water. The navigability in the sense of our law is not destroyed, because the water course is interrupted by occasional natural obstructions or portages, nor need the navigation be open at all seasons of the year or at all stages of the water.

Then, speaking of the river again:

Since it is a natural interstate highway, waterway, it is within the power of Congress to improve it at the public expense, and it is not difficult to believe that many other streams are in like condition and require only the exertion of Federal control to make them again important avenues of commerce among the States. If they are to be abandoned, it is for Congress, not the courts, to say.

It seems to me that that statement from the Light Co. case is extremely valuable in determining whether legislation upon the subject of the Colorado River, wherein and whereby the Congress of the United States assumes control over that river by virtue of its being navigable in fact, is particularly pertinent here.

At least as a foundation for the position that New Mexico is about to take it seems to me important and necessary for this reason: If the Congress of the United States is exercising a constitutional power here, then it makes no difference whether the bed and the banks of the Colorado River belong to the States or not, because when they were admitted into statehood their ownership was burdened with the servient to the right of the United States to regulate the river for commerce between the States and between nations.

Thus if Congress can exercise that power we can not protest against it, because when New Mexico was admitted to the Union it conceded that power and right to Congress. Therefore New Mexico is not here resisting the exercise of that power for that obvious reason. We are here, however, asking for certain things, not in the spirit of opposition to legislation on the subject, but in the spirit of desiring to request of Congress those things which in all fairness and justice and equity the States should have under those circumstances.

With that preliminary statement of the position which I feel New Mexico must take here, I would like to discuss more intensively the subject of the compact, and in that connection, it seems to me, in view of the discussion which has occurred heretofore as regards the meaning of the resolution which the meeting of the governors of the upper basin States passed at Denver in December, I should state my own construction of that resolution in explanation of the position which I may take in connection with the pending legislation here and our attitude toward it.

At that meeting we were not in accord entirely. Some took the position that we should resist legislation in Congress until the seven States compact should be ratified. To some of us that seemed to close the door, and we could not agree to it. We thought that the most we could say would be to put the upper States on record as desiring

the postponement of legislation for a reasonable time until California, Nevada, and Arizona could be brought into a tri-State agreement.

I take it that the wording of this resolution is certainly capable of that construction and it should be so construed, because it says:

Be it resolved. That it is the firm belief of the representatives of the aforesaid upper basin States assembled at Denver, Colo., this 19th day of December, 1927. that no legislation proposing the construction of any project upon the Colorado River be enacted by Congress.

Now, it did not say that we should suspend our activities pending legislation, but that legislation should not be enacted by Congress "before the negotiations now in progress have been completed and every reasonable effort exhausted to reach such agreement between the seven States."

I have not construed that to mean that New Mexico agreed that we would oppose pending legislation, but that we would ask Congress to suspend the passage of the act, the actual enactment of it, until the seven States might have a further opportunity to get together, if possible.

Therefore, it seemed to me that for New Mexico I should not be here in an attitude of opposing, but rather that I should be here in a position of cooperation to the extent that if there should be any pending legislation which Congress could constitutionally pass, our better attitude would be to attempt to place in that legislation every single protective clause that Congress would embrace in it at our request, and that we would respectfully request Congress not to actually enact any legislation until a reasonable time might be given the States, to the end that the compact might be signed by all seven.

I feel in that connection that some of the statements made by Governor Hunt in his remarks before this committee were somewhat unfortunate. I have reference now to those statements which directly bear upon the upper basin States in this controversy, because in that statement he purported to state the attitude of the upper basin States concerning this legislation, and I feel the necessity of correcting it. I have reference to a statement on page 5 to this effect:

But the States of Colorado, Wyoming, Utah, and New Mexico objected to any dam being built in the Colorado River—with Government aid or by private enterprise—until a compact was made which would discard the system of water laws which had been in effect in the semiarid States of the Colorado River Basin from the time of the coming of the Spaniard. The present law, briefly stated, is—that he who first puts water to beneficial use and continues to use it has the prior right and title to its use. The States of Colorado, Wyoming, Utah, and New Mexico proposed to substitute in place of these laws a new doctrine which they called "equitable division of the water."

The upper States asserted that if the regulatory storage of power dams were built in the lower basin and the water was put to beneficial use, that those States would be forever stopped from irrigating and cultivating their soil. They further asserted that the major portion of the water originated in their territory and that they were entitled to the use of an equitable share of it.

I do not object to that so much as I do to his conclusions.

Therefore, the States of the upper basin were the original opponents of legislation which seeks to harness the Colorado River. They continue to remain the chief opponents of legislation to provide for the harnessing of the Colorado River, for the control of its floods, and to make the resources of the river available for use for agriculture or power, unless such legislation is predicated upon a compact which will assure to those States the right to use all of the water

which they find possible to put to economic beneficial use. Arizona does not criticize them for seeking to change a law which limits their development. We do deny their right to form a confederation of States to destroy the sovereignty of Arizona and appropriate her resources.

Arizona, as a State, standing alone and in equal and fair competition with all seven of the States, does not need a compact for her protection.

Arizona as a State standing alone and in equal and fair competition with the seven States in the basin, will be able to obtain adequate water for her needs.

I am forced to conclude that, so far as the Governor of Arizona can speak for the people of his State he really is opposed, under any circumstances, to a seven States compact. It is true that he says later on that out of consideration of the desires of the upper basin States he is willing that Arizona should enter such a compact, but it seems to me that Governor Hunt's attitude is antagonistic to the interests of the upper basin States, if this is any true reflection of his real attitude, and we must assume that it is.

Therefore, with notice of that condition in the record, with notice of that as the position of the chief executive of Arizona, who has the power of veto of any act of the legislature ratifying this compact, it seems to me that for New Mexico we must take such position as we can here to protect our future.

The greatest protection which could be given can only be obtained through the seven States compact, and it is our primary desire and wish here and elsewhere that that compact be ratified by all seven States. Nevertheless, the Legislature of New Mexico has, in fact, ratified the compact on a six-State basis. That legislative act remains unrepealed and unmodified. It is now the law of the State of New Mexico; and, as I view it, binding upon the executive department, the governor of the State, whose representative I am here.

Thus, if a seven-State compact is embodied in any legislation here and should pass Congress, my aim and my duty here before such passage might take place would be to see that every protective clause possible should be included in the legislation, and I would endeavor to have those who represent New Mexico in Congress propose such measures as are necessary to that end.

It falls upon us here, as far as our State is concerned, with the possibility of the passage of such legislation before us, not to adopt a negative attitude, but to take an affirmative attitude looking to the protection of the State, so far as we may be able to obtain it through any suggestions that we may make.

A good deal has been said, both in the House and here, upon the subject of the Pittman resolution. I find no difficulty whatever in the Pittman resolution. It enunciates to my mind a fair suggestion, and we can at least call it that, or recommendation to Congress, and every State at Denver, with the exception of California, agreed to it. May I take that resolution for a moment and ask you to have the patience to permit me to compare it with the Federal Power Commission act, and to attempt to show this committee that there is no departure in the Pittman resolution from the theory and the purpose of the Federal Power Commission act.

Briefly, I would like to read section 7 of that act. That is the "preference section," as many of you know.

SEC. 7. That in issuing preliminary permits hereunder of licenses where no preliminary permit has been issued and in issuing licenses to new licensees under section 15 hereof the commission shall give preference to applications

therefor by States and municipalities, provided the plans for the same are deemed by the commission equally well adapted, or shall within a reasonable time to be fixed by the commission be made equally adapted, to conserve and utilize in the public interest the navigation and water resources of the region; and as between other applicants the commission may give preference to the applicant the plans of which it finds and determines are best adapted to develop, conserve, and utilize in the public interest the navigation and water resources of the region if it be satisfied as to the ability of the applicant to carry out such plans.

That whenever, in the judgment of the commission, the development of any project should be undertaken by the United States itself, the commission shall not approve any application for such project by any citizen, association, corporation, State, or municipality, but shall cause to be made such examinations, surveys, reports, plans, and estimates of the cost of the project as it may deem necessary, and shall submit its findings to Congress with such recommendations as it may deem appropriate concerning the construction of such project or completion of any project upon any Government dam by the United States.

In other words, the preference goes to the States, next to the municipalities, next to private ownership, and in the event that in the judgment of the commission it might be best for the Government of the United States to construct and operate such a plant, it shall refer the matter to Congress with its recommendations.

Now, in the closing paragraph of the Pittman resolution we enlarged a bit upon that theory, but the underlying principle, I submit, is the same:

The State or States upon whose land a dam and reservoir is built by the United States Government, or whose waters are used in connection with a dam built by the United States Government to generate hydroelectric energy are entitled to the preferred right to acquire the hydroelectric energy so generated or to acquire the use of such dam and reservoir for the generation of hydroelectric energy, upon undertaking to pay to the United States Government the charges that may be made, for such hydroelectric energy or for the use of such dam and reservoir t oamortize the Government investment, together with interest thereon, or in lieu thereof agree upon any other method of compensation for the use of their waters.

Assuming now that this pending legislation should give to the States a prior right to purchase the power or the water, you would have exactly the same condition as is in the Federal power act, but you would have departed from it in the sense that you are permitting two States to have that right instead of all or any State. But in the equities of the situation would not it be fair in particular instances for Congress to recognize that in exercising its constitutional power in the construction of this dam it should make some allowance to the States of Arizona and Nevada in view of the fact that it is constructed within their boundaries? The dam site is within their territorial limits and the water flows through the State of Arizona.

It seems to me that the matter which this committee has before it, in the light of all the circumstances surrounding the project, is confined to the consideration of whether the States of Nevada and Arizona are entitled to some remuneration, not as a matter of law, not as a constitutional right, but as a fair consideration to them.

I think that thought which we endeavor to convey in this resolution is one which in theory at least has been adopted by the Congress of the United States in the passing of the Federal Power Commission act and can be carried a bit further consistently in the event that the United States should construct such a project that some

allowance should be made to those two States in the use of their lands and water in lieu of any right which they might have in connection with a privately constructed project.

In that connection I have the temerity to make a suggestion regarding the two bills now pending before this body. I refer to Senate bill 728 and Senate bill 1274. On page 2 of Senate bill 728, line 11, the words "also to construct and equip, operate, and maintain," etc., occur. In place of that particular line I would adopt the phraseology employed in the Federal Power Commission act in this manner:

For the purpose of utilizing the surplus water or water power from the said storage reservoir and to employ the same when necessary for the development and improvement of navigation of the Colorado River and to enable the project to be self-supporting and a financially solvent undertaking, the Federal Power Commission is hereby given exclusive jurisdiction and control of said surplus water or water power and shall administer the same pursuant to the terms of the Federal water power act: *Provided, however*, That the preference given in section 7 of said act shall first be given to the States of Arizona and Nevada, and if they shall not avail themselves in whole or in part of said preference within the requirements of said act, then to the extent that the States have failed to qualify the preference shall go to municipalities, and to the extent that the municipalities shall not qualify then to citizens of the United States, or to any association of such citizens, or to any corporation organized under the laws of the United States or any State thereof, but if, in the judgment of the commission the development of such surplus water or water power from the said storage reservoir should be undertaken by the United States itself, then the commission shall not approve any application for such surplus water or water power to any other agency, but shall certify its judgment in that respect to the Secretary of the Interior, who shall proceed under the terms of the act to construct and equip, operate, and maintain at or near said dam a complete plant and incidental structures suitable for the fullest economic development of electrical energy from the water discharged from said reservoir, and to acquire by proceedings in eminent domain, or otherwise, all lands, rights of way, and other property necessary for said purposes.

In the event the Secretary of the Interior shall proceed to the construction of the said plant as herein authorized, he shall include in the cost at the switchboard to the distributee or consumer an amount per horsepower sufficient to realize a sum to be paid Arizona and Nevada such as may be agreed upon between California, Arizona, and Nevada; but if no agreement is reached between them within a reasonable time, then the Secretary of the Interior shall include in the cost at the switchboard to the distributee or consumer an amount sufficient to realize a sum not in excess of $1,800,000 with the plant running at full capacity, said amount to be adjusted according to economic conditions and output, and to be divided equally between Arizona and Nevada in lieu of any other equitable method of compensation for the use of their land and water in the construction of the project.

By that means we would have the spirit and the intent of the Federal Power Commission act incorporated into this bill; we would have the spirit and the intent of the Pittman resolution incorporated into this bill; and I can not see wherein it can injure or hurt anyone, and I can see where it would redound greatly to the credit of Congress if such a provision or something similar to that should be incorporated in this legislation.

Senator PITTMAN. Mr. Wilson, all of the provisions governing the Federal Water Power Commission are already in the act, with the exception of the particular priority to which you referred.

Mr. WILSON. I understand that, Senator, and I failed to state that, of course, the entire act would have to be more or less remodeled to reach this suggestion. I mean that if this suggestion goes in in the

form that it is, you would have to change or modify other provisions in the bill.

Senator PITTMAN. I mean there is already a provision in the Federal water power act granting to municipalities a priority of license.

Mr. WILSON. Yes; there is.

Senator PITTMAN. But you specified two municipalities, namely, the States of Arizona and Nevada, as prior to other municipalities.

Mr. WILSON. That is the idea that I had in mind. The Federal water power act says States and municipalities. I want to specify and give preference to the two States whose resources have been used in the construction of this dam by the Government.

On the subject of flood control I am unable to think of the Imperial Valley in the terms of an aggregate body called the Imperial Valley irrigation district. I can think only in terms of the farmer who must pay the burden of the assessments due to the protection of his property. He must work daily combating with natural difficulties the plague of parasites, and blemish, and all of those things that assail a farmer in his work, including the difficulty of marketing. I think of the Imperial Valley in the terms of, say, 60,000 people striving against the forces of nature to make a living; and when I come to the question of flood control I come to that proposition with the thought in my mind that New Mexico can not help taking a vital interest in that as a humanitarian matter. I think that must be the approach of all the upper basin States. It is not common to New Mexico. And in approaching the problem I would like to see the relief given as soon as it can be provided. Our interests are selfish in the sense that we want our future protected. In that sense we want those interests protected, but at the same time we feel that the Imperial Valley should have protection also against the possibility, even though it should not amount to more than a possibility, of the destruction by inundation of their property and their homes.

I think that I can not do better before this committee, perhaps, and I know I can shorten my remarks by reading into the record upon this subject a letter which I wrote to the Hon. John C. Tilson, a Member of the House of Representatives from Connecticut. On November 22, 1927, after having received a considerable propaganda from various sources concerning the advisability of a flood-control dam in place of the Boulder Dam project, I wrote a letter, more or less open on the subject, and I will read it. [Reading:]

NOVEMBER 22, 1927.

Hon. JOHN C. TILSON,
House Office Building, Washington, D. C.

DEAR SIR: In recent country-wide publications I have noticed a tendency to attempt to divert Congress from the main purposes of the Boulder Dam project on the Colorado River, and to plant in the minds of persons more or less disinterested but desirous of seeing the proper thing done in that connection, the idea of the construction of a flood-control dam as a substitute for the proposed Boulder Dam project. May I suggest some thoughts in that connection from the standpoint of the upper basin States, as I understand it, and particularly of my own State.

I was not attempting, as has been charged, to speak for the upper basin States, but to speak concerning my understanding of their standpoint. [Continuing reading:]

The Boulder Dam project, as originally defined, has four primary purposes, and I give them in the order of their importance to the upper basin States:

First. To impress upon the entire Colorado River system the Colorado River compact between the seven Colorado River States, to the end that their future uses of the river may be protected and the terms of the compact enforced by agreement between the States with the approval and cooperation of the Federal Government, such approval to be given in the act of Congress authorizing the project, and such cooperation to be rendered by the Government in its construction and subsequent operation of the project. The compact provides adequate machinery for the adjustment of differences between the States, but the control of the Federal Government in the administration and the distribution of impounded water will be of the greatest value in the settlement of possible disputes between the States of both basins, as well as those within the lower basin, concerning the acquirement of rights in excess of compact allocations. In no other way, and especially not by a flood-control dam, could this be efficiently and adequately accomplished.

Second. As soon as the authorization by Congress is given for the construction of the Boulder Dam project, including the all-American canal, the Mexican situation can be brought to a head and it should not be long before a treaty could be entered into with Mexico. There is no greater menace to all of the States included in the Colorado system than the Mexico situation. The administration by the Government of the United States of water impounded in the Boulder Dam project, including its distribution through the all-American canal to American water users, would give the Government immediate control of the appropriations in Mexico. If the United States of Mexico refused to come to a settlement of existing equities by treaty, then the American capitalists who are behind the project in Mexico could be forced to accept a limitation of the rights which they could acquire in the future in the waters of the river. In the event of a treaty, the Government would continue its control of the Boulder Dam project for the purpose of fulfilling its treaty obligations and to protect the States of the Colorado River system from any additional encroachments by the landowners in Mexico. This could not be accomplished by a flood-control dam, and, in fact, it is more than likely that such a dam would lead to further appropriations by landowners in Mexico, which could not be controlled.

Third. The Boulder Dam project has for one of its principal purposes flood control, and while it may be argued by the advocates of a flood-control dam that this purpose will be satisfied by the construction of such a dam, yet it could not be anything more than a temporary expedient. I am not an engineer, but I view the desilting of the stream as important an element in flood control as that of actual control of the water during flood seasons. Any dam which is constructed must be adequate from both standpoints and I am unable to believe that a mere flood-control dam will function efficiently as a desilting proposition. If it is a fact, and I have never heard it controverted, that the Colorado River discharges annually a volume of silt equal to the total amount of dirt removed for the excavation of the Panama Canal, it would appear that a flood-control dam could not remedy one of the most difficult factors in any program involving protection of the Imperial Valley. If I am correct in this conclusion, then a flood-control dam will fail essentially to accomplish the purpose of those who advocate it. No project except the Boulder Dam could fulfill adequately both purposes.

Fourth. Finally, while power is an incident to the entire project, it is an essential one in that it can not be expected that the Federal Government will undertake any project such as the all-American canal and a flood-control dam without a means of recouping its expenses. The Imperial Valley and the district which is under irrigation in that section in the Lower Basin from the main stream could not possibly sustain the cost of an all-American canal and a flood-control dam.

There I had in mind the present conditions in the Imperial Valley and especially the hardships under which the farmers are working there. (Continuing reading:)

A flood-control dam would not provide a constant head such as is required for the generation of power, whereas the Boulder Dam project has tremendous potentialities in this connection, as you know. If my understanding concerning the situation in Congress is correct, it is futile to assume that Congress will appropriate money of the taxpayers of the country for the construction of the all-American canal and the flood-control dam without definite provisions for the repayment of expenditures. The Boulder Dam project affords

ample assurance through the power possibilities of the repayment of that money, and by no other means, so far as I know, can this be assured.

New Mexico is not primarily interested in the method which may be employed by Congress in its wisdom to dispose of the power so as to guarantee repayment to the Government of the moneys expended for the construction of the entire project which includes the all-American canal, but we are vitally interested in the protection of our future by the Colorado River compact. The construction of a flood-control dam would only add fuel to the flames and force the upper basin States into litigation to protect their rights against the increased uses of water by the lower basin States which, would undoubtedly result from a flood-control dam. We are seeking to avoid the uncertainties of litigation and if the whole situation is involved in the uncharted difficulties which would flow from the construction of a flood-control dam one of the most important purposes of the Colorado River compact would be destroyed. We would have no recourse except to the courts and in view of the Wyoming-Colorado case we appreciate very fully what would quite likely be the outcome of our efforts to protect ourselves by that means.

It may be argued that the Government could authorize the construction of a flood-control dam and impress upon it the terms of the Colorado compact to the same extent that it might do in connection with the authorization of the Boulder project, but it is fairly certain that California would not accept such a dam in lieu of the storage project, and thus would not ratify the compact.

I base that upon the repeated statement at the Denver conference that the California delegation would not accept anything which was not based upon large storage, and it was further stated that the compact itself, so far as the agreement of California was concerned to its provisions, was predicated upon the theory that large storage would become available by virtue of some such legislation as this. [Continuing reading:]

It is doubtful if Arizona would ratify the compact under such conditions, and thus there would be no compact and no protection to the upper basin States. The upper basin governors at the recent conferences in Denver were able to bring Arizona and California together to an extent not theretofore approached. Arizona accepted the suggestion of the governors as regards the division of water from the main stream to the extent that those waters are underwritten in the compact by the upper basin States at Lee Ferry, with certain reservations not material here, and the proposals were then within 400,000 acre-feet of the minimum demands of California. We feel that it will not be a great while before the two States will be brought together, and we believe that Congress should give us the time necessary to bring about that agreement.

That is, in effect, what the upper basin governors agreed to and embodied in their resolution in Denver, and it is still the position of New Mexico. [Continuing reading:]

The flood-control dam proposals seem to us to represent an effort on the part of those who do not want to see the project constructed to add to the controversial matter now before Congress by pitchforking into the arena ideas of alleged economy which have no place in any fair consideration of the subject, for the reason that the taxpayers' money is safeguarded by the power end of the project at Boulder Canyon.

There remains for a little more complete consideration of the question some discussion of the provisions of the bill pending here. Personally and upon such theory as I have been able to satisfy myself with, neither Senate bill 728 nor Senate bill 1274 adequately expresses the constitutional basis upon which, to my mind, they must proceed. For instance, the titles to both bills are, in effect, the same:

To provide for the construction of works for the protection and development of the lower Colorado River Basin, for the approval of the Colorado River compact, and for other purposes.

I would like to distinguish, in any further comments upon that, between the power of Congress over nonnavigable streams and over navigable streams, for this reason: So far as that title is concerned and so far as the recital in the first paragraph is concerned, the Colorado River might be nonnavigable as well as navigable. It does not say anything about it. I find no authority in the Constitution of the United States upon which could be predicated any right of Congress to appropriate for flood control on nonnavigable streams. That being the case, the title and the first paragraph, in order to show a constitutional exercise of authority, must recite, it seems to me, that the purposes of the bill are to improve the navigability of the Colorado River. Thus, I must criticize both measures, and I know it is presumptuous of me to do so, because I do not think as they now stand their recitals bring them within any basis of a constitutional right.

The CHAIRMAN. I may say, Mr. Wilson, that both bills, as I understand it, are predicated upon the understanding that the Colorado River has been declared to be a navigable stream; and that in so far as the titles of bills are concerned it is quite customary to modify and change the titles at the time of the enactment of the legislation. That, I think, is a matter that is not only frequently but customarily taken care of by the committee that has the bill under consideration.

Mr. WILSON. I was not so much referring to the title, perhaps, as I was to the recitals in the first paragraph as well.

As regards the nature of the protection which I find in the legislation, I want to say that paragraph 6 is certainly most valuable to the upper basin States, although I must confess that I prefer the phraseology of one bill in that connection to the other. In Senate bill 1274, after reciting the priorities or the dominant uses, it says:

It being the intent of this act that the use of water for power shall be subservient to the first two uses specified above, which shall be known as the dominant uses.

I think that expression is missing in Senate bill 728, and I wish it could be included. It involves, in effect, the words of the compact, and while I know that the compact is made a part of the bill, yet I would rather not see any conflict implied or otherwise between section 6 and the provisions of the compact as they have been written.

I realize that in paragraph 6 the Secretary of the Interior may enter into contracts in the alternative and that he may enter into a lease for the use of the water for the generation of electric energy, which, I suppose, means he could contract with a private corporation for that purpose and that the Government would not necessarily construct the generating plants. Nevertheless, I think it would be more useful if it could be stated in the terms of the Federal Water Power Commission act because it seems to me by that act Congress has announced its attitude toward the whole question of the control of the Federal power sites and that it should be followed in any subsequent legislation.

The CHAIRMAN. I think you will find authority for the Federal Power Commission conferred in the bill 1274, although not so conferred in bill 728, the main difference between the two bills being that S. 728 confers authority upon the Secretary of the Interior to construct the power plants and the other bill does not; it provides for the leasing of the water for the purpose of producing hydroelectric power.

Mr. WILSON. The point I wanted to make upon that, Mr. Chairman, was that I want the preference, etc., impressed upon it as they are in the Federal Water Power Commission act because I think that is the best method of handling it, inasmuch as it is a known method and one that is being constantly employed and well adapted to this particular project.

The CHAIRMAN. You will note that in paragraph (e) of section 5 of bill S. 1274 there is provision that "All licenses issued by the Federal Power Commission," etc. It puts it squarely under the control of the Federal Power Commission; and, of course, the law creating that commission will govern.

Mr. WILSON. Yes; it is in there, practically. I think it should be impressed upon this bill in such a form that it would be a piece of affirmative legislation as regards the rights of the Federal Power Commission to turn the whole project back to the Secretary of the Interior so that he may control it under the terms of this act in the event that the States, the municipalities, and private interests do not care to construct it. In other words, I would not think that a project of such great interest to the public, such a great public instrumentality for good, should be defeated in the event that neither States, municipalities, or private power interests should not care to tackle the job, but that it should then be left to the Government to complete it.

I do not clearly understand the paragraph at the head of page 8. It seems to me that by that paragraph, unwittingly, perhaps, there is the probability that a certain increase of cost will be transferred to the consumer, which should not be.

The CHAIRMAN. In what bill is that?

Mr. WILSON. That is in bill 728, and I think it is in the other bill also.

The CHAIRMAN. No; it is not included in the other bill.

Mr. WILSON. I want to ask the committee if it has considered the practical working out of that provision. Suppose, for instance, Los Angeles contracts for 200,000 horsepower and it is prepared to build a power transmission line for that much power. If it were not for this provision, it need not exceed the cost for the transmission of the amount of power that it has contracted for. Under this provision any city or any private contractor could force the city of Los Angeles to permit the transmission of power over its lines to the extent of one-fourth of the capacity of its lines. That would mean that if it constructed its line to its whole contract capacity of 200,000 horsepower, then some one could come along and up to 50,000 horsepower demand the right of way over its transmission lines, and it would have to concede it. That would mean that every contractor on a large scale which proposed to build a transmission lines would

have to build that line with a capacity one-fourth greater than would be required to convey its own contracted quantity, in which event the cost of that additional construction work would have to be passed on to the consumer.

In other words, if the city of Los Angeles built a power line to its full contract amount of 200,000 horsepower, it would have to build a line of 250,000 horsepower in order to take care of this possibility, this liability, upon its transmission lines, even though the extra capacity might never be employed.

I would think that what Congress would do in the passage of this act would be, in effect, to transfer and transmit down to the consumer the cost of that additional transmission line, although it might never be used, because no one might take advantage of that provision and make demand to use the lines for additional power.

I make that suggestion because the thought occurred to me that it might be changed in some manner so as to prevent that additional cost being passed on to the consumers, which would undoubtedly occur.

As regards the provisions on page 11 of bill 728, in paragraphs (b) and (c), it seems to me that those provisions are very valuable to the upper basin States. I understand that those things will be considered and discussed by some one following me, and it is not my intention to go into great detail about them, but it is certainly of the greatest advantage to the upper basin States that in the event a six-State compact should be accepted, and all of the States except one should ratify, that the power of the Government, operating through the right to control rights of way for ditches, dam sites, etc., could be exercised for the protection of the upper basin States, if this legislation should be passed, because it would be the duty of Congress in the administration of this act and all of the officers that would have any authority under it, to see that no rights are gained or acquired in violation or in excess of those provided for in the Colorado River compact.

We are, of course, interested also, and very vitally interested, in section 12, which by its terms makes the compact a part of the act. But I would like to make a suggestion as to that, and that suggestion would be this: At the close of section 12, on page 16, add to that paragraph this recital:

> But nothing in this act contained shall be construed as barring any State from ratifying the said compact after this act has taken effect, and when any State shall so ratify it, it shall enjoy all the privileges, powers, and authorities conferred by this act upon those whose ratification shall put this act into effect.

The provision contained in section 13, reading—

> This act shall be deemed a supplement to the reclamation law, which said reclamation law shall govern the construction, operation, and management of the works herein authorized, except as otherwise herein provided—

is very valuable to the upper basin States.

There will be certain protection which can be afforded through the reclamation service to the upper basin States in the administration of this project, and it will practically be administered, I presume, through that service in order that treaty rights shall be observed if a

treaty is entered into between this country and Mexico, and there will be many provisions, many things, which the administration by the reclamation service of the project will be helpful between States and the use of the water in the lower basin.

At the Denver conference Arizona accepted the proposals of the governors of the upper basin States on the allocation of water, but attached a condition to the effect that the tributaries of Arizona must be released and relieved from the burden which might be hereafter impressed upon them by virtue of any treaty between the United States of America and the Republic of Mexico.

The theory of the Arizona commission was that under section C, article 3, of the Colorado River compact the entire burden of the results of any treaty between the two countries would eventually fall upon the tributaries of Arizona for the reason that their water was not allocated under the compact and would thus be surplus water within the meaning of that section.

The upper basin governors gave the matter considerable consideration and rejected Arizona's condition in this connection for the reason that a reconstructed river at Lee Ferry shows 17,000,000 acre-feet as the mean annual run-off from the upper basin States and if the allocation made by the compact to the upper basin States of 7,500,000 acre-feet and to the lower basin States of 8,500,000 acre-feet deducted from the reconstructed river at Lee Ferry a surplus of 1,000,000 acre-feet would remain in the river to be applied to the discharge of any treaty obligations subjected to utilization for that purpose under section C, article 3, of the compact.

Taking now the contribution of the tributaries below Lee Ferry, between that point and Topoc, the figures submitted to the governors of the upper basin States disclose the probability of not less than 500,000 acre-feet as the contribution of those tributaries to the main stream which could not be used at any time in the future consumptively by the State of Arizona. It is true that estimates given the governors at the Denver conference showed a probability of more than 500,000 acre-feet, but for the purpose of this exposition that figure can be accepted as a minimum. Thus, there would be a surplus of 1,000,000 acre-feet coming from the tributaries and main streams above Lee Ferry and a surplus of one-half million acre-feet between Lee Ferry and Topoc, a total of 1,500,000 acre-feet, upon which would fall the burden of the draft made upon the stream by any treaty between the United States of America and the United States of Mexico.

In view of the fact that it is unlikely that more than that amount would be given to Mexico under the terms of any such treaty, it is obvious that there would be no drain on that account from the tributaries of Arizona. Therefore, the governors of the upper basin States refused to consider this condition which Arizona imposed upon its acceptance of the allocation suggested by the governors. The compact itself does not make any distinction between the tributaries of the upper basin States and those of the lower basin States in the matter of satisfying treaty obligations out of the Colorado River system, and Arizona's request, therefore, would have resulted in a modification of the terms of the compact giving to her an exemption

which the compact does not give to any of the Colorado River Basin States.

Paragraph 14 is especially important. It carries an appropriation of $250,000 for the investigation of projects for irrigation, generation of electric power, and other purposes in the States of Arizona, Nevada, Colorado, New Mexico, Utah, and Wyoming. It will be noted that Arizona is included. Those investigations should disclose what from an economic standpoint should be developed upon the river and with reference to power as well as irrigation.

Mr. Chairman, I thank you.

The CHAIRMAN. If there are no other questions of the witness, he will be excused.

Senator HAYDEN. I want to secure your opinion in regard to the power of the United States to apportion waters among the States in the case of an interstate stream. I might predicate my question on a situation that actually exists on the Delaware River: The States of New York, Pennsylvania, and New Jersey appointed commissioners to negotiate a compact for equitable apportionment of that stream among the States. The Legislatures of Pennsylvania and New York promptly ratified, but the Legislature of New Jersey failed to ratify that compact and it is not in effect. Do you believe it is within the power of the Congress by law to designate how much water shall go to New York, how much to Pennsylvania, and how much to New Jersey, or how much each State may use out of that stream?

Mr. WILSON. I do not think so; not without their consent, not unless the allocation was made incidental to the construction of some project or some great improvement upon—is it Delaware Bay?

Senator HAYDEN. No; it was merely an apportionment of the water for domestic uses in those States.

Mr. WILSON. It would have to be done in connection with some constitutional power and as incidental to it, and it could not be done by the Congress of the United States without some right or some jurisdiction over the subject matter.

Senator HAYDEN. If, for example, the proposed apportionment of the water would interfere with the navigation of the river at the Port of Philadelphia, then that might be a basis for action by Congress.

Mr. WILSON. Yes, sir.

Senator HAYDEN. But unless there were some direct constitutional question involved, wherein authority had been conferred upon the Congress, such apportionment could not be made.

Mr. WILSON. No; it could not be made. In other words, in this connection as I see it the Congress is passing a law which has to do with the regulation of the Colorado River for the betterment of commerce, to make it more navigable. Incident to that power the Congress can take jurisdiction as I view it over the water of the Colorado River to the extent necessary to execute that authority. If it is important to the execution of that authority that there should be some allocation between the States of the water, I think the Congress could so act in this connection.

(The witness left the table.)

The CHAIRMAN. I will call on Attorney General Boatright. General, I believe you have a short statement, and while the time for adjournment has about come, yet you may be heard for a few moments.

STATEMENT OF WILLIAM L. BOATRIGHT, ATTORNEY GENERAL OF COLORADO

Mr. BOATRIGHT. Mr. Chairman, because Senator Carpenter, Colorado River commissioner, is suffering from throat trouble, which prevents his being able to make himself heard, he has requested me to present this statement to the committee.

The CHAIRMAN. Very well, you may read it.

Mr. BOATRIGHT. I will read the statement for Senator Carpenter.

STATEMENT OF DELPH E. CARPENTER, PERSONAL REPRESENTATIVE OF GOV. WILLIAM H. ADAMS, OF COLORADO, AND INTERSTATE RIVER COMMISSIONER OF COLORADO

Mr. CARPENTER. The State of Colorado respectfully requests that the Congress refrain from the enactment of any legislation to authorize and provide for the construction of the proposed projects in the States of Arizona, California, and Nevada until such time as those States have provided full protection to the States of Colorado, New Mexico, Utah, and Wyoming against adverse claims of a destructive character which would result, directly or indirectly, from the use of waters of the Colorado River as a result of such construction. Our policy is expressed in the resolutions adopted by the governors and representatives of those States at Denver, Colo., December 19, 1927.

We respectfully request that no structures be authorized until an equitable apportionment of the waters of the Colorado River shall have been made by compact between the seven interested States, duly ratified by said States and by the Congress.

We do not appear for the purpose of discussing the merits of either of the pending measures. Our objection is directed wholly to the enactment of any legislation before the rights of the interested States have been adjusted by compact, and respectfully direct the attention of the Congress to the following facts:

By act of August 19, 1921, consent was given by the Congress to the seven Colorado River States to conclude a compact between them respecting the equitable apportionment of the waters of the Colorado River.

Such a compact was concluded at Santa Fe, N. Mex., November 24, 1922, and was thereafter known as the Colorado River compact.

The compact was unconditionally ratified by California, Colorado, Nevada, New Mexico, Utah, and Wyoming at the 1923 sessions of their legislatures, but the State of Arizona took no action pending the outcome of certain engineering investigations for the purpose of obtaining information which the officials of that State deemed necessary to the proper consideration of the interests of said State.

For causes, since removed by act of Congress until March, 1929, the four upper States by concurrent legislation in 1925 offered to

make the compact effective between the six States which had theretofore ratified said compact, without prejudice to the subsequent ratification by Arizona, in the full belief that Arizona would so ratify whenever she had satisfactorily considered and adjusted her local problem. This was an emergency measure.

This offer was promptly accepted by the State of Nevada, but the State of California not only made her acceptance conditional but repealed her 1923 act of unconditional ratification of the compact.

The 1923 acts of the legislatures of the seven States, except Arizona and California, unconditionally ratifying the Colorado River compact are still effective.

The 1927 session of the Utah Legislature withdrew the offer made by that State in 1925 to make the compact effective on a six-State basis, but retained the 1923 act of unconditional ratification, with some slight modification.

This action of the Utah Legislature eliminates the six-State ratification feature from the discussion, and the unanimity of the vote would indicate the improbability of change in that State.

During the summer of 1927 the officials of the State of Arizona informed the governors of the other Colorado River States that after full investigation and study of her local problems she was sufficiently advised to say that she would ratify the Colorado River compact if and when a subsidiary compact was concluded between the States of Arizona, California, and Nevada respecting problems of the Colorado River local to those three States, and her officials requested opportunity of discussing and agreeing upon such problems.

The governors of the upper States joined in extending their good offices and in requesting that the governors and official representatives of the seven Colorado River States meet at the city of Denver in August, 1927, for the purpose of devising ways and means of bringing about the negotiation and conclusion of such a three-State compact as would permit the States of Arizona and California to complete a seven-State ratification of the Colorado River compact.

The officials of all seven States accepting the invitation, the "governors' conference" of the seven States convened at Denver, was in session for seven weeks, and is now in recess awaiting call by Governor Dern, of Utah, chairman of the conference. Upon receipt by Governor Dern of information of the conclusion of a series of conferences between special representatives of Arizona, California, and Nevada who have under consideration the formulation of a common policy respecting the disposition of problems growing out of the uses of water for generation of electrical power, he is to reconvene said conference for further proceedings.

All seven States are working on the common problem, and the results of their labors, in the form of compacts, will be before the Congress for approval in the not distant future, providing the negotiators are surrounded by those human conditions and that atmosphere of neutrality which are imperative to the successful conclusion of voluntary agreements.

In the light of what has transpired, the State of Colorado takes the liberty of suggesting that five of the seven Colorado River States

have proceeded with all possible dispatch in those activities necessary to the early concluding of those interstate compacts. These are imperative as a proper foundation for the physical development of the resources of the river without injury to and with full protection of the rights, welfare, and autonomy of each of the interested States.

The States are justified in urging Congress to refrain from proceeding with the development of the river until the rights of each of the States shall have been permanently determined. To each State this is a matter of paramount importance. Each is arid and must depend upon the use of the waters of its streams for its very existence. In necessary self-defense each is justified in demanding that its right to future growth and existence be given first consideration and that no measure be enacted to its injury. More than 80 per cent of the waters of the Colorado River have their origin in the four upper States of the Colorado River Basin. The pending legislation would authorize structures through which would be asserted claims of preferred rights to the use of the waters of the streams of the upper territory for the benefit of the lower territory and to the exclusion of the uses in the States of origin. Such superior claims would constitute servitudes upon the natural resources within the upper States.

The States may properly request that Congress refrain from authorizing structures and otherwise legislating upon matters which tend to confuse the very problems in the solution of which the States are now engaged. Most of the multitude of issues respecting Colorado River matters have been solved. The remaining differences are now substantially narrowed to the settlement of the power issue between the States which will benefit by the proposed development. It is reasonable to assume that both time and opportunity will be afforded the States within which to conclude these negotiations.

Other considerations indicate the wisdom of withholding congressional action at this time. The Colorado River compact between the seven States and the subsidiary three-State compact between the lower States, when ratified by the States and by Congress, will constitute the basis of all development of the river resources by public and private agencies. All legislation, National and State, and all governmental activities will proceed in conformity with those compacts which will then have become the law of the land.

It is difficult, if not impossible, to forecast the final provisions of agreements between the States, and it is correspondingly difficult to draft legislation to conform to such compacts before one of the compacts is even phrased.

Legislation enacted now, necessarily, must be remodeled to conform to the basic compacts after they are finally approved. Alleged property rights which may have been vested would embarrass both the formulation and enforcement of subsequent legislation. Without the compacts neither National nor State legislation may proceed intelligently. The compacts are the foundation, the charter, and constitution upon and around which all legislation and subsequent development must proceed. The States are pressing the conclusion of the compacts with appropriate dispatch. The degree of progress is timed by the speed of the most procrastinating negotiator. Aggra-

vating or deterring influences, opportunity of obtaining advantage through favorable legislation, and other similar factors, only tend to delay, while the actual placing of any State in the attitude of a victor, or of having attained its purpose through legislation, could only destroy the possibility of agreement.

To condition the effectiveness of legislation upon the conclusion and ratification of the compacts before the compacts are agreed to would result in the creation of a standing menace to the very existence of six of the States, by reason of the fact that those States would always face the danger of the repeal of the provisions of the act creating the safeguards, which would result in the putting into effect of those provisions which would be destructive of the States. For example, if a bill were passed by the present Congress, without awaiting the conclusion of the interstate compacts, and that act of Congress contained a provision that the act should not become effective until the Colorado River compact shall have been ratified by a required number of States, such provision would be subject to repeal at any subsequent Congress, and the proponents of the bill would obtain all the advantage of the enactment of the measure, while the States which furnish the water and receive no benefit from proposed construction must continually face the danger of repeal of protective clauses and would be confronted with the fact that the beneficiary States would have little interest in protecting the other States by treaty, because perennial publicity of threatened floods would eventually exhaust the patience of Congress and would eradicate the protective barriers erected for the protection of the States where the river has its source. If it were possible for this session of the Congress to bind all future sessions by the enactment of protective provisions, which could not be later repealed and which would constitute an irrevocable compact for the protection of the States, these suggestions would not be pertinent, but such is not the case, and the only manner in which the States may be completely protected, pending conclusion of the compacts, is for the Congress to refrain from the enactment of any measures which at any future time might easily be converted into agencies for destruction of the States whose autonomy it is now the duty and desire to Congress to protect.

We are firmly of the opinion that enactment of any pending legislation before the approval of the compacts would not only be the creation of a continuing menace against the welfare and sovereignty of six of the Colorado River States for the primary benefit of the one State which furnishes no part of the resources, the waters of the river which it proposes to utilize, but such legislation would embarrass pending treaty negotiations and would make extremely difficult, or wholly prevent, the early conclusion and ratification of both the Colorado River compact and the desired subsidiary three-State compact.

We sincerely concur in the statements of the Governors of Utah and Wyoming that the entire situation has so improved within the past 12 months that there is every reason to believe that the Santa Fe compact will be approved by all seven States within the near future, providing Arizona, California, and Nevada are permitted to con-

tinue their negotiations in a spirit of equality and the realization of the necessity of arriving at a speedy and satisfactory conclusion. The settlement of the complex interstate relations is in the active charge of governors and State officials who are devoting their time and treasure without stint to the settlement of all controversies and the final ratification of that seven-State compact, which is the necessary foundation for all future development. These States are not negotiating for some mere temporary expedient. They are settling problems for all time, and the brief span of a few years required for this purpose is as a passing moment when compared with perpetuity.

We respectfully submit that the State of Colorado and her sister States of the upper basin of the Colorado River system, whose very existence is involved in the measures now before the committee, have used every opportunity and expended every effort in utmost good faith to bring about the conclusion and final approval of those interstate agreements necessary for the protection of the States and to the orderly development of the river. They not only promptly ratified the Colorado River compact but have lent their aid and good offices in assisting the lower States to settle their local problems. No part of the delay is the fault of the upper States. The entire delay has been occasioned by disagreement among the States of the lower basin, for whose benefit the proposed works will be constructed and who have been slow to agree respecting a proper and equitable division of the benefits. The States which have done and are now doing everything within their power to assist both the Congress of the United States and their sister States to arrive at a sound and equitable solution of the problems of the Colorado River, respectfully pray the assistance of the Congress in the great undertaking of common interest to the States and the Nation, and the State of Colorado joins with its sister States of the upper basin in urging such assistance by refraining from legislation authorizing the construction of works on the lower river, prior to the ratification by the seven Colorado River States of a compact between them providing for the equitable division of the waters of the river.

The CHAIRMAN. General Boatright, have you anything to add to the statement?

Mr. BOATRIGHT. May I just add this, that Senator Carpenter, because of the condition of his voice, suggested that if there should be any questions that any member of the committee desires to propound, if they would be put in writing he would prepare a statement of written answers in return. I will say that there is no disposition to obviate cross-examination, but that on account of the condition of his voice, or his throat, he was unable to present his statement in person, and would be unable to make himself heard.

The CHAIRMAN. The members of the committee understand the situation, and if any of them desire to propound questions they can prepare them in written form and submit them through you for response.

Mr. BOATRIGHT. And I will be very glad to take them up promptly.

(The witness left the table.)

The CHAIRMAN. Governor Emerson, do you want to go ahead this afternoon?

Governor EMERSON. It is entirely at the pleasure of the committee as to what I should do in that regard.

Senator JOHNSON. Will you be here to-morrow morning?

Governor EMERSON. Yes.

Senator JOHNSON. Will it be just as agreeable to go on in the morning?

Governor EMERSON. It will; as I understand they have made the way clear for me to be heard in the morning?

The CHAIRMAN. I only had in mind that the proponents had the right to an equal amount of time as the opposition.

Senator JOHNSON. I do not know how we will get that.

Senator ASHURST. We have one more witness.

Senator JOHNSON. We have four hours to-morrow and four hours on Saturday, and if Senator Ashurst has another witness I do not know how we can possibly get an equal division of time under the arrangement made as to closing these hearings on Saturday.

Senator ASHURST. Let us stay here to-night and get through. Perhaps it will take only half an hour.

Senator JOHNSON. Do you say you will want only half an hour?

Senator ASHURST. Oh, it might be slightly more than that.

Senator JOHNSON. I do not see how we can do that very well.

Senator ASHURST. We do not want to be shut off in the matter of giving this witness a hearing. But for your cross-examination, which was very lengthy, we would have been through before now.

Senator JOHNSON. Oh, well, now, the time occupied by my cross-examination has been kept here, and it has been very limited, indeed. You have been occupying some eight hours with your witnesses on direct examination.

Senator ASHURST. Oh, no. I kept the time myself.

Senator JOHNSON. I have the time as given me by the clerk of the committee.

Senator ASHURST. Only eight hours have been employed, including all of the cross-examinations.

Senator JOHNSON. Is that so, Mr. Clerk?

The CLERK (Mr. Fry). My record shows eight hours on direct testimony and one and one-half hours on cross-examination.

Senator ASHURST. Then we have one more half hour.

Senator JOHNSON. You should not utilize all the time of the committee. We will cut our time down to the lowest possible limit, but we want an opportunity to be properly heard.

Senator ASHURST. Our last witness might go on to-morrow afternoon at 2 o'clock, if that is all right.

Senator JOHNSON. After Governor Emerson has been heard?

Senator ASHURST. Certainly; that will be all right with us.

Senator ODDIE. The State engineer of Nevada, Mr. George W. Malone, is here and would like to be heard.

Senator JOHNSON. He is entitled to be heard.

The CHAIRMAN. How much time will he want?

Senator ODDIE. A short time.

Senator JOHNSON. He is entitled to be heard.

Senator ODDIE. He is not in the room now. But Mr. Squires is in the room, and perhaps we might hear from him, unless Senator Pittman has some other plan.

Senator ASHURST. Why not hear him now?

Senator PITTMAN. Mr. Squires, what are the plans of your commissioners?

Mr. CHARLES P. SQUIRES (Colorado River commissioner for Nevada). Mr. Malone will have a short statement to-morrow.

Senator PITTMAN. Will there be an opportunity for him to be heard to-morrow, Mr. Chairman?

The CHAIRMAN. I think so.

Senator JOHNSON. He is entitled to be heard, of course. But the trouble is that we have taken up all of the time with the Arizona witnesses. I have no desire to shut off any of them; but if one should happen to be shut off, what of it?

Senator ASHURST. We only ask one hour more.

Senator JOHNSON. But that might interfere with the arrangement. It was tne distinct order of the committee to close these hearings on Saturday. Let us adjourn now until 10 o'clock to-morrow morning, Mr. Chairman, and go right along.

The CHAIRMAN. The committee will now stand adjourned until 10 o'clock to-morrow morning, and we will try to work this out equitably in some way.

(Whereupon, at 4.20 o'clock p. m. Thursday, January 19, 1928, the committee adjourned, to meet again the following morning, Friday, January 20, 1928, at 10 o'clock.)

COLORADO RIVER BASIN

FRIDAY, JANUARY 20, 1928

UNITED STATES SENATE,
COMMITTEE ON IRRIGATION AND RECLAMATION,
Washington, D. C.

The committee met, pursuant to adjournment of yesterday, at 10 o'clock a. m., in room 128, Senate Office Building, Senator Lawrence C. Phipps (chairman) presiding.

Present: Senators Phipps (chairman), Jones, McNary, Johnson, Shortridge, Kendrick, Pittman, Ashurst, and Dill.

Present also: Senators Hayden and Waterman.

The CHAIRMAN. The committee will come to order.

Senator ASHURST. May I ask your indulgence a moment, Mr. Chairman? I ask unanimous consent to print in the record a letter written by Senator William H. King, of Utah, to Secretary Work, which was printed in the United States Daily on October 20 last, and which pertains to this subject.

Senator JOHNSON. I have no objection if you give it to the reporter for printing in the record.

The CHAIRMAN. Without objection it will be printed in the record.

Senator ASHURST. I herewith submit the reply of Governor Hunt to the interrogatories propounded by Senator Johnson.

Senator JOHNSON. I have not read it, but I have no objection to its going into the record.

Senator ASHURST. I must apologize to the chairman and to the committee for not submitting this sooner, but in the rush of events I overlooked it.

(The letter of Senator King to Secretary Work, and the copy of reply of Governor Hunt, referred to and submitted by Senator Ashurst, will be printed elsewhere in this record.)

The CHAIRMAN. We are now to hear from Governor Emerson, I believe.

STATEMENT OF HON. F. C. EMERSON, GOVERNOR OF THE STATE OF WYOMING

Governor EMERSON. Mr. Chairman and gentlemen of the committee, I come before the committee this morning as present Governor of the State of Wyoming, which State has a direct and vital interest in the legislation that is now under consideration by this committee.

Wyoming has an area of over three-quarters of a million acres on the watershed of the Green River in Wyoming, which will become available for agricultural development through a gradual process

extending a good many years into the future. That development is proceeding to some degree to-day, and will continue to follow a course for many years to come, and as our projects become feasible the development will be very desirable to Wyoming and to the Nation.

The Green River is one of the important tributaries of the Colorado River, joining with the former Grand River arising in the State of Colorado to form the main stem of the Colorado River below.

Wyoming has had considerable experience in the matter of interstate waters. Upon the North Platte River we found an embargo placed for years upon development in Wyoming by reason of the construction of the Pathfinder Reservoir and two certain canals called the Interstate and the Fort Laramie Canals, below this reservoir, irrigating lands in Wyoming and Nebraska; the greater part of the developed area to-day being in Nebraska. We find a condition where Nebraska to-day looks askance upon development in Wyoming.

The CHAIRMAN. For the information of those present and of the members of the committee, this has nothing to do with Colorado Basin drainage directly, has it?

Governor EMERSON. No; but it is a case in point. I am making brief reference to it to show that Wyoming wishes to avoid a repetition of a rather sad experience in development to date in Wyoming upon the North Platte River, and I will simply close this feature of my remarks by saying that our experience in regard to the development of the North Platte makes us much concerned over any development upon the Colorado River system in a large way before an interstate agreement is completed.

We have also had the bitter experiences of years of protracted litigation on our Laramie River in Wyoming which has led us to the conclusion that the best way to solve our interstate water difficulties is through mutual agreements rather than going to the necessity of resorting to the courts for a solution of these grave problems.

My own experience in the Colorado River problem extends over a number of years. The first move toward an agreement between the States was negotiated in Denver at a conference of the League of the Southwest in August, 1920, and since that time the matter of interstate agreement has been under discussion continually.

In the fall of 1920, in order to become familiar with the situation obtaining upon the lower river, I made a trip to Yuma, Imperial Valley, into Mexico, and visited other parts of the lower river. I went over the levee system on both sides of the river and also had opportunity to see the fine development of Imperial Valley. In December of that year I attended the hearings at San Diego before Secretary Fall.

My experience further encompasses service as the representative of Wyoming upon the Colorado River Commission which drafted the Colorado River compact; and in the process of our studies the lower river was again visited and the Boulder Dam site was carefully inspected.

Further relation to the problem comes through my function as special adviser to the Secretary of the Interior upon Colorado River development. In the spring of 1927 a visit to the lower river was

again made, and the dam sites at Topock or Mohave, Bulls Head, and Glen Canyon were all inspected.

Through these various experiences I feel that I am rather familiar with the physical situation that applies to the river, and also with the political question of the equitable division of water between the States of the Colorado River Basin.

We might divide the Colorado River problem into two principal factors: One, the physical situation, which is deserving of attention to-day; and the other, the political situation arising by reason of the fact that arbitrary State lines divide the Colorado River Basin so that we find seven States interested in this problem.

As far as the physical situation is concerned, I am convinced that the construction of a reservoir of large capacity at Black Canyon would be the key to the solution of the problem. There is need of flood relief. There is need of additional water supply for present developed lands. There is need to do something about the silt problem; and then, in addition to the actual needs that confront the people of the lower river to-day, there is also the further possibility of a great constructive project giving further benefits in the line of reclaiming additional areas, furnishing a large amount of hydroelectric energy, and providing water when it is needed for use by the coastal cities. I have so reported to the Secretary of the Interior, and I am very willing to concede that the construction of a reservoir of large capacity at Black Canyon will afford a good solution of the physical problems that now apply to the lower river.

However, there is the other feature of prime importance, and that is the political problem—the matter of an understanding between the seven States of the Colorado River Basin as to the use and distribution of the water of the Colorado River system.

Wyoming has shown her interest and has gone along with this pkroblem. There has been marked accomplishment during the past eight years. Progress is being made at the present time, and I am thoroughly convinced that the door should not be shut at this time in any way that would handicap the interstate negotiations as now being carried forward.

In 1923 Wyoming ratified the Colorado River compact. This was not ratified without a considerable discussion by our legislature. In fact, a bitter attack was made upon the compact. But this instrument did stand up under criticism, and finally the legislature approved of the seven-State compact by a large majority in both the House and Senate.

When we came to the time of convening the 1925 legislature we found that Arizona was still refusing to give approval to the compact, although the other six States had, in 1923, given their unqualified ratification to same. The representatives of the six States that had ratified in 1923 conceived the plan of indorsement of the seven-State compact as applying between the six States themselves, leaving the door open to Arizona whenever she might see fit to come in and join in approval of the seven-State compact.

Senator KENDRICK. Pardon me, Governor. Did you mean to say that the other States had conceived the idea of indorsing the six-State compact? Did you not intend to say——

Governor EMERSON. The six States agreed to accepting the terms of the seven-State compact as applying between the six States themselves, leaving Arizona out, but the door open whenever Arizona should wish to come in and give her approval to the compact and thereby make it unanimous.

I want to say, in passing, upon the point of Wyoming's endeavor to go along with this problem and to do everything consistent to bring about the completion of a satisfactory interstate agreement, that I myself was the cause of holding the 1925 Wyoming Legislature in session for 12 hours after the specified time of adjournment, in order that they might approve of this six-State plan.

I wish to say that the six-State ratification of the seven-State compact is a poor substitute indeed for the seven-State plan, although I believe that the six-State plan would give a large measure of protection.

Few realize the real magnitude of the great project that is proposed at Black or Boulder Canyon; a dam twice as high as any dam that has been constructed in the world heretofore; a reservoir seven or eight times the capacity of any reservoir that has been constructed heretofore. The magnitude of this project is so great that we should be sure we are right before we go ahead. There is no such urgency for relief from conditions applying to the physical situation upon the lower river as to warrant any course but to allow all reasonable time and effort for the completion of the seven-State agreement by the approval of all the seven States.

I feel that it would be a decided mistake to see a project authorized at this session of Congress, as by so doing it is certain that an advantage would be given in negotiations to one of the three States of the lower basin. The carrying on of negotiations looking forward to the complete acceptance of the seven-State compact would thereby, in my opinion, be seriously handicapped.

I wish to submit that the approval by all seven States of the Colorado River compact, representing an equitable agreement for the use and distribution of the water of the Colorado River system, will be most valuable to each of the seven States. It is essential, it seems to me, not only in consideration of the matter of equity to all of the States, but also as a means of clearing the situation in a practical way for the orderly development of the river.

I have referred to the experience that Wyoming has had upon its Laramie River, a comparatively small stream flowing from Colorado to Wyoming. The case involving the use of water from this river was held for 11 years in the Supreme Court of the United States; the decision rendered by the court in the case was not satisfactory in the final analysis to either Wyoming or Colorado. We will surely have the same condition, in my opinion, upon the Colorado River unless the seven States can agree among themselves.

I have stated that progress has been made, and I wish to submit at this time that we are now on the crest of a wave looking to the completion of the seven-State compact. From 1920 to 1922 we found the development, which started from no agreement, and no consideration of agreement between the States, to the point where a uniform document could be accepted by the representatives of the seven States and approved by the representatives of the United

States—a real accomplishment—each commissioner representing his individual State knowing that the document he signed would be the law, so far as its terms might apply, for all time to come. The responsibility was indeed grave, and still the eight men were able to agree upon this document which has been named the Colorado River compact. That was an accomplishment indeed. The matter went further, and we found the unqualified approval of six of the seven States given through action by the several legislatures of 1923.

From the 1923 legislature until about a year ago the situation seemed to drift backward, and although the 1925 legislatures of the six States considered the six-State plan only as a poor substitute for the seven-State plan, we found that in 1927 the Utah Legislature withdrew its approval of the six-State plan, and therefore there obtains to-day no plan between any group of States as to an agreement concerning the use of water of the Colorado River system.

About a year ago there came to me information that Arizona would submit to the proposition of the approval of the seven-State compact in event she could reach an agreement with the States of California and Nevada as to a division of the water allocated to the lower basin and as to certain revenues in connection with any power that might be developed by the project in whole or in part within the State of Arizona. That was progress, because Arizona had stood out against the seven-State compact originally, claiming that it was unfair to that State. Arizona now seems to wish a solution of the situation and the adoption of a plan whereby she could also come in and join the other States in the approval of the compact.

As has been explained in these hearings before, the governors of the four upper basin States extended invitation to the governors of the three lower basin States to meet with them and their representatives at Denver in August and consider means for bringing about the ratification complete of the seven-State compact. The invitation was accepted and conferences were held in August and September of 1927. Again progress was made.

In regard to the division of water, I feel that the States of California and Nevada and Arizona have come close to agreement. They have been discussing the question of revenue from power upon certain competent bases, so that if more time is given it seems to me that there can be agreement upon those points.

It is my conviction that within another year there can be agreement upon the Colorado River compact and the concurrence of all seven States in a plan; and I wish to again say that a compact between the seven States seems almost essential, not only in consideration of equity to the States themselves but also to clear in a practical manner the situation so that an orderly development of the river can proceed without obstruction and litigation can be avoided. I therefore submit that a compact benefiting all States should still have reasonable time for discussion.

There has been the thought in the minds of this committee and the committee of the House that each time this problem has been presented more time has been requested. I appeared before the committee some two years ago and then probably lent my opinion to the same thought. But to-day the situation, to me, is decidedly

encouraging, and the need of an interstate agreement that can be subscribed to by all seven States is of such transcendent importance that more time should be given. The agreement, whatever may be reached, will be for perpetuity in many of its relations.

The Colorado River has been taking its present course for centuries. The flood menace is there. It should be relieved just as soon as the way is reasonably clear for that relief. However, there has not been a break from the river into the Imperial Valley in years of recent history, except as the way was opened for it by tapping the river for the benefit of irrigation within that valley.

With the progress that has been made during the past year, with the encouraging situation that we now face, it seems to me most reasonable that at least time should be allowed until the next session of this Congress for the completion of discussions of the compact matter, or at least a determination of the fact that agreement can not be reached between the seven States.

It seems to me so essential to clear as far as at all practicable the title to the water of this river before any project is constructed of magnitude; and the Boulder Canyon project is so colossal in its size that certainly every endeavor should be made to bring the seven States together before the project is authorized.

The resolution that was adopted by the governors and other representatives of the four upper basin States in Denver, Colo., upon the 19th day of December, 1927, presents the stand which I take at this time. It happens that I phrased this resolution, and I wish to read the resolution without the preamble for the record:

> Therefore be it
> *Resolved*, That it is the firm belief of the representatives of the four upper basin States as assembled at Denver, Colo., this 19th day of December, 1927, that no legislation proposing the construction of any project upon the Colorado River should be enacted by Congress, or otherwise authorized by any Federal agency, before the negotiations now in progress have been completed and every reasonable effort exhausted to reach such agreement between the seven States.

I will again repeat my conviction that another year will find the compact completed between the seven States, provided advantage is not given to one of the seven States by the authorizing of legislation that could not be conceived as helping the cause of negotiation.

Senator McNary. What is the basis of that hope?

Governor Emerson. Progress during the last year, Senator McNary.

I have endeavored to show that by the agreement of Arizona to ratify the seven-State compact in event she could reach agreement with California and Nevada we have one definite, encouraging development in the situation. The discussions at Denver were practical, and real progress was made.

The Chairman. Are there any questions of the witness?

Senator Johnson. Have you concluded, Governor?

Governor Emerson. Yes, sir.

Senator Johnson. You have made, I understand, examinations of the particular project, have you not?

Governor Emerson. Yes, sir.

Senator Johnson. Eliminating entirely the question of compact and considering, now, alone the matter of development of the Colorado River, you believe in the Boulder Dam project, do you not?

Governor EMERSON. I certainly do.

Senator JOHNSON. The appropriate place at which that development should be made is Black Canyon in the Colorado River?

Governor EMERSON. That is my opinion.

Senator JOHNSON. The dam, as you have very aptly described it, is a colossal undertaking, but, nevertheless, a feasible undertaking, you believe, do you not?

Governor EMERSON. Yes, sir.

Senator JOHNSON. As I recall it, you are an engineer, are you not, Governor?

Governor EMERSON. I am.

Senator JOHNSON. And have been State engineer of your State for a considerable period of time?

Governor EMERSON. For seven and a half years.

Senator JOHNSON. So that the construction of a 550-foot dam, a colossal undertaking, is nevertheless a feasible undertaking and a very appropriate one if, other things being equal, the Colorado River is to be developed?

Governor EMERSON. Yes, sir.

Senator JOHNSON. A large storage capacity, some seven times greater than any storage capacity that exists on all the earth to-day, is appropriate and feasible, too, is it not?

Governor EMERSON. It is.

Senator JOHNSON. And it is the means by which there should be the development of the lower Colorado River?

Governor EMERSON. That is my judgment, after careful analysis of the physical situation.

Senator JOHNSON. So that I may take it that, eliminating the seven-State compact as you have just referred to it, this bill would meet your hearty approval?

Governor EMERSON. It would as to the general plan. Naturally there are certain provisions in it that I would want to see amended to some extent.

Senator JOHNSON. That might be possible; but the general plan I am speaking of for the development of the river by a dam of this height and by a storage capacity of the immense quantity indicated, meets your hearty approval, as an engineer, and as a State official as well, does it not?

Governor EMERSON. It does, as a solution of the physical situation applying to the lower river.

Senator JOHNSON. You looked at the other sites along the river, did you not?

Governor EMERSON. I have examined Mojave, Bulls Head, Boulder Canyon, and Glen Canyon by personal visits to those sites.

Senator JOHNSON. And what you have stated is your considered judgment after your personal investigations?

Governor EMERSON. Yes, sir. I have spent a great deal of time studying the physical situation.

Senator JOHNSON. You were before this committee upon a particular project of your State, were you not?

Governor EMERSON. Yes, sir.

Senator JOHNSON. What was that called?

Governor EMERSON. There were two projects. One was the Casper-Alcova project, and the other was the Saratoga project.

Senator JOHNSON. One of them was dependent more or less upon the compact between Nebraska, Colorado, and Wyoming. Is not that so?

Governor EMERSON. Yes, sir. The compact question has a relation to that project, a compact referring to the use of water from the North Platte River.

Senator JOHNSON. The water of the North Platte? What is the project that that relates to, please?

Governor EMERSON. We present both the Casper-Alcova project and the Saratoga project. and they bear relation to the North Platte project of the Government as another development upon that river.

Senator JOHNSON. Are both of them more or less dependent upon a compact which should be entered into between the three States?

Governor EMERSON. The compact does bear a relation to both of them.

Senator JOHNSON. Both of them. Is that correct?

Governor EMERSON. The interstate water situation is there.

Senator JOHNSON. That compact has not as yet been executed by Nebraska?

Governor EMERSON. No; it has not.

Senator JOHNSON. Do you want your projects postponed until the compact shall be agreed upon by the States?

Governor EMERSON. No, sir. But the situation upon the North Platte is quite different from the situation applying to the Colorado River system.

Senator JOHNSON. I recognize that; but, nevertheless, there is a compact between the three States that is now pending; and you would not wish your projects postponed until you agreed, would you?

Governor EMERSON. No, sir; I would not.

Senator JOHNSON. There are differences existing?

Governor EMERSON. Decided differences in the situations.

Senator JOHNSON. Yes; but differences exist between the three States, do they not? I made some inquiry this morning for the purpose of ascertaining, and I rather think that is a fact, is it not?

Governor EMERSON. Yes; that is true, especially with Nebraska.

Senator JOHNSON. That is what I mean—with Nebraska. So that Nebraska declines for the moment, at least, to enter into the compact with Wyoming?

Governor EMERSON. They do not seem to have any great desire to have a compact.

Senator JOHNSON. As I listened to your presentation the other day I thought that your projects were wholly meritorious and that they ought to have such approval or indorsement as this committee was able to give to those projects. I am ready to give it, and I am ready to give it whether there is a compact between you and Nebraska or not.

Governor EMERSON. I am glad to know that, Senator.

Senator JOHNSON. You would not wish me nor would you wish these gentlemen to postpone the relief that you desire until you make that compact with Nebraska, would you?

Governor EMERSON. No, sir.

Senator JOHNSON. Very well. That is all.

Governor EMERSON. I should like to explain the difference between the North Platte situation and the Colorado situation.

Senator JOHNSON. You have a perfect right to make that explanation, of course.

Governor EMERSON. The bill now before the committee involves the construction of a reservoir of sufficient capacity to hold the entire flow of the Colorado River for almost two years. The matter of State rights are not involved to anywhere near the degree upon the North Platte that they are upon the Colorado. These North Platte projects are entirely within Wyoming and Wyoming permits would be granted by the State.

One of the things that are of paramount importance in this proposed legislation now before this committee is the question of the compliance with the State water laws. There is a proposal in your bill, Senator Johnson, that sets forth the plan that the laws of the States ratifying the compact shall be complied with, but no reference is made to complying with the laws of another State that may not elect to come within the compact. So such condition exists upon the North Platte in Wyoming.

Senator JOHNSON. Do you know how that happened to be put into the bill?

Governor EMERSON. I believe I know the reason.

Senator JOHNSON. Do you not know that that was put into the bill at the request and the instance and the insistence of the upper-basin States?

Governor EMERSON. No, sir; I do not know that.

Senator JOHNSON. Very well, sir. Go ahead.

Governor EMERSON. I have stated that the question of State rights is not involved upon the North Platte in the important relations that it is upon the Colorado River. The projects lie entirely within the State of Wyoming and compliance will be given with the laws of Wyoming.

The project is not of such size as to store the flow of the river or call for the flow of the river for anything like a two-year period.

Those are the important differences between the two situations.

Senator JOHNSON. But still, the compact is there and the compact is not agreed upon in your instance, as it is not agreed upon in our instance.

Governor EMERSON. That is correct; but the general proposition——

Senator JOHNSON. You would like us to act in your instance, regardless of the compact, but you would not like us to act in our instance regardless of the compact?

Governor EMERSON. The answer would be yes. I must contend that the situation is such as to justify my position in that respect.

Senator JOHNSON. If you will pardon a facetious remark, it makes an awful lot of difference whose ox is gored, doesn't it?

Governor EMERSON. I think Congressman Swing put it this way, that people who live in glass houses shouldn't throw stones.

We do not believe our house is of glass, however.

Senator JOHNSON. I do not put you in that attitude.

Senator KENDRICK. Governor Emerson, we have had for five to eight years, perhaps, taking the dates that you have given us, an almost continuous controversy, endeavoring, apparently, to compose the differences between these States. I just want to ask if you believe that it would be safe or fair to States of the upper basin to

continue indefinitely in a controversy that is more or less dangerous because of threatened developments that we can not prevent, rather than for the States to join in an effort to get what protection they could?

I want to state that I agree with you fully in the conviction that we should have the seven-State pact; but in case it develops we can not have that, the thought in my mind and the question I want to ask is, do you not believe that the upper basin States owe it to themselves to secure at least partial protection against the troubles with the lower basin States rather than to have no protection at all? Do you not think that that would be sound judgment?

Governor EMERSON. Most certainly, Senator Kendrick. I would not submit to the proposition that those negotiations should be continued indefinitely, but I am convinced that from the progress that has been made in the past year, from the developments that I can see are heading toward a solution whereby the seven States can get together, that more time should be extended. I will not say that that time should go beyond the second section of this present Congress.

The CHAIRMAN. There is no difference existing between Colorado and Wyoming over the division of the waters of the North Platte River, as I understand it?

Governor EMERSON. No, sir. We are convinced we have a basis for a compact.

The CHAIRMAN. And negotiations are under way with Nebraska?

Governor EMERSON. They are.

The CHAIRMAN. And those you expect to bring to a satisfactory conclusion within a reasonable length of time?

Governor EMERSON. Yes, sir. But may I say that the situation we found on the North Platte between Wyoming and Nebraska is all the more reason why we wish to see agreement before there is development upon the lower Colorado River. In this case the tables are reversed and the proposed development is above and the established development is below.

By reason of lack of a compact before this large development of the Government was undertaken we find Nebraska obstructing the development of a project in Wyoming, even though, as Senator Kendrick knows, the North Platte River at North Platte, Nebr., to-day is a real stream throughout the year, whereas when he first came and trailed his cattle across that river they hardly got their roofs wet in the low-water period each season.

But the development upon the North Platte River preceded compact, and this is why I believe Wyoming is right in wishing the completion of the Colorado River compact first before any large project is undertaken upon the Colorado River.

Not that we are going to contend for indefinite discussions of the negotiation, but we do feel that with the progress that has been made in the past year another year will find an agreement of the seven States, clearing the situation so that development can proceed without obstruction.

Senator JOHNSON. Just two other very brief questions: Is it not your understanding that Arizona was dissatisfied with the amount of water allotted to the upper-basin States?

Governor EMERSON. I did not understand that question, Senator. Will you repeat it?

(The question referred to was read by the reporter as above recorded.)

Senator JOHNSON. Is it not your understanding that Arizona would only consider a complete agreement in case she could get from California or the lower basin, under a three-State compact, what she claims should have been given by the seven-State compact?

Governor EMERSON. No, Senator Johnson. That is not my understanding; Arizona definitely submits to the proposition of the approval of the seven-State compact if she can reach agreement with California and Nevada.

Senator JOHNSON. Yes; and under that she must get the water that she says was denied to her by the division that was given to the upper States.

Governor EMERSON. I do not understand that that is her position.

Senator JOHNSON. But you do understand that she was dissatisfied with the allotment that was given to the upper States, do you not?

Governor EMERSON. So she claimed.

Senator JOHNSON. And the reason of her dissatisfaction was because she thought it left insufficient water for her?

Governor EMERSON. That was the contention of a group of Arizona folks.

Senator JOHNSON. Is it your opinion, or is it your understanding, that Arizona will accept the compact without exacting large revenues from power?

Governor EMERSON. She states that she must have some revenue to her State in return for the development of any hydroelectric energy from a project located in whole or in part——

Senator JOHNSON. Let us take your position. You say to us that we ought to have a seven-State compact?

Governor EMERSON. Yes, sir.

Senator JOHNSON. You know that we can not get a seven-State compact unless Arizona receives revenue from power development, do you not?

Governor EMERSON. No, sir.

Senator JOHNSON. You do not know that?

Governor EMERSON. No, sir; I do not, Senator Johnson. There is a provision upon page 12 of your bill which may be a basis for agreement on the power question, and that is the proposal to allocate a certain amount of power to the States.

Senator JOHNSON. Yes. I am not asking you about that, because Arizona is not satisfied, as I understand it, with that provision.

Governor EMERSON. She may be.

Senator JOHNSON. She may be. Now, Governor, pardon me. I want to be entirely frank with you, and I trust that you will be with me.

Governor EMERSON. I intend to be, sir.

Senator JOHNSON. Do you not know that the water division is dependent upon the settlement of the power question?

Governor EMERSON. There is a relation between the two.

Senator JOHNSON. I am not asking you about a relation between the two. Do you not know that the one is dependent upon the

other? I do not think that I am misstating the situation in saying that. Are you not familiar with that fact?

Governor EMERSON. Both factors will have to have attention and solution, as I understand it——

Senator JOHNSON. Exactly. All right.

Governor EMERSON (continuing). Before agreement can be reached. I may say that when I went to Denver to attend the seven-State conference I hoped we could confine our discussions to the divisions of water, which was the one thing to which the compact applied——

Senator JOHNSON. Pardon me. You have just indicated to me that both must be solved.

Governor EMERSON. Yes.

Senator JOHNSON. All right. So that there can be no division of water unless there is a solution of the power question?

Governor EMERSON. That seems to be evident.

Senator JOHNSON. It is evident. I thought you were disagreeing with me a moment ago. Now we are in agreement. There must be revenue from power therefore before Arizona will make a division as to water?

Governor EMERSON. That is my understanding of the position of Arizona, the question being as to the form the revenue will take.

Senator JOHNSON. When you postpone this bill you postpone it not for the purpose of having a seven-State compact, but you postpone it for the purpose of having revenue derived from power for the State of Arizona, do you not?

Governor EMERSON. Only because the determination of that question will allow the approval of Arizona of the seven-State compact.

Senator JOHNSON. I do not care whether it is "only" or not. It is a condition precedent to any compact that revenue shall be given, out of power, to Arizona, is it not?

Governor EMERSON. Yes, sir.

Senator JOHNSON. All right. That is all.

The CHAIRMAN. Are there any other questions?

(No response.)

We thank you, Governor, for your testimony.

I will call on Mr. L. Ward Bannister.

STATEMENT OF L. WARD BANNISTER, IN BEHALF OF THE CITY OF DENVER, COLO.

Mr. BANNISTER. Mr. Chairman and gentlemen, I appear under the instructions of Mayor Benjamin F. Stapleton and as special counsel for the city of Denver in respect to Colorado River matters.

This city has a population of 325,000. Its interest in Boulder Canyon legislation lies in the fact that Denver does not want to be left the capital of a State shorn of water for future appropriation and use, and also in the fact that under filings already made and dating back to 1914 it expects from the head tributaries of the Colorado to bring water across the Continental Divide at three different points for use in the city of Denver and in the meantime on surrounding farm lands, and is now engaged in that enterprise. The amount would be only 250,000 acre-feet—a bagatelle to the river, but life to Denver.

In speaking for Denver I want it understood that I have no authority and do not assume to speak for anyone else, not even for Colorado. If I refer to the interests of the "upper States" or "upper basin," it is only because Denver's interests are derived from the interests of the upper basin or upper States, including Colorado; therefore identical with them.

GENERAL ATTITUDE TOWARD BOULDER CANYON LEGISLATION

In full accord with the resolution signed by the four governors of the upper States and the city of Denver December 19 last, we of the city protest against the enactment of any Boulder Canyon legislation while negotiations and efforts are pending looking first to a subordinate agreement among the three lower States of Arizona, California, and Nevada, and then to the ratification of the main Colorado River compact by Arizona and California, thus enthroning the latter as the law of the river.

This we do because we want Arizona in the compact and because she requests this consideration. We hope, however, that Governor Hunt, of Arizona, will recall his recent letter, in which he announced a desire to discontinue interstate negotiations until it had been determined that all procedure upon Boulder Canyon bills had been definitely suspended.

It is one thing to suspend all action. It is another to refrain from actual enactment. It will take weeks for the Senate and House committees to consider and in all particulars whip either the Swing and Johnson bills, which are different, or the Phipps bill (depending upon which is to be taken as the basic draft) into final shape. I see no reason why the Senate and House committee should delay this work just because States are engaging in conferences.

Indeed, there is every reason why they should go ahead. The present congressional embargo against the issuance of Federal Power Commission licenses will expire in March, 1929, at the end of the short session of this the Seventieth Congress. It might as well expire in May, 1928, at the end of the long session, for experience demonstrates the difficulty of getting any but the most necessary measures through the Congress during the short session unless with general consent.

Those licenses once issued would carry asserted water priorities against the upper States and, therefore, against Denver. Unless, therefore, at this, the long session, a concurrent resolution should be passed extending the present embargo, Denver is forced to ask, in self defense and safety, for the enactment toward the end of this session of proper Boulder Canyon legislation upon the basis of six-State ratification if by then it appears that as many as seven States are not to be had.

The protection to the upper States of legislation upon a six-State basis would not be as complete in point of legal certainty as that predicated upon a seven-State basis, but could be made just as certain as to six of the States, and as a matter of probability, although not of certainty, almost as good as to the ratifying seventh.

Not to accept legislation upon a six-State basis if seven States can not be had would be to court, in the face of unrestrained power-

commission licenses. the possibility of certain ruin to the upper States and, therefore, to Denver, so far as concerns the initiation of new and additional uses of water in that region.

It is said that half a loaf is better than none. Are not nine-tenths also better than none?

The governors' resolution, signed also by the city of Denver, announced a combination policy against Federal legislation but only for the period of pending efforts and negotiations to bring about seven-State agreement. The resolution is silent as to the policy to be pursued after the expiration of that period.

It is not to be expected that your committee is going to hold separate hearings for us of the upper States—one hearing upon what we want during this period of interstate negotiation and another upon what we want after the expiration of that period. You will want to make a "clean-up" now as to our views for both periods, and I comply with that desire.

I see no reason why the interstate negotiations among the lower States can not be completed and signed up through the medium of special legislative sessions within two or three months and Arizona's and California's ratifications to the main compact secured within the same time. Denver would have no objection to further time, indeed would want it to be granted, if only at this session of the Congress, the embargo against the issue of power licenses could be extended.

Denver wants seven-State agreement if it can be had, and if while we are working for it we can do so under advance assurance that the status quo will not be altered by the Federal Power Commission.

SOME ESSENTIALS OF CONSTRUCTIVE LEGISLATION

The legislation finally enacted whether predicated on the Johnson bill or the Phipps bill, as the basic draft for amendment, will deal. of course, with, among other things, the important topics of:

(1) Who shall own the dam and regulate the water flow?

(2) Who shall own the power plant and generate the power?

(3) Revenue to Arizona and Nevada.

(4) What States shall be permitted to use the water and power of the project?

(5) All-American canal.

(6) General constitutionality of the measure selected for passage.

(7) Whether the measure selected invades any sovereignty of the State.

(8) Whether the measure protects the upper States in securing to them a segregation of water exempt from appropriation by water users in the lower States.

(9) Application of some of the principles involved in the foregoing topics to the Johnson and Phipps bills.

These topics or points will be discussed in order.

WHO SHALL OWN THE DAM AND REGULATE THE WATER FLOW?

The answer is, the United States and forever. The functions of the dam to be predicated upon the improvement of navigation under the interstate-commerce clause of the Federal Constitution will include also flood control, reclamation of Federal lands, satisfaction of treaty obligations with Mexico, recognition of water interests of

both groups of States. The impartial and effective discharge of these functions belongs in their international, national, and interstate nature to the Government, not to any State.

WHO SHALL OWN THE POWER PLANT AND GENERATE THE POWER?

This is an important question but its importance is subordinate to the greater question of whether the now unused water of the river is to be divided between the two groups of States or is to be permitted to become consolidated for use down in the lower States at the expense of the upper.

As to the question of who is to own and operate the power plant, Denver takes no irrevocable position. Indeed on that question we are for whatever position will procure in the Congress the greatest number of votes for the measure effecting a division of the water between the two groups of States. It is water we want and we are not going to be diverted from that great objective by considerations which, however important they may be, are minor after all compared with the greater issue.

Better a measure enacted although the Government be the generator of the power than no measure at all. Better, too, that States or municipalities or private enterprise generate than no measure at all.

If you ask which of ownership and generation would be the more likely by votes in the Congress to bring about the division of the use of water between the two groups of States instead of its consolidation in two or three, my answer would be, although on this your own knowledge is superior to mine, that more votes would be forthcoming if the optional right of the Government were taken away and the ownership and operation of the plant left first to the choice of States and municipalities, or should they not want it, then to private enterprise, with the Government in the background as the last of all resorts.

For as suggested by the Hon. Francis C. Wilson, interstate-stream commissioner for New Mexico, who carries universal confidence and who has been contributing so many constructive suggestions, the Government, although not having the optional right to own the plant and generate the power, could still be left in the measure, with the right to own and generate should States and municipalities or private enterprises not be willing to undertake the task.

Already States and municipalities have a preferred right under the Federal Power Commission act and private enterprise a subordinate right. Is not this a useful approximate analogy? And if the Government be left in the background in the measure, as Commissioner Wilson suggests, fully empowered to act if other agencies fail, would not that be a happy compromise between the forces of public and private enterprise? Why must this Boulder Canyon project, with the solution it offers to a great interstate controversy, be made the victim of a battle over what after all is not the main issue involved in the measure—the simple division of the water so that part may be exempted from appropriations in the lower States and part from appropriations in the upper?

The opinion that the National Government should keep out of business, entertained by such a great percentage of the members

of the Congress and our citizens generally must be reckoned with. Those holding it should not be alienated from supporting the measure. Would not the injection of the Government as a last resort, instead of as the proposed holder of an option, satisfy the advocates of public enterprise?

Whatever our views upon this question may be, the Utah situation, too, must be counted. Indeed it may control. Some, at least, of the Utah delegation at Washington asked for certain amendments protective to their State. An amendment eliminating the Government from the power field, leaving a preference to States and municipalities, and subordinately, a right to private enterprise, also was included. Utah has gone out of the six-State compact. Should we not be able to get a measure on a seven-State basis, would she come back into the six-State column, so that we could have one upon a six-State basis if this and the other amendments were granted? I can not say, but attention must be given to the demands of the officers and delegates of that State.

REVENUE TO ARIZONA AND NEVADA

Under the Interstate Commerce clause of the Federal Constitution and by way of improving navigation, and under the authority of Alabama Power Co. *v.* Gulf Power Co. (283 Fed. 606, 1922), the Government probably, as a matter of law, could construct the dam against the will of the States of Arizona and Nevada, although the bed of the river may belong to them, and as an incident generate the power or license others to do it; and if doing so itself escape legally the taxing power of the States.

It does not follow that this, as a matter of justice, should be done, and I don't believe it should. The bulk of the power would be used in California. Under such circumstances, subject to the clear right of the Government and subject to operating the project on a sound financial basis, these States should be accorded a chance for revenue in respect to these power resources situated within their borders—the guiding principle being that of substitution for what justly could be collected by way of taxes if the plant were owned and operated by private enterprise.

In any valuation for assessment purposes the construction value of the plant and equipment and accompanying structures should be regarded. So, too, should part of the dam, but not all of it, because we must remember that the dam is to be used among other things for satisfaction of international obligations, reclamation of Federal lands, flood and silt control, and as a step in the solution of an interstate controversy.

That Arizona and Nevada are thus entitled as a matter of justice to revenue is in line with what is now widely known in Colorado River history as the Pittman resolution.

Should the reasonable period for interstate negotiation expire without result and we be driven to legislation on a six-state basis, Arizona should receive the power revenue whether she ratifies the compact or not. Justice is justice and the failure to ratify should not change it.

There is some talk to the effect that Arizona and Nevada may lease the water privileges, build and operate the plant, bind themselves to

reimburse the Government for the dam, assign their rights, or else sell power at the switchboard; as one of the possible methods for raising revenue. Denver offers no objection.

WHAT STATES SHOULD BE PERMITTED TO USE THE PROJECT'S WATER AND POWER?

All States within service reach should be permitted to use the power generated at the Boulder dam, Arizona included, and without reference to whether she ratifies the compact or not. Both the Johnson bill and the Phipps bill are to that effect. Power is not water and by the mere use of power in Arizona that State would not be acquiring any water rights which could be asserted against the upper States.

With the project water, however, it is different. Under section 8 (a) of both bills the provision is that appropriations must be "made and perfected in and in conformity with the laws of those States which may or shall have approved the Colorado River compact," thus cutting Arizona out of the use of project water unless she should ratify the compact. The provision is the same in respect to Arizona as in respect to Nevada or California. The right of a lower State to use the project water depends upon ratification of the compact.

I was among those drafting that section. The purpose was to make sure to the greatest extent possible that a lower State which does not ratify the compact can not acquire a water priority against the quantity of water set aside by the compact to the upper States. The motive was not persecution but self-defense. Could the use of the water have been allowed in a nonratifying State it would have been as freely recognized as was the use of the power.

The Government surely has a legal right to choose what lands or States it will serve with water. Arizona can not justly complain if by refusing to ratify the compact she refuses to allow water to be put to use within her borders.

With no appropriations at all made within her limits she can not say that they are being made in violation of her local laws governing the methods of making an appropriation or that they are being made without her consent. Should she ratify the compact she would become as eligible as California or Nevada as to the irrigation of the million acres which I understood her Senator Winsor to say would be watered in Arizona from the Boulder Canyon Dam.

ALL-AMERICAN CANAL

Under both the Johnson bill and the Phipps bill, this canal could be built should the Secretary of the Interior so decide, although the Phipps bill does not mention this particular kind of a structure. The effectiveness of the canal in conjunction with the dam as an aid in bringing about an international treaty is disputed somewhat by engineers, but it would seem that the discretion to build or not to build should be left where the bills place it, namely, with the Secretary of the Interior.

I have no fear that in any controversy between this country and Mexico over the waters of the Colorado that the World Court or any other disinterested international tribunal to which the controversy

might be referred, would allot to Mexico any water that could be said to be the product of storage in this country at the expense of this country.

Senator SHORTRIDGE. You do not think that we will ever submit that problem to the World Court, do you?

Mr. BANNISTER. I am not saying it would be. Mexico can ask it to be submitted to some tribunal; and even if it is submitted, I could not conceive of any decision taking away from this country water that would be the product of money spent in this country.

This does not mean that Mexico might not in default of treaty be awarded something out of the normal natural flow of the river and that this country might not to the convenience and profit of the Colorado River States want to substitute for the normal natural flow some of the flood waters stored in the Boulder Canyon Reservoir, in order that the normal flow could be used in the States themselves.

And I recognize, too, Senator Shortridge, that this country takes the position, as a matter of strict law, that Mexico has no legal right to have a drop of water come down to her, that having been held in the opinion of General Harmon, in the Cleveland administration, in respect to the Rio Grande.

GENERAL CONSTITUTIONALITY OF THE MEASURE SELECTED FOR PASSAGE

The best ground upon which to predicate the constitutionality of a measure for the Boulder Canyon project is the interstate commerce clause of the Federal Constitution under which an improvement of navigation is regarded as an improvement of interstate commerce.

The construction of the dam would equate the flow of the river in such wise that for a considerable distance below the dam there would be a uniform stream and above the dam a lake same 90 miles long. The lake would be an interstate lake as between Nevada and Arizona. The equated flow below the dam would be an equated flow likewise between States, the States of Arizona and Nevada and Arizona and California.

These interstate waters thus arising as the result of the construction of the dam would be used to some extent in interstate navigation. This is particularly true of the interstate lake above the dam, over which without doubt passengers and goods would be carried.

Where the dam is built for a constitutional purpose, namely, the improvement of navigation, and is in a stream that by nature is navigable, the constitutionality of the measure under which the dam is constructed is not impaired by reason of the fact that the surplus waters from the dam are used for other purposes such as the generation of power either by the Government itself or by its lessee. This has been held in the case of Alabama Power Co. *v.* Gulf Power Co., already referred to in this statement. The case is to be distinguished from one in which the purpose is only the generation of power and not the improvement of navigation.

It will not do to say that to predicate the building of the Boulder Canyon Dam upon the interstate commerce clause of the Constitution is to generate power or do something else under the guise of the interstate commerce clause. The question is not what ultimate effects the construction of the dam would have but whether it would serve a constitutional purpose, in this case the improvement of navigation

and therefore the regulation of commerce among the States. There are many instances where Congress, under the exercise of its interstate commerce powers, has used those powers for the more remote pupose of accomplishing a national purpose of moral import. The old statutes we used to have prohibiting within certain limits the transportation of alcoholic liquors from one State to another; the statutes relating to narcotics and their transportation as between the States, are conspicuous examples.

It would seem that a measure for the construction of the Boulder Canyon dam would have the certainty of its constitutionality increased if it were to recite definitely that it is enacted in the course of improving navigation. It is scarcely conceivable that the United States Supreme Court would go back of such a declaration in the face of the interstate lake created above the dam and the uniform flow produced below.

WHETHER THE MEASURE SELECTED WOULD INVADE ANY SOVEREIGNTY OF THE STATE

Does either the Johnson bill or the Phipps bill invade the sovereignty of any State? If all seven of the Colorado River States should prove to be unable to unite in a seven-State compact, and the most that could be obtained should be a six-State compact, and Arizona should not be one of the six, would her sovereignty be in any wise invaded by either bill?

Sovereignty is a legal term. There can be no invasion of sovereignty unless whichever bill may be the one in question should, in effect, expressly or by implication, violate some right given to the State by the Federal Constitution. No State has a legal right to rise above the Constitution. And no one could gain any sympathy by contending that the powers of the Federal Government under that instrument should be any less than they are.

We hear much about the invasion of sovereignty and the violation of fundamental rights of the States, but what particular provision of the Federal Constitution is violated by either of these bills? And what are the particular sections of these bills accomplishing the violation? Here we have silence.

There is in one bill—and ought to be in the other—a provision throwing the power plant in a ratifying State. May not the Congress determine in what State the power plant shall be located? If one State does not want the plant, may it not be located in one that does? There are provisions requiring that all appropriations shall be made and perfected in and in accordance with the laws of ratifying States. Is there not here a plain intent to regard the will of the States, even if we were to assume that the Congress would not be obliged to do so? And is it not true that if a State wants to ratify the compact it may enjoy the use of the project water just as freely as any other ratifying State?

There are provisions in both bills subjecting to the division of water made by the compact between the two groups of States any and all rights to water possessed by the United States. The United States undoubtedly owns riparian rights attached to its riparian lands in California. It is possible—although I for one join others in

denying it—that the United States may own riparian rights attached to its riparian lands in other Colorado River States, which have a water law supposedly different from that of California. If the Government has riparian rights in California, or if it has riparian rights in these other States, does the Government violate the Federal Constitution or violate the law of any State if these bills provide, as they do, that whatever water interest the Government may have is to be divided in accordance with the compact? I can not see it. The known and recognized fact that the Government has riparian rights in California within itself justifies and requires the provision that the rights of the United States, meaning proprietary rights, in respect to the waters of the river, should be subjected to the interstate division effected by the Colorado River compact. Neither bill recites that the United States owns a water right in any particular State. How, then, can it be said that the Congress is asserting an interest that any particular State denies?

There are provisions in both bills and should be in any Boulder Canyon legislation, directing the Secretary of the Interior to administer the waters of the project in recognition of and not against the terms of the Colorado River compact and to require from all water users contracts subjecting their uses to the compact.

Under what clause of the Constitution do these provisions violate any constitutional right of the State? Under what caluse do they invade the sovereignty of the State? If the Government has the legal right to construct the dam in furtherance of navigation and as an incident put the surplus waters to use, can a State say that these waters are not to be administered by the Government?

When these waters are not to be put to use within a given State, in our case a nonratifying State, can it be said what the Government is violating the right of that State in putting them to use in a different State?

So, too, in any legislation there ought to be and in the Johnson and Phipps bills are, provisions under which hereafter new rights of way upon the public domain are to be subjected to a carriage and storage of Colorado River system waters in full recognition of the water segregation to the lower, as made in the compact. This would apply to rights of way all over the river basin for transporting and storing of water, no matter in what State local appropriators may make their diversions under State laws and whether having anything to do with the waters of the Boulder Canyon project or not.

Article 4, section 3, of the Constitution, gives to the Congress "the power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States." If in the exercise of this power to dispose of "property," a power which includes the disposition of land, if in the exercise of this land power as distinguished from the exercise of any water authority, the Congress chooses so to word future rights of way as to limit the use for storage or transportation of water, may it not do so?

If the Congress chooses to say that rights of way in the upper States shall not be used to store or carry water exempted to the lower States and that rights of way in the lower States shall not be used

to store or carry water exempted to the upper States, may it not do so? If the United States owns the receptacle, namely, the land that is to hold the water, may not the United States regulate the use of the receptacle even though it were to be conceded that if the receptacle were not involved, there would be no authortiy over water merely as such? Surely, Mr. Chairman, it is idle to contend that in all probability Congress does not possess this power.

WHETHER THE MEASURE PROTECTS THE UPPER STATES BY SECURING TO THEM A SEGREGATION OF WATER EXEMPT FROM APPROPRIATIONS BY WATER USERS IN THE LOWER STATES

There is much vagueness about the word "protection" as applied to the interests of the upper States in the water of the river. The word is really synonymous with the segregation in favor of the upper States of a quantity of water to be exempt from appropriation in the lower States.

There can be no segregation of water without going after it. To do nothing is not to obtain a segregation. It is, in certain and practical effect, to allow the issuance of power licenses by the Federal Water Power Commission under which water priorities would be asserted against the upper States and whereby the upper States would lose the right to put to use all of the now unused waters of the river system.

I have said already and repeat that Denver does not want any bill passed by the Congress during that reasonable period necessary for pending interstate negotiations and efforts to settle; that we want a proper bill passed before the end of this session of the Congress, unless within this same session the embargo against the Federal Power Commission, expiring in March, 1929, but which, in point of safety to the upper States, should be considered as expiring with the end of the present long session, should be extended; that preferably, by far, we want a bill that may be based upon a seven-State contract and will work to that end, and that it is only in the event that a seven-State compact can not be had that we wish for a bill predicated on six.

Your committee is going to determine what ought to be done with the two pending bills, not only in respect to the period of interstate negotiations, but also to the period afterwards. Others have expressed, as I see it very properly, their views as to that second or succeeding period and I have not hesitated, nor can I hesitate, to do the same.

Denver can point out 12 ways in which these bills, even if passed on only a six-State basis instead of seven, would assist vitally in segregating water for the upper States and therefore for Denver—12, the number of the Apostles in Holy Writ.

First, it is probable that by interstate compact, States can successfully bind their respective individual water appropriators by whatever division of water between States the compact may make and that the States may thus defeat the application of the unjust principle of priority regardless of State lines. I, myself, believe this. But the principle has been denied in respectable legal quarters and upon it we have no judicial precedent. It is only too evident that the segregation of water for the upper States, not only should be

procured through interstate compact among as many of the States as possible, but, also, that it should be procured and fortified in its legality, as it is through these bills, except as to the Johnson bill, requiring only four, by the exercise of whatever power the Congress possesses, either through the regulated use of rights of way on the public domain or under the interstate commerce clause or otherwise.

Second. Arizona, California, and Nevada, are, and it is no reflection upon them, the great water rivals of the upper States. Arizona and California, particularly California, assert serious water claims against the upper States and based upon existing water rights. An act of Congress providing for the Boulder Canyon project would bring to the upper States the ratification of the compact by California, even if the act were predicated only on a six-State agreement. We already have the ratification of Nevada. Is it good reasoning for the upper States to refuse to free themselves from water claims of two of the lower States if the third one is not to be had? Should the segregation not be obtained from two, even if not from three?

Third. A Boulder Canyon bill would release to the upper States the normal flow of the river for the satisfaction of existing rights and permit existing rights in the lower States to be satisfied out of the flood waters stored by the project. According to a memorandum issued to me under date of December 9, 1927, by Engineer E. B. Debler of the Reclamation Service, it appears that the low flow of the river is exhausted to a degree more serious to the upper States, if this memorandum is correct, than I had supposed. The head gate of the Imperial Valley ditch is below Yuma, and the capacity of that ditch is said by Mr. Debler to be 6,500 second-feet, with a water claim therefor of 10,000 second-feet. Yet it also appears that for 32 days in 1915 the flow dropped as low as 2,700 second-feet, and that the average flow for the same period was 4,400 second-feet; that for 24 days in 1915 the flow dropped to as low as 2,300 second-feet, with the average flow for the same period at 4,000 second-feet; that for 73 days in the summer of 1924 the flow dropped as low as 1,200 second-feet, with the average flow for the same period at 3,300 second-feet; that for 35 days in the summer of 1926 the flow dropped as low as 2,440, with an average flow for the same period of 4,600 second-feet.

When I say that during any of these periods mentioned the flow dropped to a certain minimum point, I do not mean that this was true for the entire period, but only at some particular time within the period. The average flow for each period as a whole I have given.

The California priorities, including that for the Imperial Valley ditch, are old ones, dating for the most part beyond 1900. The same thing is true of many of the Arizona priorities. It is said that most of the priorities in the upper basin, in point of aggregate volume of water, are more recent. And that includes the priority of the city of Denver, which dates back only to 1914.

Assuming this situation to be true, it follows that if priority regardless of State lines were to be strictly applied, the upper States in default either of interstate compact or act of Congress would be obliged to allow some of the water represented by their existing

priorities to go down to satisfy these priorities of California and Arizona.

Is it not better for the upper States to secure a segregation of water, the amount allotted to them by the compact, exempt from these appropriations in the lower States and to do this by the combined methods of interstate agreement among as many States as can be had, and by act of Congress, even though such an act could not be predicted on a seven-State basis, but on a six?

I am aware that in the case of Wyoming *v.* Colorado, relied upon by the Californians, and which would be relied upon by the Arizonans, also, the court does not apply the principle of priority regardless of State lines, strictly, but first says that each State on an interstate stream must exercise reasonable diligence to conserve the waters of the common supply by reservoir construction, finds that Wyoming, which was the lower State, had already done so, builds up a water fund greater than that of the lowest flow of the river, and then proceeds to divide that fund between the States on the principle of priority regardless of State lines.

There would be an excellent chance for the upper States to escape these early priorities in the lower basin through invoking the calculation of just such a water fund. We have no assurance, however, that the court would create any such fund without first requiring reservoir construction even in the upper basin. There is too much speculation about such a fund to justify us of the upper States to rely upon it as a means of avoiding those early priorities in the lower basin. We should play more safely by making our escape through the medium of interstate agreement among six of the States if seven can not be had, plus an act of Congress designed to take care of us as to the missing seventh.

Furthermore, in the case of Bean *v.* Morris (221 U. S. 485), it was held that in suits between individual appropriators in one State and individual appropriators in another, the rule of priority regardless of State lines applies strictly. In such a case we should not have the calculation or creation of any water fund to help us.

Therefore, I contend that a Boulder Canyon bill, if only upon a six-State basis, and containing protective clauses similar to those of the Johnson and Phipps bills, more particularly as to this point—the Phipps bill would secure the desired segregation of water for the upper States by supplying existing rights in the lower basin with stored flood waters and by releasing the normal flow to that extent for use in satisfying existing rights in the upper States.

Fourth. A properly worded Boulder Canyon bill, if on the basis of as many as six States, would enable the upper States to make peace with their greatest water rival, the State of California.

Under date of December 16, 1927, the same engineer, Mr. E. B. Debler, informs me by a letter that nearly all of the California and Arizona rights out of the main river, so far as volume of water claims is concerned, are older than 1900, and that of the water thus claimed, Arizona has 823,500 acre-feet per annum, and California 4,917,000 acre-feet; and that in terms of peak flow per second of time Arizona's claims aggregate 3633 cubic feet, and California's 11,567 cubic feet.

Clearly, California's claim in terms of acre-feet being over five times that of Arizona, and in terms of second-feet being over three

times that of Arizona, it follows that California is many times more dangerous, so far as existing rights in the main stream are concerned, than is Arziona.

Under these circumstances, it is for the interest of the upper States, and therefore for Denver, that a segregation of water be procured from California, even if it can not be procured from Arizona. California will give us that segregation immediately upon the passage of a Boulder Canyon bill.

Fifth. By the Phipps bill, although not by the Johnson bill as now worder, the upper States can procure a segregation of water exempt from the great power priority which would attach at the Boulder Canyon Dam by throwing the power plant into a ratifying State, the State of Nevada. This water priority for the generation of power would be the most dangerous of all priorities that could be connected with the project, because it could use all of the water that by gravity would go to the lower basin from the upper.

When we know that development will take place in the lower States; that it can not be forever headed off; that if we do not look out it may take place without any protection to the upper States at all, is it not the part of wisdom to meet that development constructively rather than negatively and to procure the segregation of water for the upper States by throwing the power-plant appropriation into a State that ratifies the compact?

Sixth. Both bills segregate water to the upper States, so far as concerns the proposed project, by requiring that all appropriations of water in connection therewith shall be made in States ratifying the Colorado River compact. Thus again a segregation to the upper basin is procured.

Seventh. Both bills expressly purport to subject the use of the project waters to the terms of the Colorado River compact, including the segregation made by the compact. Do the upper States not obtain by these provisions, so far as concerns this Boulder Canyon project and the great amount of water which it would put to use in the lower basin, a clear exemption in their own favor of the quantity set aside in their favor by the compact, and do they not do this whether the legislation be predicated upon either a six or seven State basis? Such directions, accompanied as they are by provisions to the effect that all water users taking water from the project must subscribe to the terms of the compact, are a great protection to the upper States.

Eighth. Both of these bills assist in the segregation of water to the upper States by requiring the Government to operate the dam in conformity with the compact and by subordinating to the compact's segregation of water in their favor whatever water rights the United States has in the Colorado River.

Beyond all doubt the United States owns riparian rights connected with riparian lands in California. Is it not helpful to the upper States to procure a segregation exempt from these riparian rights?

Ninth. Even although only a six-State compact could be procured, the State of California would be underwriting in effect——

And I want to call the particular attention of this committee to this—even although only a six-State compact could be procured, the State of California would be underwriting in effect the segrega-

tion of water made by the compact in favor of the upper States by putting up her own water rights in the river as security against any of the water claims of the seventh State, Arizona. That is precisely the effect of California's obligation under a six-State agreement, for she would be agreeing that all the water the upper States need turn down to satisfy all of the States of the lower basin would be just that quantity which the compact itself allots to all of the low States combined.

Under this obligation of California, if California's priorities were first in point of time, and Arizona's second, and those of the upper States third, then the upper States could require California to satisfy the Arizona priorities, even though the effect might be to deprive California wholly of water.

Senator SHORTRIDGE. That is a very important principle of law that you are stating.

Mr. BANNISTER. Is not this a guaranty of a segregation to the upper States?

Senator SHORTRIDGE. What I mean is, as I followed you—and I listened intently—you stated it as your opinion that we would be obligated in a certain way.

Mr. BANNISTER. Senator Shortridge, the representatives of your own State have said that. Commissioner Wilson, of New Mexico, takes the same view, and I, as I have just stated, share it.

Should any one suggest that there would be no remedy by which such a guaranty could be enforced by the upper States, I answer that there most certainly is a remedy for such a right. It has been held in the case of Platte Valley Irrigation Co. *v.* Buckers Co. (25 Colo. 77) that priority No. 2 may compel priority No. 3 in a proceeding for that purpose to be the first of the two priorities to surrender water to priority No. 1. By the same sort of a proceeding, the upper States could enforce the obligation of California, although the obligation would owe its existence to interstate agreement with her rather than to a mere order of priorities. So, too, as Commissioner Wilson has pointed out, California probably could be impleaded in any suit brought by Arizona against the upper States.

Tenth. Both bills assist, as they should, in effecting a segregation of water for the upper States by subordinating all new rights of way everywhere throughout the Colorado River basin and on the public domain for the carriage and storage of water, to the water exemption made by the compact in favor of the upper States. This subordination represents an exercise of the land power of the Congress in disposing of government property, and its constitutionality has been discussed already.

Eleventh. The right-of-way provisions of both bills regulating the use of Government domain for the transportation and storage of water through the exercise of the land power of Congress would catch the San Carlos priority now being built up against the upper States in connection with the Government's project on the Gila. Unless the upper States can accomplish a segregation of water in their favor and protect it against this San Carlos priority before the water is actually put to use under that project at San Carlos, it would follow in meeting any treaty obligation of the United States to Mexico that, as between the San Carlos priority and any later priorities in the upper States, it would be the latter which would be the

first to be required to surrender water to satisfy the treaty obligation in Mexico.

If, however, a Boulder Canyon bill could be passed before the actual application of the water of the San Carlos project to use, then under the authority of the case of Silver Lake & Co. *v.* City of Los Angeles (176 Calif. 96) the right-of-way provisions of such a bill could be made to limit the use of that project in such wise as to divide the Mexican burden half-and-half as provided in the compact between the upper and the lower group of States.

Twelfth. A Boulder Canyon bill, even if necessarily predicated upon a six-State compact, would give to the segregation of water for the upper States the statutory protection afforded by the Congress through the various provisions already referred to, as to the seventh, or nonratifying State. As to all of the other lower States, the upper States would have their segregation insured not only by the same statutory protection but by the compact of those States as well.

Senator KENDRICK. Mr. Bannister——

Mr. BANNISTER. Senator, may I ask that you let me finish, and ask your questions afterwards? I want to get through with this before 12, and then I am at your disposal at any time.

The Johnson bill is a constructive measure, but it is not the Swing bill of the House. It fails to throw the great priority of the power plant into a ratifying State as do the Swing bill and the Phipps bill. It fails to require more than a four-State compact as a basis for legislation, whereas the Swing bill requires six. Under existing conditions, Denver can not support the Johnson bill without very substantial amendment.

The Phipps bill, too, is constructive in nature, and if a seven-State compact should eventuate as the result of the pending interstate negotiations, the bill would insure the necessary segregation of water for the upper States and accordingly for Denver. Just as I hope that Senator Johnson will step his bill up from four States to six or seven, as the case may be, so do I trust that should Senator Phipps find the seven-State compact impossible, he will be willing to step his own bill down to six. I do not know but that this may be his intention.

Both bills, too, I believe would have their chance of ultimate passage increased, although as to this, gentlemen of the committee, you are wiser than I, if in the ownership of the power plant and generation of the power they would take in the Government as a "pinch hitter" in default of States, municipalities, and private enterprises, rather than as the possessor of an optional right to reject these agencies. As I have said before, Arizona and Nevada may themselves wish to lease the water privileges and build and operate the plant, assign their rights to others, or otherwise arrange for a revenue to their treasuries. So, too, this suggestion, advanced here first, I believe, by Commissioner Wilson, probably would effect a happy compromise between the forces of Government ownership and private enterprise. What Denver wants is water. Everything else is subordinate.

There are a number of amendments to be suggested other than those already indicated in this statement, but the present is not the time for laborious detail.

THE INTEREST OF THE GOVERNMENT

The Government has an interest in this project beyond that of flood control. It owns enormous areas of public land in all of the Colorado River States. In order that it may guarantee in greatest measure water for these lands, no matter in what State situated, and provide for their maximum enjoyment in the hands of those applicants who apply under the land laws it is highly important that the Government should not permit the use of the now unused part of the waters of the Colorado—the unused part represents about two-thirds of the waters of the system—to become consolidated for use in one or two States of the lower basin. Clearly the interest of the Government is in diffusing this water as widely, at least, as between the two great groups of States.

Again, as a matter of public policy, in the way of provision for the support in years to come of the greatest population possible the Government ought to stand for the diffusion of water among the States rather than for its consolidation in one or two of the States, as would be the case in the event of no compact and no congressional act, but with power licenses issued to the lower basin for the immense projects now in contemplation.

REPEALING A BOULDER CANYON ACT AND LEAVING THE UPPER STATES HELPLESS AGAINST A NONRATIFYING LOWER STATE

That the Congress through its land power in respect to its own public domain can so regulate future rights of way thereover as in effect to protect the upper States against a nonratifying State in the lower basin I have not heard disputed in this river controversy. The objection has been made, however, that a subsequent session of the Congress might repeal those of the provisions of an act authorizing the Boulder Canyon project, which exercise the power referred to and leave the upper States helpless against priorities obtained in the nonratifying State.

The objection is unsound. In the first place, the repeal, even if it occurred, could not repeal the compact which the upper States would have with the two ratifying States of Nevada and California, assuming that Arizona would be the nonratifying State. In consequence the upper States should still be to the good as to their water segregation as against appropriations made in those two ratifying States.

In the second place, no repeal could affect the physical fact of the presence of the power plant, which would have been already constructed in a ratifying State—Nevada. Therefore no repeal could turn that enormous water priority, the greatest that could be connected with the project, into a priority against the water allocation of the upper States. And with that plant in operation it is unlikely that its market would be challenged by any other power plant of much consequence constructed upon the river for years to come.

In the third place, if the right-of-way provisions were repealed by the subsequent session, as suggested, the upper States would be no worse off against the nonratifying State of Arizona than they are to-day.

In the fourth place, no subsequent session is going to repeal those provisions. The fear is unfounded. The six States, parties to the six-State compact which ought to be negotiated if a seven-State compact is not to be had, would have their Senators and Representatives at Washington and on guard.

The Congress is not going to repeal what in its nature would be an economic charter to all the river States; is not going to abrogate provisions which the Government itself would need in order to keep water diffused between the two great basins for the use of its own lands scattered throughout the States, instead of allowing the use of the water to become consolidated in one or two of the States in the lower basin, as it would be in the absence of compact or of such an act of Congress as that proposed for the Boulder Canyon project. To affirm that the Congress would do such a thing is to impute to that body not only a certain amount of dishonor but folly as well.

CONCLUSION

Arizona and California should get together, and I believe there is a fair chance of their doing so—enough of a chance to justify this committee in not reporting out a bill for many weeks to come. The two States have already been so close together on the topic of water division that it would be better for either to concede to the other than that they should fail to reach an agreement. Arizona has, as do the four upper States, a great interest, and it is only fair that she should have an understanding with California before signing the seven-State compact. At the same time, should the two States fail to reach an accord after a reasonable time for the interstate negotiations or efforts now pending, I do not see by what warrant the interests of four States should be sacrificed to that failure. That they should be thus sacrificed is a proposition to which Denver can not subscribe. Whenever we think of doing so, we look in the direction of the Federal Power Commission and toward the progress of the construction work now going on at San Carlos on the Gila. Then we sense the danger of more than absolutely necessary delay for the negotiations and efforts to which I have referred.

Mr. Chairman, to the passage of one of these bills, amended much as suggested, amended to fit the situation that may be found to exist upon the expiration of the current period of interstate negotiation, I am deeply devoted. I plead for it earnestly, indeed, passionately. This is not because either bill would be a measure of benefit for a lower State—I let the lower States voice their own needs—but as a measure needed by the city I represent.

Never again will there be such universal sentiment for flood protection in general to help along this particular project as now. The tide of opportunity is in. It will remain only for a time. Let it not depart, leaving on the shore behind it, and wholly unsolved, this great controversy to which so many of us have been giving our years.

The CHAIRMAN. I think you have given us a very comprehensive statement, including much information that will be useful to the committee.

Senator KENDRICK. I wanted to ask Mr. Bannister, in view of his clear and logical statement, as to the importance and necessity of

seven-State ratification, and then, as I understood him, as to the wisdom of the upper basin States protecting themselves in so far as they could if there could not be a seven-State ratification.

I ask you, Mr. Bannister, in, as I believe, directly logical sequence, if it develops that not all of the upper basin States will come in and take advantage of such protection as they can obtain by a six-State pact, would it not be the part of wisdom for as many as three of the upper basin States to come in and ratify with less than the entire number of the lower basin States, and thereby secure such protection as they are able to secure?

I ask the question because you have referred only to a ratification by six States.

Mr. BANNISTER. Senator, my thoughts have not gone any further—what I mean is, that I would hate to have to be presented with that question. I really have not analyzed it.

Senator KENDRICK. We are presented with it now. Utah has withdrawn from the pact; and I may say, as you perhaps have occasion to know, that in the lower basin States the physical conditions, the topography of the country, etc., divide our waters between the States as they divide the water between our upper basin States, so that our interests there are going to conflict. It was my contention that in protecting my own State it would be exercising the part of wisdom to secure protection against as many as two of the lower-basin States if we could not have three.

Mr. BANNISTER. Well, Senator, I think there is no doubt that if there could be a measure of protection under such an arrangement it would be better than none at all. But with me it is as I said. I would hate to think of such a plan, especially under the existing circumstances. I feel that there is no occasion to. I feel that these States really can get together.

Senator KENDRICK. We all want to get together. But I ask you if you do not think we would only be acting with discretion.

Mr. BANNISTER. There are many factors that would have to be injected, and I have not given them sufficient thought, Senator, in my own mind, to reach a conclusion.

Senator JOHNSON. Is this substantially the statement that you made before the House committee, Mr. Bannister?

Mr. BANNISTER. Yes; except that there I spoke extemporaneously.

Senator JOHNSON. But, with mere changes in reference to the bills pending here, it is substantially the same?

Mr. BANNISTER. Yes, sir.

Senator JOHNSON. Is this the statement upon which Governor Dern asked your recall by the Governor of the State of Colorado?

Mr. BANNISTER. These are the views, Mr. Chairman and gentlemen of the committee, in respect to which the water commissioner of my State, according to the published telegram to my governor, felt obliged to apologize to his excellency, the Governor of Utah, and my recall was sought at the hands of Governor Dern.

Senator JOHNSON. That is, Governor Dern sought your recall because of the expression of the views that you have expressed here to-day?

Mr. BANNISTER. I should say so, Senator. To that I wish to add a qualification.

The resolution signed by the governors and by the city, December 19, followed a combined policy for the period of pending negotiations. It was silent as to what course was to be taken thereafter. The Governor of Utah stuck to the resolution absolutely, as I did, throughout the period first described.

As for the second period, he took one direction, as he had a right to do, and as I assume the committee wanted to go, and I took another.

The only complaint that I have against the Governor of Utah is that when he took that other fork of the road his language was such, unintentionally, I believe, in his zeal as a seven-stater, that he gave the impression that we all were taking the same road.

What there was about my remarks that offended him, I do not know; but I argued the merits of these bills—or, rather, the Swing bill, which was before the House committee—as a measure necessary to the protection of the upper States, and in doing that I advanced the same 12 reasons that I have advanced here and, in addition, considered some 18 objections which his excellency had raised.

That, Mr. Chairman, was my sin.

Senator JOHNSON. That is all, sir.

Senator SHORTRIDGE. In your statement, which revals much study and definite views in regard to many, many legal propositions, you made use of technical legal terms, some of which I did not grasp as you read.

Mr. BANNISTER. I did not think I could use any that you could not get, Senator.

Senator SHORTRIDGE. In other words, with great clearness you stated your views touching certain principles of law as to the rights of the States as landowners. I noted your statement as to the right of the Government as a landowner or as a property owner, and I noted particularly your thought as to the possible obligation on the part of California to guarantee something to other States.

In a word, what I mean to say is that your statement contains a great many propositions concerning which I want to devote some attention—not now, but as we move along.

Mr. BANNISTER. I will be back, Senator.

The CHAIRMAN. If there is nothing further at the moment, the committee will stand adjourned until 2 o'clock this afternoon, when we will meet again in the room of the Commerce Committee on the gallery floor of the Senate.

(Whereupon, at 12 o'clock noon, a recess was taken until 2 o'clock p. m.)

AFTER RECESS

(The hearing was resumed at 2 o'clock p. m., pursuant to recess.)

The CHAIRMAN. The committee will come to order, please. I have a letter from the Governor of Nevada, addressed to the chairman of the committee, which I will read:

Hon. LAWRENCE C. PHIPPS,
Chairman Senate Committee on Irrigation and Reclamation,
Washington, D. C.

MY DEAR SIR: This will advise you that Hon. George W. Malone, State engineer of Nevada, will act as my personal representative and also as chairman of Nevada's Colorado River Commission at the hearing before the committee on

the Swing-Johnson bill relating to the construction of the Boulder Canyon dam, or any other bills affecting the Colorado River.

Any courtesy extended to him and his fellow members of our commission will be appreciated by the writer.

Very truly yours,

F. B. BALZAR, *Governor of Nevada.*

Mr. Malone, are you ready to proceed?

Mr. MALONE. Yes, sir.

STATEMENT OF GEORGE W. MALONE, STATE ENGINEER OF NEVADA AND SECRETARY OF THE COLORADO RIVER COMMISSION

Mr. MALONE. Mr. Chairman, the members of the committee, our governor, F. B. Balzar, desires me to say that he regrets his inability to appear before your committee; and, further, that Nevada is for the development of the Boulder Canyon project, providing a way can be found to deal fairly with the interested States.

Our State has expended considerable time in the preparation of data, reviewing both the water and power set-ups, and they are submitted with the hope that the situation may be somewhat clarified.

I acted as chairman of the Three States Conference at San Francisco, held subsequent to the Denver Seven State Conference, and the power report submitted herewith is in line with the results obtained at that time.

The Nevada Colorado River Commission is ready and willing to negotiate with Arizona and California for the purpose of forming an agreement relative to the water and power situation on the Colorado River at this, or any other, time.

Our commission desires to see each of the States in the Colorado River Basin treated fairly and will recommend that our Senators and Congressmen support any legislation that, in our judgment, accords such treatment.

Nevada has claimed 300,000 acre-feet of water to be used within her borders and Arizona and California have always conceded her right to that amount; she could no doubt use more water than is claimed if allowed an unlimited period for development, but is only claiming what she thinks can be used within a reasonable time, and both States have conceded her claim.

SUMMARY OF POWER SET-UP ON LOWER COLORADO RIVER

Costs given in mills, mean mills per kilowatt-hour on 3,600,000,000 kilowatt-hours per year, corresponding to 1,000,000 installed horsepower, or 550,000 firm horsepower on 55 per cent load factor. Annual charges include depreciation, operations, and maintenance in all cases. I will read the summary of results relative to power and will request that the reports on both the water and power set-up be placed in the record.

	Cost
Dam, including interest during construction	$55,000,000
Power plant, including interest during construction	35,000,000
Transmission line, including interest during construction	50,000,000
All-American canal, including interest during construction	35,000,000
Annual cost, including interest and amortization, 41-year period including dam, power plant, and all-American canal (9-year absorption period equal of 50 years)	7,712,000

	Mills per kilowatt-hour
Power cost at switchboard, including dam and power plant, including interest and amortization, 41-year period (full period 50 years)	1.511
Power cost at switchboard, same basis, and including dam, power plant, and all-American canal, corresponding to 7,712,000 annual charges	2.140
Power cost at switchboard, same as above, including dam, power plant, and transmission line	2.671
Power cost delivered in markets, including dam, power plant, and transmission line (12 per cent less)	3.040
Power cost in markets, including dam, power plant, and all-American canal interest only, including transmission line	3.323
Power cost delivered in market, including dam, power plant, all-American canal as present proposed legislation, including transmission line	3.751
Steam-electric power cost at market based on $1 per barrel fuel oil, 60 per cent load factor, 25 years' amortization period, and $110 per installed kilowatt, including transmission	4.890

There has been considerable talk of possible deficit during the absorption period or during the time estimated that all of the power will be taken up by the markets following the construction period.

Interest during construction is included in the original estimate; then nine years are allowed for the full amount of 550,000 firm horsepower to be marketed; this power is made up of units, to be constructed as needed, and the interest on original investment and operation and maintenance only will be paid during this period; then the last 41 years, making a total of 50 years, the original investment will be repaid in 41 equal installments.

We estimate in our power set-up that the total amount of power will be absorbed by the markets within six years, and on that basis there would be no deficit; it is estimated by some a much shorter time, but if by any chance it took a longer period, the deficit, if any, would have to be made up before the States could benefit.

CONCLUSIONS AND RECOMMENDATIONS

1. That the States of Arizona and Nevada should receive an amount from the proposed development at least equal to the benefits that they would receive if this natural resource were developed by private capital, and upon reasonable notice be allowed to withdraw certain amounts of power for use in their own State.

2. That the power developed can be delivered into the available power markets, meeting competitive power costs, guarantee the Government investment, and still meet the conditions outlined above, with a margin to spare, considering the set-up from the data gathered from the Weymouth report.

This Weymouth report compiled all the data up to date, and in addition secured an enormous amount of detailed data and made estimates at an approximate cost to the Government of $400,000, and is the last word in the Government reports.

Senator JOHNSON. Is that the unpublished report we have?

Mr. MALONE. Yes; that is the unpublished report.

Senator JOHNSON. That the Senator and I have been trying to get printed as a public document, but because of the cost they denied it. That is your understanding, Senator?

Senator ASHURST. That is true, Senator.

Mr. MALONE. I will say that Nevada spent about $500 copying it for themselves.

3. That the power can be delivered into the power markets for 4.5 mills, which is 1.5 mills under present plant cost, according to testimony before the California Railroad Commission, and 0.40 mill below anticipated cost, if plants were to be constructed at this time, and amortize the Government investment within from 15 to 18 years, proper charges being made for other benefits, irrigation, domestic water, and flood and silt control.

4. That overwhelming opinion of engineers and men who have studied the fuel situation, is that steam electric power will never be produced in the southwestern power markets cheaper than is possible at this time, that the increased cost of fuel and construction costs will offset any decrease from other causes.

5. That it was the opinion of Arizona, California, and Nevada engineers, who attended the three-State conference in San Francisco, that the Government estimates for the construction of the project were liberal, if proper methods were employed in prosecuting the work, based on the Weymouth report set-up.

RECOMMENDATIONS

That provision be made in any legislation for the States of Arizona and Nevada to benefit from the proposed development, and that provision be made for withdrawal of certain blocks of power upon proper notice for use in their own States, or that provision be made in any legislation to accept the provisions of an agreement between any of the lower States relative to distribution of benefits.

In this great development there is an infinite number of important questions any one of which can be discussed at great length.

In the construction of any great project to control floods and silt and in the marketing of the power to return the investment, practically every problem that can be imagined will arise, and each a subject that would in its proper place be interesting discussion.

We have therefore read and endeavored to digest all of the reports, hearings, etc., to be found on this subject, and have collected and correlated what, in our opinion, are pertinent to any development on the lower river.

You are interested as a committee to pass on any suggested legislation in the following five particulars:

1. Whether or not any development should be made by the Government on the lower Colorado River.
2. Location of site best suited to the requirements.
3. Cost of project.
4. How best to arrange the financial set-up for the least ultimate cost to the Government.
5. The State's interest in the development.

GOVERNMENT DEVELOPMENT

The flood and silt menace on the lower Colorado is a terrific problem, floods will ruin the Imperial Valley and Yuma lands faster on occasion, but not any more surely than continual heavy silt deposits.

It is the policy of the Government to assist in every possible way in serious flood-control problems, and incidentally in this case, silt coming down the river in the future will be controlled.

Among the incidental benefits occurring by virtue of this development will be the reclaiming of large areas in both Arizona and California and a comparatively small acreage in Nevada, the supplying of domestic water for southern California cities, and development of power to assure the return of the investment; and, since there are seven States interested in the problems, they will require the services of a disinterested agency.

LOCATION OF SITE

A storage site to include the necessary benefits should have:

1. Capacity of twenty to twenty-five million acre-feet located below important tributaries.
2. Located as near as possible to place of use of water and economic distance for transmission of power.
3. High enough to develop sufficient power to pay the cost.

There are three sites that fulfill a part of the requirements—Topok, Glen Canyon, Boulder or Black Canyon.

Topok has sufficient capacity, is below all tributaries not otherwise being controlled, and the construction cost is comparable with other sites, but it would necessitate moving several miles of railroad in difficult country and inundate the town of Needles; and it has been pronounced not practicable to make these changes, and it is not high enough to develop power to pay construction.

Glen Canyon has sufficient capacity, but even if construction costs were comparable, it is located above the Little Colorado River, whose waters can not be economically controlled on the stream itself, and the increased distance over which irrigation water would necessarily have to be regulated would cause an appreciable increased loss, and it is not within economic transmission distance of the power markets, thus definitely eliminating the project from returning the investment through the sale of power.

Boulder or Black Canyon is below all principal tributaries not otherwise capable of being economically controlled, has sufficient capacity for flood control, and the power market is within economic distance.

COST

The cost of the project is estimated to be $125,000,000, including interest during construction, including dam, power plant, and all-American canal.

This estimate is set up by Government engineers after the expenditure of nearly $400,000 in careful detail surveys, including foundation investigations, and these estimates were checked by Mr. Hill and Mr. Wiley, two of the most widely known consulting engineers on the Pacific coast; there can be no doubt of their ability and integrity. These results are set up in very great detail in the Weymouth report, a Government document of eight volumes.

FINANCIAL SET-UP

The power set-up for the Boulder project shows by this method the Government advancement can be returned within a reasonable time. This is shown in detail in the report.

STATE'S INTEREST

California's interest is, of course, in the fact that the power, domestic water, and a large portion of the water for irrigation is used to develop her State.

Arizona's interest is that a large portion of the water will go to develop her State, the records show that she has 891,000 acres to be developed through this project; and that her natural resource is being utilized by this development.

Nevada's interest is that she has a very small amount of land, approximately 80,000 acres, that may be irrigated, and that she may obtain cheap power near the development; this will also obtain in Arizona; however, this is limited because when small blocks of power are transmitted any distance transmission costs make it an uneconomic procedure; and that her natural resource is being utilized for the development of this project.

Nevada has only one other site, Bullshead, where a small amount of power can be generated in the future; this site is below Boulder Canyon.

She is convinced that if the site were not taken for this purpose that it would be developed, and that it would then become part of the wealth of the State.

The commissions of the seven States have agreed upon one point, and that is that Nevada and Arizona should benefit from the development by virtue of the site being located within their borders; it is only left to determine the method by which this can be accomplished.

Nevada has never contended that the Government is bound to allow her anything for the use of this site, but in the event profits are made from this development, Congress has the right to direct where they shall go, and in justice, who would have a better right to participate in these benefits than the States within whose borders the site is located.

Our only request, then, is that arrangements be made whereby proper charges can be made for the service rendered, flood control, silt control, and irrigation and domestic water storage, and that this be added to the income from power, and that the States of Arizona and Nevada participate in the excess over the payments due the Government, and that the charges for power be not made as low as the repayments to the Government will permit, but low enough to successfully compete with power from other sources. We believe that a supervisory board could be created from the three States to assist the Secretary of the Interior in determining where these charges shall be fixed.

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SUGGESTIONS TO FORM BASIS OF POWER AGREEMENT BETWEEN THREE LOWER STATES

1. Fix at the switchboard a period of 3 mills per kilowatt-hour and split all above the cost to the Government, on a 40-year amortization period, between Arizona and Nevada. Power can then be delivered into the power markets at less than 4.5 mills, which is 0.4 mill under anticipated cost if plants were to be constructed at this time, and 1.5 mills under present cost, according to testimony before the California Railroad Commission.

2. A board of control to be appointed consisting of three members, one to be appointed by the governor of each of the lower States to assist the Secretary in the sale of the power and to secure adequate revenue from other sources, the Government to be paid first, then the three States of Arizona, California, and Nevada to split the remainder among them, California's one-third to apply on the all-American canal until paid for, then to go to reduce the price of power to the purchaser, with suitable readjustment periods.

3. That a board of control be created and the power sold the same as above outlined and reasonable charges made for flood and silt control and irrigation and domestic water, but all the money received to be used to retire the amount expended by the Government at the earliest possible date; then the Government to retain control, and to deduct for operation, maintenance, and depreciation, the remainder to be divided between Arizona and Nevada.

Whatever agreement is had, to assure Arizona and Nevada of reasonable return through the proposed development of their natural resources, that they be allowed in addition to withdraw, upon reasonable notice, certain blocks of power for use in their own States.

At the San Francisco conference held in November and December 1927, the three lower States were represented by engineers as well as their respective commissions, and at that time, after thoroughly investigating the power set up the California commission made a definite offer of $700,000 annually to each of the States of Arizona and Nevada. This amounts to practically 0.4 miles per kilowatt-hours and some members of the Arizona delegation indicated that they would recommend that 1,080,000 for each, amounting to 0.6 miles per kilowatt-hour be accepted with a provision that the two States be allowed to participate in any excess over that amount; this was closer than ever before to an agreement.

When it became evident that we would not close at that time, I as chairman on December 18 wired the four upper State governors, suggesting that they do nothing to oppose the legislation until we had an opportunity to continue the conference in Washington where we could confer with the congressional committee and the heads of departments, and formulate some plan satisfactory to Congress; we are ready and willing to do this now.

In closing will again say that we believe that Congress has the right to determine where the benefits from this development shall go, and we believe that proper charges should be made for service rendered in addition to the income from power, and that the charge for this power should be comparable to available power elsewhere for these markets and that the two States should benefit, coming second only to the Government payments.

Nevada is convinced that the development is economically and physically sound if proper care and supervision is exercised in the following particulars:

1. That charges be made for power, comparable to available power elsewhere for these markets.

2. That the charges now made and expended for flood control be diverted to amortize the Government investment on the dam as these expenditures become unnecessary by reasons of the flood-control works.

3. That the assessments now made and expended on cleaning canals and ditches be diverted to amortize the Government investment, as this work becomes unnecessary by reason of silt-control works.

4. That a proper charge for irrigation storage be made on the three or four hundred thousand acres of new land receiving water by virtue of this development, when it is able to support such charge.

5. That a proper charge be made for water stored for domestic purposes for southern California cities when this water is utilized.

6. That a board be created to assist the Secretary of Interior in the determination of these charges.

In the reports herewith submitted for the record all of these questions are taken up in detail, and we are ready to discuss them at any time.

The Nevada committee will recommend the support of legislation that—

1. Takes into account a fair distribution of benefits accruing from this development, coming second only to the Government payments.

2. Three hundred thousand acre-feet of water.

3. Right to withdraw upon proper notice certain blocks of power for use within the State.

These items may or may not be mentioned specifically in the legislation but may be handled in the manner that the judgment of this committee may direct.

The 300,000 acre-feet of water has already been agreed to by both Arizona and Nevada.

The CHAIRMAN. Mr. Malone, you spoke of the established cost of the dam and appurtenant structures supposed to be erected at Black Canyon. What is your own personal view as to the adequacy of the estimates? Are you prepared to express an opinion as to whether or not the $125,000,000 should be sufficient for this purpose?

Mr. MALONE. I will say in answer to that, Senator Phipps, that the only way anyone could check these estimates would be by the expenditure of an enormous amount of money. The detail surveys that have been made on the Colorado River no one, I believe, questions. In other words, the capacity of the reservoirs, the heights of the dam to do the necessary regulatory work, the distance across to be covered by the dam. In other words, the volume, etc., of the material for the dam no one questions.

The CHAIRMAN. And the possibilities for adequate foundations?

Mr. MALONE. That I am coming to. The foundation has been drilled, has been investigated, just as we would do it. Nearly all engineers have done some of that work. There is always an element of uncertainty, but in your estimates, whatever elements of uncertainty there were, the engineers were careful to allow for con-

tingencies. I assume that this has been done. I have the highest regard for Mr. Weymouth, who is now in New Mexico for the J. G. White Co., on the same kind of work, building dams for reclamation work, and I have no reason to doubt he has made these allowances. Then, again, Mr. Hill and Mr. Wiley have checked them, and, as I say, the only way to go back of that is to spend an enormous amount of money, which none of us are prepared to do, and unless you did that, your opinion is worth as much as mine as to whether he has done the thing properly or not.

The CHAIRMAN. Given a dam structure 550 feet in height, what would be low water?

Mr. MALONE. Approximately 400 feet above the stream bed.

The CHAIRMAN. At what point in elevation or height of the dam would the water be taken out for the production of hydroelectric power and for irrigation?

Mr. MALONE. Well, that will vary, Senator; it may be the maximum height in case floods filled it to that particular point, or the drought had not been such as to keep it down, or it may be the minimum height. I will not say what the minimum is definitely, but I think the range is 400 feet to 540 feet.

The CHAIRMAN. That is really what I was trying to arrive at—the minimum at which water would be taken out.

Mr. MALONE. Approximately 400 feet.

The CHAIRMAN. If it were taken out at that elevation it would not be taken out at that point when the dam was full or at the highest point.

Mr. MALONE. No.

The CHAIRMAN. It would be taken out at different points, depending on the amount of water impounded. Now, with flood control, would there be conflicts? Would it be necessary, in order to assure flood control at all times, to take it out from a lower level than the approximate 400 feet?

Mr. MALONE. It would not. There is about eight or ten million acre-feet capacity estimated necessary for flood control. Now, it would be necessary, probably, during the period when floods would be liable to come down at any time, to keep that somewhat below the high-water mark, but it depends entirely on the time it would take water from certain tributaries to reach the dam, certain floods to reach the dam, and the speed at which it could be emptied in case floods started to come down, and it has been computed, the records will show, that taking care of the condition you mentioned, that the water can be so regulated to develop the 550,000 firm horsepower. In other words, if the elevation of the water surface was 450 feet instead of 540 feet, it would simply take more water to generate the same amount of power at that height.

Therefore, it has been computed that over a long term of years, with that volume of storage, that your storage capacity and water is ample for the generation of 550,000 firm horsepower. Does that answer your question?

The CHAIRMAN. Yes; it does, to my satisfaction. What is the acreage estimated that is allowed for the accumulation of silt?

Mr. MALONE. Five million acre-feet, and according to the estimates the silt comes down at the rate of from 100,000 to 125,000 acre-feet per year, which would mean the volume of storage allowed

for silt would last approximately 50 years, and then, of course, before the capacity of the reservoir was seriously affected, would probably be another 50 or 75 years.

The CHAIRMAN. Is it possible to have sluice gates, or outlets, near the base of the dam that would permit the flushing out of the silt in times of high water without the pressure being too great?

Mr. MALONE. I do not think it is practicable. We have the same problems in a small way in reservoirs that are smaller. It has never proved practicable at all. It will sluice out to a certain distance back of the gates, but it will fill up too far back to be touched by any sluicing process. You would have to have your reservoir nearly empty in order to get the velocity any distance back of your dam.

The CHAIRMAN. I know it has been recommended by none of the engineers.

Mr. MALONE. I do not believe it is practicable.

The CHAIRMAN. And they have agreed with you on that feature. Now, what is the distance from Black Canyon to the available market for the power produced? Would that be the distance to Los Angeles or some other point?

Mr. MALONE. That is your only market of any extent. There will be certain small blocks of power no doubt used in our own State.

The CHAIRMAN. Other enterprises would pick up small amounts along the line of the transmission lines, but Los Angeles is the only available market at the present time?

Mr. MALONE. It is the market which is supposed to take up that amount of power; yes, sir.

The CHAIRMAN. What is the distance in miles from the site of the dam, approximately?

Mr. MALONE. It has been variously estimated, but the distance we estimate is the one set down in the Weymouth report, 300 miles.

The CHAIRMAN. Three hundred miles?

Mr. MALONE. Yes, sir.

The CHAIRMAN. And you have stated a figure of 12 per cent as the anticipated line loss in any transmission of power for a distance of 300 miles. On what do you base that, Mr. Malone?

Mr. MALONE. I simply took that estimated loss because it is recommended by outstanding power experts. The Government, I believe, estimates in one of their set-ups 14 per cent, but 14 per cent is the highest I have ever seen used. The reason I adopted the 12 per cent was because in San Francisco, during our last conference, we went into that very thoroughly, and Mr. Ready, who is with the California Railroad Commission; Mr. Scattergood, with the Los Angeles Light and Power Bureau; and Mr. Craigen, with the Salt River project of Arizona; and Mr. Maddock and Mr. Jacobson, also representing Arizona; and Mr. Crozier, employed by our State, all agreed that 12 per cent was ample, so we adopted that figure.

The CHAIRMAN. I wanted to have your statement on that point because it struck me as being rather low.

Mr. MALONE. Fourteen per cent is the highest I have heard estimated at all, and since these four or five outstanding men agreed that 12 per cent was enough, we adopted it.

The CHAIRMAN. In your statement during your testimony you used the figures that we have used, that have been used in the Swing-

Johnson bill. That is, they arrive at $125,000,000, aside from any estimate of the cost of the transmission lines?

Mr. MALONE. Yes.

The CHAIRMAN. You had not made any separate estimates of your own?

Mr. MALONE. I simply took the figure, because it is set up that way in the Weymouth report on those items. If you exclude any of the items, you change it that much, but, as I said before, there has been no comprehensive detailed surveys made, except the Weymouth investigations, and anyone who tries to make an independent estimate by changing the figures, by either the volumes or distances, or whatever might be taken into account, I believe is doing it without proper consideration. If we go back of the Weymouth report, it will be necessary, from our point of view, for Congress to appropriate further money and go ahead and make a new investigation.

Mr. Weymouth, who held the office of Commissioner of Reclamation at the time, supervised the expenditure of approximately $400,000 in the preparation of this report, and at that time definitely recommended that the development be located at Black Canyon, and further recommended that the dam be constructed 550 feet high for flood and silt control, and the storage of irrigation and domestic water, and that 550,000 firm horsepower be developed to help pay the lost, and sets out in eight volumes in very great detail just how this can be done.

Absolutely no investigations have been made by the Government or any of its agents since that time, but have taken all of their information from this report and have made no new recommendations, not made substantially by Mr. Weymouth at that time.

I have been down the Colorado River into Imperial Valley, Yuma Irrigation District and old Mexico and have seen practically all superficial examination such as is possible to be made in that manner does not reveal further information than that contained in the report so any one must conclude as Mr. Weymouth has done unless you make another very substantial appropriation and to the work over.

The CHAIRMAN. You gave the figure of 3.04 mills delivered as the cost of the hydroelectric power, including nothing for the all-American canal, but including all other elements of cost.

Mr. MALONE. Yes.

The CHAIRMAN. Does that include depreciation or amortization?

Mr. MALONE. Yes, sir.

The CHAIRMAN. And interest?

Mr. MALONE. And interest.

The CHAIRMAN. You have given a figure of 4.89 mills as the present cost of producing power by steam, with oil at $1 per barrel.

Mr. MALONE. Not as it is being produced at this time, but if you were able to build your plant, starting at this time, with the efficiency and so forth they are capable of getting.

The CHAIRMAN. But is it not a matter of fact that it is being produced to-day in some of the more modern plants at much less than 4.89?

Mr. MALONE. I do not believe it is in that particular vicinity with the cost of fuel oil $1 per barrel.

The CHAIRMAN. The particular vicinity you have in mind being the Los Angeles market?

Mr. MALONE. Yes.

The CHAIRMAN. With a plant at Tidewater, which is practically Los Angeles. I don't have the exact figures in my mind, but that figure seems to me higher than those I have heard.

Mr. MALONE. May I explain that I believe you have heard these costs, where they are picking up stray lots of oil and gas. They have their engines so arranged that they can burn gas or oil and use either as fuel, and they pick up the fuel oil in odd lots much cheaper than a dollar. I believe some of it as low as 60 cents a barrel for oil. I imagine that is where you got your lesser costs.

The CHAIRMAN. That is not what I understood to be the fact. I understood that in the modern, up-to-date steam plant, with oil at practically the figure you state—$1 a barrel—on account of the advances that have been made in the art of producing the power by steam, they are now securing something over double the output in kilowatt-hours that they did two or three years ago from a barrel of oil.

Mr. MALONE. They are getting the highest efficiency that we know anything about down there, I believe—somewhere around 13,500 b. t. u.—and that means somewhere round 460 or 470 kilowatt-hours per barrel of oil.

The CHAIRMAN. Those are the exact figures that have been quoted to me—13,500 b. t. u. and 460 to 470 kilowatt-hours per barrel.

Mr. MALONE. I believe they would come very close to the figure I gave you. However, I would be glad to go into the details if you have the time.

The CHAIRMAN. Well, if you can supplement your statement here to-day by giving us some figures as to the actual cost with present-day practices we would be glad to have you do it.

Mr. MALONE. It is the figure which I would give you on that efficiency.

The CHAIRMAN. Then, you think any further inquiry that you might make of the power-producing companies as to the results that they are getting to-day with what we call commercial crude oil, such as they would buy if they had to purchase in large quantities right along, would not vary the figure you have submitted here.

Mr. MALONE. If it cost a dollar per barrel it would not change it very much.

The CHAIRMAN. Is it the tendency to-day for power companies furnishing the public with power to develop the possibilities of their hydroelectric resources, or to devote their energy to further developing steam plants?

Mr. MALONE. It depends altogether upon the availability of the hydroelectric projects. In southern California the hydroelectric projects that are still left to develop are much more expensive than those which have been developed and would run well over this figure. If you happen to be closer to your hydroelectric development, or the water supply is more dependable, like it will be on the Colorado River, then I think they would turn their energy toward the hydroelectric plants again, but in your southern California territory your water supply is very indefinite. There have been years within the last 10—I think 1924 was the shortest year—when prac-

tically all the hydroelectric development was very uncertain, and that turned you toward the steam development more than anything else.

The CHAIRMAN. The information that I have picked up in a general way, without having endeavored to keep informed at all times, as to the progress of the art, indicated to me that more and larger developments were being made in steam plants than in hydroelectric plants over the past three or four years, which was my reason for propounding the question to you. If, as you tell us, the transmission over 300 miles will result in a line loss of only 12 per cent——

Mr. MALONE. On large amounts of power, such as this.

The CHAIRMAN. On large amounts of power, naturally.

Mr. MALONE. I am satisfied that is a condition you will find, that the hydroelectric plants of southern California that are still available for development will cost much more than most of the resources that have already been developed, and will run higher than your steam costs, but if you were in a territory where your water supply was stable and everything tended toward a steady dependable power, like it will on the Colorado, with the proper development you would have an entirely different condition.

The CHAIRMAN. Now, on the understanding that your market would be Los Angeles or its vicinity, where the hydroelectric power produced at Black Canyon would necessarily come into competition with the power produced by steam, you feel that there is a certain margin of profit, or difference between the cost of the two which would permit of taking off a considerable amount for interest, amortization of the plant and also a little for a tax, or return of some kind, if you wish to call it a royalty, to the States of Nevada and Arizona where the plant is to be located. Is that your contention?

Mr. MALONE. I will answer you this way, Senator Phipps: In this set-up I have endeavored to give you the cost of each unit. That is, the cost delivered at the power market, leaving out certain units and including certain others, and in this report which will be presented here for the record, I have gone into very great detail into the question of interest on the all-American canal and operation and maintenance, so that you can take each one and see what it amounts to. I do not say that there is sure to be a margin including all the features in the bill that are now included, if no charge is made for any other service rendered. What I have endeavored to say here is that our results show a margin. Of course, they are theoretical results. Your dam may cost you more than you figure, or some other thing might happen, but I am convinced—I say I am convinced. Our engineers who we employed in San Francisco for this work, Arizona's engineers, and Los Angeles engineers were convinced, that if the Weymouth report is correct in its set-up, which, as I say, you can not go back of, for if you do it will require another appropriation and another investigation, so taking that as a basis and making the proper charge for your silt control and your flood control and for your domestic water and irrigation water, we were convinced that there will be a margin; yes.

The CHAIRMAN. Now, you have stated that in your calculations you figured that it might be nine years before the full capacity of the power plants at the dam could be marketed. Is it not the con-

tention of Nevada that on the completion of the works, and when operation is begun of the power plants, then the allowance to Nevada should attach immediately?

Mr. MALONE. It is our idea that our participation in any profits would only begin when there are profits. We are setting it up so that we are certain profits will be there, and on proper supervision—that is what we are concerned about—proper supervision and that the proper charges be made. We will not participate in any benefits until such time as the project is on a paying basis. In other words, if we made an agreement with California, I do not think it was ever in our minds—this was aside from your legislation entirely—it was never in our minds to collect anything until such time that enough power was marketed so that it was paying its own way, and the margin was there.

In answer to your nine year absorption period question, I estimate it will take six years. This is based on the proposition that the records show that from 125,000 to 150,000 installed horsepower is the increase from year to year in the power being used in southern California. Now, installed horsepower is about double, just for rough calculation purposes, the firm horsepower always. Then, the estimate I have, assumes that a million installed horsepower would be taken up in approximately six years, and if it is, there will be no deficit. Mr. Durand, I understand, says two or three years. That is a possibility, because there will be other manufacturers coming in, and I do not doubt that at all, although I did not take a stand as optimistic as that. But I have allowed nine of the 50 years. That is the reason we take the remaining 41 years for amortization payments, making the 50-year period, and to see whether or not there would be a margin as balanced against the steam power.

The CHAIRMAN. Given the installation of the plants, and the beginning of operations, if at the end of the nine-year period no profit has been derived over and above that required to meet the charges and amortization and interest, the State of Nevada would not expect to collect any revenue from the proposition.

Mr. MALONE. Not if in addition proper charges had been made for the other services rendered as I outlined.

The CHAIRMAN. Charges for other services rendered. Just what have you in mind?

Mr. MALONE. I mean the flood control, silt control, the irrigation water, and the domestic water. It would be perfectly possible to supervise this project so that there would be absolutely nothing available for anybody, simply by giving the service free of charge, flood control, silt control, and storing water for irrigation of new lands without any charge and for domestic water without any charge, and then being lenient on the price of power. There could very easily in that set-up be no margin for anybody. You can even be below your requirements very easily. But our only contention is that if these other proper charges are made and that is the idea of some assistance being given to the Secretary, not in any way taking from him his authority or superseding whatever he feels is his proper field, but assist him in the preparing of data supporting and determining what charges should be made and what charges are proper to be made on power, so that it will be a good set-up, and it is just

the same as any other proposition in that respect, that the proper charges be made.

The CHAIRMAN. What do you have in mind as to the course you would pursue if it were given to you to allocate the overhead and investment?

Mr. MALONE. I beg pardon.

The CHAIRMAN. If you were called upon to allocate the overhead charges and other costs pertaining to the enterprise. To illustrate, would you say that a certain proportionate amount of the cost of the dam should be assessed as against flood control, a certain other amount assessed as against the all-American canal, irrigation included, and another for power?

Mr. MALONE. Yes; that is the proper theory. You have a condition at this time—I would not want to make any definite statement as to how much it is costing. It is costing somewhere between $300,000 and $500,000 in the matter of levees and control works made necessary by the lack of flood control. While the point here is that if you built the dam and this expenditure is therefore unnecessary, or any part of it, for further protection, you can reasonably divert a part of that toward payments for the dam itself and make no further charge or no greater charge on the land than is being made at this time, and this only obtains during the amortization period. And the same with silt control. Silt control costs over a half million dollars annually in the changing or canals and ditches, so I am informed; and while that will not be entirely eliminated to start with, it will be gradually eliminated. Therefore a part of these charges could be very properly diverted toward the cost of those works. Then, in the all-American canal there are 400,000 acres of new land. If you are going to pay for the all-American canal as set up in this bill, by assessment of power, why not make a proper charge on this land? I do not say $75 or $40 or $50 an acre, but a proper charge which will no doubt be obvious at that time, an impartial arrangement in the matter, and make that proper charge, whatever it is, as it goes under cultivation, the same as we always have to do under reclamation work out there, even under reclamation districts. We have to pay back the original costs, and where we do not we make arrangements for payments, the same as this absorption period, and have what is known as 10–20–year bonds many times. The first 10 years would pay the interest and operating expenses and the next 10 years the original investment and operating expenses and interest, and we have that all figured out to start with.

Then, the domestic water, you have 1,500 second-feet of water, which will make 1,080,000 acre-feet per year. The estimate is about $20 per acre-foot delivered over the divide, taking over half the power that is available to do that, over half the 550,000 firm horsepower. Two dollars an acre-foot added to that will still be so far below the present charges for irrigation water over there that it will not be noticed, and as to domestic water, where the per capita allowance is about 150 gallons, and considering there are approximately 326,000 gallons in an acre-foot, $2 per acre-foot would be lost entirely. You can not find it, and that would amount to $2,000,000 in revenue which in turn amounts to over 0.5 mill per kilowatt-hour additional revenue in this set-up. I just illustrate it in that way.

The CHAIRMAN. You think there should be a charge for the water taken in addition to the amount that will necessarily be charged for the power consumed in pumping water to the elevation necessary to transport it?

Mr. MALONE. Yes; for the reason that that is not an unreasonable charge. As I say $20 per acre-foot for domestic water is nothing, and, so far as some of the irrigation water in that particular country is concerned, is very low.

The CHAIRMAN. Is it your opinion that given this dam complete, further dikes or other flood protection along the lower reaches of the river would be rendered unnecessary?

Mr. MALONE. Not entirely, but much less expense would be necessary.

The CHAIRMAN. Even with the San Carlos or Coolidge Dam, you would still think flood protection necessary?

Mr. MALONE. Some levee construction will always be necessary because you will always have a flow of some kind and varying at intervals. In other words, the studies show that, if the amount of storage I have just outlined is provided, it will hold the maximum flow to about 40,000 second-feet, which is quite a flow of water at that, and will necessitate some levee construction at all times, but nothing in comparison to the present, I should say.

The CHAIRMAN. I want to ask you, Mr. Malone, do you believe an agreement among the three lower-basin States may be reached in the near future?

Mr. MALONE. I believe, Senator Phipps, that it would be possible to reach an agreement if you could get everyone to say exactly what they would do. That is the problem. We are willing to say what we will do. I can not say that all of us are at this time. I believe that an agreement is possible, if this were so.

The CHAIRMAN. You think that decided progress, or satisfactory progress in negotiations has been secured during the past six months?

Mr. MALONE. If the two statements were sincere in California and Arizona which I read to you. I will not say that the Arizona commission offered to do this, but some of their delegates offered to recommend it. Their proposal amounted to about $350,000 more per year for each of the States than California offered to agree to. That was the difference when we finally adjourned our meeting. I will not say that the Arizona commission said they would accept that, simply some of their delegates indicated that they would recommend it, so I do not know for sure about an agreement.

The CHAIRMAN. Do I understand, that in arriving at an agreement, you are within 400,000 acre-feet as to the water division, and $350,000 per year in revenue?

Mr. MALONE. It was so indicated by those two statements. I would not say that now, however.

The CHAIRMAN. I have nothing further. Have you some questions, Senators?

Senator JOHNSON. Are you the State engineer of Nevada now, Mr. Malone?

Mr. MALONE. Yes.

Senator JOHNSON. There were five things that you discussed. Very hastily I go over them. First, whether there should be any

development at all. You answered that in the affirmative, that there should; did you not?

Mr. MALONE. In my opinion, there should.

Senator JOHNSON. Secondly, was the site. The site, in your opinion, should be the Black Canyon?

Mr. MALONE. Yes, sir.

Senator JOHNSON. Thirdly, was the cost. You agree that the cost can be kept within the limit of the cost indicated in the bill, do you not?

Mr. MALONE. Based on the Weymouth report, which is all we have and which I think has gone into it in every great detail.

Senator JOHNSON. And you believe it to be accurate?

Mr. MALONE. I believe it is.

Senator JOHNSON. The next was the best arrangement for a financial set-up. You have read what the Secretary of the Interior has reported, have you not?

Mr. MALONE. Yes.

Senator JOHNSON. And the financial set-up of the bill is satisfactory to you? I am not speaking now of division among States at all.

Mr. MALONE. What do you mean, the inclusion of everything that is now included?

Senator JOHNSON. Yes, sir.

Mr. MALONE. I believe it would be perfectly satisfactory with us, if the proper charges were made as I outlined.

Senator JOHNSON. The last one you discussed was the matter of the State benefits. To that I advert for a moment. The entire project must be paid out of power, must it not?

Mr. MALONE. I might change that just a little. It might be guaranteed out of power, but I would not say that the entire project would have to be paid for out of power.

Senator JOHNSON. Well, substantially, isn't that so?

Mr. MALONE. No, sir; I do not believe it is.

Senator JOHNSON. Who would pay for it?

Mr. MALONE. As I outlined, we need $7,712,000 per year. It is after the amortization periods have begun. Some of the estimates are slightly under that. This is a couple of hundred thousand dollars over what Secretary Work submitted in a letter last year. Two million or two and a half million could easily be collected from the sources I have mentioned without any undue hardship if the conditions or after the conditions, as I outlined them here, have come about, and if they are not going to come about the object of the development is lost.

Senator JOHNSON. Well, the amortization of the proposition is what I was referring to particularly. That is from power, isn't it?

Mr. MALONE. I would not make any distinctions.

Senator JOHNSON. You would say that the amortization may be made from the various sources you have indicated?

Mr. MALONE. Yes, sir.

Senator JOHNSON. The largest of those, of course, is power.

Mr. MALONE. It is one thing we are sure of.

Senator JOHNSON. And without it you could not undertake the project, could you?

Mr. MALONE. I do not think so. I believe it is necessary, as I have said, to guarantee the cost through the power, but to be sure there is supervision enough so as to know you are getting the proper charges made——

Senator JOHNSON. I am not quarreling with you on that.

Mr. MALONE. No. I am just outlining them again, and that the power is not sold below, too much below other sources of power, but simply low enough to make it competitive.

Senator JOHNSON. All right. Put it the other way around. You have got to rely upon the sale of power in order to have this project at all, haven't you?

Mr. MALONE. In my opinion, yes.

Senator JOHNSON. Yes. Now, the only market there is for this power is Los Angeles, isn't it, or Southern California?

Mr. MALONE. Southern California. That is not the only market, but the main market.

Senator JOHNSON. Without that market, it would be impossible to finance this scheme at all?

Mr. MALONE. I think it would, at this time.

Senator PITTMAN. Just another question. And without the dam site in Arizona and Nevada there would not be any project.

Mr. MALONE. That is undoubtedly so.

Senator PITTMAN. I said that because you had forgotten to mention the other two States.

Senator JOHNSON. No; I did not forget the other two States in the slightest degree.

Senator ASHURST. The trouble is that the Senator can not forget them.

Senator JOHNSON. No; that is perfectly obvious. I do not want to forget them, either. I realize the alliance, and I am not complaining about it in the slightest degree.

Senator ASHURST. Keep that out of the record.

Senator JOHNSON. My dear sir, I do not complain about it.

Senator PITTMAN. The only alliance that exists, to my knowledge, between Arizona and Nevada—because there has never been a word spoken between them, and I wish to say that our commission is not tied to any proposition whatever—the only alliance, Senator, is a natural alliance made necessary by the position so far of California:

Senator JOHNSON. Well, I deny that. The last session of Congress and the previous history of the entire project will demonstrate, too, who is accurate in that regard.

Mr. MALONE. I welcome your questions, Senator.

Senator JOHNSON. Oh, I realize that. I understand that you and the California people who met in San Francisco met on terms of amity, of course.

Mr. MALONE. And Arizona included.

Senator JOHNSON. All three of you sat down there and talked at great length about the matter.

Mr. MALONE. Yes.

Senator JOHNSON. In an honest endeavor on the part of every one of you, I assume——

Mr. MALONE. Yes.

Senator JOHNSON (continuing). To try to reach a conclusion in respect to it. There wasn't any desire, such as may have been indicated here, on the part of the California representatives not to reach a conclusion with you, was there?

Mr. MALONE. I would not say so. I believe it was sincere on the part of both Arizona and California.

The CHAIRMAN. I would like to say a word there. I have not heard any such allusion made.

Senator PITTMAN. What I mean by this is not the efforts of the commission to agree with Nevada or with Arizona. What I mean, Senator, is the form of cross-examination that you were just participating in, which was leading to the conclusion that everything should be borne by power. That was the theory. That it had to be borne by power, and it was unfortunate that there would not be anything left for the State of Nevada as compensation.

Senator JOHNSON. Oh, no; that was not the point of it at all. I have in my mind very clearly—I do not think you will disagree with it—that without power and the possibilities of power from this project, the project could not go on at all.

Senator PITTMAN. Not at all.

Senator JOHNSON. And that is what I was examining him about. And that the only place you can sell power in reality is in southern California under the circumstances. There is not any doubt on that score, I take it, and there ought to be no disagreement between us in respect to it.

Now, if I read the record correctly, Congressman Douglas asserted that the power set up in connection with the Boulder Dam project was economically unsound and would not permit or justify the payment of revenue therefrom to Arizona and Nevada. You do not agree with that, do you?

Mr. MALONE. I do not agree with that, considering the outline I made for proper charges.

Senator JOHNSON. Yes. Now, as part of your estimated cost of power from the project delivered in central markets do you include the cost of steam stand-bys to make such power reliable or steam stand-bys for delivery from a distance, say, of 300 miles?

Mr. MALONE. I do not agree with your conclusions, and I may say that our engineers, our power experts, do not agree, and two of Arizona's engineers took the same view, and Charles Cragin, of the Salt River project, agreed that there might be a certain amount.

Senator JOHNSON. I really do not know what transpired at San Francisco, so I am asking you if you included those stand-bys.

Mr. MALONE. Yes; I appreciate that. Your engineers figured five-tenths of a mill would be required for steam stand-by service to make this power reliable in the power markets.

Senator JOHNSON. Exactly.

Mr. MALONE. We do not agree with that, as I say, and Charlie Cragin figured that perhaps twenty-five one-hundredths of a mill, or something like that, would be required. In other words, a very small amount in comparison to your engineers' assumptions that would be directly chargeable to Boulder Canyon power, and I will say why, briefly, and that is covered in the report which I will submit, and it can be studied by the committee, if they so desire. Over

one-half of the power, or about 240,000 horsepower, will be needed to lift 1,500 second-feet over your divide. That will be a much decreased distance—perhaps 200 miles; maybe 175 miles, for that part of the power. Your own people can verify that. And then, too, on that particular power, by aid of small reservoirs at the point, and also near Los Angeles—they are already constructed, most of them, near Los Angeles—a small interruption in service, as much as would ever come about, except in a catastrophe that is impossible to gauge, you would not be handicapped. Therefore you only have left about 200,000 horsepower to figure steam stand-by on. This is taking for granted you are going to do what you maintain you are going to do with your water.

Senator JOHNSON. Would steam stand-bys at all be necessary? We will not go into the cost of them for the moment.

Mr. MALONE. The reason that I say I do not believe the amount you estimate will be necessary, I do not base it entirely on my judgment. I base it on the judgment of power experts employed by us and others. That with your all-southwestern hook up that you have now practically and will have complete by that time, meaning all your different companies in the West are practically hooked up; even up in Nevada they are hooked up over here to California, and along with the steam plants that are necessary for an economic balance between the hydroelectric and the steam power, meaning by that your base load is more economic in most cases to carry by hydroelectric, and your peaks by steam, simply because your steam investment is smaller, and as it stands idle your interest is smaller and when it is running it costs more; but if it is only running on peaks and short periods it is a more economic proposition to carry your peaks by your steam. Your hydroelectric costs more to install, or it costs more in this case on account of transmission, etc., but in turn it is a more reliable power and it does not cost so much to operate. Therefore, you have your economic balance between steam and hydroelectric, and that a possible overload on this steam obviates to some extent the stand-by that you might otherwise need. What I am getting at is you have possible overloads on steam plants and you have hook ups from various plants. Therefore, each plant in the western country does not necessarily need the full amount of stand-by service, if you get what I mean. Only a small amount would be directly chargeable to Boulder Canyon.

Senator JOHNSON. I will get what you mean if you will answer me directly.

Mr. MALONE. All right, I will.

Senator JOHNSON. Do you require in transmitting 300 miles of power steam stand-bys?

Mr. MALONE. The reason it is impossible to answer you yes or no—I have to explain in each case; each case would be different.

Senator JOHNSON. If you will just tell me if it is not so I will not trouble you further.

Mr. MALONE. In this particular case what do you want to know?

Senator JOHNSON. In this particular case would steam stand-bys be essential?

Mr. MALONE. Yes; but a very small amount chargeable to Boulder Canyon. You did not ask that before.

Senator JOHNSON. Well, that was what I meant.

Mr. MALONE. You might possibly need half of what the California engineers included, but I do not think under any consideration you would need the full amount.

Senator JOHNSON. Are you speaking now in matters of cost or matters of amount?

Mr. MALONE. Both.

Senator JOHNSON. Well, as I understand you, you would need steam stand-bys?

Mr. MALONE. You might need some. Twenty-five one-hundredths mill would probably be the maximum.

Senator JOHNSON. Is that included in your estimate that you have given here?

Mr. MALONE. No.

Senator JOHNSON. That was the point I was getting at.

Mr. MALONE. I just add to that, however, for the record, that in our opinion you need a very small amount on account of this project, and it is gone into fully in the report.

Senator JOHNSON. By that you mean you do not need steam stand-bys?

Mr. MALONE. That in my opinion a very small amount may be needed. I say it is a controversial question, and there is no use of me saying that I know exactly what will come about when this project is entirely utilized.

Senator JOHNSON. Exactly. And at any rate any cost of those steam stand-bys is not included in the estimates that you have given here?

Mr. MALONE. No.

Senator JOHNSON. Correct, sir. Now, is it not a fact that there are improved processes, tremendously improved processes, that are being put into operation now for cheapening power from steam?

Mr. MALONE. In what regard?

Senator JOHNSON. I don't know. In many regards.

Mr. MALONE. Yes. I will try to answer that, although, of course, it is impossible to answer it. It is a controversial question, too. They have a process by which mercury vapor is used to increase the efficiency, and they also have a possibility of increasing the boiler pressure to increase the efficiency.

Senator JOHNSON. The reason I ask you the question is because I read a setatement by a gentleman—his name I forget, but he is the president of one of the big southern power companies—in which he said that because of the improved processes and the cheapening in the production of power by steam he did not care anything about this power at Boulder Dam. I don't know whether he was in earnest or whether he was not; but at any rate that was the published statement that I saw.

Mr. MALONE. Our conclusions are, after studying the situation thoroughly and employing such power experts as I mentioned a while ago, that he was either mistaken or not serious.

Senator JOHNSON. I see.

Mr. MALONE. But, of course, that is a controversial question. But with regard to these increased pressures in boilers, it is the consensus of opinion among engineers that there will be some slight decrease, possibly, but that the increased cost in the construction

will offset in a large measure any possible reduction in costs due to that fact, and that with the mercury vapor, the increased cost of that product itself will do the same thing. And also it is the opinion of every disinterested fuel expert that I have been able to find on the Pacific coast that your fuel will become a problem in a few years, and that any decreased cost, if not offset otherwise, would be by the increase in fuel. Understand, those are all questions that you can get expert opinions on, and they will differ.

Senator JOHNSON. Well, I was asking you as an expert, because I confess I know nothing about it, but I saw this report of the increased facilities, the improvements that were enabling them in the vicinity of Los Angeles to produce power from steam at a greatly reduced cost. Are you familiar with that, Mr. Chairman? Did you see anything about it?

The CHAIRMAN. I read the same statement, I believe, and I think that from it I may have derived the figures that Mr. Malone himself agreed upon.

Senator PITTMAN. If that is true, then the Government would build the dam depending entirely on the power to pay for it, and nobody would buy it.

Senator JOHNSON. Don't think that I am vouching for the statement of the gentleman who made the statement. I beg you not to think so.

Senator PITTMAN. I do not know who he is, but I have an idea.

Senator JOHNSON. Don't get me into the attitude of vouching for the statement of somebody that is at the head of a power company, please.

Mr. MALONE. When you referred to me, Senator, as an expert—I used to think I was an expert, but the farther I go the more experts I consult on this kind of project.

Senator JOHNSON. You are a little like the rest of us. None of us are experts. Don't you think that the Government, considering what it has done and is doing in other reclamation projects, relieving settlers from interest, and so on, could fairly and reasonably relieve the all-American canal from interest charges?

Mr. MALONE. Under a bill I believe introduced by yourself last year the all-American canal was under the reclamation act, where there are no interest charges, and provided that contracts be made prior to the construction of the all-American canal providing for the payments, and so forth.

Senator JOHNSON. Well, I am asking you if you do not think that is a perfectly just thing under the circumstances?

Mr. MALONE. You could eliminate the interest and still make just charges. I do not say in this report that you shall pay any certain amount, but pay for the service rendered. Pay the just charges, whatever they are. And we consider that the Secretary should have some assistance from men who are on the ground or are familiar with conditions to determine what those just charges are.

Senator JOHNSON. Your plan, however, would provide that the Secretary should have the control?

Mr. MALONE. Oh, yes.

Senator JOHNSON. They would be advisers to him in respect to the matter, solely?

Mr. MALONE. I think it would be necessary that he be in control. Any board merely acting in an advisory capacity, I should say.

Senator JOHNSON. Merely in an advisory capacity.

Senator PITTMAN. Senator, may I ask a question there on that same subject?

Senator JOHNSON. Surely.

Senator PITTMAN. Do you happen to know what amount per annum the interest would amount to on the all-American canal project?

Mr. MALONE. On what they call the straight-line basis, about $890,000—$896,000, I believe.

Senator PITTMAN. $896,000?

Mr. MALONE. Per year.

Senator PITTMAN. Now, let me ask you what the State of Nevada would think about it if $896,000 added to the cost of the power was such an amount that there would be no profit for distribution to Nevada? Would Nevada favor paying that interest?

Mr. MALONE. We would like to be treated fairly in the matter, and I would leave that to the judgment of the committee. I would not say that it all should be given to one State. The point I have tried to make in my reports is that there will be profits in this enterprise. Whether your committee recognizes that fact or not is beside the question. If you do not recognize it they will all go toward the particular thing that is being financed in the set-up. If you do recognize it, then in case the profits are sufficient the two States who own the site may benefit.

Senator PITTMAN. I am merely trying to ascertain the position to take in the matter. I am frank with you. I have not conferred with Mr. Malone in this matter, and I am trying to understand his report, too, as much as you.

Senator JOHNSON. Well, I am not familiar with it, I confess to you. All of the charges that you have suggested are charges that should be made in the interest of increased power revenue, are they not?

Mr. MALONE. Not power revenue, Senator. All the charges that I suggest should be made would be made on a fair basis to the particular projects financed, and which would be made with a view of returning the investment to the Government in the proper time, and also allowing a fair return to the States furnishing the dam sites, if you please.

Senator JOHNSON. Yes. You would not expect, as I understand your plan, any profits to accrue to either of the States until after those profits had begun to come in?

Mr. MALONE. I would not expect anyone to borrow money to pay the State of Nevada.

Senator JOHNSON. It would not be a question of borrowing money, perhaps, but you would wait until the project was self-sustaining, or until profits were coming in before you would pay any profits out, would you not?

Mr. MALONE. Well, that was the particular point on which I would like very much to have a board assist the Secretary, because it is very easy to make a showing, for instance, that your domestic water costs you so much that you can not at this time afford to pay for it. But if the facts were gathered by a board and laid before the Secre-

tary, they could be judged on the facts of the case as to where the water was going, and what charges were being made for it, and whether or not the returns justified it. That is what I mean, Senator.

Senator JOHNSON. I see. Thank you very much, Mr. Malone. I wish to God there was some other place that Los Angeles could get domestic water than the Colorado River, but I don't know any other place.

Mr. MALONE. Well, why would you wish that, Senator?

Senator JOHNSON. Well, then we would not have any water-right troubles, perhaps.

Mr. MALONE. There might be worse troubles, Senator.

Senator JOHNSON. No; if we could protect Imperial Valley in some fashion and give domestic water to southern California in some other way than by the erection of any of these works I would love it, I confess to you. It is no pleasure to be here in opposition—well, never mind, excuse me for that.

The CHAIRMAN. Are there any further questions of the witness?

Senator PITTMAN. I just want to ask one further question there. Under the set-up in the Johnson bill, would there be any profit on this power?

Mr. MALONE. With no revenues from any other source, Senator?

Senator PITTMAN. Just as he sets it up in his bill?

Mr. MALONE. There would be a theoretical small profit; but, as suggested, there probably will be extra expense here and there that might very properly consume the entire margin unless proper charges are made. I would say that the set-up shows a profit on power alone.

Senator PITTMAN. Your set-up is made on the basis of paying interest on the investment in the all-American canal, is it not?

Mr. MALONE. There is a set-up in my report that takes every item set up in the Senator's bill into account, and then the separate items, what they amount to, which, by the way, are in your office, Senator. I wish I had them here.

Senator PITTMAN. And what margin does that leave between the cost and the market price of other power in the market at Los Angeles?

Mr. MALONE. With everything included, about an even mill; 1.1 mills theoretical margin.

Senator PITTMAN. Based on the set-up?

Mr. MALONE. The entire set-up?

Senator PITTMAN. The set-up in the Johnson bill?

Mr. MALONE. Yes.

Senator PITTMAN. That is all.

The CHAIRMAN. Anything further?

Senator HAYDEN. I attended the Denver conference when you were present and saw the States come very close to accord. I am very much interested in your statement of the result of the conference at San Francisco. I understood you to say that the California offer was approximately 0.4 of a mill per kilowatt-hour as compensation to Arizona and Nevada, and that certain members of the Arizona commission offered to recommend approximately 0.6 of a mill per kilowatt-hour.

Mr. MALONE. Certain members of their delegation. I do not know whether they are even members of the commission. I do not hold the commission to that, you understand.

Senator HAYDEN. I understand, but those were figures that were seriously discussed.

Mr. MALONE. Yes.

Senator HAYDEN. Being a difference between the States of approximately 0.2 of a mill per kilowatt-hour?

Mr. MALONE. Yes.

Senator HAYDEN. I was anxious to get those facts fixed firmly in my mind. I noticed in the course of your testimony—and I made some figures here—where you fix the price of power laid down in Los Angeles, taking into consideration the set-up in the bill, at 3.75 mills per kilowatt-hour. And then I understood you to say that leaving out the set-up in the bill with respect to the all-American canal, that power could be laid down in Los Angeles for 3.04.

Mr. MALONE. Yes; that was the statement I made.

Senator HAYDEN. Well, subtracting the one from the other, then the subsidy to the all-Americal canal in the hill amounts to seventy-one one-hundredths of a mill? Am I correct in that assumption?

Mr. MALONE. Yes; the difference amounts to that.

Senator HAYDEN. If that is true, then there is a subsidy in the bill of over seven-tenths of a mill for the all-American canal, whereas California has offered to Nevada and Arizona only four-tenths of a mill by way of compensation, and Arizona, as was explained by the representatives of Arizona, has asked for only six-tenths of a mill?

Mr. MALONE. For the two States.

Senator HAYDEN. The two States. So the set-up that exists in the bill carries more by way of subsidy to the all-American canal than was asked by the representatives of Arizona in San Francisco as compensation to the two States?

Mr. MALONE. Yes. And in that connection, Senator, I want to say this: There is some difference of opinion between myself—I won't include too many members of the Nevada commission—I will speak for myself, but I believe they are in accord with me on that. We have always considered that the all-American canal does benefit all of the seven States to whatever extent that it might assist in the gaining of an agreement with Mexico at the proper time, but I or our commission are not in position to judge what that would be. You members of the committee are in a position to judge that. I have always considered there was some benefit. What that benefit is, it is probably not anything like as much as is included, but whatever it is determined to be it is perfectly all right with us. Arizona insists, on the other hand, and they argue it, and in some ways it looks like it is well taken, that it is no benefit whatever to the other States, but, as I say, the Members of Congress and the members of this committee are far better able to judge what benefits there would be in that particular than any commissions.

Senator HAYDEN. As I understand you to answer Senator Johnson, you would have no objection to the construction of the all-American canal as an ordinary reclamation project, without interest, for the benefit of the lands in that section of the country, and it would be a positive advantage to the scheme to have it done in that way. In other words, this seven-tenths of a mill that is charged to power by having the all-American canal constructed as an ordinary reclamation project would be removed?

Mr. MALONE. Interest on the all-American canal amounts to, as I say, about $896,000 a year on a straight-line basis, meaning the average over the period. Which, in turn, amounts to almost exactly a quarter of a mill in this set-up. That could be eliminated if the Senator's bill was drawn as it was last year at one time, so that the all-American canal would be constructed under the Reclamation Service, contracts being made with the lands prior to starting construction, the same as you have it on the dam in regard to power, and then there would be no interest, and the lands would pay the cost. Does that answer your question?

Senator HAYDEN. Yes. I can see that. Now, the set-up in the bill of last year provided for $31,000,000 for the construction of the all-American canal. The bill itself provides for the construction of a canal from the Laguna Dam into the Coachella Valley. My understanding of that $31,000,000 figure is that it would only carry the canal through the sand dunes and into what now comprises the Imperial irrigation district. There will be some eighty-odd miles for the additional canal to the Coachella Valley, at a cost of about $11,000,000, to carry out the purpose of the bill. Have you in your set-up counted on $31,000,000, or a total of $42,000,000, for that purpose?

Mr. MALONE. We have counted on $31,000,000—it is either $31,000,000 or $31,500,000, I have it in my report, and in addition the interest during the construction of the canal, which would only be a part of the 10 years as outlined for the dam, making a total of $35,000,000, including interest during construction and the original cost of the canal. Now, I am not exactly clear where the end of the canal would be, Senator, and I would not answer it without referring to the Weymouth report. You can get it from the report if you desire.

Senator HAYDEN. My recollection of the Weymouth report is that the cost of the all-American canal proper, carrying it only through the sand dunes, would be $31,000,000 and that there would be an additional cost of $11,000,000 to carry it from that point to the Coachella Valley. Now, the bill provides for delivering water into the Coachella Valley. So it seems to me that if the plan of the bill was carried out you would have to make your figure $42,000,000 instead of $31,000,000, and base your calculations on that assumption.

Mr. MALONE. I would be very glad to clear that point up for the committee. I am satisfied that Thomas Maddock or myself could do it. I could tell you, though, definitely in a day or so.

Senator HAYDEN. That is all.

Senator JOHNSON. Was not the only proposition that was made by Arizona in writing the proposition that was made in Denver of 1 mill?

Mr. MALONE. No, Senator. In that same proposition were included three others or two other propositions signed by two Arizona men and two Nevada men, or three. I think Senator Pittman signed it with us. We had him there as our legal adviser. And two or three California men included two or three other propositions which were fair to California, or closer—or a lower figure, put it that way, than 1 mill.

Senator JOHNSON. At any rate, it is in writing?

Mr. MALONE. Yes.

Senator JOHNSON. Very well. But the proposition was in writing?

Mr. MALONE. Yes; the proposition was in writing. And so are the others in writing.

Senator JOHNSON. So we can obtain them?

Mr. MALONE. Yes.

Senator JOHNSON. You say there were other propositions in writing in San Francisco?

Mr. MALONE. No; no propositions were made in writing. We simply held sessions without keeping a record, simply so we could talk freely. I am not here quoting to bind anybody. Your commission is not bound by anything I say, because it was understood that if we did not arrive at an agreement it was off like that, and we would start new again.

Senator JOHNSON. All right. That is all.

The CHAIRMAN. Anything further? If not, that will be all, Mr. Malone. We thank you. Mr. Squires, do you desire a few minutes?

Mr. SQUIRES. Just about two minutes, Mr. Chairman.

STATEMENT OF CHARLES P. SQUIRES, A MEMBER OF THE COLORADO RIVER COMMISSION OF NEVADA, LAS VEGAS, NEV.

Mr. SQUIRES. My name is Charles P. Squires; I am a member of the Colorado River Commission of Nevada, and I am talking here at this time because in the interests of brevity and clarity I think it desirable that the position of Nevada with regard to this legislative situation be clearly placed in the record.

Nevada desires Boulder Dam legislation at the present session of Congress.

We prefer a three-State agreement and complete ratification of the seven-State compact. If this shall prove impossible, we desire this legislation to proceed on a six-State compact basis.

Nevada's requirements from the Boulder Dam project are:

1. An allocation of 300,000 acre-feet of water.

2. The right to the use of 100,000 firm horsepower of electric energy, to be paid for at actual cost at the bus bar of the generating plant, with the understanding that this may be used in other States until needed by Nevada, and that such power may be recaptured for use in Nevada in such amounts and on such reasonable notice as may be agreed upon.

3. Reasonable revenue from the power in lieu of taxation.

The CHAIRMAN. Mr. Squires, do we understand from that that Nevada desires, in addition to the allocation of water, an allocation of power amounting to almost one-fifth of the firm horsepower to be produced at actual cost at the bus bar?

Mr. SQUIRES. Yes, sir.

The CHAIRMAN. And in addition thereto one-half of the revenue allotted to Arizona and Nevada on the remaining 450,000 horsepower?

Mr. SQUIRES. Not so, Senator. That is not our thought. That on any power which we shall be able to use within the State of Nevada we are building up our own resources and from them we will gain in taxation far more revenue than we could hope for from power direct.

The CHAIRMAN. But you desire to take it at the switchboard at cost?

Mr. SQUIRES. At cost.

The CHAIRMAN. And retail it at the market?

Mr. SQUIRES. At cost, including the amortization costs of the project and have it to use for the development of industries within our State of Nevada the same as they expect to use a portion of the power for the development of industries in California. On the same basis.

Senator PITTMAN. Is that in conformity with the statements made by Mr. Malone?

Mr. SQUIRES. I think so; quite so.

Senator PITTMAN. I understood Mr. Malone to say that they wanted half of the profits on this power and the right to withdraw a certain amount of power in the State for use as required?

Mr. SQUIRES. I think it amounts to the same thing, Senator. I do not think he had the thought that we should receive from California sources profit on power that we were using within our own State.

Senator PITTMAN. Well, if there were 100,000 horsepower withdrawn from the total horsepower at cost it would change the profits, would it not?

Mr. SQUIRES. I think it would, as far as we were concerned. We certainly would forfeit our rights to any revenue from California sources on that power, on that portion of it.

Senator PITTMAN. I am thinking about the drafting of the bill. That is what I am thinking of now.

Mr. SQUIRES. I have been endeavoring to avoid any details whatever.

Senator PITTMAN. Would there be 100,000 horsepower provided for Arizona on the same basis?

Mr. SQUIRES. There might be, although Arizona has said consistently that they desire but very little power reserved for them. They have ample sources of power within their own State. This power, as I see it, might be used for many years by California agencies before our needs in the State of Nevada would develop sufficiently so that we would desire to recall any of it. But we desire to have that right of recall so that if and when our need develops for that power we can have the right to take it and use it in the development of our own State.

Senator PITTMAN. What I had in mind, Mr. Squires, is this: I think we all recognize that if there are any remunerations to Nevada and Arizona the remunerations should be the same.

Mr. SQUIRES. Absolutely.

Senator PITTMAN. Now, if the profits on that power were to be divided equally between Arizona and Nevada, and in addition to that Nevada was to have 100,000 horsepower at cost, that taking of the 100,000 horsepower at cost would mean that Arizona participated in four-fifths of the power. So then Nevada would make profits on the other one-fifth?

Mr. SQUIRES. I have not attempted to figure out how that could be handled. I have attempted to say in a general way what we desired to do. We do desire power to use within our own State.

Senator PITTMAN. Well, what I was trying to get was whether the commission had in mind, if the bill was drawn along that line, that Arizona should have the same provision?

Mr. SQUIRES. We have no objection to Arizona having that provision made. I think Arizona is properly entitled to receive from

that project all of the power that they need from it. All that they have reasonable use for.

The CHAIRMAN. Are there any further questions of this witness?

Senator ASHURST. I have no questions, Mr. Chairman, but I would like Mr. McCluskey to go on now and then we would finish Arizona.

The CHAIRMAN. How much time will he want?

Senator ASHURST. He has some new matter and he will be brief if he is not subject to interruption.

Senator JOHNSON. Let us understand. I have a very important engagement at 4.30. We will give him to 4.15, that is one-half hour. That ought to be enough under the circumstances.

Senator ASHURST. If he is not interrupted too much by questions he can finish in that time.

Senator JOHNSON. At 4:15 we will adjourn.

The CHAIRMAN. We must adjourn at 4.15. I have some important matters to attend to.

Senator JOHNSON. We are at least entitled to one day, four hours, to-morrow, and I want that full four hours.

The CHAIRMAN. You may proceed on that understanding, Mr. McCluskey.

STATEMENT OF H. S. McCLUSKEY, MEMBER OF THE COLORADO RIVER COMMISSION OF ARIZONA, STATE CAPITAL, PHOENIX, ARIZ.

Mr. MCCLUSKEY. In order to show a unanimity of sentiment in Arizona and that some of the former supporters of this measure have changed their minds, I have a telegram here addressed to the Governor of Arizona from the board of the Yuma County Water Users Association:

> The board of governors just passed the following resolution:
> "Whereas there is no agreement between the seven States as to the division of water and power; therefore be it
> "*Resolved by the board of governors of Yuma County Water Users Association,* That we protest the passage of the Swing-Johnson bill or any other legislation until such an agreement is reached."
>
> YUMA COUNTY WATER USERS ASSOCIATION,
> J. S. POWERS, *Secretary.*

The telegram is dated January 18, 1928.

I am also advised that the Chamber of Commerce of Yuma, who had indorsed the proposition this year, and a telegram from that association was read into the House record, are now taking a referendum vote of the members on the proposition of rescinding that indorsement.

This bill, as I understand it, does not proceed on the basis outlined by Mr. Wilson, of New Mexico, and Mr. Bannister this morning, that there is any intent to use the subterfuge that the Colorado River is going to be developed for navigation. As I understand the proposition, the bill proposes to store the waters of the Colorado River in order to make them available for the generation of hydroelectric power which is to bear the cost burden of the project. The project is primarily to provide flood control for the Imperial Valley, the desilting of the river, the making of further water available for irrigation and domestic use, to pay the interest and the M. and O. on the transportation of that water from the Colorado River into the Imperial and Coachella Valleys. There is not a word in

the bill, either the Phipps bill or the Swing or the Johnson bills concerning navigation.

The CHAIRMAN. Pardon me, if I may interrupt you at that point, Mr. McCluskey. When another witness was on the stand the other day and raised a question as to the title and purposes of the bill, I replied that both the Swing-Johnson bill and the Phipps bill were predicated upon the navigability of the river. Further, that it was quite customary to change the title of the bill at the time of its enactment. The recitation, "To provide for the construction of works for the protection and development of the lower Colorado River Basin" is a very comprehensive statement. Under that, as the committee work on the bill progresses, I have had it definitely in mind to propose an amendment covering the point of navigability of the stream, because I have been convinced that the work to be performed would have the result of improving the stream for purposes of navigation.

Mr. MCCLUSKEY. Well, in any event, it is neither in the title nor in the context of the bill, as I have intended to discuss the bills as drawn rather than what might be in the minds of the members of the committee, becauses I am not able to read the members' minds and I do not know their minds.

The CHAIRMAN. I simply give that information at this time so that you may know that it has been in the mind of one of the members of the committee, at least.

Mr. MCCLUSKEY. Well, I could not be advised of that, Senator.

Now, something was said about this project being considered as other irrigation projects are considered and something was said with reference to irrigation projects in the State of Arizona.

There are two Federal irrigation projects in the State of Arizona: The Salt River project and the Yuma project. The Salt River project will probably repay to the Government all that has been expended in its development in the next 10 years, and the Yuma project in about the same time.

The CHAIRMAN. What about the San Carlos project?

Mr. MCCLUSKEY. That is not a Reclamation Service project. It is a project upon which the farmers will pay to the Government its investment and the interest in full.

The CHAIRMAN. It does not happen to come under the straight reclamation act on account of the Indian lands, but it is, nevertheless, a project in Arizona which is being developed by Government aid.

Mr. MCCLUSKEY. It is being developed by Government aid, but they will pay all the money invested and the interest.

In the hearings before the Committee on Rules of the House of Representatives, on H. R. 9826, there is a table on page 15 purporting to show all the power plants constructed on reclamation projects, the amount of power developed on all of them, the first cost of the plant, the gross power sales, and the net power revenue. All of the power developed to date—this comes from Government sources—I do not stand sponsor for the figures. But it shows 55,000 horsepower developed on all the Reclamation Service projects. I am advised that it was developed in the first instance to provide power to aid in building the project. I would like to put this table in the record.

(The table referred to is as follows:)

Power plants constructed on reclamation projects

State and project	Name of plant	Station capacity (kilovolt-amperes)	First cost of plant	Gross power sales [1]	Net power revenue [1]	Remarks
Arizona:						
Salt River	Roosevelt	10,000	$557,560			
Do	Cross Cut	5,000	480,455			
Do	South Consolidated	2,000	163,140	(2)	$998,411.03	Costs and sales cover plants constructed by United States and operated to Nov. 1, 1917; do not include enlargements or new plants constructed by Salt River Valley Water Users' Association.
Do	Arizona Falls	1,000	109,500			
Yuma	Siphon Drop	2,000	274,783	$6,074.11	2,649.11	Operation commenced July 26, 1926. Estimated net annual power revenues, $35,000.
Idaho:						
Boise	Black Canyon	10,000	409,800	41,390.00	35,000.00	
Do	Boise River	1,875	167,905	(2)	157,491.72	
Minidoka	Minidoka	7,000	455,317			
Nebraska-Wyoming:				1,040,657.85	639,860.90	
North Platte	American Falls (2 plants)	1,540	76,975			
Do	Lingle [3]	1,750	186,693	304,029.45	82,534.52	Estimated cost. Plant under construction.
Do	Guernsey	6,000	475,000			
Nevada, Newlands	Lahontan	1,875	141,866	227,765.95	142,486.23	Leased to Canyon Power Co., 10 years.
New Mexico-Texas, Rio Grande	Elephant Butte	187	8,440	(2)	2,243.33	Plant used for irrigation facilities mainly.
Utah, Strawberry Valley	Spanish Fork	1,000	60,725	249,653.22	15,125.07	
Washington:						
Okanogan	Power plant No. 1	187	11,923	1,754.71	952.84	Plants not operated for commercial sales, due water shortage.
Do	Power plant No. 2	187	13,931			
Yakima	Rocky Ford	187	23,000	(2)	3,635.33	Plant operated for irrigation facilities mainly.
Wyoming:						
Riverton	Pilot Butte	1,000	147,405	19,281.81	4,182.01	
Shoshone	Shoshone	2,000	565,454	41,551.10	15,865.54	
Total		55,000	4,329,872		2,092,073.61	

[1] Gross power sales and net power revenues cover sales of surplus power only; do not include power developed by the plants and used by the United States for construction of irrigation works, pumping for irrigation, and other purposes.
[2] Gross sales not available.
[3] Net power revenues in all cases except Lingle power plant, North Platte project, based upon operating costs only, not including depreciation on plant.

Mr. McCLUSKEY. In the Salt River project, with which I am most familiar, all the power developed by the Government on that project, amounting to 18,000 horsepower, is inadequate to care for the needs of the project, itself, and there is none of it available for commercial use. The power on the Salt River project which is sold, to which reference is made so often, is power for which the farmers have bonded themselves, and their lands over and above what the Government has advanced to it.

The CHAIRMAN. Just for your information, Mr. McCluskey, the Roosevelt Dam is at the head of the stream.

Mr. McCLUSKEY. Yes, sir.

The CHAIRMAN. And farther down a subsidiary plant was under construction two years ago.

Mr. McCLUSKEY. Yes; and another one is now under construction.

The CHAIRMAN. So is the one at——

Mr. McCLUSKEY (interposing). Two; one at Mormon flat, and one at Horse Mesa. There are three other plants on the project now operating.

The CHAIRMAN. At Horse Mesa?

Mr. McCLUSKEY. Yes; and another one is now planned at Stewart Mountain.

The CHAIRMAN. And the output from both those additional plants will be used almost entirely in the reclamation project later on.

Mr. McCLUSKEY. No; they have sold some of the power from those two plants, a portion of it; a considerable portion of the power is being used in the project for pumping for drainage purposes.

The CHAIRMAN. Yes.

Mr. McCLUSKEY. In the report submitted to the Secretary of the Interior by the committee of special advisers on reclamation, Senate Document No. 92 of the Sixty-eighth Congress, first session, on the first page, the report addressed by the committee to the Secretary of the Interior, Hon. Hubert Work, the statement is made that—

> The net construction costs of the projects, subject to repayment as of June 30, 1923, is, in round numbers, $143,000,000. Of this amount about $101,000,000 are covered by active water-right contracts; $39,000,000 are unsecured by water contracts.

That is the amount of money spent upon construction by the Reclamation Service from its origin up to June 30, 1923.

So that this project is asking for approximately as much money as was expended by the Reclamation Service up to the time that report was made.

This bill contains a provision—section d of Article 8—which refers to section 10 of article 20 of the constitution of the State of Arizona. There is no such section in the constitution of the State of Arizona. The people of the State of Arizona, at a special election called for that purpose, repealed that particular section of their constitution.

Senator McNary, in a statement made early in these hearings, stated that he had put an amendment in this bill last year, that had subjected the project to the terms of the reclamation act and that thereby, in his opinion, the State of Arizona was protected by the reclamation act. I think that is a correct statement. It may not be the exact wording.

Senator McNARY. I did not say anything about Arizona. I said that the bill which I was preparing contained that provision, subjecting the all-American canal to all the rules, regulations, and costs that are specified in the act of 1922, and all supplementary acts.

Mr. McCLUSKEY. I am assuming that section 13 of this bill may be that amendment. [Reading:]

> This act shall be deemed a supplement to the reclamation law, which said reclamation law shall govern the construction, operation, and management of the works herein authorized, except as otherwise herein provided.

I direct attention to the wording, "except as otherwise herein provided."

That is no protection to Arizona.

Mr. Bannister in his statement here this morning set out many of the provisions in these Swing-Johnson and Phipps acts which are exceptions to the general terms of the United States reclamation act. So far as that amendment is concerned, Arizona receives no protection under it or in the bill. In fact, as near as I can determine, the bill is designed to say to the State of Arizona that, "in spite of the fact that you do not want this Santa Fe compact, and that your people will not accept it, that we are going to impose the terms of the compact upon you, both as to the Colorado River proper, as it will be regulated by the Secretary of the Interior at Boulder Canyon, and to the Arizona tributaries by the denial to the State of Arizona of any right to use the public lands as rights of way for canals for transporting water either for irrigation use, domestic use, or for transmission lines for the transmission of power." If the bill passes and is declared valid we are not going to be able to use our own waters from tributary streams wholly within our own State, the water from which comes from the rainfall upon our own watersheds.

So, in effect, this act says to Arizona; that unless you accept the Santa Fe compact and be bound by it you can not have water. This bill is to be imposed upon us by a confederation of four States, under the bill of Senator Johnson, six States under the bill of Congressman Swing, and seven States by the bill of Senator Phipps.

The CHAIRMAN. But essentially I think that the matter to which you refer relates to the waters impounded by the structure; it does not go to the waters of your tributary streams that reach the Colorado River below the point which is selected for the erection of the dam, as I understand it.

Mr. McCLUSKEY. Not as I read the bill.

I think that statement is also borne out by Mr. Bannister's statement that the bill provides that no public lands or rights of way over public lands shall be granted to any State, which fails to ratify the compact, to take water from the Colorado River system. In other words, that all the waters in the lower basin are to be subjected to the terms of the compact. Mr. Bannister also called attention to the fact that the San Carlos project, which is wholly within the State of Arizona, would be subject to the compact, under the terms of the Swing-Johnson bill. I am not certain but that it would include the Salt and Yuma projects.

The State of California, in her act rescinding her ratification of the seven-State compact and ratifying the six-State compact, provides that her ratification is contingent upon—

(*a*) The development to be at or below Boulder Canyon, and the development to be of a capacity of less than 2,000,000 acre-feet of water.

(*b*) That the Congress of the United States is to exercise the jurisdiction of the United States to make the jurisdiction of such compact binding and effective as to the waters of the Colorado River.

The Colorado River compact, in defining the Colorado River, defines it not only as the main Colorado River, but as the Colorado River and all of its tributaries, and makes no exception of the tributaries in the State of Arizona. So as we interpret the bill, Arizona is to be denied the right to use any additional water even though it may originate in her own State, which is a part of the lower basin in the lower Colorado River, until such time as we agree to come in and subscribe to the compact, in spite of the fact that we believe it wholly unfair to our State.

Senator McNary referred yesterday to Senate Document 31, of the Seventieth Congress, first session. After a hasty examination last night we can not see that that document, or the statements contained therein, from the Attorney General of the United States, in any way affects the contentions that were made by the State of Arizona. In the conclusions on page 10 under the head of (*a*), discussed on page 11, the language is as follows:

> It is granted that in 1819 when Alabama was admitted as a State, the title to the beds and waters of navigable streams was lodged in the State subject to the rights since surrendered to the United States by the Constitution.

On page 11 it is stated:

> In Alabama the legal title to the beds and waters of navigable ways is lodged in the State in trust for public purposes; subordinate, however, to the supreme right of navigation, which is lodged in the United States for all the people of all the States.

This is exactly the rule we have always contended for in Arizona. It is the rule laid down in Shively *v.* Bowlby, 152 U. S. 1, and in Boquillas Co. *v.* Curtis, 213 U. S. 339.

The opinion, after having conceded the foregoing premises, goes on and presents a number of grounds upon which it is claimed that the State of Alabama has lost its right in the bed of the river which it is conceded the State once owned.

The grounds upon which this contention of loss of right by the State of Alabama is based are the following:

(1) The United States having rightfully built the dam in pursuance of the rightful powers, and with the consent of the State of Alabama, has become complete owner of the dam and the ground upon which it rests.

(2) That the State of Alabama is estopped by her acquiescence from claiming title to the ground upon which the dam stands.

(3) That the State of Alabama granted the right to build the dam to a company, and the company deeded the right to the United States.

(4) That Alabama, by a legislative act, had ceded political and legislative jurisdiction over the said lands to the United States.

(5) That Alabama, by conveying the land riparian to the stream to private owners, the title of which the United States later acquired

without reserving to herself the bed of the stream, conveyed the land to the middle of the stream.

Only the first proposition applies to Arizona's rights in the Colorado River. Under it Arizona acquired title to the bed of the river. Arizona has done nothing to estop herself or to convey her title to the bed of the river. It is undoubtedly true that the United States could build a dam on the river for the purpose of maintaining its navigability or for any other proper Federal purpose, but could not construct a power or irrigation dam without the consent of the States of Arizona and Nevada.

Arizona does not believe that it is absolutely essential, in order to insure flood protection to the Imperial irrigation project, that it is necessary to build this Boulder Canyon project. We believe that flood control can be provided for Imperial Valley without cost by adopting other means. We believe that if the Government insists upon providing flood control and the improvement of the river for navigation, that it is not essential to build this tremendous project down there. We contend that the purpose of building this tremendous project is for irrigation and power purposes. We contend that navigation can be provided and flood control also at much less cost. There is testimony in your hearings that flood control can be provided at the Mohave site for $15,000,000.

There is testimony in your record by Mr. Weymouth that flood control can be provided at Boulder Canyon for $28,000,000.

We have a report by an engineer by the name of B. F. Jakobsen, of the city of Los Angeles; we knew nothing about him up to the time we hired him, but we hired him on the assurance that he was one of the best engineers in the United States for this sort of work. He has made a report that a dam can be built at Marble Gorge, 6 miles below Lees Ferry, for $19,000,000 which will store 11,000,000 acre-feet of water. That site has been passed upon by Dean Ransome, formerly of the University of Arizona. He is the man who passed on the geology of the Boulder Dam site. He is a very high-class man, formerly with the United States Geological Survey, and he has passed on the geology of this site and says it is all right. The dam site has been drilled by a private contractor under the direction of a geologist from the University of Arizona. A report has been made, a copy of which I will file with you, which states that a dam can be erected at Marble Gorge which will utilize the Glen Canyon storage facilities and furnish adequate storage to provide flood control on the Colorado River for from $18,000,000 to $19,000,000. The rock is good. The site is easy of approach; there is a bridge now being built there which would facilitate the construction of the dam. The essential materials are all available a short distance from the site. It is not in the earthquake area.

I offer this report in evidence.

(The report referred to will be found in the Appendix.)

There would be 3,100 feet of fall in the river that is available for the development of power below this site. There would be only 650 feet fall below the Boulder Canyon site for the development of power as proposed. The loss of water by evaporation would be less at Marble Gorge because the elevation is 3,100 feet at this site, and 650 feet at the Boulder site.

The Marble Gorge site can be made to utilize all of the storage facilities at the Glen Canyon site, which is 12 miles above it. Eventually this site must be developed, and when the Glen storage site is developed, it will make necessary the writing of a huge obsolescence cost at the Boulder site. It is estimated there will be developed between 3,000,000 and 4,000,000 horsepower between the Marble or Glen site and the Mexican border. That power could be made to bear, under the provisions of the Federal power act, the cost of the dam at the Marble site, and the Government is assured of its return on an investment of $20,000,000, by 4,000,000 horsepower, as against the assurance of a return on $125,000,000 by 550,000 horsepower and such comparatively small additional power as may be developed below Boulder Canyon.

The CHAIRMAN. What acreage would be provided for by the water impounded at this Marble site?

Mr. MCCLUSKEY. It all depends on the height of the dam you want to build.

The CHAIRMAN. We are talking about the dam you mention.

Mr. MCCLUSKEY. A 425-foot dam built here has a 11,000,000 acre-foot capacity on a $19,000,000 estimate of cost. More storage can be had by building a higher dam.

Something has been said from time to time about the all-American canal protecting the water rights of the United States by diverting into the Imperial Valley and into the Salton Sea the water that might otherwise go to Mexico.

We have here a document loaned to us by the Department of the Interior, the Geological Survey, identified as D-100-9-L-15, open to public inspection for press notice—the date is not given, signed by Herman Stabler, chief of the conservation branch, a report on the probable future stages of Salton Sea by George F. Holbrook, assistant engineer, July, 1927.

We have taken the liberty of making a copy of the conclusions of that report, and in order to save time I would like to file it in the record as a part of my remarks.

The CHAIRMAN. Without objection, it may go in.

Mr. MCCLUSKEY. And I would like to have it printed as a part of my remarks.

The CHAIRMAN. Without objection, it is so ordered.

(The matter referred to is printed in full, as follows:)

REPORT ON PROBABLE FUTURE STAGES OF SALTON SEA

(By George F. Holbrook, assistant engineer, United States Geological Survey)

CONCLUSIONS

(*a*) Lands bordering on Salton Sea below elevation —240 are worthless from an agricultural point of view. Those between elevation —240 and —230 are worth very little, except in the near vicinity of New and Alamo Rivers. Lands lying between elevations —230 and —220 are generally valuable for farming within the boundaries of the Imperial irrigation district. Outside of the district lands at this elevation are not classified as arable by the Strahorn soil survey.

(*b*) The contract between the Southern Pacific Co. and the Imperial irrigation district, granting a flowage right of way to the district will be an impediment that will have to be removed before the irrigation district can waste any more water into the Salton Sea than at present.

(c) The maximum amount of storm water that may be expected to flow into Salton Sea in a very wet year is 500,000 acre-feet.

(d) Under present conditions there is being wasted 1.5 acre-feet of water annually per acre irrigated from the Imperial Valley canal system. Upon the completion of the all-American canal conditions affecting the operation of the canal systems in Imperial Valley will be changed. It is not known to what extent these changes will affect the necessity for wasting water from the system. It is believed that the present value of 1.5 acre-feet per acre irrigated is a liberal estimate of the amount likely to be wasted under future conditions. On this basis, with 925,000 acres irrigated, the amount of water wasted into Salton Sea annually would be 1,387,000 acre-feet.

(e) In order to evaporate the amount of water that may be wasted into Salton Sea under conditions of ultimate development an average water-surface area of 239,000 acres will be necessary. This corresponds to elevation —228 feet.

(f) With Salton Sea at an average stage of —228 feet, and the possibility always present of storm water raising this level to —225 feet, it is not likely that any lands below the —220-foot contour will have any value for agricultural purposes.

Mr. McCLUSKEY. Great emphasis has been given from time to time to the danger to life and property in the Imperial Valley. We concede that there is a probability of some danger to property in the Imperial Valley, but a report has been made, and a diagram, upon which it is estimated that it would take 15 years for the Colorado River to fill the Imperial Valley if the entire volume of that river were turned into that valley. We believe that under those circumstances there is no justification whatsoever for the allegation that there is any danger of loss of life on account of the inability of the people to get out of there in case the river broke in, or that they would have any difficulty in removing their livestock from the Imperial Valley.

We say that it is an unfair proposition, in our judgment, to attempt to impose upon the property rights of the States of Arizona and Nevada the cost of protecting the Imperial Valley man's property at the expense of our property. But we do not object to that. We assert, if the property rights of Arizona are to be utilized for that purpose only, we would not object. But when it is proposed to go beyond that we feel that we are entitled to receive what we would be able to get if the water power of our State were developed by private enterprise, or by any other agency than the Federal Government. There is no question as to the fact that the river could be developed by private enterprise. There is abundant testimony in your records that the money is available for development of the river by private enterprise, and that flood control would be provided by this method. Private enterprises have already spent large sums of money in trying to get power permits on that river. The State of Arizona has applied to the Federal Power Commission for power permits on the Colorado River, and we believe that we will have no difficulty in obtaining all of the money necessary to develop all of the power that can be absorbed from that river. If the Government makes the development, we think we are entitled to an amount of revenue equal to that which we would be entitled to receive if it were developed by it own initiative or by private enterprise, or any other agency.

We believe under those circumstances that the proposal in this bill is unwarranted. We are not opposing the proposition of the Government building a reclamation project. We are not opposing the

proposition of the Government going into the power business as an incident to reclamation, if it has the constitutional right to do so, although we deny that it has such constitutional right to come into our State for that purpose without our consent.

The quibble is raised that this is an attempt to develop this river for navigation. We do not believe the Congress of the United States would seriously consider developing navigation on the Colorado River, as such. We do not believe that the commerce that will be carried on the Colorado River if the navigation is improved on the river would supply sufficient revenue to even justify the time and expense that has been expended in holding hearings and a discussion of the proposition, to say nothing of the printing of documents in connection with the proposition.

So that we state the proposition, in our opinion, is a power project primarily to pay the cost of an irrigation project in California and water for the coast area. The statement that power would be the burden bearer of the project, I think, justifies us in coming to that conclusion.

We believe that the Congress of the United States should approach this proposition honestly; that it should approach it as an irrigation and a power project, and in approaching it as an irrigation and a power project that it should conform to the terms and conditions contained in the reclamation act and the Federal power act. That is, that the work must be done in conformity with the laws of the State, and that a permit be first secured from the State and from the Federal Power Commission, as if it were the same as any other project.

The question of flood control has been raised. It has been asked whether the United States has a right to go in and provide flood control as such. Great emphasis was laid on the Mississippi situation. We do not believe there is any power in the Constitution of the United States to permit Congress to provide flood control as such. We believe the Senate document filed by Mr. Gust and the Government document which has been referred to by Senator McNary sustains this opinion.

There may be one other ground on which the Government could provide flood control in the Mississippi, and that is on the same basis as they irrigate their arid lands. If the Government can provide flood control to protect its lands from overflowing, it might be handled on the same theory as it controls water for irrigation. It is argued that the Government has as good a right to prevent its lands from being overflowed as they would have to provide for irrigation of arid lands, provided it was done with the consent of the States.

There are many other objections to this bill.

The CHAIRMAN. Mr. McCluskey, I dislike to interrupt you; but are you watching the time?

Mr. MCCLUSKEY. I have not been.

Senator JOHNSON. The time is about up.

The CHAIRMAN. Yes; the time is about up. If you have anything there that has not been covered by the other witnesses representing Arizona, we would be glad to have you present it.

Mr. MCCLUSKEY. Well, I will conclude, Mr. Chairman; but there were some other matters I had in mind. May I ask permission of the committee to insert, together with the report of Mr. Jakobsen, the

report I have referred to of Dean F. L. Ransome, of the University of Arizona?

Senator JOHNSON. It is not very lengthy, is it?

Mr. MCCLUSKEY. No; it is just three or four typewritten pages.

The CHAIRMAN. Any lengthy document will be left for the use of the committee, but short statements or reports may be included.

Mr. MCCLUSKEY. It is only three or four typewritten pages.

The CHAIRMAN. Very well.

(The matter referred to is printed in full, as follows:)

UNIVERSITY OF ARIZONA,
Tucson, Ariz.

GOV. GEORGE W. P. HUNT,
State Capitol, Phoenix, Ariz.

MY DEAR GOVERNOR: In response to your telegram of April 7 I proceeded to Flagstaff with Mr. E. D. Wilson, geologist of the Arizona bureau of mines, joining the party of the Colorado River Commission there on April 9. We reached Lees Ferry on the evening of April 10. On the following day Mr. Wilson and I accompanied Messrs. McClusky and Maddock, of the commission, and C. Hoatson, of Superior, to the bridge site in Marble Gorge, about 5 miles below Lees Ferry. Whether the site now being prepared for a bridge across the gorge is exactly at the spot shown as the Marble Gorge bridge site in Plate XXII of La Rue's report on Water Power and Flood Control of Colorado River below Green River, Utah (United States Geological Survey Water-Supply Paper 556), I am not certain, but I assume that it is. Both La Rue and Geologist R. C. Moore (p. 52 of the report cited and p. 134 of Appendix B to the same report) recognize the advantages of this site as regards the cross section of the gorge and exceptional ease of access, but dismiss it from serious consideration, because they consider that the river at this site has probably cut through the Coconino sandstone into the Hermit shale, and this shale they consider to be wholly unfit for the foundation of a high dam.

As we looked into the Marble Gorge at the bridge site we could see the cross-bedded Coconino sandstone exposed for an estimated distance of from 10 to 15 feet above the surface of the water, with a well-defined, nearly horizontal contact between it and the rather thin overlying beds that constitute the lower part of the Kaibab limestone. (Plate LXXV, WaterSupply Paper 556.)[1] As the Coconino standstone near Lees Ferry has bene estimated to be about 300 feet thick, it did not appear to us at all certain that the river has at this point cut down to the top of the Hermit shale.

In order to get further information on the thickness of the Coconino sandstone and the character of the Hermit shale we proceeded about 2 miles west of the bridge site, where we found a lateral canyon, down which we were able to make our way to the river. This canyon appears to be the one that opens to the river opposite to the mouth of Badget Creek, on the north side of the Colorado.

In this canyon we could readily identify the top of the Coconino sandstone, which shows the same cross-bedding as at the bridge site. The thickness of the Coconino we found to be about 150 feet, as measured by aneroid barometer. Accordingly, at the bridge site this sandstone should extend downward for 140 feet to 135 feet, below the surface of the river, as seen on April 11, 1927. Unless the distance to bedrock in the Marble Gorge is unusually great, the river may not have reached the Hermit shale.

The Hermit shale is a fine-grained deep-red rock that when exposed to the weather breaks up into flakes and gives the general impression of being a soft, crumbling material. Where scoured clean, however, in the bottom of the side canyon, down which we traveled, the shale appears as a surprisingly hard, compact rock. This is particularly true for a distance of 50 feet or more below the Coconino sandstone. It appeared also to be less pervious than the overlying Coconino, as there was some seepage of water from the sandstone along the contact with the shale.

[1] Longwell, Miser, Moore, Bryan, and Paige, Rock formations in the Colorado Plateau of southeastern Utah and northern Arizona; U. S. Geol. Survey, Prof. Paper 132, p. 8. 1923.

In my opinion, the conclusion that the Hermit shale is unsuited for the foundation of a high dam has been too hastily reached. It is admitted that the weathered shale is soft and crumbling, but this is unimportant. If the shale, where unaffected by the weather, is firm and impervious, this is all that is essential. The rock of the dam foundations will not be exposed to the weather, whereas the shale as seen on most natural slopes has been so exposed for hundreds of years.

In view of the many advantages of the bridge site, I believe that the possibility of basing a dam on the Hermit shale should be carefully considered by engineers experienced in dam construction. By drilling or tunneling, or both, the shale should be examined, where it is unweathered, with a view to determining its permeability, general strength, and the possibility of its developing plasticity or slippage under load. It should also be tested chemically for the presence of any considerable quantity of soluble or chemically active constituents that might be objectionable in a rock that is required to withstand high water pressure.

Even if it were consider advisable to use more concrete for a foundation in the shale than would be considered necessary in other rock, this would be more than offset by the obvious advantages of the site as regards ease of access, sample room for constructional operations, and abundant available material for concrete.

I do not undertake to say that the bridge site is suitable for the construction of a high dam, but I do maintain that it has been condemned or disregarded in the past without sufficient investigation. There are some indications that the Hermit shale, below its superficial zone of weathering, may be amply strong enough and sufficiently impervious to form a satisfactory foundation for a dam of the concrete-arch type in a situation such as the Marble Gorge.

If the Marble Gorge bridge site is, in the opinion of competent engineers, as admirable a dam site as it appears, then steps should be taken to determine (1) whether the bedrock is Coconino sandstone or Hermit shale; (2) if it is sandstone, then how much sandstone would intervene between the bottom of the dam and the top of the shale; (3) if the Hermit shale is already cut into by the river or would be reached in excavating for the foundation of the dam, then what is the character of the shale at the site.

Yours very truly,

F. L. RANSOME.

The CHAIRMAN. Now, may I have the attention of the members of the committee for a moment? I desire to read into the record a letter which I addressed to Mr. Edwin S. Kassler, president of the Nevada-California Electric Corporation at Denver, Colo., under date of January 11, 1928, as follows (reading):

JANUARY 11, 1928.

Mr. EDWIN S. KASSLER,
President Nevada-California Electric Corporation,
Denver, Colo.

MY DEAR MR. KASSLER: You will recall our conversation, during which I told you that you had been quoted as stating that the corporation would prefer to purchase power at the switch board in event a dam is constructed across the Colorado River in the neighborhood of Boulder Canyon, rather than to finance a proportionate amount of the expenditure required to install a power house and pay the Government for the right to use the water.

If this is also in accord with the feeling of the board I would appreciate it very much if you would write me, setting out the above expressions in full, as I think it would go a long way toward removing the existing sentiment that my attitude with reference to the Boulder Canyon Dam bill has been dictated by the interests of the Nevada-California E ectric Corporation.

With personal regards,

Yours sincerely,

L. C. PHIPPS.

That is signed by my name. The reply, under date of January 16, which I have just received, is addressed to me, as follows (reading):

NEVADA-CALIFORNIA ELECTRIC CORPORATION,
Denver, Colo., January 16, 1928.

HON. LAWRENCE C. PHIPPS,
Washington, D. C.

MY DEAR SENATOR: Replying to your recent inquiry. In event of the construction of a dam at or near Boulder Canyon by the United States Government, the board of directors of the Nevada-California Electric Corporation would unquestionably prefer to have its subsidiary companies purchase electric power at the switchboard at a fair rate rather than pay a proportionate cost of financing construction of a hydro power plant at the dam site, together with attendant rental payments for use of water.

The cost of electric power generated by tide water steam plants has been so far reduced, with possibilities for still further cost reductions, that it is questionable whether electric power can be generated at Boulder Dam and transmitted to coast cities in competition with steam-generated power when transmission losses are taken into consideration.

Very sincerely yours,

E. S. KASSLER, *President.*

I think it is proper to have these letters printed in the record, and, without objection, it will be done. In presenting these letters, I desire to state that, notwithstanding the position of the Nevada-California Electric Corporation, which would prefer that the Government erect the plant, I am absolutely opposed on principle to the Federal Government going into the business of producing hydroelectric power and selling it at the switchboard.

Now, without reading in full, I present for the record, without objection, a lengthy telegram which I received from the chamber of commerce, of the city of Los Angeles, under date of January 12, setting forth the views of the chamber with reference to this project.

(The telegram referred to is printed in full, as follows:)

LOS ANGELES, CALIF., *January 13, 1928.*

LAWRENCE C. PHIPPS,
Chairman Senate Committee on Irrigation and Reclamation,
Washington, D. C.:

Will you please accept following statement as testimony on behalf of Los Angeles Chamber of Commerce, through its board of directors, concerning control and utilization of waters of Colorado River. Copy of this statement by air mail to-night.

In reference to the proposed Boulder Canyon development, false and misleading statements have been made which in our opinion have tended to create erroneous impressions as to the actual existing conditions. Therefore at this time the board of directors of the Los Angeles Chamber of Commerce make the following definite statement:

1. We favor construction of a high dam to be located at or near Boulder Canyon, in the Colorado River, which dam will store and conserve the waters, control the floods, regulate the river flow, provide desilted water for domestic use of Los Angeles and other communities of the southwest, permit arid land reclamation, and furnish hydroelectric power.

2. It has been stated that "if available waters are conserved and developed, including those of the Owens Valley and Mono Basin, there will be a local supply of water sufficient for all purposes," an investigation on our part by reputable engineers of years' experience convinces us that these statements are incorrect and overdrawn, and that even with the addition of 1,500 cubic feet per second of Colorado River water there will still be more needed for an ever-increasing population locating in the region south and west of the Sierra Madre Mountains.

3. Allusion has been made to the "menace of saline qualities" in the water to be impounded by the dam. It is the opinion of our committee of engineers who made a study of this matter that the area of the salt deposits which is exposed is very small compared with the total area, and that the resulting slight increase in salinity would be but temporary and would not impair the use of the water for domestic and agricultural purposes.

With reference to the general proposition of the control of the waters of the Colorado River and their utilization in the most effective way for the general good of the Nation, we respectfully submit the following:

1. We favor the construction of a high dam at or near Boulder Canyon in the Colorado River for the following reasons: Such a dam will prevent flood destruction and give flood protection to the lands in the Parker Indian Reservation and the Yuma project in Arizona and the Imperial and Paloverde Valleys in California, will create a great reservoir of water to serve Los Angeles and other communities of the Southwest whose rapid growth will soon vitally need this as a dependable source of supply, will make available a large volume of hydroelectric energy—an important necessity for agricultural, industrial, and community development in the Southwest, will permit the States of the lower basin with safety to approve the proposed compact between the seven States interested in the waters of the river and for the further reason that it is a great economic waste to allow the flood waters of the river to spend themselves in the Gulf of California when by impounding them they can be made productive of great wealth and added prosperity to our Nation.

2. We also favor due and proper protection to the rights of all the other States having an interest in the waters of the Colorado River basin and believe that all their rights should be justly and equitably considered and protected.

3. That the waters conserved by the erection of said high dam be used exclusively for the irrigation and reclamation of lands within the United States, and that proper provision be made in order that the United States soldiers and sailors may obtain the benefit of such reclaimed lands.

4. That the United States lend its assistance so far as practicable and when found feasible to the building of the necessary canals and distributing works in order that the water so conserved may be distributed to the lands within the United States which will now or may hereafter be irrigated by such waters and that such canals and distributing works be located exclusively within the territory of the United States if the same is found possible or practicable.

5. That the right to generate and distribute the hydroelectric energy which may be developed by the said dam be sold to municipalities and other agencies which may have the facilities for the development and distribution of the same at such a price as will repay a proper portion of the cost of the project within a reasonable time, all circumstances and conditions considered. We earnestly urge that the Congress of the United States during its present session shall enact such legislation as shall provide for the immediate consummation of this development in justice to the vital necessities of the Southwest.

GEORGE L. EASTMAN,
President Los Angeles Chamber of Commerce.

Senator JOHNSON. We will begin at 10 in the morning, but I want to offer in evidence at this time the entire letter, on portions of which I interrogated Mr. Winsor. I do it, first, because it is appropriate to be in the record; and, secondly, it is proper that the entire letter should go into the record.

The CHAIRMAN. Without objection, that may be inserted in the record.

(The letter referred to is printed in full, as follows:)

YUMA, ARIZ., *August 24, 1923.*

Dr. HARRY T. SOUTHWORTH,
Commander the American Legion,
Department of Arizona, Prescott, Ariz.

MY DEAR DOCTOR: Acknowledging your letter of the 1st instant, permit me to express my very sincere belief that the American Legion, by according its indorsement to the Colorado River compact, has taken an altogether sound and patriotic stand. I am equally certain that the Legion's efforts in behalf of ratification will greatly advance the cause, thereby constituting a distinct and practical contribution to the public welfare.

Also, I find myself in accord with your view that the road to ratification lies through the dissemination of accurate information and share your confidence that a large majority of Arizonians are favorable to the compact now. It only remains to reach with the facts such as are not fully informed, or who may be misinformed, and there must, there will, follow such a demand for Arizona to

catch step with the march of progress that the legislature, upon which devolves the formal duty of ratification, can not fail to heed the people's voice. I trust that I may be able to contribute some views and ideas with respect to the compact that will aid in clearing the atmosphere.

KEY TO DEVELOPMENT

The Colorado River compact is the key to the development of the Colorado River's resources. As such, it constitutes a proposition so clear, so simple, and so understandable when fairly stated that it affords ground neither for doubt nor fear, nor occasion for hesitation. It is a treaty—a frank and fair understanding for mutual and common benefit—to which the States of the Colorado River Basin and the Government of the United States are parties. It was authorized—as treaties between States are required to be—by act of Congress, and formulated, after full discussion, by the legally chosen representatives of all parties to it. Whatever its imperfections—and no work of human minds and hands but has them—it is a sound, logical, workable agreement, according recognition to every just claim, protective of every substantial right—as nearly perfect, in all human probability, as any treaty that could ever secure the unanimous consent of the contracting States and the approval of the Federal Government. It is an essential feature of a movement of towering proportions and importance, and backed by the history and status of that movement amply justifies the confident belief that if enacted into law it will accomplish the purposes for which it was designed. Without it the development of the Colorado's resources, within Arizona, may be classed as a dream of future ages.

PURPOSES OF THE COMPACT

The great and vital purposes of the compact, as set forth in its preamble, are "to promote interstate comity; to remove causes of present and future controversies," and through accomplishment of these altogether worthy and commendable purposes to bring to achievement the outstanding object; i. e., "expeditious agricultural and industrial development of the Colorado River Basin, the storage of its waters, and the protection of life and property from floods."

WHAT DEVELOPMENT MEANS

What development of the agricultural and industrial possibilities of the Colorado River Basin means to Arizona is surely comprehended, in a general way, by all, though it may be that many, even among the well informed, do not altogether grasp the full measure of its significance. To proclaim broadly the material benefits which must flow from the prosecution and achievement of so huge an enterprise within our borders is merely to utter a commonplace, but a recounting of the outstanding specific advantages which must inevitably accrue, in greatest measure, to every industry within the State and to every citizen of whatsoever class, of whatsoever trade or calling, should possess a certain interest.

RECLAMATION OF LANDS

Comprehensive development of the Colorado River, its potential resources represented by twenty-odd millions of acre-feet of water, gathered in the heights of the Rockies and rolling irresistibly to the sea, means the reclamation of great areas of arid lands. It means the subduing to the service and use of man of all the vast stretches of wild and parched and profitless desert along the Colorado's course that are susceptible of practical reclamation from that stream. This will occur but gradually, as humanity's requirements urge, but under the constructive plan of development for which the compact opens the way, when need arises and river's waters, subjected to control, will be available for such a purpose, for they are dedicated first to agriculture, the basis of all industry and the reliance of life.

MAGIC OF ELECTRICITY

But although in point of order of the uses to which the Colorado's waters may be put, reclamation has, as it should have, first place in that plan, in the sense of early and general realization of the widespreading benefits of river

development, and in the sense of rapid creation of colossal wealth, at the front of this master project must be placed the calling into being of limitless forces of hydroelectric power.

It were idle to attempt to estimate all that the conjuring of this mighty agency of civilization and of human progress signifies to Arizona's growth, and to her advancement in the order of States. The extent of its influence may not even be approximated, for it can scarcely be doubted that ahead lie extensive fields not known nor thought of, to be quickened into fruitfulness through the joining of the wonders of science with the magic of low-cost power. At the beginning, of course, it means the activities of construction, the benefits of large-scale employment, the stimulus of pay rolls, the business of supplies. And the consideration of these quickly accruing and considerable advantages is by no means unworthy. But how infinitely greater is the view which reveals 5,000,000 horses constantly straining at their titanic load, vibrant with electric energy, harnessed and trained, toiling by day and by night, bringing wealth into the world and prosperity into the home—giving life to the industries both of labor and of money and impetus to the forward march of mankind.

A very small part of the power of the Grand Canyon of the Colorado will prove the source and basis of a growth to Arizona beyond the pretentions of optimism. In the interior and favored valleys it will lift water out of the ground, and cause fields and orchards and vineyards—hundreds of thousands of acres of them—to spring up, to supplement, if not to exceed, the areas reclaimed by direct diversion, and the homes of people to do these fertile lands. Out of the air it will draw at low cost the huge supplies of nitrogen so necessary to agricultural productivity and vitally important throughout the wide compass of chemistry. It will insure lessened costs for the production of mineral wealth stored in 10,000 hills, and make practicable the opening of many of these storehouses of nature. It will stimulate the search for oil. It will render feasible the rearing of manufactories for the conversion of Arizona raw products—of herd and field, mine and forest—into finished articles, in part at least for use at home, thus lowering the cost of living and supplying materials for future growth. It will cause towns to multiply, cities to expand, markets for Arizona products to enlarge. Transportation enterprises thus fed will span the State and join its farther quarters with electrical ribbons of steel. Wealth will be created and wealth will be attracted, as like ever serves as a magnet to like. The eyes of the East and the West, the North and the South, will be turned Arizonaward, and her beckoning hand, suggestive of opportunity, will persuade men of means, of labor, and of science. Population will multiply. Prosperity will reign. Arizona will come into her own.

This is an imperfect picture—an incomplete and inadequate listing of the benefits that must inevitably spring from the harnessing of the Colorado's mighty power. But it should be sufficient to commend the constructive movement which calls it forth.

PROTECTION OF PROPERTY

Still another vital phase of the development of the Colorado has to do with the controlling of its terrific floods—a phase of which the importance may not be overemphasized. On the lower reaches of the river, in Arizona and California, more than a hundred million dollars worth of American property and thousands of American homes are in jeopardy. An annual production of a hundred million dollars worth of foodstuffs and raw materials may at any time be utterly destroyed. The danger is imminent, the result inevitable, if protection be not soon afforded. The sturdy farmers peopling these delta lands are bearing the brunt of an unequal struggle, against odds which they can not continue to give. And when they lose, as they must, their loss will be the country's, for these lands are the richest in the world and their contribution to the support of the Nation is significant. Control of the Colorado's waters by storage is the only solution of this serious problem, and that solution depends upon the clearing away of the obstacles to the development of the river.

This outline, lacking as it is, will afford an idea of the ends for which the Colorado River compact was designed—a suggestion of the benefits that will spring from its enactment.

NECESSITY FOR A COMPACT

And why is a treaty necessary to the development of the Colorado River? Why may not Arizona, as to her seems best, engage within her borders, as some have urged, upon that great work, without asking leave of any? The debatable question aside, as to Arizona's financial and business capacity for an enterprise of such staggering proportions, a treaty is necessary for the simple reason that the Colorado does not belong to any one State. Despite the circumstance that it crosses Arizona's norhtwestern corner and traverses her western border, it is an unsound, a wholly baseless theory which holds that Arizona's rights are exclusive. Besides Arizona and the other lower basin States of California and Nevada, the upper basin States of Wyoming, Colorado, Utah, and New Mexico have interests in the river. They have moral, equitable, and legal rights of which they are jealous, even as Arizona. Wyoming, Colorado, and Utah practically feel the necessity for an agreement declaratory and protective of their rights, if there is to be development in the lower basin. Their mountains shed 85 per cent of the Colorado's flow. They require a fair proportion of that flow for the ultimate reclamation of their arid lands and for domestic uses. Before development occurs in the lower basin, by means of which prior right to the river's waters may be established and perfected, they want to know that their legitimate opportunities for agricultural growth are not to be destroyed thereby. Their concern is a natural one, and their purpose, in the absence of an understanding, to oppose development which might jeopardize their future, is scarcely to be wondered at. Hence the necessity for a treaty which will quiet their fears and take the place of interminable lawsuits. Hence the necessity for a treaty, in the words of the compact, "to promote interstate comity—to remove causes of present and future controversies." Hence the necessity for a treaty which will permit development within the lifetime of those now living, for in the absence of such an agreement, establishing and fixing the rights of the States in the river's waters, any attempt at development will be met with legal obstruction. And the law's processes can be employed to indefinitely delay constructive action.

Then there is a political phase. The development of the Colorado River is a national matter in which, to be sure, the more directly interested States may and should participate or cooperate, but nevertheless it is primarily a national matter. Its interstate aspects, its colossal magnitude, the economic necessity for unified development, the general demand that the river's vast resources be conserved for the people—all these considerations, and others, join to make it a national undertaking. National undertakings require for their accomplishment legislation by Congress—legislation carrying huge appropriations. Such a program calls for the support of every western Senator and Representative, and that may only be secured on the basis of a mutually agreeable treaty. The Members from the upper basin States have frankly said so.

Furthermore, the interests of the Federal Government itself are more than theoretical. They are direct and practical. They are not merely the interests of a parent government seeking the welfare of its children and adjustment of their differences. Laying aside the international aspects of the case and ignoring the legal status of the Colorado as a navigable stream, the Federal Government's interests are those of an owner and as well the custodian of a national policy. The United States owns every site in the lower basin of the Colorado River adapted for the construction of works for the controlling of floods, the storage of water for reclamation, of the development of hydroelectric power. This phase of the situation is absolutely controlling. Theorists and doctrinaires to the contrary, it is a condition which may not be ignored nor avoided. Forgetting the legal obstructions which might be interposed by States jealous of their rights, forgetting the political obstructions which it is within the power of the congressional Representatives of such States to put in the way, there can be no development of the Colorado, either at the hands of a State or by private interests, in the absence of an agreement with the United States, which under the terms of the Federal water power act is represented in all matters pertaining to these sites, but the Federal Power Commission. And the Federal Power Commission has announced the policy that development of the Colorado River, by or through any agency whatsoever, will be deferred pending the ratificaiton of a treaty with respect to the allocation of the river's waters. That policy is supported and confirmed by the attitude of Congress.

It is not clear that it is a waste of time, tremendously valuable time, for objectors—conscientious or otherwise—to advance contrary plans, or any plans which fail to recognize the necessity for a treaty? These are the conditions, and they are neither unjust nor onerous. These are the rules, and they are fair. And should it not be satisfying to the most determined, the most persistent guardian of the rights of the State, that with the Federal Government a party to the treaty, with the Federal Government at the head of the movement for development, even-handed justice is insured to all?

TERMS OF THE COMPACT

What, then, are the terms of this essential treaty? Expressed in everyday language the compact, primarily, is merely an agreement by which the major portion of the waters of the Colorado River—sufficient to relieve the fears and remove the doubts of all sections, and insure water for the ultimate reclamation of their arid lands—are amicably divided, or allocated, without resort to the courts, without the destructive delays of endless litigation. This division is between the two groups of States interested in the river—the upper basin group, Wyoming, Colorado, Utah, and New Mexico, and the lower basin group, Arizona, California, and Nevada—groups naturally suggested by their outstanding differences of climate, geography, and economic conditions. Secondarily and incidentally, the treaty sets up simple machinery to render it effective; establishes the order of importance of the uses to which the river's waters may be put—first, domestic and agricultural, then power; recognizes and protects existing rights, both of States and of individuals; authorizes a further apportionment or allocation in 40 years, should occasion therefor arise; and establishes a purely precautionary and equitable rule for the supplying of any water to which the United States might hereafter as a matter of international comity, recognize Mexico's right.

So much confusion of minds would be avoided if it might be clearly and generally understood that this is all the compact contains—that these are the only things it does or attempts to do. Efforts have been put forth to read into it numerous sensational provisions; to attribute to it many startling aims. But they must be looked for, if at all, in the minds of their authors. In the treaty they will be sought in vain. Contrary to charges which have been hurled against it, the compact predetermines no dam sites, and has nothing to do with their location; it allots no power to any State or municipality or interest, and confers no right with respect to the development of power; it grants no water to Mexico, that being a function only of the United States Government, it is just a clearing away of legal and political obstructions to development. Interpreted naturally, without prejudice, without distortion of meaning or straining of the imagination, it presents no sinister aspects, harbors no unworthy purpose, seeks no perfidious end.

DETAILS OF THE ALLOTMENT

The division of water is the outstanding feature of the compact. It might almost be said to be the only feature, since all other provisions are incidental. It was the obvious necessity for a friendly allocation—for a mutually agreeable guarantee that activities within one State would not deprive other States with interests in the river of their fair and legitimate opportunities, that brought the compact into being. Concern must center, therefore, in the details of the allotment.

To the four States of the upper basin there is allotted 7,500,000 acre-feet, and to the three States of the lower basin, in which Arizona lies, 8,500,000 acre-feet per year. The remainder of the flow of the river is unallotted, and the right to its use is not affected. The allotment is qualified and limited by a provision that "the States of the upper division shall not withhold water, and the States of the lower division shall not require the delivery of water which can not reasonably be applied to domestic and agricultural uses." This in effect is a limitation only upon the upper States, since the water they are thus prohibited from withholding must find its way to the lower basin, while that which is there can never be returned. It therefore follows, by application of the simplest logic, that the actual allotment to the four upper basin States is what they can "reasonably apply," within their maximum of 7,500,000 acre-feet, to "domestic and agricultural uses." They can claim no

more. And it must equally be clear that the allotment to the three States of the lower basin, in fact if not in figure, is all that the upper States can not reasonably apply to the uses stated. There is a guaranteeing clause by which the States of the upper basin bind themselves to not permit the flow of the Colorado at Lees Ferry, near the northern Arizona line, to "be depleted below an aggregate of 75,000,000 acre-feet for any period of 10 consecutive years," but satisfying as this assurence of fair division may be to the States of the lower basin, again the commonest rules of logic will suggest that their best and most abundant guarantee of an ample water supply lies in the rule prohibiting the withholding of water, "which can not reasonably be applied to domestic and agricultural uses," rendered powerfully efficient by the law of gravity.

Technically the compact allots to the upper basin 7,500,000 acre-feet and to the lower basin 8,500,000 acre-feet per year, but an analysis of actual conditions, considered always with due regard for the letter and spirit of the treaty, discloses figures still more significant. Exhaustive investigations by capable engineers of the United States Government show conclusively that the upper basin States can never reasonably apply "to domestic and agricultural uses" more than 6,000,000 acre-feet of water per year. By the same authorities it is estimated that there will be available for storage and use in the lower basin, after the maximum of development in the upper basin shall have been reached, above 11,000,000 acre-feet—ample for all present requirements, for all known future demands, with a surplus of more than 5,000,000 acre-feet—quite enough for insurance that projects of questionable feasibility, whether or not they have been accorded adequate investigation, will not languish for want of water. The estimate of present requirements and known future demands also makes allowances, on the side of equity and "international comity," for 190,000 acres of land now being irrigated in Mexico and 95,000 additional acres the reclamation of which is practicable. No allowance is made, or need be made, for lands in Mexico which do not exist or which, to the extent they do exist, neither have nor can acquire either legal or moral right to American water needed for the fructification of American soil.

It should be borne in mind, also, that the figures given take no account of the flow of the Gila or of lands now watered or which may hereafter be watered by it. The Gila Basin is technically a part of the basin of the Colorado, into which it drains, but it is so obvious as almost to preclude discussion that the waters of the Gila are not embraced in the allotment which features the compact, nor is the stream directly or indirectly affected by that undertaking. Division of the waters of the Colorado, as between the upper and lower basins, occurs at Lee Ferry, and the engagements and guaranties of the upper basin apply as at that point. The Gila enters the Colorado far below Lee Ferry, where the upper basin can have no interest or concern in it, nor can its volume lessen or ameliorate the specific limitations imposed upon the States of the upper basin. It is therefore clear that the flow of the Gila, averaging 1,070,000 acre-feet per year, constitutes an addition to rather than any part of the allotment to the lower basin, and adds to the figures heretofore set out as representing the water of the Colorado available for use in the lower basin.

The conclusion must inevitably be reached by any unbiased investigator that the division of water is just and fair, and affords no grounds either for doubt, uneasiness, or dissatisfaction on the part of the States or the people of the lower basin.

NO DANGER FROM CALIFORNIA

Neither has Arizona anything to fear in the matter of a division of the water available for use by the States of the lower basin. The suggestion has been offered that California might "hog it," but the suggestion must have been uttered thoughtlessly, or entirely without knowledge of the facts. If California were disposed to "hog" the waters of the lower basin, and physical conditions were such that it might avail itself of their benefits, Arizona, by the compact, loses no legal right or power she now possesses to prevent aggressions at that State's hands. But the fear expressed is entirely swallowed up in the certainty that there will be no shortage. California will not "hog" the water, for she has no place to put it. Her present needs and ultimate possibilities of reclamation from the Colorado are well established, and present no menace to Arizona's hopes or aspirations.

WHY THIS PARTICULAR COMPACT

There may be an idea in the minds of some that ratification of this particular compact is not after all an intensely important matter—that even though development of the Colorado River is highly desirable, as all will admit, and even though a treaty between the States is necessary as a condition precedent thereto, if this one fails another can be formulated. It is a conservative prediction that defeat of the present treaty would be fatal to development, at least for many years to come. Congressional authorization by virtue of which the compact was formulated has expired. Consent of Congress would have to be secured for the negotiation of another, and in the face of Arizona's refusal to give approval to an agreement, which without doubt has the favor of a large majority of the members of Congress, there may well be doubt that that body would give its consent. The six States of the Colorado River Basin which have ratified the compact have a considerable number of representatives in the two Houses of the National Legislature, and their opposition, if interposed, would be sufficient to defeat congressional authorization of another treaty.

But if Congress, urged by Arizona's representatives, were to give consent, the acts of six legislatures besides ours would be required before their treaty makers could be brought together. That is an extremely doubtful event, at any time within the next decade, but if it should occur and when, it is certain that Arizona's agents would find it a difficult undertaknig to secure terms as favorable as are embraced in the existing compact. The agents of the other States would be at the treaty table, not to placate Arizona—to whom a program for the development of the Colorado means more than it does to any other State—but taking their cue from us, to demand the maximum for themselves. In all reason and likelihood, another attempt to formulate a compact which would clear the way for utilization of the Colorado's resources would end only in disagreement, but if there should be agreement it would be on terms that would cause us to regret our earlier opposition.

OVERLOOK TRIVIALITIES

But no angle from which the question may be viewed affords a valid reason why the compact we now have should not be ratified. It is sound, logical, fair, and just, and may well be considered an eminently satisfactory agreement. It may not be perfect—nothing is. Doubtless there are provisions which some Arizonans, some Coloradoans, some Californians would like to see changed. On such things opinions differ, and while one mind grasps a point in a certain way another views it in a different light. But if the compact is founded upon justice, contains no fatal flaws, and in its larger outlook affords assurance of accomplishment of the end sought, there can well be an overlooking of trivial and inconsequential differences. For it must be borne in mind that treaties are not written by any one of the parties to them. In the very nature of cases calling for treaties there must be compromises; there must be a yielding here and there; there must be a disposition to see the other fellow's side—to appreciate the opposite viewpoint; there must be a willingness to get together for the common welfare.

ARIZONA'S RESPONSIBILITY

And here in Arizona there should be a serious realization that in the final analysis, whatever the last measure of this State's technical and legal rights may be—or might be determined to be if pursued to a long-drawn-out conclusion—we have no right to prevent development, to impede progress, to lock the wheels of industry. From the strictly local and selfish point of view, Arizona has no right to obstruct the development of these vast resources now going to waste. Her own interests and the interests of her people, suffering from depression and groaning under the burdens of excessive taxation, demand prompt and constructive action. No possible losses that might be suffered under the compact, even though the objections offered by its critics were valid, could equal the losses of indefinite delay. Arizona's duty to posterity itself—a name that has often been take in vain by objectors to the compact—calls for the bequeathing to those who shall come after, not a wild and tumultous torrent, but a river harnessed and controlled, doing the bidding of man, contributing to the blessings of life—a productive and not a destructive agent. But in a much

larger sense and a very proper one, a disposition to consider Arizona alone—even though the disposition be conscientiously and sincerely inspired—is to be deplored. By no means must the representative of Arizona forget Arizona, but it is a question if that fault might not be more forgiveable than that Arizona should forget and fail of her responsibility as a progressive, enlightened, and broad-minded Commonwealth. To take the ground that the Colorado's development should be viewed by Arizona solely as a matter of her own concern would be to put a blot upon our boasted progressiveism. For if progressiveism means not humanitarianism it means nothing, and humanity's interests and humanity's rights are at stake on the Colorado. The future of the whole Southwest hang, in no small degree, upon the realization of the tremendous potentialities of the Colorado River, and there should be no regret in Arizona—there should be elation—if the States surrounding us, and the men and women of our blood and bone who live in them, come to enjoy something of the widespread benefits of its development. That will not harm us—it will help us; but on the other hand it will harm us immeasurably—industrially, socially, yes, and spiritually—to paly the part of a dog in the manger.

THE MEASURE OF ASSURANCE

While numerous criticisms, so patently baseless as not to merit discussion, have been aimed at the compact, an objection to ratification has been offered concerning which there perhaps ought to be a better understanding. It has been charged that if the compact should be ratified the Federal Government would not develop the Colorado River anyway—that the compact contains no guaranty that it will; and one writer of vigor if not of violence has declared, in substance, at least, that the advocates of ratification who are saying that work will start as soon as the compact is raified are lying, and know they are.

Out of all peradventure, if any advocate of ratification is saying that work will start as soon as the compact is ratified, that it will start upon the part of the Government before an appropriation is made therefor, or that it will start upon the part of any other agency—State, municipal, or private—until the consent of the Federal Government can be secured therefor, he ought to be spanked. It can not be done. Furthermore, no one who is informed respecting the compact, or respecting the movement to develop the Colorado River, will claim that the compact is, or could be, a contract to develop the river's resources by the United States or by any other party to the agreement. What is asserted, and what is known, is: First, that there can be no development by any agency—Federal, State, or private—without the treaty between the States. Congress will not authorize it not appropriate for it, the Federal Power Commission will not grant its permit, and the States of the upper basin will block any movement in that direction through the courts and through their Representatives in Congress. Second, that as surely as any event may be forecast, the ratification of the compact by Arizona and by Congress will be the signal for important governmental activity on the Colorado River. For that is the spirit of the movement, which was first definitely proposed by Secretary of the Interior Franklin K. Lane, was favored by every succeeding Secretary, and steadily grew until it became a recognized policy of the Congress. Repeated declarations by congressional committees having before them proposals for river development, that all such measures must await an agreement between the States, strongly bear out the idea. Authorization of a treaty between the States was a definite part of the plan.. Ratification of the treaty is another. Six States have ratified, and a measure to complete this second step is pending in Congress awaiting the action of Arizona. The leaders of Congress—among them, and recently, the chairman of the powerful Committee on Irrigation and Reclamation, have promised that ratification will be followed promptly by legislation for actual development, anticipating which necessary investigations are being made. Arizona's Representative in Congress, Hon. Carl Hayden, has strongly declared his faith that the program will be carried out. And the greatest of assurance lies in the fact that every Western Senator and Representative, with the treaty to support them, will be found working shoulder to shoulder for it.

What the form or extent of congressional action may be can not be foretold. That will be influenced by the representatives of no State more than by Arizona's. But there is strong basis for a feeling amounting to certainty that the first unit of development on the Colorado River will be a Federal

project—either direct and outright or by cooperation—and without a doubt it can be made cooperative if Arizona, as well as she might be, should be interested in the enterprise. Furthermore, the first unit of construction will be in the lower basin—within the State of Arizona, at a site to be determined—and designed jointly for the control of the river's floods and the development of power. For while a widespread belief, a thoroughly awakened consciousness—sentiments with which the Members of Congress are themselves imbued—that the resources of the Colorado River must be made productive for the benefit of humanity constitute the great driving force behind the compact, the spur that is most effectively impelling to early action is an appreciation of the necessity for prompt action to save lives and property from destruction.

INFLUENCE OF OTHER LEGISLATION

And here is another angle to the situation, in which Arizona has a direct interest, and which it were not wise to overlook. There is pending in Congress an important measure, known as the Smith-McNary bill, through the medium of which the cause of reclamation in the arid West will be greatly advanced. Upon its enactment may be said to depend at least one great project in Arizona—the San Carlos—and perhaps others. But the logic or legislation has connected the fate of this general measure with the Colorado River compact. It is realized by representatives of the States of the upper Colorado River Basin that projects might be constructed in the lower basin of the river under the provisions of the Smith-McNary bill. Hence, the objection of the upper States to the inauguration of development in the lower basin until the rights of the States in the waters of the river have been satisfactorily settled and agreed upon naturally inspires and embraces objection on their part to any sort or plan of legislation under which such development might or could occur. It follows that to secure united support of the West for the Smith-McNary bill the problem of the Colorado must be disposed of. United support of the West must be back of any reclamation measure to make its passage possible. With the Colorado River compact ratified there is every reason to believe that the Smith-McNary bill will become a law, and Arizona's interest—certainly to the extent of the San Carlos project—will be greatly served.

PREMATURE DISCUSSION

Discussion has been precipitated as to whether Arizona should favor the development of the Colorado River at the hands of private interests, or should itself finance, own, and control the great power projects within this State. A most serious and wholly unfair phase of this discussion is that it proceeds in some quarters upon the assumption that a program may be formulated and pursued which will displace the compact and render an agreement between the States unnecessary, or that a new agreement may be entered into. Neither can be done. To the extent at least that the discussion of prospective plans obscures or beclouds the real and only immediately vital issue—i. e., ratification of the compact—it is premature. It would seem to be an attempt to draw a red herring across the trail. Whatever Arizona's policy may be, no policy can be made made effective, no project can be practically promoted that fails to recognize the necessity, as a condition precedent, for a binding treaty between the States and the Federal Government. That accomplishd, it will be Arizona's right, it will be Arizona's duty, to adopt the policy and follow the course, in harmony with the law and the facts, which will most surely rebound to the happiness, the welfare, and the prosperity of the people.

With assurances of my high regard, I am

Sincerely yours,

MULFORD WINSOR.

The CHAIRMAN. The committee will now adjourn to meet to-morrow morning at 10 o'clock, and to-morrow morning we will meet in our own committee room in the Senate Office Building.

(Thereupon, at 4.15 o'clock p. m. on Friday, January 20, 1928, the committee adjourned to meet on the following day, Saturday, January 21, 1928, in room 128 Senate Office Building.)

COLORADO RIVER BASIN

SATURDAY, JANUARY 21, 1928

UNITED STATES SENATE,
COMMITTEE ON IRRIGATION AND RECLAMATION,
Washington, D. C.

The committee met, pursuant to adjournment of yesterday, at 10 o'clock a. m., in room 128 Senate Office Building, Senator Lawrence C. Phipps (presiding.)

Present: Senators Phipps (chairman), Jones, McNary, Oddie, Johnson, Shortridge, Sheppard, and Ashurst.

Present also: Senator Hayden, of Arizona.

The CHAIRMAN. The committee will come to order.

I have received a telegram from the president of the San Diego Chamber of Commerce, dated the 20th, reading as follows:

Chamber of Commerce urge you recognize that growth of city depends entirely upon water from Colorado River. Population San Diego County more than doubled in last seven years. Agriculture has riparian rights to water supply beyond that which the city has now under development.

JERRY SULLIVAN, Jr.,
President San Diego Chamber of Commerce.

I have also received a letter from the president of the Chamber of Commerce of the United States of America. While it is short, I will not read it at this time. I will only say that it is along the lines of the suggestions made by the witness, Mr. Bannister, with reference to the order in which preference should be given for the development of hydroelectric power from the dam.

Senator JOHNSON. A typical chamber of commerce letter.

(The letter referred to and submitted by the chairman is as follows:)

CHAMBER OF COMMERCE OF THE UNITED STATES OF AMERICA,
OFFICE OF THE PRESIDENT,
Washington, January 19, 1928.

Hon. LAWRENCE C. PHIPPS,
Chairman Committee on Irrigation and Reclamation,
United States Senate, Washington, D. C.

DEAR SENATOR PHIPPS: I have the honor to place before you the position of the Chamber of Commerce of the United States on certain of the principles involved in the Boulder Dam project.

Examination of the Doulder Dam project discloses its great importance and the purposes of national character which it will serve. These purposes involve questions of preparation for adjustment of international relations with Mexico, flood control, and apportionment of water resources among States, the utilization of such resources, and compensation, if any, to States in respect thereto. Upon these phases of the subject the national chamber has no position established for it by action of its member organization, either through referendum or resolution at annual meeting.

One of the features of the project is of such a nature, however, that the national chamber has an established policy, which has already been declared and which has been considered by the membership, to be so important that it has been reiterated. This is the position that the Government should scrupulously refrain from entering any phase of business which can be successfully undertaken and conducted by private enterprise.

Therefore the national chamber has a position with reference to provisions in any proposed legislation as to the utilization of the water power which will be made available by the project and the distribution of the electricity which is generated. Any legislation which is enacted with respect to the Boulder Dam project should expressly and affirmatively provide that all proper effort shall be made to have private enterprise receive such opportunity to generate and distribute power at Boulder Dam as is provided under the Federal water power act as to the utilization of water powers at Government dams elsewhere in the country and will be consistent with the other purposes for which this dam will be constructed. The Federal power act not only provides for opportunity to private enterprise but for opportunity to States and their municipalities, as well as to the Federal Government.

I am, therefore, presenting to you the opposition repeatedly declared by the chamber's membership to the Government undertaking any of the phases of business which can be successfully undertaken and conducted by private enterprise. We respectfully point out that in any legislative authorization for the Boulder Dam project the power provisions will be contrary to the principle to which the chamber is committed unless they contain clear and distinct recognition that private enterprise is to have the opportunity above described.

I respectfully request that this letter be incorporated in the hearings of your committee.

Yours sincerely,

LEWIS E. PIERSON, *President.*

Senator JOHNSON. Mr. Chairman, I have here photostatic copies of the reports of James R. Garfield, F. C. Emerson, J. G. Scrugham, and W. F. Durand, who are special advisers of the Secretary of the Interior with respect to various matters relating to this project. I think these advisers were called by the Secretary of the Interior a fact-finding commission.

I want to preserve these reports. I do not know whether they can be printed as public documents or not. If there is any question on that score, I want them inserted in the record.

The CHAIRMAN. The proper thing is to print them in the record as addenda instead of inserting them in the middle of the testimony. They should be put in at the end.

Senator JOHNSON. As addenda, at the conclusion of the testimony, then, will be printed these reports of four of the members of the Secretary of the Interior's fact-finding commission.

The CHAIRMAN. I will say that I am advised by the fifth member that he has not prepared any statement and is not likely to submit one. However, if he does, I think that should also be included.

Senator JOHNSON. I quite agree with you.

(The reports referred to and submited by Senator Johnson will be found at the end of the record.)

Senator JOHNSON. Mr. Chairman, I will ask Mr. Van Norman to make a statement.

STATEMENT OF H. A. VAN NORMAN, REPRESENTING THE CITY OF LOS ANGELES, CALIF.

Senator JOHNSON. State, first, your name, your residence, and your occupation.

Mr. VAN NORMAN. My name, Mr. Chairman and gentlemen, is H. A. Van Norman. My home is in Los Angeles, Calif. My occu-

pation is engineer in the employ of the department of water and power of the city of Los Angeles.

Senator JOHNSON. You are associated with Mr. Mulholland?

Mr. VAN NORMAN. Yes, Senator; I have been associated with Mr. Mulholland for a number of years. In the last few years I have been his chief assistant in engineering work.

Senator JOHNSON. Are you familiar with the necessities for domestic water of the city of Los Angeles?

Mr. VAN NORMAN. Yes, sir.

Senator JOHNSON. Will you go on and state in your own way the necessities, where Los Angeles must go in order to obtain a domestic water supply, and the like.

Mr. VAN NORMAN. The present water supply of the city of Los Angeles, and likewise the coastal plan of southern California—that is, the area lying to the west of the Sierra Madre Mountains along the Pacific coast to southern California—is exhausted. That is, the present use of water in that area for all purposes is in excess of the supply. The deficit is only made up by drawing on the underground reservoirs in the region. The coastal plain section is filled by alluvium from the mountains.

Senator ASHURST. Would you pardon me just a minute?

Mr. VAN NORMAN. Surely, Senator.

Senator ASHURST. I have just received a notice to come to an important meeting of the Public Lands Committee on the naval oil reserves. I mean no discourtesy in leaving, and I will return as soon as I may. My able colleague, Senator Hayden, will remain during my absence.

The CHAIRMAN. Very well, Senator.

Proceed, Mr. Van Norman.

Mr. VAN NORMAN. Therefore the extraction of water from these underground reservoirs for all purposes in southern California has progressed to the extent, in the last few years, that the ground-water tables are becoming lowered to a dangerous extent.

The city of Pasadena, for instance, has overdrawn the basin to the extent that it is now extracting approximately 10,000 acre-feet per year in excess of the inflow into that basin.

I might go on and tell the committee of a great many other cities and communities that are faced with the same difficulties; that are actually drawing beyond their present water supplies; and, of course, it is apparent that this can not go on indefinitely without the complete exhaustion of these underground basins.

Senator JONES. How deep do you have to go to reach those basins?

Mr. VAN NORMAN. It varies, sir. In some regions the water is as close as 50 feet to the surface at the present time, and in others they are lifting as much as 300 feet. Of course, that varies over the region.

Senator JOHNSON. This process of exhaustion applies practically to all of the coastal cities of California, does it not?

Mr. VAN NORMAN. Yes; it does, Senator.

The city of Los Angeles—that is, the incorporated area—has, as you gentlemen all probably know, built one aqueduct from the Owens Valley, a distance of 250 miles. This aqueduct has a capacity of

400 cubic feet per second. The average use out of that aqueduct now is about 300 cubic feet per second.

The difference between the full capacity and the present use represents the quantity of water available for the city of Los Angeles, within its present limits, to grow on.

In 1905 the engineer of the city of Los Angeles, Mr. Mulholland, assisted by consulting engineers, made a forecast of the quantity of water that would be required for the city of Los Angeles 20 years in the future. That estimate they considered at that time optimistic as to the probable growth of the city. Their prognosications, however, were 30 per cent under the actual growth of that city.

It is interesting to take the curve of estimated growth at that time and compare the actual growth with it. It results, as I have stated, that the actual growth has been 30 per cent in excess of the estimate.

We do not like to place ourselves in the position of making extravagant estimates of the growth of the city so as to try to make it appear that we are going to be short of water sooner than it might actually occur. Therefore our tendency in this case has not been to exaggerate the growth, but to be conservative, the same as was done at the time of the building of the present aqueduct.

The estimates of growth that have been made and concurred in by all of the engineers in southern California show that the city of Los Angeles, the incorporated area of the city, will be beyond its present water supply by the time it will be possible, with the greatest of haste and speed, to construct the proposed Boulder Canyon Dam and an aqueduct from the Colorado River to that region.

It is generally recognized—and has been recognized for some years by the engineers of the region, who are informed on the subject, and now even recognized by nearly all of the people—that there is a great present demand by the communities for the securing of an additional water supply; and the Colorado River is the only place from which that supply can be obtained for this area, with the population at present being over 2,000,000 people and growing at the rate of a million or so every five or six years.

There has been a great deal said about the additional water supply available for southern California cities from the Owens Valley and Mono Basin.

The records, of course, of the surface supply into both of these regions have been gone into carefully for a great many years. Gauging stations are located on all of the streams, and these records have been carefully kept and carefully compiled.

The city of Los Angeles, through its hydrographic department, has kept records in Owens Valley and Mono Basin both. The result of the compilation of the flows of all of these streams since the year 1916, I will state, has been that it shows conclusively that there is not sufficient water in the two basins to fill the present aqueduct and justify the construction of another aqueduct to the city of Los Angeles or to southern California. The present aqueduct, with a capacity of 400 second-feet, cost $24,000,000. It was started in 1907 and completed in 1913.

The additional water theoretically available in the shed, if it were possible to corral all of the water and control it to 100 per cent of the visible water by storage and pumping from underground reser-

voirs or in any other manner would only be, during the average flow from both basins during that long period, less than 700 second-feet.

However, it is considered by the engineers responsible for the furnishing of domestic water supplies to the cities that there should be at least 20 per cent reserve as a factor of safety. We would not want to be responsible for having a city build up wealth to the extent of probably billions of dollars, such as is the case in southern California at the present time, depending upon a water supply, and then some unprecedented period of dry years occur, and they would be without water.

However, the period from November, 1923, to March, 1927, being 40 months, yielded only an average of 556 second-feet, and from October, 1925, to March, 1927, the average was 507 second-feet, for 18 months.

So it is prudent and proper to reserve a portion of all of the apparent supply in any watershed against dry years that might occur and that would be drier than any that have occurred in the past.

Therefore, if it were necessary to go to the Owens Valley and the Mono Basin for an additional water supply, there is not sufficient water, as I have stated, there to justify any construction, and it would only be a very temporary supply at the best.

The CHAIRMAN. Mr. Van Norman, just for my own information, and for that of the committee, as well, I want to ask this question:

As I understand it, with reference to the watershed or basin of Owens River Valley, you can get the full run-off at the Haiwee Reservoir. That is so far down the stream that you get practically all that falls into that basin for all practical purposes?

Mr. VAN NORMAN. Yes, sir.

The CHAIRMAN. In a year of a particularly heavy run-off, such as last year, is there any means of controlling and conserving the water that comes into the valley farther south or nearer the city of Los Angeles? There is no system of reservoirs there for holding back water for irrigation or other purposes, is there?

Mr. VAN NORMAN. You mean by that, Senator, the water that flows out of Haiwee Reservoir? There is a means of conserving that after it gets near the city of Los Angeles. Is that what you mean?

The CHAIRMAN. No. You catch everything above the Haiwee Reservoir?

Mr. VAN NORMAN. Yes, sir.

The CHAIRMAN. Below the Haiwee Reservoir there is a considerable rainfall, particularly in periods like last year; and I wanted to know if there is any system of reservoirs in that section of the country where the water could be conserved, or whether it would be practicable——

Mr. VAN NORMAN. I understand you now, I believe, Senator. That is, water that falls on the desert below the Haiwee Reservoir?

The CHAIRMAN. Yes.

Mr. VAN NORMAN. No; there is no way of catching that water. Last year, as you have stated, there was quite a considerable rainfall. I think it amounted to as much as five inches at the north end of the Haiwee Reservoir, tapering off to probably two inches at Mojave. Those storms, however, only occur once in possibly a lifetime, and it would be impossible to conserve any of that water.

The CHAIRMAN. Take the drainage on the other side, after you pass the desert and get farther south from the San Bernardino

Mountains: Are there systems of reservoirs any place there which conserve the waters of those streams that flow on down through the Los Angeles section?

Mr. VAN NORMAN. Yes, Senator. That is being taken care of in a very efficient way.

I will start at the west and go easterly and describe just a few places that are typical.

The city of Los Angeles has constructed in the San Francisquito Canyon, on one of the tributaries of the Santa Clara, an impounding reservoir that is able to take such surplus water as is available over and above the rights of cities and communities below, and conserve that. The water is largely held over for the summer irrigation succeeding the winter in which the reservoir is filled.

Then just below the Newhall tunnel there are reservoirs that catch any water that comes out of that canyon.

The CHAIRMAN. They are on the desert side?

Mr. VAN NORMAN. Of the Sierra Madres?

The CHAIRMAN. And on the other side you have one stream called the Los Angeles, I believe?

Mr. VAN NORMAN. The Los Angeles River.

The CHAIRMAN. And then there are two or three others?

Mr. VAN NORMAN. Yes. There is the San Gabriel and the Santa Ana.

Los Angeles County, within the past two years, has voted $35,000,000 of bonds for the purpose of controlling floods and for the conservation of such water as it is possible to conserve within the coastal plain side of the Sierra Madre Mountains. Already a reservoir is nearly completed on one of the tributaries of the Los Angeles River.

I will give you an idea of the difficulty of conserving that water and of the physical conditions that limit the conservation facilities by describing the Parvima Dam, which will cost about $2,000,000 when completed, which will be within the next few months; it will be 400 feet high, practically, and it will have a storage capacity of only about 11,000 acre-feet.

You see, our mountains are so precipitous that we must depend almost entirely on getting the water from these mountains into the gravels so that it will be available for the users to pump. The water that does go into the gravels is not sufficient to keep up with the present demand.

In addition to the San Gabriel the engineers of the water department, in cooperation with the county flood-control engineers, are working out a plan now for the storage and conservation of water and regulation of the floods of the Big Tujunga, so that the clarified effluent will be available in such quantities as can be controlled and spread over the gravels and put into the ground to replenish these underground supplies.

The CHAIRMAN. I have had very little information on the subject, and that is my reason for asking you those questions. I wanted to get a better picture of that situation. Of course, I know it is not comparable with what we have, for instance, in the Colorado mountains, where the annual run-off of a stream is practically the same year after year, or at least where you are justified in providing reservoirs that will retain very large quantities of water and then

draw it off for irrigation, holding back a two years' supply where that is possible. But the variation is so great from the San Bernardino Mountains, and also from the Sierra Madre, it seems to me that the initial expenditure has to be much greater than anything we have in order to catch an equal amount of water.

Mr. VAN NORMAN. That is true, Senator; and the long periods of drought between those years—we only have an average of 15 inches of rainfall in that region, and long periods of drought between wet years, and the carrying over of water in reservoirs if the sites were available would not be feasible. It would be nearly all lost by evaporation.

So, in order to conserve the water we are going to the great expense of building these dams, providing sufficient storage to hold back the rush so that we can run it out at a slower rate and get it into the gravels, and then you have in effect a covered reservoir and are able to recover the water as you need it.

So, as I have stated, $35,000,000 has been voted and is being spent, and in addition to that, some millions of dollars at other elections. I do not recall exactly the amount, but it was something over $40,000,000.

It is not a matter of the people of southern California limiting their expenditures to any particular fixed sum for a water supply. They have got to go and get it. It does not make any difference what it costs them. They have got to take care of all the water they have and have got to get more, unless we want to stop at some point when our water supply is exhausted, and that be the end.

That is the situation there. As I have stated, the only place that water can be obtained in sufficient quantities to guarantee a water supply to southern California for any period of time is from the Colorado River.

I appeared before you gentlemen in Los Angeles some two years ago. At that time the proposition of going to the Colorado River for water was new. We ourselves did not know as much about it as we know now. We had made preliminary investigations and computations, rough in character, but nevertheless sufficient to justify the statement that it was feasible and was advisable and was proper to go to the Colorado River for a water supply.

Since that time the engineering department has spent almost a million dollars in surveys and investigations and we have surveyed and mapped over 25,000 square miles of territory for the purpose of finding out and getting all the information that was to be had about that region to make a determination of the most economical location for the aqueduct.

In addition to that, we have built 135 miles of roads along the more inaccessible sections of this proposed line so that we could get into the preliminary line and make investigations of the geology of the region, to be used in making our estimates of the cost of driving tunnels, etc.

The CHAIRMAN. You made some investigation of the possibilities of removing silt from the water by some method of sand filtration. Has that given any hope of success?

Mr. VAN NORMAN. Yes. I will be very glad to explain that. There has been a great deal of misunderstanding about what we were

driving at down there, and I will be very glad, for the benefit of the committee, to explain the proposition.

The south terminus of the Maria Mountains is just above the Palo Verde Valley and extends some 25 or 30 miles paralleling the river. In the past they have broken down and great beds of gravel have been formed along the river and, as the result of the detritus from these mountains, have been washed out by torrential storms and cloudbursts, and the Colorado River is riding on top of that fan, and it was thought that by digging a trench, paralleling the river, in this porous material there would be a considerable quantity of water that would seep into this trench that could be taken out, and of course it would be clear coming out of the gravels.

In pursuance of that idea the trench has been dug for a distance of about 2 miles. It is 40 feet wide at the bottom and about 60 or 70 feet wide at the water surface, and a depth of about 10 feet. There are several hundred thousand yards, in round figures 500,000, of material that has been excavated from it. Pumps have been installed, and the water lowered and tested to see how much it would make, and wells have been drilled also in the gravels; and the conclusion of the engineers of the department who have been studying it and carrying on their investigations is that it will be possible by the extension of this trench and the installation, probably, of some additional wells, to develop 250 to 300 second-feet of clear water from that region.

The aqueduct that is proposed to be constructed will have a capacity of 1,500 second-feet, but it is thought that this infiltration gallery, as it is termed, will provide a clear-water supply during a period of years after the completion of the Boulder Canyon Dam until such time as the river is desilted by the storing of the water in the Boulder Canyon Dam, the clarified effluent released, and by the time the demand of the aqueduct gets up to a point near the capacity of water that can be filtered and gotten out of the gravels for use—when that time arrives the water coming from Boulder Canyon will be clear enough so that by some very inexpensive type of treatment, settlement in sedimentation tanks or running through sand filters, the water will be proper for pumping over for domestic uses.

The CHAIRMAN. With reference to the proposition of filtering through the gravels, of course it would be reasonable to expect that the silt would be removed to a very large extent, at least, but after some period of time would not those gravels become clogged with sediment and there would be no means of washing back and clearing your filtration bed?

Mr. VAN NORMAN. Of course, I think you probably have seen rapid sand filters, and when you mention washing back, such water works reverse the flow and clean the gravels.

In the ordinary filter, such as you probably have in mind, Senator, there is a constant flow in one direction through these gravels. Whatever solids or silts that are in suspension settle there and form a film.

The Colorado River is a stream of great variation in flow, high velocities and low velocities, and I think there will be quite a material effect in the cleaning of the bottom during changes in flow, ecains, w after the water is regulated from the Boulder Canyon
year after
reservoirs that

Dam. Then it will flow with such velocity that I believe it will work out all right.

There is another plan that can be adopted in connection with that. This region along the outwash slope of the Maria Mountains that I have described is 25 miles or more, and the canal can be extended for a distance of 25 miles at not very great cost, because it is purely an open canal and a dredger could excavate it at $1.50 or $2 a foot, even if there were 20 yards of gravel to the foot; and the water can be turned in at the other end, and if the cross section of the canal was sufficient to hold the velocity low enough the silt would precipitate in the upper end of the canal and you could take the clear water out at the lower end.

So it is not a difficult job to provide a clear supply of water from that source; and that, of course, would have to continue until such time as the Boulder Canyon Dam is constructed and some time after that construction, the period elapsing from the time the water is stored and the silt removed until such time as the silt which is now deposited in the tunnel between the dam and this intake is cleaned out.

The CHAIRMAN. Thank you.

Mr. VAN NORMAN. Mr. Chairman and gentlemen, I have kind of gotten off my line of thought, but I will try to finish up.

This matter that Senator Phipps asked me about—the conservation measures in southern California—I just wanted to deal briefly with. I will not repeat it, but I would like to bring out an incident to show what the city has done in the conservation of water in the Owens Valley.

The Owens River, like our southern California streams, is subject to high and low flows during wet and dry years, and we found in 1924, for instance, that there was only available in the Haiwee reservoir from the whole of the Owens Valley an average of 200 second-feet; that at the intake of the Los Angeles aqueduct at Charlie's Butte it was very much less. It was only 170 second-feet, the average, the year round. The difference was made up by the pumping of water out of the gravels of the region.

The city has installed over a hundred wells in the Owens Valley, varying in depth from 250 to 750 feet. Each well has a modern vertical turbine pump driven by an electric motor. The power for the driving of these pumps is generated by hydroelectric plants owned by the city.

So there is no water going to waste in the Owens Valley. The consumptive use for agricultural purposes is very little on account of the limited area that has been irrigated in the last three or four years, and the aqueduct is taking all of the water supply of the Owens Valley. Notwithstanding statements that have been made about great quantities of water up there, it does not require an engineer to discover the fact. You can drive along the road and get the truth.

The Owens Lake in 1913, when the aqueduct was put into operation, had a water surface area of over 90 square miles. To-day it is practically dry. The water that has been diverted out of the valley by the aqueduct during this period of years and the little additional use by farmers above there has completely exhausted or used up the water supply of that region.

The CHAIRMAN. I think it was in 1913 when I made a trip through that section, and I made another trip through last year by automobile, when I noticed the pumping plants you mention.

Mr. VAN NORMAN. Yes; and you very likely noticed the low stage of Owens Lake, too, Senator?

The CHAIRMAN. I did.

Mr. VAN NORMAN. So that, I think, should dispose of the idea that in Los Angeles' plan to go to the Colorado River for an additional water supply—and I mean southern California with Los Angeles, of course—there is some kind of hocus-pocus. It would seem to me that it would be apparent that if there were sufficient water in southern California to take care of the needs of that region, it would be one of the things we would be shouting the loudest about; and it certainly should be obvious that the belittling of our water supply does not correspond with the policies of the Chamber of Commerce of the city in advertising all the other advantages of the region.

It seems to me foolish to entertain some of the statements that have been made. I could go on at length, but I do not think the committee cares to have me do that.

If there are any other questions that you gentlemen would like to ask I shall be very glad to try to answer them; and with that I will close.

The CHAIRMAN. You understand that the evidence which you gave to this committee a year or more ago is made available for the purpose of consideration of this bill?

Mr. VAN NORMAN. Yes, sir. It is in the record.

The CHAIRMAN. I say, it is made available for the use of the committee.

Mr. VAN NORMAN. Yes, sir.

Senator HAYDEN. I want to preface my remarks, Mr. Chairman, by saying that in the event of an agreement between the States of Arizonia, California, and Nevada for an equitable apportionment of the waters of the Colorad River, the State of Arizona and the State of Nevada would have no concern as to how California used her share of the water. But in the absence of an agreement it is a matter of very grave concern to the State of Arizonia as to what quantities of water shall be diverted from the Colorado River.

My understanding of the situation is that there is a demand on the part of the State of California for 4,600,000 acre-feet of water based, among other things, upon 1,000,000 acre-feet being diverted for domestic use in and around Los Angeles. Am I correct in that figure of approximately 1,000,000 acre-feet?

Mr. VAN NORMAN. Fifteen hundred second-feet would be 1,095,000 acre-feet.

Senator HAYDEN. You stated that 700 second-feet could be obtained from Owens River and the Mono Basin?

Mr. VAN NORMAN. No, sir; I did not state that. I stated that the records over a long period show that the 100 per cent supply of that region would be less than 700 second-feet. So of course it would not be practical to take all of that. You would have to allow for certain losses, and so on.

Senator HAYDEN. You testified that the present capacity of the Los Angeles aqueduct was 450 second-feet?

Mr. VAN NORMAN. Four hundred second-feet.

Senator HAYDEN. And is this 700 second-feet in addition to the 400?

Mr. VAN NORMAN. No; that includes the 400. That quantity, I stated somewhat less than 700 second-feet, is all of the water there. The present waterway to convey water to Los Angeles takes 400 second-feet.

Senator HAYDEN. So that the total amount that is obtainable, in your judgment, from Owens River and the Mono Basin would be an additional 300 second-feet?

Mr. VAN NORMAN. No. I will have to correct that. The theoretical total quantity there would be an additional 300 second-feet, but there would be only probably 60 of 70 per cent of that, under the very best of conditions, that could be carried over from dry years to wet years. Then the physical conditions up there, Senator, are such that probably all of that water is in the Mono Basin and that would require, of course, long tunnels, and so on.

Senator HAYDEN. Of the 400 second-feet of water that is now being diverted, how much of it is being used for irrigation in southern California and what part for domestic uses?

Mr. VAN NORMAN. There is about 60,000 acre-feet a year—that would be approximately 90 second-feet continuous flow—that is used for irrigation purposes in the San Fernando Valley. If that water were not use for irrigation in the San Fernando Valley it would require a very much greater draft on the supply coming down from the Owens Valley for domestic uses; the reason for that being that since 1913, when water was first brought from that basin, the ground water table in the San Fernando Valley has risen. The surface flow at the Narrows, where the city of Los Angeles takes its supply out of the Los Angeles River, has nearly doubled in quantity. That is attributable to only one thing, and that is the introduction of foreign water. the spreading of foreign water over these lands on the west end of the San Fernando Valley, and that has augmented the supply to almost double the former average flow.

Senator HAYDEN. Ninety second-feet is used for irrigation. How many feet do you recover by way of return flow?

Mr. VAN NORMAN. We recover approximately—I can express that a little better in quantities. The increment in the gravels of the valley since the aqueduct water was put on is about 150,000 acre-feet, and the difference in the flow at the Los Angeles River, between the dry year of 1905 and the present time, I believe—it was about 50 second-feet then, and it is 90 second-feet now. I said, double. It is approximately that.

Senator HAYDEN. Ninety second-feet was used for irrigation, and you recovered 40 second-feet by pumping. Is that your best judgment?

Mr. VAN NORMAN. I would not say quite that much, Senator, because there have been some wet years and wetter years than the ones that occurred just before 1905 and in the period since then; but maybe some of the increment is due to that.

Senator HAYDEN. I would be surprised if so great an amount of water were recovered. In the Salt River project the return flow is about 25 per cent?

Mr. VAN NORMAN. We are safe in saying 30 to 33 per cent.

Senator HAYDEN. Is it your understanding that the water that is supposed to be diverted from the Colorado River over the mountains into the municipal area in the vicinity of Los Angeles is to be used exclusively for domestic purposes?

Mr. VAN NORMAN. That has been our purpose. The engineers of the department feel that the cost of pumping and all the other charges in connection with it will make it so that it can not be used generally for irrigation.

Senator HAYDEN. What we were concerned about was whether there would be a duplication of the experience in connection with the Owens Valley development, that the city would bond itself to obtain a municipal supply of water, and having obtained more than it could use, part of it would be diverted for irrigation purposes.

Mr. VAN NORMAN. That is not the case, Senator. I think there is considerable misunderstanding about that. The true fact is that of course it was obvious that a city, in going after an additional water supply where it had to go 250 miles, would not construct for its immediate needs. It would be prudent to construct, at the same time, for the future. That is what was done.

There was an aqueduct of 400 second-feet capacity constructed from there, and the use of that aqueduct has been increasing from year to year ever since, and I stated a few moments ago the length of time it would last until it was all exhausted.

The San Fernando Valley mentioned is in the city limits. It is incorporated within the city. The water that is being used on that land now is dedicated to the use of that particular land perpetually.

If you will go out through the San Fernando Valley you will find many towns—Lankershim, Venice, Owens Mouth, Granada, and several other towns—that are spreading out, and the area has come rapidly from agricultural in character to urban in character. A transition is taking place, and a transposition of the water from agricultural to urban uses is growing rapidly.

That is exactly what has occurred. But the fact that the Los Angeles aqueduct was built and a lot of water for agricultural purposes was obtained was purely a matter of good business and of sound judgment to use that water temporarily until the change in use occurred.

Senator HAYDEN. I gather from your statement that the point of diversion of water from the Colorado River is in the vicinity of Blythe?

Mr. VAN NORMAN. Yes; 20 or 25 miles upstream from Blythe, Senator; yes, sir.

Senator HAYDEN. I have heard it suggested, and we in Arizona were rather hopeful that such a plan might be adopted because it would also accommodate our uses; that the construction of a dam across the Colorado River in the vicinity of Parker, to be erected after development above and after the river is desilted, would be advantageous not only to Arizona but to the city of Los Angeles. The impounding of the water by such a dam would clarify it so that it could be pumped directly from the river without going through the gravels as you have mentioned.

Mr. VAN NORMAN. Yes; that is a perfectly feasible and logical idea, Senator, and I believe that some time or other when we get to

working together we are going to work out a lot of those things that will be of mutual benefit to your State and ours.

Senator HAYDEN. I have been told that a dam approximately 100 feet high at Parker would generate 100,000 horsepower and would back the water up nearly to Needles. I am also advised that clear water coming out of the Boulder Canyon Dam would pick up a certain quantity of silt from the lowlands in the Mojave Valley, but that if the water was practically still and at a level for a long distance, 70 or 80 miles, that by the time it arrived at Parker it would be so clear that you could pump it directly into your aqueduct.

Mr. VAN NORMAN. That is true.

Senator HAYDEN. Such a dam at Parker would not only provide a means of diverting the water into Arizona and into the country on the California side, in the vicinity of Blythe, but would also serve this municipal use?

Mr. VAN NORMAN. You are quite correct about that, Senator, and I think it is worth while to mention, now, that any such project as that on the lower river is not feasible and possible until large storage is provided higher up to hold the major part of the silt that is in transportation all the time, and from then on we can figure on these projects lower down, as soon as the dam is built at Boulder Canyon, one can be built at Parker and a gravity canal can be taken out of that dam at Parker about a hundred feet in elevation above the present water surface in the river and a great many hundred thousand acres of land put under gravity flow on the Arizona side of the river by the construction of the dam. I said a good many hundred thousand. I see Mr. Heard making a note that maybe I have gone a little strong on that—but a considerable acreage, Mr. Heard.

Senator HAYDEN. Our experience on Salt River has been that by supplemental reservoirs below we have been able to regulate the use of the water and greatly increase the power output of the original dam.

For example, if, in addition to the dam at Parker, a dam were built at Bulls Head Rock, which would back the water up to another dam at Boulder Canyon, the two reservoirs below would vastly increase the firm power at Boulder Canyon and bring it up to a million horsepower.

Mr. VAN NORMAN. Surely. Those things I think the States will be able to work out, and if they do, the essential thing is getting the water dammed and held in storage at Boulder so that we only have to deal with the regulated flow out of Boulder. And if we go into the Parker site, for instance, and construct a dam in the future, we can probably arrange with the operators of the reservoir at Boulder to hold the water down to a very small flow when not much is needed thereby aiding in the construction of dams below Boulder by controlling the flow. Those are advantages that will accrue to all of us.

Senator HAYDEN. Our concern is this, that if the combined demand for domestic uses and irrigation purposes is so great that you must choose between them, then, if certain lands must remain unreclaimed either in Arizona or in California in order to supply domestic water, we in Arizona can not see why the favor should be extended to California lands by giving them an increased portion of the water

and the favor denied to Arizona lands by requiring them to remain a desert. That is the reason why we are so insistent upon an apportionment of the water to each State.

Mr. VAN NORMAN. There is a thought that I have in connection with that. I do not know whether it has been offered at these hearings or not, but it is this:

It must be obvious to all persons here that the place to dispose of the power from Arizona—a large part of it—is over in southern California; that in order to attract the manufacturers that are going to use that power to southern California you have got to sell it to them at a rate that is attractive.

In order to attract the population to that region, which will consume some of your products, some of the products of the Imperial Valley—and they are the best market you have. If you have to ship your products to the Pacific coast you are not shipping them to Chicago or the eastern centers, and therefore it seems to me that the greatest advantage that can accrue to any of the States out there is to provide themselves with a market. I do not think it is good economics or good common sense to say that you do not want to increase the population of southern California by providing a water supply for it, because it will dry up an acre of land in Arizona or in the Imperial Valley. I do not think that is good, sound logic. I think that the more the population increases over there the better the rate at which this power and this water and all these commodities are furnished to the people over there, and the more you attract there the more demand there will be for the products that you are now producing and will produce in the future.

Senator HAYDEN. I do not think there is any doubt but that the lower Colorado River basin is one economic unit.

Mr. VAN NORMAN. Of course it is; absolutely.

Senator JOHNSON. The thing that has been impressing me during all of this controversy is the artificial boundary line between States. This is not the place to argue it, and I am trying to look at this question fairly; but the thing that impresses me is the national standpoint. Let it pass at that.

You said that you were going to take water at Blythe, under your contemplated plan?

Mr. VAN NORMAN. Yes, sir.

Senator JOHNSON. The cost of that to the city of Los Angeles would be very great, would it not?

Mr. VAN NORMAN. Yes. In order to provide the market that I have just described we have got to spend some money. It is going to cost $150,000,000, at least, to take the water from that point into the State of California. It is going to cost another $50,000,000 or more to build transmission lines to convey the power over to that market. Who is going to put up that money unless the people over there do it, to provide a market for this project and these developments we have been talking about?

Senator JOHNSON. How much of a lift will you have for the water?

Mr. VAN NORMAN. The net lift, after allowing for slope between pumping plants, will be about 1,625 feet.

Senator JOHNSON. And where is it your expectation, if your plans mature, to obtain the power?

Mr. VAN NORMAN. There is only one place to get it, Senator, and that is from a power plant on the Colorado River; and this Boulder Canyon is the one we are depending on for that.

Senator JOHNSON. How much power will it require, in your opinion, for the city of Los Angeles to take from this project in order to carry out its contemplated plan?

Mr. VAN NORMAN. I have it figured out here, Senator. I will refer to my notes and give you an accurate answer.

Senator JOHNSON. I will be glad to have you give it, if you please.

Mr. VAN NORMAN. For a total of 1,500 cubic feet per second continuous flow, after allowing the necessary line losses and the proper efficiencies of the pumps, and all the rest of it, the figure is 294,820 kilowatts. That is, in horsepower, 395,000.

That, gentlemen, as I said very carefully, is the full 1,500 second-feet flow. I have a table here showing the quantity of power that will be required for this pumpage, in stages of 100 second-feet, from 100 second-feet on up to 1,500 second-feet. It is our estimate that if we get started building that aqueduct and building the Boulder Canyon Dam and building power plants and all these other things that we are talking about, within the next couple of years, at the time they are completed we will start off with 300 second-feet. That will be the requirement of the coastal plain States by the time that aqueduct is completed. Three hundred second-feet is 55,000 theoretical horsepower, and so on across, adding line losses and so on.

When we get to the pumping plants at the point where the water is lifted, we have 79,000 horsepower. So we will have a demand on the switchboard when this proposed aqueduct is put into operation of about, say, in round figures, 80,000 horsepower, each year increasing as time goes on.

Senator HAYDEN. And up to 1,500 second-feet what would be the maximum?

Mr. VAN NORMAN. The maximum power, Senator?

Senator HAYDEN. Yes.

Mr. VAN NORMAN. That was the figure I gave you a few moments ago—294,820 kilowatts, or 395,000 horsepower.

Senator JOHNSON. The cost to the city of Los Angeles, you have said—I am speaking in round numbers—to get the water supply from the Colorado River would be about $200,000,000. Is that correct?

Mr. VAN NORMAN. No, Senator. I included there the cost of the transmission line or transmission lines from the Boulder Canyon Dam to the distributing centers for that power in southern California. The $50,000,000 was an approximation on my part. The $150,000,000 is intended to express the capital cost of this proposed aqueduct and the additional $50,000,000 for transmission lines.

Senator JOHNSON. That is all, sir.

Senator HAYDEN. How much power will you recapture from the water after it passes over the summit going down on the other side to the coastal plain?

Mr. VAN NORMAN. I think that is more or less of a fanciful thing. This water, when it gets over the divide, say, at the east end of the tunnel, under the San Gorgonio Pass, in the vicinity of Redlands, has got to go on to Santa Ana and other places. Until the distributing system, Senator, is worked out, the lines laid, and the whole thing worked out and designed, it is pretty hard to say. It would

be a guess; that is all. I question whether there would be any, to any great extent.

Senator HAYDEN. You have 1,500 second-feet of water maximum and at least a drop of a thousand feet?

Mr. VAN NORMAN. Yes. Of course, they would install a hydro plant on this aqueduct. It would be necessary to have a regulator below, at least. There is a long, flat slope through a very expensive country, and there are a good many problems that enter into it, and I question whether it would be of very much value.

The CHAIRMAN. Mr. Van Norman, do we understand that there is no considerable drop coming down the slope of the San Bernardino Mountains? How do you cross that range with your proposed aqueduct?

Mr. VAN NORMAN. At Shaver Summit. That is about 25 miles to the southeast from Mecca, the head of the Chucawalla Valley. That is the highest point on the aqueduct. It is gravity from there. Now, it will be a gravity system, and for a considerable ways; and then there will be a long tunnel through the San Gorgonio Pass to Redlands.

That will be at an elevation of 1,500—probably the hydraulic grade at the west portal of that tunnel will be at elevation 1,500.

Now, there is a lot of the outwash slope along the Sierra Madre to San Bernardino, and so on, will have to have water.

Now, that is what I meant in reply to Senator Hayden's question about the recovery of power. It is a very complicated thing. It is a water project primarily. If some water happens to go along the lower sections, and there are power sites to be made use of, of course, that will be done.

The CHAIRMAN. You come through a tunnel, and that will avoid pumping water to the higher elevations, and then the slopes are gradual? There is no place where there is a definite drop of several hundred feet?

Mr. VAN NORMAN. No; not in the tunnel.

The CHAIRMAN. Or in the main canal?

Mr. VAN NORMAN. No, sir; it will be a gravity slope, going along gradually, with the possibility of a foot to a thousand, or something like that.

Senator JOHNSON. Santa Ana is in the same situation as Los Angeles with regard to the necessity for water, is it not?

Mr. VAN NORMAN. It is, Senator. I might explain that at the present time there are 28 cities, I think up to date, or possibly a few more, that have been joined into an organization called the Colorado River Aqueduct Association, and they, through their efforts, have gotten an enabling act passed. The purpose of this is to authorize the creation of a water district to provide a supply to all of those cities, Santa Ana, and Long Beach, and many cities, as I have stated here, all in that district, and all joining in the purpose to get this water supply. That is the way it is working. I believe the status of that now is that Mr. Howard, the former city attorney of Pasadena, has started proceedings to test the validity of that act, so as to make it operative as soon as the conditions will permit of going ahead.

Senator JOHNSON. Now, Mr. Childers.

The CHAIRMAN. Have you concluded, Mr. Van Norman?

Mr. VAN NORMAN. Yes, Senator, unlesss some of the gentlemen want to ask some questions.

The CHAIRMAN. I want to be sure of one point in your statement. Eventually, using the full 1,500 second feet of water through the canal would require 395,000 horsepower, and that would be taken out of 550,000 constant horsepower that is estimated to be produced at Boulder Canyon Dam?

Mr. VAN NORMAN. Yes, sir. Now, Senator Hayden has called attention to a certain thing. It might be that by the time all that power is developed—I am confident there will be other developments along the river, either above or below, where all the people that want power can get it. But, as you state, Senator, if no other plant was installed other than this, that would be the condition, there would be almost four-fifths of the power which would be used for pumping water.

The CHAIRMAN. Are there any other questions from this witness? (After a pause:) If not, we thank you, Mr. Van Norman.

Senator JOHNSON. Mr. Chairman, Mr. Van Norman has certain tables and studies on this matter about which he has testified. If there is no objection, I would like to have him sort them out and put them in as an appendix to his testimony.

The CHAIRMAN. Without objection, that may be done.

(The matter referred to by Mr. Van Norman is as follows:)

TABLE NO. 1.—*Mean monthly discharge of Owens River; Pleasant Valley*

Year	July	August	September	October	November	December	January
1918							
1918-19	342	228	239	349	264	249	225
1919-20	239	201	180	204	235	250	244
1920-21	272	223	201	206	218	201	207
1921-22	363	209	161	185	201	201	216
1922-23	676	320	256	221	235	243	247
1923-24	375	244	228	209	226	208	206
1924-25	129	125	130	153	207	194	182
1925-26	326	193	155	181	187	181	166
1926-27	169	151	139	181	224	200	190
1927-28	530	259	224				

Year	February	March	April	May	June	Acre-feet	Mean
1918		261	346	279	813	102,193	425
1918-19	236	244	294	536	373	216,040	298
1919-20	256	292	230	296	519	190,060	262
1920-21	227	227	170	258	640	184,121	254
1921-22	250	252	340	355	888	217,925	302
1922-23	273	266	211	291	338	216,281	298
1923-24	243	204	174	161	120	156,745	306
1924-25	199	157	165	178	261	125,600	173
1925-26	186	239	217	321	324	162,132	223
1926-27	225	296	234	332	681	182,452	252
1927-28							

TABLE No. 2.—*Los Angeles Aqueduct at intake*

Year	July	August	September	October	November	December	January
1913–14	88	79			(229)	100	(293)
1914–15	99	200	196	432	59	98	29
1915–16	416	57	28	67	10	119	50
1916–17	528	200	211	333	174	134	166
1917–18	326	162	57	247	450	465	429
1918–19	249	83	89	408	407	365	316
1919–20	80	38	60	188	354	446	426
1920–21	102	69	67	173	373	406	424
1921–22	154	72	65	160	349	480	404
1922–23	504	215	105	310	450	502	491
1923–24	162	96	110	382	378	417	423
1924–25	61	58	53	104	267	259	285
1925–26	308	143	70	219	288	290	278
1926–27	125	89	66	207	280	236	399
1927–28	475	195	167				

Year	February	March	April	May	June	Mean second-feet	Total acre-feet
1913			103	75	104	94	16,935
1913–14	(46)	84	320	219	124	158.2	70,977
1914–15	126	233	194	92	303	171.8	124,357
1915–16	29	41	199	102	133	104.6	75,985
1916–17	96	66	75	80	313	199	143,912
1917–18	424	336	174	77	403	295	213,593
1918–19	398	376	197	201	294	281	203,638
1919–20	406	405	147	72	226	237	171,880
1920–21	410	246	75	74	285	224	162,180
1921–22	485	414	321	129	617	302	218,710
1922–23	453	245	103	75	134	299	216,310
1923–24	332	248	156	76	57	226	165,493
1924–25	215	138	132	97	213	170	123,165
1925–26	341	331	180	134	318	241	174,510
1926–27	474	437	239	167	465	264	191,443

TABLE No. 3.—*Owens Valley deep wells—Mean monthly discharge in second-feet*

Year	July	August	September	October	November	December	January	February
1919–20					20.3	23.3	20.5	18.7
1920–21	18.6	19.1	18.5	15.6	15.9	9.8	8.8	8.8
1921–22	12.2	11.5	11.0	12.0	8.3	10.0	6.4	7.0
1922–23	7.4	7.5	7.2	7.6	7.6	7.8	7.7	7.5
1923–24	10.9	11.5	10.2	7.8	6.0	5.8	5.5	7.7
1924–25	12.0	17.4	33.0	33.0	33.7	33.0	28.0	26.6
1925–26	46.2	54.2	52.7	49.5	40.0	50.0	35.7	22.3
1926–27	4.7	54.5	53.0	63.0	82.4	50.1	78.0	42.6
1927–28	4.0	4.7	5.2	5.8				

Year	March	April	May	June	Maximum second-feet	Minimum second-feet	Mean second-feet	Total acre-feet
1919–20	20.7	21.5	25.3	25.6	25.6	18.7	19.8	9,519
1920–21	8.0	7.4	12.3	12.7	18.6	7.4	12.9	9,393
1921–22	7.0	7.1	7.2	7.4	12.2	6.4	8.9	6,478
1922–23	7.2	7.1	6.9	7.9	7.9	6.9	7.4	5,385
1923–24	8.4	10.0	11.3	8.7	11.5	5.5	8.7	6,288
1924–25	25.7	43.2	53.6	61.8	61.8	12.0	33.4	24,258
1925–26	2.7	3.2	4.5	5.6	54.2	2.7	30.7	22,206
1926–27	1.2	1.7	1.9	3.0	82.4	1.2	36.3	26,279
1927–28					5.8	4.0	4.9	1,202

TABLE No. 4.—*Total flow from Owens Valley into the Haiwee Reservior of the Los Angeles Aqueduct*

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
1912-13							
1913-14	129	168			316	54	30
1914-15	100	50	55	47	56	91	11
1915-16	86	41	23	43	3	15	35
1916-17	98	153	203	312	101	139	166
1917-18	151	126	54	266	375	387	410
1918-19	277	96	98	377	385	355	321
1919-20	131	88	86	235	405	473	472
1920-21	174	108	96	210	387	408	442
1921-22	215	102	96	205	349	419	405
1922-23	410	224	14	186	426	451	491
1923-24	199	131	133	278	380	404	428
1924-25	96	91	87	132	243	299	318
1925-26	390	215	128	268	330	347	325
1926-27	210	170	134	256	321	250	469
1927-28	509	220	125				

Year	Feb.	Mar.	Apr.	May	June	Mean second-feet	Total acre-feet
1912-13					158		
1913-14	12	54	32	102	93	99	71,700
1914-15	117	120	40	40	71	66	47,800
1915-16	24	33	184	134	170	66	47,900
1916-17	115	57	47	85	28	125	90,500
1917-18	415	315	136	127	335	258	187,000
1918-19	367	323	227	252	318	283	205,000
1919-20	447	445	145	179	333	287	208,000
1920-21	419	271	140	154	349	263	190,000
1921-22	494	431	280	308	536	320	232,000
1922-23	481	272	154	151	172	286	207,000
1923-24	367	257	194	119	77	247	179,000
1924-25	267	191	197	190	294	200	145,000
1925-26	383	296	224	143	353	284	206,000
1926-27	481	449	274	301	449	314	227,000
1927-28							

Senator JOHNSON. Mr. Childers.

STATEMENT OF CHARLES L. CHILDERS, ATTORNEY AT LAW, EL CENTRO, CALIF.

The CHAIRMAN. Mr. Childers, give us your full name, residence, and occupation, for the benefit of the reporter, and also for the benefit of the committee.

Mr. CHILDERS. My name is Charles L. Childers. I am an attorney. I am attorney for the Imperial irrigation district; and I reside at El Centro, Calif.

Senator JOHNSON. How long have you lived at El Centro?

Mr. CHILDERS. I have lived at El Centro 15 years, Senator.

Senator JOHNSON. And you are familiar with the county and the situation in which it finds itself, and its needs, and the like?

Mr. CHILDERS. Quite, Senator.

Senator JOHNSON. Go ahead and make your statement in your own way, Mr. Childers, please.

Mr. CHILDERS. Mr. Chairman and gentlemen of the committee, with your permission, I think I will assume as a part of my remarks to discuss briefly some of the law questions that may arise. I hesitate to approach this subject, and do so with great deference to the mem-

bers of this committee, many of whom are lawyers of great ability. However, a number of times during the hearing before this committee and the hearing in the House upon this bill questions as to the constitutional power of the Congress to pass upon this bill, questions as to the rights of States to object to the passage of the bill or the development proposed, have been raised. And I think it would not be amiss to refer to some of the authorities and discuss those points as briefly as we may.

It has been well settled that if constitutional power exists in the Congress to do an act, that power is, in itself, sufficient, and the United States is not obliged to look elsewhere for authority. In other words, while the United States is a government of specified powers, within those powers it is wholly supreme. As was said by the Supreme Court of the United States in the case of Tennessee *v.* Davis, (100 U. S., 257), and reading from page 263, the court said:

> The United States is a government with authority extending over the whole territory of the Union acting upon the States and the people of the States. While it is limited in the number of its powers, so far as its sovereignty extends it is supreme. No State government can exclude it from the exercise of any authority conferred upon it by the Constitution, obstruct its authorized officers against its will, or withhold from it for a moment the cognizance of any subject which that instrument has committed to it.

And again, in the case of Chappell *v.* United States (160 U. S., 499). Reading from page 509, the court said:

> It is now well settled that whenever, in the execution of the powers granted to the United States by the Constitution, lands in any State are needed by the United States for a fort, magazine, dockyard, lighthouse, customhouse, courthouse, post office, or any other public purpose, and can not be acquired by agreement with the owners, the Congress of the United States, exercising the right of eminent domain, and making just compensation to the owners, may authorize such lands to be taken, either by proceedings in the courts of the State with its consent, or by proceeding in the courts of the United States, with or without any consent or concurrent act of the State, as Congress may direct or permit.

So, if the authority exists, then the Congress is not obliged to ask consent of anyone. And if the authority exists and Congress has the right to proceed, it may proceed in its own way.

Again, referring to one or two authorities just touching upon this preliminary point. Mr. Chief Justice Marshall, than whom there has been no greater jurist in the United States, in the celebrated case of McCulloch *v.* Maryland, stated:

> We think the sound construction of the Constitution must allow to the National Legislature that discretion with respect to the means by which the powers it confers are to be carried into execution, which will enable that body to perform the high duties assigned to it, in the manner most beneficial to the people. Let the end be legitimate, let it be within the scope of the Constitution, and all means which are appropriate, which are plainly adapted to that end, which are not prohibited, but consist with the letter and spirit of the Constitution, are constitutional.

Again, the court, speaking through Mr. Justice Gray, in the Matter of Quarles (158 U. S., 532), says:

> The United States are a Nation, whose powers of government—legislative, executive, and judicial—within the sphere of action confided to it by the Constitution, are supreme and paramount. Every right, created by, arising under, or dependent upon the Constitution, may be protected and enforced by such means and in such manner as Congress, in the exercise of correlative duty of

protection, or of the legislative powers conferred upon it by the Constitution, may in its discretion deem most eligible and best adapted to attain the object.

Now, those authorities, state the general rule with which you gentlemen are, of course, very familiar. So the question is whether or not in the Constitution we find the authority to proceed with the work here contemplated.

Suggestion has been made that if the Boulder Dam is constructed it must be upon the theory of improving navigation. I state to you that there are at least three well recognized theories upon which the Congress may proceed: Under the commerce clause; under the theory or reclamation; or the Congress may proceed on the Colorado River to do flood-control work as such.

Now, under the commerce clause. It will be observed that under that particular section of the Constitution the word "navigation" is not used. The Constitution provides that Congress shall have the power to regulate commerce between the States, foreign nations, and the Indian tribes. Not a word is said about navigation. The courts have held that this broad authority includes navigation. And there is no doubt, as has been said around this table, that the Congress has authority to go into the Colorado River, if it is a navigable stream, and do those things necessary or deemed necessary by the Congress in aid of, or for the benefit of, or to improve navigation.

But it is not limited to navigation. The Constitution provides that the Congress shall regulate commerce. Commerce, as we understand it to-day, is carried on more extensively in our interior by rail and by land than it is by water. Suppose the Colorado River should be found to be nonnavigable, would it mean that the Congress of the United States is without power to proceed under the commerce clause? Not at all. Two of the great continental railroads cross the Colorado River below the Boulder Canyon Reservoir. Three transcontinental highways cross the Colorado River below the Boulder Reservoir. Great floods that have occurred in the past have been known to be much higher than those that we have definite records of. Suppose a flood came down, or any other condition occurred on the Colorado River that would destroy those means of transportation. Commerce in the west, and that particular section of the southwest, would be paralyzed. So under the commerce clause there is no reason to assume that Congress is limited to navigation, just because more of the authorities refer to navigation than to some other provision, or some other means of transportation.

Now, the decision of the Congress upon these questions is final. Congress has the absolute power to determine what is or what is not an obstruction to navigation, or what is or what is not an improvement to navigation, or to commerce.

I may, in that connection, refer to cases in the Supreme Court of the United States, namely:

The Clinton Bridge, 10 Wallace, 454.

Union Bridge Co. *v.* United States (204 U. S. 364).

I take it that that question is beyond controversy. And if the United States has the right to do this work, it may do so without the consent of the State, without condemnation, or compensation, as is said by the court in the case of Chapell *v.* Waterworth (39 Fed. Rep. 77), citing many authorities:

The submerged lands under navigable waters are public property and not private property and when the United States needs any of them for the purpose of commerce or navigation—

You will note that in this authority the words "commerce or navigation" are very significantly used. (Continuing reading:)

When the United States needs any of them for purposes of commerce or navigation it can take them without condemnation or compensation either to the State or its grantees.

I might cite many authorities upon the commerce clause. That has been gone into around the table, and I believe admitted that under the commerce clause clearly the United States has authority to proceed.

Now, let us refer to reclamation. In the very same instrument we find authority vested in the Congress to control the public lands. That provision stands on exactly the same dignified plane as the other, to regulate commerce. There is no difference between them. One places authority in the Congress to regulate commerce between the States; the other places authority in the Congress to control the property of the United States. They stand on exactly the same plane. And the Congress has that authortity first as a sovereign. As is said by the United States Supreme Court in the case of Camfield *v.* the United States (167 U. S. 518):

The General Government doubtless has power over its own property analagous to the police power of the several States and the extent to which it may go in the exercise of such power is measured by the exigencies of the particular case * * * while we do not undertake to say that Congress has the unlimited power to legislate against a nuisance within a State which it would have within a territory we do not think the admission of a territory as a State deprives it of the power of legislating for the protection of the public lands though it may thereby involve the exercise of what is ordinarily known as the police power so long as such power is directed solely to its own protection. A different rule would place the public domain of the United States completely at the mercy of State legislation.

And again, in the case of Irving *v.* Marshall (20 How. 588), the court said:

As the control, enjoyment, or disposal of this property (the public land) must be exclusively in the United States anywhere and everywhere, within their own limits and within the powers delegated by the Constitution no State and much less can a Territory interfere with the regular, the just and necessary powers of the latter.

As a proprietor. Reading from the case of United States *v.* Midwest Oil Co. (236 U. S. 459), the court there said:

It must be borne in mind that Congress not only has a legislative power over the public domain, but it also exercises the power of the proprietor therein. Congress may deal with such lands precisely as an ordinary individual may deal with farming property.

It is not strange, with this unlimited power in the Congress to deal with the public lands, that the States have upheld the reclamation laws, as has been done.

Senator ASHURST. Mr. Childers, may I interrupt you?

Mr. CHILDERS. Yes, sir.

Senator ASHURST. Notwithstanding all you have said, Congress recognized the laws and rights of the States in the reclamation act of June, 1902.

Mr. CHILDERS. Congress has directed the Reclamation Service, or the Department of the Interior, if you please, to appropriate water, under the laws of the States. That is true. That goes to the appropriation of water in the States.

Senator ASHURST. That the Federal Government could not appropriate the water belonging to the States is recognized by the act of June, 1902.

Mr. CHILDERS. The Federal Government would have to comply with that act. That might be done with the consent of the State. The State could not change its law to apply in one case and not in another. In other words, the Bureau of Reclamation goes into a State the same as an individual goes into a State and appropriates water. It has no power——

Senator ASHURST. The Federal Government has no greater power or authority over the waters belonging to the Western arid States than an individual citizen has.

Mr. CHILDERS. I will touch on that a little later, Senator. I hesitate to touch on it at all. That is rather a moot question. It is referred to in many cases; and it is referred to by many text writers and authorities. I do not want to go into it in any extended manner, but I will touch on it, if I may.

Now, in Arizona, to make doubly sure that the United States should not be embarrassed, the enabling act of June 20, 1910:

> That the people inhabiting said proposed State do agree and declare that they forever disclaim all right and title to the unappropriated and ungranted public lands lying within the boundaries thereof.

Now, that provision is carried into the Arizona Constitution as section 4 of Article XX. It is not different from most of the western States, I believe.

Senator HAYDEN. Are there not certain decisions of the Supreme Court that hold that Congress has this same power?

Mr. CHILDERS. I think it would have. I do not recall it being discussed in the cases, but——

Senator HAYDEN (interposing). The Supreme Court has held that way.

Mr. CHILDERS. The Constitution has placed it in the Government, and no power could take it away.

Just before I leave the reclamation act I want to say this: The United States has lands in all these western States. Along the all-American canal there are some 200,000 acres of land to be directly served by that canal. In Arizona and California, I have no doubt, several hundred thousand acres of public lands can be reclaimed, but can not be reclaimed from the present flow of the river. The unregulated low flow of the river, as has been indicated, is exhausted, and it is only by the regulation of the flow that those lands can be reclaimed and placed on the market. So the United States has a very great interest in reclaiming those lands, as it has done in the Salt River Valley in Arizona and elsewhere, and has made hundreds of millions of dollars of wealth. It has reclaimed the Yuma Valley, and made a highly productive community out of land that was wholly valueless.

That same thing has happened in other communities, and the United States is interested in having its land put in a productive state and taken out of the unproductive class and put in a class

where it is of great value. So if the Congress of the United States may decide that it is necessary to do this work for the improvement of its own land, clearly, under the Constitution, it has the right to proceed, and to proceed in its own way. If it determines that the Boulder Dam to a height of 550 feet is necessary for that, or is deemed advisable for that, there is no power that can criticize or complain about the act of Congress in that regard. Not the ownership, if you please, of the bed of the stream, or any other claim, can interfere with the free exercise of that right which has been confided to the Congress by the Constitution of the United States.

Now, on flood control we have this condition: The United States is the owner of the banks of the Colorado River almost exclusively, from the source of the international boundary line.

Senator ASHURST. You say almost exclusively. What do you mean?

Mr. CHILDERS. At points there may be some private ownership. At Yuma, for instance, there may be some, but in the main, the banks of the river are the lands of the United States, from one end of the other. At Yuma the United States has spent almost $9,000,000 in putting in the Yuma project. The Laguna project has been built at a great cost. On the California side is a power plant that has been built within the last two or three years for the Yuma project at a cost of $250,000, which is owned by the United States. On either side of the river are public lands of the United States of potential value of perhaps hundreds of millions of dollars, to-day valueless, but some day will be reclaimed and made tremendously valuable.

What I am trying to say is this: That the United States itself has properties of enormous values. If the river in flood should destroy the works below this property, the value may be completely destroyed. As was said by President Roosevelt some 21 years ago when the Colorado River was flowing into the Imperial Valley, that if it were not stopped, if it were not put back into the channel, the recessions would take place, would destroy the Laguna Dam and the other properties. The engineers tell us that would place the river at Yuma in a gorge some hundred feet deep. That being the case, it is doubtful if this land could be reclaimed. It is certain that the Laguna Dam would be destroyed, and the power house on the California side be left high and dry because water could not be placed in it.

Now with that condition, there is no doubt at all that the United States has the same right to go into the Colorado River and project its own property as it has to project this beautiful building that we are in here to-day. So I say, as a question of flood control only and flood control as such, the United States has the right to build such structures in the Colorado River as it sees fit. If that structure is the Boulder Dam, then clearly the United States Congress has the right to build the Boulder Dam. And if it has the right to do that, it is not obliged to ask the consent of anyone, either an individual or State, and it is not obliged to take any property by condemnation or to pay compensation for its use. It is on this theory that the United States has expended some $2,840,000 for flood protection on the Yuma project.

So we have at last three: First, under the commerce clause, there is no doubt of the right of the United States to proceed either with flood control or improvement of navigation, or for the protection of other forms of commerce.

Secondly, for the reclamation and improvement of its own property.

And third, for the flood control and for the protection of its property. On these three there is no question, under the authorities, that the United States has absolute soverign power, and may proceed without the consent of anybody.

Now there are two others, and I want to touch very briefly on the point the Senator mentioned, namely, whether or not the United States has any power over these unappropriated waters. I do not even express an opinion upon it, but I do say that the text writers, and the students of western water law have discussed this question very seriously. In a number of Federal cases that have been tried within the last few years, briefs have been presented upon it. I believe the United States departments have expressed the view that the United States is the owner of the use of the unappropriated flow of waters over the public lands. If that be the case, then the United States, as the riparian owner, has control of the unappropriated water.

Senator ASHURST. Pardon me there.

Mr. CHILDERS. Yes, Senator.

Senator ASHURST. We have no riparian law in many of the States.

Mr. CHILDERS. If the United States, under the theory that I have indicated—which I am not expressing an opinion upon, for the reason that authorities have differed so greatly upon it, is the owner of the use of the unappropriated water, then as the owner it is not bound by State law in that particular.

Senator ASHURST. In the west the Federal Government is not always riparian owner.

Mr. CHILDERS. I want to repeat that I am not expressing an opinion as to whether that is the law or not. But if it is the law that the United States has the power to control the unappropriaed water, then as the riparian owner it can control it as it sees fit.

Senator HAYDEN. Could you cite any act of Congress that asserts that doctrine?

Mr. CHILDERS. There is no act of Congress that asserts that doctrine, Senator. There have been a few acts, as the reclamation act. Why was it necessary for the Congress to say that the United States should appropriate under the State law, if, as a matter of law, it had to do it anyway? Congress must have had the notion that it was not obliged to do it, but as a matter of comity it ought to do it——

Senator HAYDEN (interposing). What do you think of that policy?

Mr. CHILDERS. You are asking me for a personal opinion whether it is right or wrong.

Senator HAYDEN. Yes; and I also refer you to the Federal water power act.

Mr. CHILDERS. Under the law of conformity, I think it is consistent.

Senator ASHURST. Let me state to you Mr. Childers, the history of the reclamation law is that the law could not have been enacted

without recognizing the rights of the States. The Senators and Representatives from the Western States stood on their rights and did not receive or ask merely a largess or bounty to the States.

Mr. CHILDERS. Please understand that I am not undertaking to say what the atttitude of Congress was at that time, or is now, or will be in the future, but I am simply undertaking to say what the act would indicate to my mind. We might refer to others, as the Senator has heretofore. Under the water power act, they have recognized State authority.

Senator ASHURST. I could not let that statement go without comment.

Mr. CHILDERS. If it was for any other purpose, let me say, if it was for any other purpose, then it has no place in the law. If the United States is bound to recognize State authority, then it was not necessary to have it in the act. I just mention that in passing.

Now, the next thing I will advert to is the international situation. Of course, if there were a treaty between the United States and Mexico there is no doubt at all but that the United States could go into this stream to do as it saw fit to carry out treaty obligations. There are national obligations even in the absence of treaties.

Reading from the case of McCulloch *v.* Maryland again, where Chief Justice Marshall said:

> We can not doubt therefore that Congress has the power to make grants of lands below high water mark of navigable waters in any territory of the United States whenever it becomes necessary to do so in order to perform international obligations or to effect the improvement of such lands for the promotion and convenience of commerce with foreign nations and among the several States or to carry out other public purposes appropriate to the objects for which the United States holds the territory.

Now, I mention that simply for this purpose: That if the United States has power to go into this stream to do anything under the commerce clause; if it has power to go into this stream to reclaim public lands; if it has power to go into this stream for flood control for protection of its own property, or otherwise; if it has any power as a riparian owner or under international relations, then it has all the power necessary to do all those things which it has fundamentally the right to do, and without, if you please, without the consent of anyone.

Now, we have heard a good deal about the invasion of the State; about the resources that are being taken; about the property that is being used, and if I may, I will refer to just one or two of those things.

In the first place, the United States clearly owns the banks of the Colorado River in Boulder Canyon, and not the States through which the river flows. If the river is not navigable, then the United States owns not only the banks of the river, but owns the bed of the river, and not the States through which the river flows. As was indicated a few moments ago, to make doubly sure that this exclusive ownership was in the United States, Arizona, by her constitution, carried out the provisions of the enabling act and wrote directly into her constitution that she relinquishes the control of Arizona——

Senator ASHURST (interposing). May I interrupt you, Mr. Childers, a moment?

Mr. CHILDERS. Yes.

Senator ASHURST. You said if the river was navigable, that the United States owned the banks. You overlooked the bed. Who owns the bed?

Mr. CHILDERS. I will get to that in a moment, if I may, Senator.

Senator ASHURST. As to your reference to the enabling act and the constitution, I will say the ordinances to which you refer have been repealed.

Mr. CHILDERS. Senator, the State may have gone through the form of repealing. They may be repealed, but I doubt it.

Senator ASHURST. That is what makes lawsuits.

Mr. CHILDERS. I will refer to some authority on that in a moment, if I may.

Senator ASHURST. Such differences of opinion are why we have a crop of young lawyers always coming on.

Mr. CHILDERS. I think we can agree, perhaps, on that point.

Now I was indicating that Arizona had relinquished or quitclaimed her right to the land, by her constitution. But, as the Senator very properly said a moment ago, even if that were not in the constitution, it would be a fact. That relinquishment was made about 140 years ago, when the Constitution of the United States was adopted. Arizona has not relinquished anything. Nothing was taken away from Arizona. It was done when the Constitution of the United States was framed; and the same condition applies in Arizona as applies everywhere else except, perhaps, in those particular cases to which I will advert in a moment, where there is a contract or treaty or compact between the State and the Nation. So the public lands on either side of the bed of the stream, are owned by the United States.

Now, in addition to that—and this is one of the points I had in mind—Arizona, by paragraph 10 of Article XX of her constitution provides:

> There is hereby reserved to the United States, with full acquiescence of this State, all rights and powers for the carrying out of the provisions by the United States of the act of Congress entitled "Reclamation act" to the same extent as if this State had remained a territory.

So in dealing with the public land for reclamation purposes, Arizona has been careful to indicate that she gives to the United States full power to do all of those things that the United States could have done had the State of Arizona remained a territory. And that is one of the things that I say I believe could not be repealed by Arizona.

Now, as to the power rights, and power sites on the river. In the constitution of Arizona, and in the enabling act those power sites or lands that might be valuable for the development of hydroelectric power, were reserved by the United States. So that there is that entire ownership of the banks of the stream, at least, which was reserved, and is now owned by the United States and not by the States.

Now, if I may refer to the condition of the law on the question of whether or not such a reservation is binding. I am reading from a decision of the Supreme Court of the United States, by Mr. Justice Brewer, in the case of Stearns *v.* Minnesota, (179 U. S. 223). The court was considering a question very similar to the questions we are talking about, where certain rights were reserved to the United

States upon the admission of Minnesota as a State. The court there said:

> That these provisions of the enabling act and the constitution, in form at least, made a compact between the United States and the State, is evident. In an inquiry as to the validity of such a compact this distinction at the outset must be noticed. There may be agreements or compacts attempted to be entered into between two States, or between a State and the Nation, in reference to political rights or obligations, and there may be those solely in reference to property belonging to one or the other. That different considerations may underlie the questions as to the validity of those two kinds of compacts or agreements is obvious. It has often been said that a State admitted into the Union enters therein in full equality with all the others, and such equality may forbid any agreement or compact limiting or qualifying political rights and obligations; whereas on the other hand, a mere agreement in reference to property involves no question or equality of States, but only of the power of a State to deal with the Nation or with any other State in reference to such property. The case before us is one involving simply an agreement as to property between a State and the Nation.
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> That a State and the Nation are competent to enter into an agreement of such a nature with one another has been affirmed in past decisions of this court, and that they have been frequently made in the admission of new States, as well as subsequently thereto, is a matter of history.

Senator ASHURST. Are you going to discuss the Oklahoma case?

Mr. CHILDERS. That was a political question. There is a question where the State capitol was involved, and it was a political matter for the State to select a place for its own capitol. And there was a case, as you have adverted to it, which was a political right of the State.

Here is a question purely of the property rights of the State. Now, if the enabling act and the constitution of these States amounted, as was said by Mr. Justice Brewer, to a compact between the State and the Nation, it is elementary, it is well settled, that the one party to the compact can not, without the consent of the other, invalidate the contract.

Senator HAYDEN. And when the Supreme Court—laying aside all questions of contract—decided that this was public property, the State could not claim it any way.

Mr. CHILDERS. I think that is the case. I do not think the State could claim it. As I said a moment ago, that was done some 140 years ago.

Now, if the stream is navigable, then the technical ownership of the bed of the stream, subject to all the paramount rights of Congress, is vested in the State.

Now, we have pointed out before that in any of the things the Congress of the United States has the right to do in this stream, the State can not interfere. The ownership of the bed of the stream is held in trust for the people. It is not a private thing that is subject to barter. It is held in trust, and it can not be relinquished; it can not be given away; it can not be disposed of. And, subject always to the right of the United States to carry out its constitutional powers.

Now, I want to refer to water. The water of a flowing stream is not the subject of ownership at all. Many loose statements have been made by text writers, and sometimes by the courts, that the State owns the water of its streams. Such is not the case. Flowing water is not the subject of ownership any more than light or air. Like the wild bird, or the animals of the forest, the State can not own

that which it can not take into possession and put its brand of ownership upon. And until water is taken into a receptacle and put into a position of control, it can not be owned. If Arizona and Nevada are the owners of the water that flows down the Colorado River, then Arizona and Nevada are responsible for the flood damage that takes place below. Such is not the case, any more than Missouri is the owner of the waters of the Mississippi and responsible for the water that goes down and damages Louisiana. Flowing water in a stream is not the subject of ownership. Even the police power of the State may to a certain extent be lost over it by appropriation and use in anther State.

It has been held that State lines are not to be considered in appropriation of water in the appropriation States. So that if Nevada, or California, if you please, or some other State could appropriate water and put it to use before Arizona makes her appropriation, and takes all of the water of the Colorado River, Arizona would even lose police control to a large extent over the water of her streams. So to say that Arizona is the owner of the water is a misnomer. She has a certain regulatory control only over it.

And the United States, in conclusion on this point, is the owner of the things incidental to all the things which the United States has the right to do. I refer now to surplus water, or hydroelectric power. I think the cases on that have been cited heretofore, and I will not repeat them here at this time.

Even so, recognizing all of those conditions, as California has recognized them from the beginning, California has endeavored and earnestly wanted to bring about a compact that would equitably and properly and completely settle the differences that may exist between the States, and to allocate to the various States that quantity of water which would insure their future protection and development. The Colorado River compact, as has been so many times referred to, was signed in 1922. The California Legislature, immediately upon its convening thereafter, approved the Colorado River compact exactly as it was written, and without any condition whatsoever. That approval was given on the assumption that development on the Colorado River would take place.

Now, that was in 1923. Arizona refused approval, and for two years, with the flood condition, with the drought condition, with the international condition that was threatening the Imperial Valley, California made her petition to the Congress, but in vain, with the other States opposing this development. In 1925, or rather late in 1924, the proposition was made of having a compact become binding upon six of the seven States. The Colorado River compact of itself if of no value to California. That was recognized; but, as I said, for two years California remained unconditionally bound by the seven-State compact and was willing to continue if development could take place. Development was not taking place, and then it was proposed that we enter into a six-State arrangement, leaving one of the States—namely, Arizona—to come in at some future time, as she might see fit.

The condition was recognized by California that she would become the guarantor, if you please, of the obligation of the Lower Basin, and in any event the compact did not provide a means whereby the demands of the Lower Basin could be assured. So California promptly approved the compact again, and on the six-State basis,

but attached to her approval the condition that it not become effective until storage was authorized.

Arizona still objected to the compact. A commission was appointed in California by the legislature of 1925, and hearings and conferences were held between California, Arizona, and Nevada during the following two years. Offers were made and rejected. In her desperation California went so far as to offer to these States a guaranteed tax of a very great sum of money in addition to what she termed and believed was an equitable amount of water.

Senator HAYDEN. What was the amount of that tax?

Mr. CHILDERS. One million dollars, to be divided between the two States. It was based on the horsepower, and it was equivalent to $1,000,000 a year.

In other words, in that offcer it was provided that the Congress of the United States might provide for this additional money to those States, with the consent and approval of California. Nothing was done. That was up to the session of the legislature in 1927.

In 1927—that was a year ago—in order not to interrupt negotiations between the two States, a new commission was appointed in California so that negotiations could be carried on during the session of the legislature, the first commission having consisted of members of the legislature itself. These negotiations were carried on almost continuously. Nothing resulted. All of the States opposed development until—as they are proposing to-day—until we have a seven-State compact. Some said, as a last resort, some time in the future, if a seven-State compact approves, then we are willing to work out some other arrangement. That was the condition we found a year ago.

Now, last summer it was proposed that a conference be held by all seven of the States at Denver. That conference was held, and the four Upper Basin governors acted in the position of mediators, so to speak, in an attempt to reach an agreement.

It will be borne in mind that the conference was called for the purpose of bringing about ratification of the seven-State compact. The seven-State compact does not deal with power. Governor Emerson of Wyoming emphatically declared, early in the conference, that power should not be discussed but discussion should be confined to a division of the use of water. This seemed to be the sentiment of the conference and during all of the early sessions power did not enter into discussions.

At the outset Governor Young of California reviewed the situation and made the following proposal:

> After Nevada has been given her 300,000 acre-feet; after Arizona has been granted all the water for irrigation and domestic uses she can take out of her tributary streams; after the perfected rights of Arizona, through existing irrigation uses, have been satisfied, and the same has been done for California; after all of these things have been effected, the relative percentages of the remaining flow of the Colorado be equitably apportioned between Arizona and California according to whatever practicable and economical use for domestic purposes and irrigation each State can make of this water as judged by an impartial and unprejudiced tribunal.
>
> I furthermore suggest, inasmuch as everyone of the seven States here represented is interested in the prompt settlement of this controversy, that the commission for determining this allocation be composed of one representative from each of these seven States together with two engineers appointed by the President of the United States. * * *

California agreed that this Board might make such an apportionment and their findings be final. This proposal was promptly rejected by Arizona and apparently rejected by the conference inasmuch as the conference demanded that California promptly put in figures the lowest amount of water she would be willing to accept.

And just there. I believe it has been suggested to this committee that that offer on the part of California, first, was not made, I may say, in good faith; and, second, that it would not mean anything if it had been accepted.

The first charge I would not even deny. It was made by the Governor of California with the consent of the California Commission. Of course it was made in good faith, and with the hope that it would be accepted and accepted promtly, to the end that an agreement could very quickly and promptly be worked out. I, myself, on behalf of my State, resent any inference even that that offer was not made in good faith.

Now, on the question of whether or not it would mean anything. I believe the gentleman said it would have to go back to the Legislature. Of course no State can be bound without legislative action. Had the commissioners at Denver through negotiations entered into a compact or treaty it would have had to go back to their Legislatures for approval. It would not bind their States. But this goes further than that. Under the proposal made by California's Governor, a compact could have been prepared in every detail excepting the division of the use of water.

That compact could have been approved by the legislatures of the several States, leaving it to the commission, as indicated by the proposal itself, to work out the equitable division of the water in pursuance of the formula laid down in the proposal, and it would have been binding upon the States. The commission would simply have made a finding of fact, and the State would have been bound by its legislative action theretofore taken. That is not a novel proceeding. It is done frequently by our courts. In courts of equity very frequently referees are appointed to hear questions of fact, and their findings are taken by the court as conclusive. Here the California Governor and her commission agreed to be bound by that finding. In the first place, that finding could have been made and taken to the legislatures for approval, and there is no doubt that the California Governor and her commission would have kept good faith on that proposition. And there is no doubt if they wanted to go further the legislature could have approved in advance, and when the finding of fact was made the State would be bound. It would not be a legislative discretion; it would be purely a ministerial act. It would be purely a finding of fact and not a question of legislative discretion. It was hoped there that progress could be made. Offers had been made before and rejected. We had tried to find some grounds upon which we could make an equitable division of the use of the waters between those States. None of those offers had ever been accepted. It did not look overly hopeful. But we wanted an agreement. We wanted it before this Congress met, if possible. Therefore the governor made this offer with the hope that in a very few days a compact could be reached on everything except the division of water.

Now, how could California have been fairer? California's would be only one of the nine men.

The CHAIRMAN. Mr. Childers, is it your understanding or, perhaps I might say rather, your opinion that this offer is available, or could be made available at the present time for acceptance by Arizona?

Mr. CHILDERS. Well, it was rejected, Senator, at that time; very promptly rejected by Arizona. It was apparently rejected by the conference, which I will go into here a little bit later. Now, whether or not California's Governor and her commission would want to go back and pick that up at this time, I am not, of course authorized to say. I am not a commissioner and would not want to assume to speak. We will probably be in a position when a commissioner goes on the stand to take that up more authoritatively, Senator, and I prefer to do it that way.

The CHAIRMAN. Well, assuming that Arizona would now make overtures, and would say, "We have now, after further consideration, come to the conclusion that we might be willing to accept this offer if it is still available and still open," in your opinion would California agree to it?

Mr. CHILDERS. Well, I have no doubt that she would, but, as I say, I would rather not assume to speak for the governor and the commissioners.

The CHAIRMAN. I am asking for your personal opinion.

Mr. CHILDERS. Yes, sir.

Senator ASHURST. For the purpose of the record——

Senator JOHNSON. I beg your pardon, Mr. Childers, when you reach a place when you would like us to adjourn, if you will designate it I will ask the chairman of the committee to take a recess until 2 o'clock.

Mr. CHILDERS. At the convenience of the committee.

Senator JOHNSON. Are you in a position now to take the recess?

The CHAIRMAN. Or would you rather finish in four or five minutes on this topic?

Mr. CHILDERS. I would like to discuss that for a few moments more, and then I will be ready to go on with another subject.

Senator JOHNSON. When you finish with this subject we will take our recess until 2 o'clock.

The CHAIRMAN. Yes.

Mr. CHILDERS. The point is, as I say, we have been trying for a long time to reach an agreement. It did not seem possible. The governors of the upper States were good enough to invite us there to try to find a solution. We did not reach a solution. And this offer, as I said a moment ago, was made by our governor in good faith in the hope that it could be acted upon. It was not accepted by Arizona and was not accepted by the conference.

Now Mr. Chairman, I think we can suspend if you desire.

The CHAIRMAN. The committee will adjourn until 2 o'clock and will meet this afternoon in this committee room.

(Whereupon, at 12.15 o'clock p. m., the committee took a recess until 2 o'clock p. m. of the same day.)

AFTERNOON SESSION

The hearing was resumed at the expiration of the recess, Senator Lawrence C. Phipps, chairman, presiding.

Present: Senators Phipps (chairman), McNary, Jones, Oddie, Johnson, Shortridge, Sheppard, and Ashurst.

Present also: Senator Hayden of Arizona.

The CHAIRMAN. The committee will come to order. Mr. Childers, you may proceed.

STATEMENT OF CHARLES L. CHILDERS—Resumed

Mr. CHILDERS. It must be clearly borne in mind that the Colorado River consists of not only the main stream but also the tributaries. The Colorado River system, as defined by the compact, includes, of course, all the tributaries. Arizona claimed, and I believe still claims, that the tributaries in her State produce 6,000,000 acre-feet or more of water per year. This water is either used in Arizona or reaches the main stream above all major diversions in California and is included in California water rights. When California has indicated her willingness for Arizona to make use of her tributaries it has been with the full knowledge that it was a concession and not a right. They are appropriated by California and a part of her water right. Arizona's tributaries are more valuable to her than any other part of the river system and so recognized by California. Nevertheless her tributaries are a part of the system and just as much a part of the Colorado River as the main stream itself. In other words, Arizona has no greater claim on her tributaries than Colorado, Wyoming, or Utah have upon their tributaries, and if each State could demand, as a matter of right, all the water from the tributary streams within their boundaries, then there would be no river left to divide.

Upon the demand of the upper basin State governors, California prepared what they, the upper basin governors, termed a definite proposal wherein she renewed the California proposal of 1925 which, upon the Arizona figures, gave Arizona approximately 8,000,000 acre-feet of water and California approximately 5,000,000 acre-feet from the system; also renewed the Nevada proposal of December, 1926. The effect of this proposal was to give to Arizona approximately 67 per cent of the water of the system in the lower basin, upon her figures, and California approximately 33 per cent. After having renewed these old proposals California made a new proposal which, after giving Nevada 300,000 acre-feet; gave Arizona the use of her tributaries (which she claimed exceeds 6,000,000 acre-feet per year), also her perfected rights of 233,800 acre-feet per year; gave California her perfected rights of 2,159,000 acre-feet per year, which rights could not be taken away or affected by a compact, and divided the balance of the main stream equally between Arizona and California.

Under this proposal Arizona would receive a little more than 8,500,000 acre-feet, based upon her own figures, and California would receive a little more than 4,500,000 acre-feet. In other words, Arizona would receive two-thirds of all of the water of the lower basin system and California would receive one-third.

This proposal was not accepted.

Arizona's proposal was that Arizona have the use of all of her tributaries, that Nevada be given 300,000 acre-feet, and the balance of the main stream be divided equally between Arizona and California. The effect of this proposal is to give to Arizona, based upon her own

figures, approximately 9,600,000 acre-feet from the lower-basin system and to California 3,600,000 acre-feet, or to California only about 1,400,000 acre-feet more than her present perfected right and far less than she can reasonably use under her appropriation going back to 1898, and nothing at all for the coastal cities for domestic purposes.

And just at that point may I enlarge upon the statement that was made this morning that in these proposals domestic water was not taken into consideration. If Los Angeles and the coastal plain cities take water, it must be from the California allotment under these various proposals. These proposals were based upon lands susceptible of irrigation and not taking into consideration domestic uses for the coast plain cities.

If the coastal cities should take water, which they must, then nearly all the land not now actually irrigated and for which water is appropriated, would, under this proposal, forever remain a desert.

Again, the Imperial Valley appropriated its water away back in 1898. The appropriation is for 10,000 second-feet of water. That water has been applied to beneficial use in a reasonable way, and development has taken place with normal rapidity. Some 7,000 second-feet have actually been diverted and used at one time.

So there is at least 3,000 second-feet under the proposal, going away back to 1898, nearly 30 years ago, that is a vested right, a right which it is doubtful can possibly in any manner be affected by a compact, and yet no provision was made for that in these proposals, and had California accepted the Arizona proposal at that time it would have meant that there would not have been enough water for California to have actually fulfilled her present appropriation.

Senator HAYDEN. Pardon me, but do you mean to say that by filing a paper somewhere many years ago a right was acquired to take 10,000 second-feet of water?

Mr. CHILDERS. Absolutely, Senator, if they can put it to beneficial use; and it has been applied to beneficial use, as I said a moment ago, with normal rapidity.

Senator HAYDEN. Up to how much?

Mr. CHILDERS. Up to the amount of 7,000 second-feet that has actually been used at one time.

Senator HAYDEN. Your theory of water law must be different in California from ours. In Arizona one may secure an appropriation for water for such amount as is actually put to beneficial use. No one can not acquire priority by mere paper application where there is no ability to divert water from a stream.

Mr. CHILDERS. Senator, if that theory applied, the appropriation doctrine would not be worth the paper it is written on. The very theory of appropriation is that when the appropriation is made and it is specified for what purpose it is made, the appropriator has then acquired a vested right upon which he can safely finance his undertaking. It can not be taken away by any subsequent use.

It is true that if he abandons his appropriation he loses it, and if the water is not put to beneficial use within a reasonable time it is classed as an abandonment.

What is reasonable time is always a question of law. If it is a project of 160 acres it is likely that a short period of time would be classed as reasonable—may be a year, may be two or three years. but where you have got an undertaking that goes into hundreds of

thousands of acres, a very much longer period of time would be classed as reasonable. It occurs to my mind now that 30 years has not been classed as unreasonable on a project very much smaller than the one we are discussing.

Senator HAYDEN. If you are correct in this assumption, California now has a vested right to all the water apportioned to the lower basin by the Colorado River compact.

Mr. CHILDERS. I have not figured out just what that would mean. It has a vested right to 10,000 second-feet of water to be applied when they can use it within a reasonable length of time.

Senator HAYDEN. That would be 7,300,000 acre-feet?

Mr. CHILDERS. If that is the way it figures out, that is what the vested right is.

Senator HAYDEN. There is practically no water left for Arizona at all, on that theory.

Mr. CHILDERS. That might be, if that is the way it figures out.

There is a difference between a perfected right and a vested right. We have classed here as a perfected right the water we have actually applied to the soil and are now to-day presently using in California, and that is 2,159,000 acre-feet. That is now, to-day, presently being applied to beneficial use in California. But, as I say, the Arizona proposals did not furnish enough water to take care of that to which we have by law acquired a right.

When the Governors demanded that California submit her best possible offer California did not make a trading offer but took the Governors at their word and, after a very careful compilation of figures, submitted the lowest possible offer she could make, and perhaps much lower than she should have, in justice to herself, made. As Mr. Wilson, water commissioner of New Mexico, said before the House Committee, "They did not come with a trading margin."

There was 1,000,000 acre-feet less for California in the Arizona proposal than in the California proposal.

The Governors took these two proposals and in effect substantially split the difference.

California having made the lowest possible offer she could make, and being satisfied that her proposal would leave much of her easily reclaimed lands without water and at the same time provided more water for Arizona than she could possibly use, of course could not accept the Governors' recommendation, which lowered her already low request by 4,000,000 acre-feet.

The Governors' proposal would give Arizona something over 9,000,000 acre-feet, upon Arizona's figures, as against 4,200,000 for California.

Senator HAYDEN. Let me ask you a question in that connection.

Mr. CHILDERS. Yes, Senator.

Senator HAYDEN. I may have misunderstood the attitude of the Arizona commission. While they may have stated that, counting the tributaries and half the main stream, the total amount would aggregate 9,000,000 acre-feet, I have never understood that Arizona made any demand for the use of the entire amount of water in any tributary except the Gila. The reason for asking for all of the Gila water was that, when the connection is made by the Imperial Canal with the Laguna Dam, none of that water could be applied to bene-

ficial use in California. As to the tributaries above the Gila a great deal of surplus water would go into the main stream from that source, which Arizona has no objection to dividing with California.

Mr. CHILDERS. Her proposition was, and it is in the record, I believe, that she be permitted to have all of the water from all of her tributaries that she could use at any time.

Senator HAYDEN. But, as a matter of fact, it was contemplated that Arizona could not use all the water of all of her tributaries at any time, and that at least a million and a half acre-feet from the tributaries above the Gila would go into the main stream, which would be available for division with California.

Mr. CHILDERS. I understand that Arizona's commissioners have claimed that they could use practically all the water. Doubtless on some of the smaller tributaries up the stream there might be torrential rains and cloudbursts, the water from which Arizona could not use; but aside from that storm water it is my understanding that she claims that she can use all of it.

Senator HAYDEN. The records of stream measurement will show that the flow of the Colorado River between Lee Ferry and the Boulder Canyon is augmented by more than a million and a half acre-feet of water, which comes from the Arizona tributaries.

Senator JOHNSON. I am not going to deny what you say, because I do not know——

Mr. CHILDERS. I think I can answer a little of that.

Senator JOHNSON. I have a distinct recollection that I asked some of the witnesses whether they claimed all of the waters of the tributaries, and they told me distinctly, positively, and unequivocally that they did. Am I in error about that?

Senator HAYDEN. I recall testimony to the effect that Arizona claimed all of the water of the Gila because it is already appropriated, but as to the tributaries north of the Gila she did not claim all the water and could not use it all.

Senator JOHNSON. You may be right; but the record will speak for itself.

Mr. CHILDERS. The record is clear on that, I think.

In this statement we are not considering possible surplus water from the upper basin over and above that allocated by the compact. It is only on the hope that some water, above the compact allocation, will flow from the upper basin that California made its proposal of approximately 4,600,000 acre-feet as the minimum that she could accept. There may be some of this surplus water and there may not be, so in all of these discussions we are ignoring surplus water from the upper basin.

Arizona has indicated before this committee, and the chairman of the conference indicated, that Arizona had, with slight interpretations, accepted the governor's proposal. Here is what Arizona did do, which is vastly different than an acceptance of this proposal. Under the compact all water above 16,000,000 acre-feet in the Colorado River system is classed as surplus water. The lower basin is given the right to make use of 8,500,000 acre-feet. Therefore anything in the lower basin above 8,500,000 acre-feet would be classed as surplus water. All Mexican demands must first be satisfied from surplus water. Arizona's so-called interpretation was to the effect

that her tributaries, which she claims produce more than 6.000,000 acre-feet per year, should be wholly released from any Mexican duty. That would place the whole burden of the Mexican demand on the main stream. It is estimated there will be 2,000,000 acre-feet surplus at Lee Ferry but evaporation losses will probably absorb it all, then the Mexican demand will come out of the 7,500,000 acre-feet allocated under the compact. If by chance Mexico should receive 2,000,000 acre-feet of water, then, instead of California receiving 4,200,000 acre-feet as indicated by the governors, she would actually receive 3,200,000 acre-feet, or, if Mexico should receive the full amount of the surplus water in the lower basin then California under the compact would actually receive less water than she is now using. So to say that Arizona accepted the governor's recommendation is misleading at least. They did not so accept.

The fact is there is a million acre-feet difference between Arizona and California.

We take it as axiomatic that when an attempt is made to divide the use of water in our arid States it should be made on the basis of most economical beneficial use. At the Denver conference the California engineers compiled information from official reports showing lands in Arizona and California susceptible of reclamation from the main stream of the Colorado River, by gravity and under various pump lifts.

On the basis of irrigation in both States from the main stream by gravity, it was found that California has 85.3 per cent of the total lands and Arizona has 14.7 per cent of the total.

Under a 50-foot pump lift California has 73.8 per cent of the total and Arizona 26.2 per cent.

Under a 150-foot pump lift California has 71.7 per cent of the total and Arizona has 28.3 per cent of the total.

None of these items take into account any water for domestic use in coastal plain cities of California and it will further be borne in mind that all lands susceptible of irrigation from the main stream either in Arizona, by their own showing, or in California, lie below the Boulder Canyon Reservoir.

With Arizona having 14.7 per cent of gravity lands and 28.3 per cent of gravity plus all up to and including 150-foot pump lift, and yet demanding 50 per cent of all the water; and with California having to rely upon possible surplus water that may or may not flow from the upper basin in order to meet her known requirements; and in view of the fact that under the California proposal California would be more than 1,474,900 acre-feet short of her requirements up to and including a 150-foot pump lift while Arizona would receive all she could use up to and including a 200-foot pump lift (or 50 feet more than any considered by California), and have a surplus of 300,000 acre-feet left over; under these conditions it is obvious that California could not accede to the Arizona demand or to the suggestions of the upper basin governors.

And even an acceptance of the Arizona water proposal would not have meant a compact as Arizona always coupled with her proposal a demand that at the same time power and other questions be included.

Arizona has never materially changed her demands from the time discussions first started. The demands of 1926 were substantially the same as the demands made at Denver, and the demands submitted by Senator Windsor before this committee were not materially different.

California having been instructed by the conference to present figures showing the least amount of water she could accept, and having done so, naturally could not materially recede from that position. About the 19th of September, the conference directed both Arizona and California to present a definite statement of the respective positions, which was done. That statement by California is perhaps as clear an exposition of the California stand as can well be presented.

On account of the shortness of time it might be well to submit that statement, which I would like to have in the record, and I would like to read it if time would permit. It goes into the question of the reasons why California has gone the limit and why she can not go further.

The CHAIRMAN. How much do you think should be printed of that? How many pages does it amount to, and do we already have it?

Mr. CHILDERS. I do not think you have it.

Senator JOHNSON. No; we do not have that.

Mr. CHILDERS. There are several pages of typewritten matter, and it goes into detail and points out that there is not enough water even in the California proposal to satisfy California's requirements, and if she goes any further, she makes the very project we are talking about infeasible and makes financing of the undertakings to be carried on in California wholly impracticable.

The CHAIRMAN. If there is no objection, that portion that you designate, which you think should be printed in the record, will be printed, at this point.

I may say that it is desired to conclude the hearing, and the committee has agreed to sit only this week, but I think there is no disposition to limit you to a definite time. The committee is willing to hear whatever you desire to present verbally.

Senator JOHNSON. We are going to conclude this afternoon.

Mr. CHILDERS. I fear that the reading of this would take more time than the committee feels that is would like to devote to it.

Senator JOHNSON. I presume there is no objection to having it made a part of the record?

Senator ASHURST. No objection.

Mr. CHILDERS. I think all these gentlemen heard it at Denver.

The CHAIRMAN. You may designate to the reporter how much of it you want to go into the record, Mr. Childers.

(The matter referred to and submitted by the witness is as follows:)

The position of California as to its allocation from the waters to be provided by the States of the upper division at Lee Ferry under the Colorado River compact is that it should be not less than 4,600,000 acre feet per annum.

With such allocation to California, Arizona will receive approximately 65 per cent and California approximately 35 per cent of the waters of the Colorado River system below Lee Ferry, based upon the Colorado River compact and Arizona's computations.

STATE RIGHTS

Much has been said in this conference about State rights, and yet the whole theory of the Colorado River compact, as well as the proposed three-State compact, is in conflict with the State rights doctrine. It waives the rights of some States in favor of other States. Under the law of appropriation, as well established in the Western States, the citizens of any State may appropriate and use water for any beneficial purpose, and, regardless of State lines, so long as such use does not interfere with prior appropriations.

For nearly three hundred miles the Colorado River forms the boundary line between Arizona and California and all of the lands in either State which can receive water directly from the River lies adjacent to that portion of the River thus forming the boundary line between the two States. Either State has the unquestioned right to divert and beneficially use such water as it may, not in conflict with prior appropriations, even to the extent of completely exhausting the supply. This is a beneficent rule designed to bring about the highest and most beneficial and most economic use of water so essential to development in the arid west. Arizona seeks not only to change this rule but to change it in such a way that she will have not only abundance of water for all known requirements but a surplus left over which will forever waste itself in the sea or be available for use in a foreign country and at the same time deprive California of water for its known requirements—even water long since appropriated and required for the completion of projects already well under way and of proven feasibility—in an amount of more than 1,000,000 acre-feet per year. The upper State governors have apparently concurred, in part, with Arizona in this view. Such a division of the use of water would be uneconomical even to Arizona. It is definitely discriminatory against California. It is wasteful and in direct conflict with all known rules for distribution of water in Western States, and is decidedly unfair to California. California, of course, can not accede to so gross a violation of her State rights.

The Colorado River compact is not for the protection of any rights of any State. The purpose of the compact is to create rights in certain States which rights do not now exist. California is willing to approve the compact and create those rights but it is not obliged to do so. California is likewise willing to make an equitable agreement with Arizona and create rights in that State which do not now exist but she is not obliged to do so and certainly she is not obliged to enter into or even consider an agreement which on its face is grossly unjust. Those temporarily entrusted with making decisions on her behalf would be untrue to their trust if they permitted her present necessities, great as they are, to influence them in binding future generations to an unjust agreement.

The lower river can not be developed for many years to come without California resources.

If California is to surrender rights which she now enjoys or is to assist in creating rights which do not now exist, and if California resources are to be employed in the development of the river which will benefit not only California but all of the Colorado River basin and particularly Arizona, then certainly California has some rights and some equities which should not be wholly ignored.

Arizona has developed more rapidly in her use of the Colorado River water than has California and largely through government financing. On this basis no compact should be required by Arizona. But if she fears a slowing up of her development, however, then the most she has a right to demand is protection against the possibility of a more rapid future development in California.

She has no right to demand of California that which she is not willing to accord to California. She has no right to demand an arbitrary division of water; she has no right to demand title to water she can not use, and which could be used in California. She has no more right to arbitrarily demand 50 per cent of the main stream than has Nevada the right to demand one-third of the main stream.

Under the present law California has the right to take and use the whole stream on her lands if necessary, and not in conflict with earlier appropriations, Arizona has the same right. If this well-established rule is to be changed by agreement then the only demand which Arizona can, in justice, make is that the uses of the same character should enjoy the same priority in either State.

There is no justice or equity in abrogating a well-recognized rule and tying up the title to water on the hope that some day it can be used by a pump lift of four hundred fifty feet or more, when it is now needed and can be used economically in another State. The only theory of the compact is to do equity between States which may not develop with the same rapidity. It is not upon the theory of the State rights or the State ownership of the water, but only in an equitable use of the water. To arrive at this equity determination must be made of the uses to which the water may be applied on either side of the stream, with the same class of uses on each side standing in the same relationship one to the other.

CALIFORNIA'S REQUIREMENTS

At the present time there is actually being diverted and used by California 2,882,000 acre-feet of water per year from the Colorado River. This is based upon service including in Imperial Valley only 462,000 acres of lands, whereas, Imperial Valley, with an appropriation going back to 1898 has long since had its canals in operations with a capacity of more than 7,000 cubic feet of water per second and its canal system fully constructed to irrigate 515,000 acres of land, of 53,000 acres more than is actually irrigated at the present time, but which has the right to demand and could receive water at any time. This land would require, under present conditions, 291,500 acre-feet additional, or a total for present demands in California of 3,178,500 acre-feet to which rights are fully established and which rights can not be taken away by compact or otherwise, but which are fully protected under the law.

In fact, the present California rights go much further. There are valid appropriations in California from the tributaries as well as from the main stream, not in conflict with any other appropriations, for something like 12,000 second-feet of water or enough to assure a supply for nearly all known requirements in that State. The water, in each instance, has been applied to use with diligence and definite fixed rights have been acquired which can not be taken away, at least without Canifornia's consent.

Imperial Valley is paying $96,000 per year to the United States under contract of 1918, one purpose of which is to bring about this larger development for which rights have already been acquired.

In addition, all of the water that is now used in the Yuma project in Arizona is being diverted in California and passed through a power house in California for the generation of electric power. While this is for the sole benefit of Arizona and was constructed at Government expense, nevertheless it is a right in California which has actually attached to the beneficial use of this water and a right which can not be taken away, but for the sake of this statement claim to this additional water is not made by California.

In order to ascertain the total requirements of California we must add to the 2,882,000 acre-feet present use, such water as will be necessary for the completion of present projects, rights to which have already vested, water for known domestic requirements, with rights also vested, and water which can be served within an economic pump lift for irrigation purposes, considered by California to be 150 feet.

The city of Los Angeles has already made a filing on 1,500 second-feet of water, or a total of 1,095,000 acre-feet per year, for domestic purposes only for the benefit of itself and other southern California cities. Bonds have already been voted by that city in the amount of $2,000,000 for preliminary work, and a large part of the same have been sold. Extensive work in the form of surveys, infiltration plans, and otherwise have been carried on. The city of Pasadena has now passed or is about to pass initiating ordinances for the formation of a metropolitan water district under the laws of California to take over and complete this great undertaking. Some twenty-eight cities in southern California have expressed their intentions of becoming members of the district.

With the known water resources of the coastal plain of southern California, now inadequate and rapidly being exhausted, and in view of the law of self preservation and the known activities of these cities in that behalf, it may be taken as a settled fact that these coastal cities will actually divert and use, 1,095,000 acre-feet of water per year from the Colorado River for domestic purposes.

Under the all-American canal there will be added to the present irrigated area in Imperial and Coachella Valleys 267,000 acres which will be served by gravity, requiring 1,174,800 acre-feet of water per year, and 171,700 acres which

will be served by a pump lift not exceeding 150 feet and requiring 755,480 acre-feet of water per year.

There are projects already under way with water rights already vested and when completed will require, together with present uses, a total of 5,589,800 acre-feet of water per year.

Under a pump lift of 150 feet there may be added to the above areas 121,650 acres requiring 485,100 acre-feet of water per year, or a total demand in California for the present known projects of 6,074,900 acre-feet of water per year.

ARIZONA DEMANDS

The total actually used in Arizona from the main stream at present is 306,000 acre-feet per year and with a pump lift of 150 feet, based upon figures furnished by Arizona, her total future demand, even including Indian land, which is unjustifiable and will be treated later, will amount to 1,739,500 acre-feet per year.

COMPARISON OF ARIZONA REQUIREMENTS WITH CALIFORNIA REQUIREMENTS FROM MAIN STREAM

Upon these computations we find that of the present use from the main stream Arizona has 9.6 per cent, California has 90.4 per cent.

The use for projects existing and those under way will be, by Arizona 7.1 per cent, and by California 92.9 per cent.

For all known projects, present and suggested, under 150-foot pump lift, the water demands of Arizona will be 23 per cent and of California 77 per cent.

AVAILABLE WATER

The Colorado River system below Lees Ferry includes not only the main stream but all streams flowing into it below that point. Under the Colorado River compact the upper basin States are required to deliver at Lees Ferry an average of 7,500,000 acre-feet per year. The tributaries of the Colorado River in Arizona, upon her figures, produce a minimum of 6,000,000 acre-feet per year, making a total in the lower basin of 13,500,000 acre-feet of water per year, not considering the Nevada tributaries.

Of this total of 13,500,000 acre-feet, California demands title to only 4,600,000 acre-feet plus one-half of the surplus or unused water of the main stream over and above that allocated by the Colorado River compact, or consumptively used in the upper basin. Upon this basis, without considering surplus or allocated water, upon the California proposal, Arizona would receive more than 65 per cent of the waters of the Colorado River system in the lower basin, and California would receive less than 35 per cent.

This is a smaller amount of title water than California, in good concience, can be asked to take in the division of water among the lower basin States.

For California to make an agreement on her own proposal she will be 1,474,900 acre-feet of water short of her present known requirements, while on the same basis Arizona will receive all of her tributaries yielding at least 6,000,000 acre-feet per annum and also receive title to the use of all of the water from the main stream which she can use up to and including a 200-foot pump lift, or 50 feet more than any considered by California, and have a surplus of 300,000 acre-feet per year left over.

If California is to serve her present known requirements, upon her own proposal, she must receive from surplus or unallocated water—water to which she can have no title—1,474,900 acre-feet of water per year. This would provide only for the known requirements with no water whatever left over or wasted. Under the California proposal, if California shall receive this amount of surplus water for its known requirments, Arizona would receive a like amount which, together with her surplus of 300,000 acre-feet of title water, would give her sufficient for all known requirements up to and including a 200-foot pump lift and 1,774,900 acre-feet left over for her higher pump lifts, or to waste in the sea, or be applied to Mexican lands.

SUFFICIENT WATER WITH GOOD TITLE ESSENTIAL TO FEASIBILITY OF PROJECTS

The all-American canal, which is conceded by all to be necessary to the future protection of all of the basin States, must be paid for by California lands. This will be a large undertaking. For it to be practicable is must be con-

structed to serve all of the lands that can be reached by it. Under the California law any contract for repayment must be submitted to a vote of the people concerned. If there is any question about the title to water sufficient to serve the lands the people will be reluctant to vote the obligation and properly so. This is for the all-American canal itself. Before it can be used extensive distribution must also be constructed. The money for the distribution system must be derived from the sale of bonds upon the lands to be served. The first step for such a bond issue, under the California law, is the submission of the whole proposition to a commission known as the California Bond Certification Commission. This commission first passes upon the feasibility of the project and its first and most pertinent inquiry will naturally be whether or not there is a known water supply with good title and sufficient for the full development. The purpose of this commission is to permit no bond issues that are not sound for investments of savings banks and public funds. To get by this commission we must naturally show, not mere hope or possible expectancy or confidence that the water needed will be available but actual title to enough water for the purpose.

After the commission has approved the issue, it is not yet an assured fact. It must be submitted to the people. Nearly all of those voting upon the proposition will be residents of the Imperial irrigation district. This district already has a canal system, unsatisfactory to be sure, but nevertheless one that does supply them with water through Mexico. This supply may continue. Therefore the people in this distrct wll be slow, and properly so, to vote bonds where there is a serious question about the title to the water supply. Still further, after the bonds are issued they must be sold and money is timid where security is weak or questionable.

The coastal cities will be required to vote bonds to the amount of perhaps $150,000,000 for their domestic water supply. These bonds require a two-thirds vote if they are to be issued by the cities, or a majority vote if to be issued by a metropolitan district. Such enormous financing can not be done on a mere hope, and yet if California is allocated the use of only 4,600,000 acre-feet of water to which she can actually acquire title, a large amount of this financing must be done upon the hope there will be a large amount of water which California may use even though she does not have title to it. As said before, to serve all of the lands proposed under the all-American canal and to serve the coastal cities, California will be more than 1,000,000 acre-feet short. This figure makes financing extremely difficult and to go below that figure will make it impossible and impracticable.

California has tried to bring about the seven-State compact and to that end has been and is perfectly willing to enter into a fair and equitable agreement with Arizona. It is obvious, however, that neither a three-State compact nor a seven-State compact in and of itself is of value to California.

California is willing that the other States be fully protected in their future requirements. To do this, however, by compact, California is simply waiving present and future rights which she is not willing to waive without the construction of projects on the river that will be absolutely necessary to safeguard her own future. If California cedes away title to so much water that she can not economically finance or develop her own resources, then she has no interest whatever either in the three-State compact or the seven-State compact.

When California offered to contract with title to only 4,600,000 acre-feet of water she well recognized that her offer was at the danger point below which she could not go, and without the reasonable time limit for putting water to beneficial use which California suggested, she could not consider for a moment accepting title to so small an amount of water. California is willing to stand bound by the seven-state compact and enter into a three-State compact with the assurance of development, but if these compacts are so rigorous in their terms as to tend to defeat this development, then California is not interested in either of them.

Section 2 of the governors' suggestion, providing for allocation to Arizona of 1,000,000 acre-feet of the waters of the tributaries in that State, is accepted.

Regarding section 3, in reference to other tributary waters, it will be understood that the waters of tributaries must be considered as part of the river system, and all taken into account in ascertaining what is "surplus water" for the purpose of supplying Mexican demands under subdivision (*c*) of Article III of the Colorado River compact.

We understand that section 3 also means that after the water from tributaries reaches the main stream it is no longer to be regarded as tributary water, and the States in which the tributaries are located lose all claim thereto as tributary water.

The proviso attached to section 3 is unnecessary and perhaps confusing. Other States which may be interested in some of the tributaries will not be parties to the proposed three-State agreement and their respective rights can not be protected or impaired by such agreement.

Subject to the foregoing suggestions and interpretation, section 3 is accepted.

Section 4, subject to readjustment of the water allocations in section 1 to comply with California requirements, is accepted except as to the part dealing with Indian lands.

Allocations to States for the use of Indian lands have no place in the proposed three-State compact.

The water is for use of the United States, not a party to the compact, and the United States would be under no obligation to respect such allocation. California objected to water for Indian lands being classed as a perfected right for Arizona and pointed out that California likewise has Indian lands and that no such provision is made for them. The proposal was then put in its present form, which is no more satisfactory to California.

It is apparent, taking the governors' suggested allocation in conjunction with previous suggestions, that their proposed allocation to Arizona includes 675,000 acre-feet of water for Indian lands. That is, we submit, unjustifiable, first, because it is in large part without basis in the theory of vested rights; and, second, it is an allocation to which Arizona is in no sense entitled. It really amounts to a double allocation to Arizona at the expense of vested rights in California, which, was not intended by the governors.

Moreover, the Colorado River compact expressly provides that nothing therein shall be construed as affecting the obligation of the United States of America to Indian tribes, and clearly the proposed tri-State compact should deal with the subject of Indian lands in the same fashion.

Regarding section 5, relating to "unapportioned waters," if the term "unapportioned waters" means waters not otherwise apportioned by the proposed three-State compact, such term is satisfactory. If it means unapportioned by the Colorado River compact, then it is not satisfactory, as the lower division States should have the use of all of the waters of the Colorado River below Lee Ferry, subject to the terms of the Colorado River compact.

Section 5 further provides that the use of the waters so divided shall be "subject to future equitable apportionment between the said States after the year 1963." This is not satisfactory. It will also be even more difficult to ascertain and divide the equitable use of such water as may not then be in actual use than it is now. Hence, the California suggestion is that any water not actually put to beneficial use for agricultural or domestic purposes prior to October 1, 1963, shall thereafter be subject to appropriation and use in either State, pursuant to its laws. California maintained and still maintains that 20 years is a reasonable time after which water not put to beneficial use should be open to appropriation, but at the insistence of the upper State governors and others that period was extended to 1963. It is only with some such provision as this that California can accept so small an allocation of title water as 4,600,000 acre-feet per year.

The latter part of section 5, providing that the use of the so-called unappropriated waters between the lower basin States shall be without prejudice to the rights of the upper basin States to further apportionment of water as provided by the Colorado River compact, is rejected. That provision, designed to protect the upper basin States against equities created by use of water in the lower basin, has no place in the proposed compact to which the three lower basin States alone are to be parties, and besides, is unfair to the lower basin States.

OTHER POINTS

There are other points, more or less of detail, and yet important, that should not be overlooked in the drafting of a three-State compact, among which is the provision, like one contained in the Colorado River compact, that no State shall demand the delivery of water and no State shall withhold water that can not be reasonably applied to beneficial use. There is also the provision defining the relative proportions of the Mexican demand each State should

bear. Othe essential provisions for such compact might be mentioned by us, but we will not attempt to discuss them at this time.

Respectfully submitted.

CALIFORNIA RIVER COMMISSION,
By JOHN L. BACON, *Chairman.*

Mr. CHILDERS. These are some of the efforts that have been made in an attempt to arrive at an agreement so that we may have not only a three-State understanding, but that the seven-State compact may be put into effect. And yet witnesses have come before your committee and have stated to you that we should wait until the seven-State compact is made effective. What does that mean?

We have tried to indicate that California has gone as far as she can go. We have tried to be fair. We have substantially offered that Arizona take two-thirds of the water in the lower basin, but Arizona refuses. Now to say, "Wait until we have a seven-State compact," simply means that the Arizona demands, whatever those demands may be, whether they are fair or unfair, whether they are just or unjust, must be met.

We are not meeting as equals. It has been suggested that if this legislation passes and this project is developed, then Arizona is at a disadvantage. Why, the fact is to-day and always has been that California is at a very great disadvantage in its negotiations for the reason that Arizona's Governor has told this committee that she does not want anything from the river; they are busy with development back in the State at Salt River and at Yuma that is now being developed with Federal funds. They are not asking for flood protection. The United States is protecting the Yuma project. The United States has already spent——

Senator ASHURST. Arizona is just as anxious to develop this river as is any State in the Union. Let that go in the record.

Senator JOHNSON. That is the position of Senator Ashurst.

Senator ASHURST. I think I ought to state that.

Senator JOHNSON. I am glad to hear you say it, Senator.

Mr. CHILDERS. Thank you, Senator.

The Yuma project is not a serious matter. They need flood protection, but the United States has undertaken the obligation of protecting it. Two million eight hundred and forty thousand dollars, if I am correctly informed, has already been spent in protecting the Yuma project from floods, and I believe a program has been mapped out by the Congress to spend $100,000 a year for lever maintenance on the Yuma project. So that is fairly well taken care of so far as floods are concerned. I believe it was stated yesterday that it might be a good many years before development was undertaken down in the Gila Valley.

But we are in this position on the California side. We are in desperate need of flood protection to-day, and have been for years. Imperial Valley stands in a position to be destroyed at any time, and has been in that position for years.

Senator ASHURST. Arizona is not a powerful State, but by diligence and prudence her Senators and Representative have been able to obtain some flood protection at Yuma. If the California delegation, zealous as they are, had devoted their attention to flood control they would be well protected by this time. But you have been trying to attach flood control——

Senator JOHNSON. Now, wait a moment.
Senator ASHURST. Let me finish.
Senator JOHNSON. Finish it.
Senator ASHURST. You have attempted to attach to flood control, the question of power.
Senator JOHNSON. The head of this governors' conference stood here before this Committee and before the House Committee, denying absolutely the right of the United States Government to give us any flood control in the Colorado River. He said he was speaking the voice of Utah and of Arizona before the House Committee and before this Committee, saying that the United States Government could not spend a single, solitary dollar in the Colorado River for flood control. That was his distinct and absolute position.
Senator ASHURST. You recognize differences of opinion amongst lawyers?
Senator JOHNSON. Oh, yes; but that is the attitude of those opposed to this particular proposition.
Mr. CHILDERS. May I just add a word? Yuma and the Yuma Valley lie above sea level. The river flows away from the Yuma Valley. It is low, to be sure. They get a very great measure of flood protection by the use of levees which have been constructed by the United States. It may be that the United States would be willing to go down into the Republic of Mexico and build levees. I do not know. But if they did, Senator, it is only a makeshift, to say the most.
We have fought the river with levees for many years, but, Senator, we are relying upon a broken reed when we rely upon levees.
There is only one way, our engineers tell us, and I think they are almost in accord upon it, of controlling floods that will protect Imperial Valley, and fully protect it, if you please, the Yuma Valley, and that is by the construction of a great dam in the river up in the canyon section.
In addition, the flood problem on the Colorado, as you so well know, involves a silt problem and even the construction of a small dam, one where the gates must be kept open, does not solve our flood problem down below. It must be such a dam as will now and forever retain that great quantity of silt and release substantially clear water, that will finally solve our problem.
We are not asking the Government to go out into the Colorado Valley and throw away a million or tens of millions of dollars. When money is spent on the Colorado River we want it spent so that one hundred cents on the dollar will be returned; and if we come to Congress and ask for a flood-control dam, one that we know will solve the problem, we anticipate that we would have to ask for a gift of many millions of dollars. which is not ordinarily given.
The proposal here is to get the flood protection and be put in a position so that the money, every dollar of it, can be returned to the United States.
California finds itself in the position of desperate need. The water that was appropriated away back yonder is being used today in other States, and because of that condition we are finding ourselves faced annually with the specter of a great draught. We are in desperate need of stored water.

Our coastal cities, as told to you this morning, are in need of domestic water. California is in position where it needs this development and needs it to-day. Arizona is not in that position. She can wait until next year or 10 years from now. It is not material to Arizona.

So I say that we are not negotiating as equals, and when the gentlemen come before this committee and say, "Wait until an agreement is reached, until we can have the seven-State compact," that simply means that you are saying to California, "You must accede to these demands, whatever they may be." When the other States make the demand that we shall wait for a seven-State compact, I feel that they are overlooking the fact that they can be protected without the full approval of all of the States.

This bill approves, by its terms, the Colorado River compact. Representatives from the upper basin from time to time have suggested amendments that would protect them. To my own knowledge, no amendment has ever been offered that would give a measure of protection to those States that was rejected by the opponents of this bill.

Some 21 or 22 amendments were put in at one time. Every safeguard that could be thought of has been written into this bill to protect the upper basin States.

On the six-State plan, clearly, California is the one that stands in danger, and not any other State in the basin. California, if you please, becomes the guarantor of the obligation of the lower basin.

I think it has been pointed out here somewhat. The Colorado River compact is a contract in which seven States are interested. The compact allocates the use of the water substantially equally between two groups of parties, namely, the upper basin and the lower basin. One party in the lower basin, to wit, Arizona, refused to be bound by its terms or accept its obligations. Nevertheless the contract runs to that party the same as it does to the others. It is a lower basin obligation and an upper basin obligation. It creates lower basin rights and upper basin rights. It is not several and does not create any rights or impose any obligations upon the States as individuals. Therefore, if it is made effective on any basis it is made completely effective as between each of the groups.

Under the six-State plan one party in one group refuses to be bound but if the contract is effective it is effective as to the whole group. Therefore the parties in the group that accept the obligations accept not only their own obligations but the group obligations. Therefore Nevada and California would accept the whole obligation and guaranty to fulfill the whole obligation of the lower basin group. Since Nevada would necessarily be a small user and California a large user of the stream, the rpactical effect would be that substantially the whole obligation would be undertaken by California and California would be compelled to see to it that those obligations were performed even though it meant a sacrifice of all the water it may hereafter put to beneficial use.

The practical effect would be this. The upper basin has physical control of the water. They may use all of the water until restrained in that use by some one farther down the stream. Until they have gone beyond their compact allocation, of course, California could not object, being a party to the contract. Arizona could object,

whether they had gone beyond their compact allocation or had not reached it, as Arizona, as an individual State, would in no wise be bound by the contract. Now, if the upper basin puts the water to use first, ahead of Arizona; in other words, if the upper basin use is prior in point of time to Arizona, then of course they can in no wise be affected either with or without the compact. If they are junior to Arizona then Arizona would have the right to go into court, and, other things being equal, obtain a decree requiring the water to be turned down but, if the upper basin had not exceeded their allocation under the compact, then the defendant in that litigation would interplead California, the party which had guaranteed to the upper basin its compact water; and California would immediately, in effect, be substituted as a party defendant and the upper basin released.

It would be similar to any other litigation where one party's obligation had been guaranteed by a third. When a contract of insurance is pleaded and admitted, while the insurance carrier might not be substituted as a party defendant, he would be the real party in interest and the judgment would either run against him directly or, at the conclusion, the party defendant would have a cause of action against him for reimbursement.

It is the same as where one party undertakes, on behalf of himself and others to meet an obligation for the payment of money and one party does not sign the obligation. The one signing becomes personally liable for the whole obligation.

It might ruin California in her future appropriations, but she, being the party who had signed the obligation on behalf of herself and the other two States, would be compelled to make good. Every person who appropriates water after the contract becomes effective would be charged with notice and would be compelled to give up his water if it were necessary to meet the State obligations.

So, California is the one State that needs all seven States in the compact, but yet, because of the great necessity, California is willing to go on and give that protection to the upper basin States by every guarantee that this bill gives; and I am not sure but that more protection is given to the upper basin States by this bill than would be given by the compact without the bill, for this reason: The effect of interstate compacts is not well known. They have not been litigated to any considerable extent. They may be binding. They may give protection. We do not know. We do know that the Colorado River compact has no penalties provided. There is no provision made for litigation between the States. The only provision to be found in the compact is that of conferences between the States to which, of course, they must all agree.

The United States, regardless of the question of who owns the control of unappropriated water, owns the public lands. A very large part of the lands covered by the Colorado River and its tributaries is owned by the United States. Certainly the United States may do with this property as it sees fit. It may attach such conditions to its use as it sees fit.

With the Congress approving the compact, approving all of its terms and subjecting all of the property of the United States and all of its agencies to the terms of the compact, even if the compact itself

is not approved, even if the States should never enter into this agreement or any agreement, every State, particularly the upper basin States, is given that full measure of protection which they seek by the compact itself.

Therefore we feel that the upper basin is not justified in coming before this committee and saying, "Wait until this instrument has been approved."

By the same token, Arizona is not injured. Under this bill Arizona may enjoy every right that any State may enjoy. Arizona does not need to approve the compact. It is the most natural thing in the world; it is the most equitable and just thing, if the United States is going to approve the compact, if the compact is or its terms are satisfactory to the Congress of the United States, it is only proper and just that the United States should subject its property to those terms. And that is all it does in Arizona.

They have come before this committee and referred to this as a California project.

As I indicated a moment ago, the natural flow of the Colorado River is exhausted. The major part of the development in the upper basin States has taken place since Imperial Valley appropriated the water. Those developments are being carried forward with water which is not only appropriated but needed in Imperial Valley. Under the law it is entirely likely that at the end of a lawsuit that water would be turned down to meet the demands of the early appropriation in Imperial Valley.

The upper basin is using water that has already been appropriated. It is using water that is now required in the lower basin. If no other method were provided, it would be perfectly equitable and just to expect these junior proprietors to make some provision to take care of the uses below. The most logical, the most reasonable method to take care of those lower appropriations would be storage of flood water in the canyon section.

I say the upper basin is tremendously interested in having this flood water stored. Otherwise, they stand in the position of possibly losing the water and drying up projects which are now well under way.

In Arizona, by reason of the fact that the low flow of the river has been exhausted, no further development of any kind can take place until there is storage. All of the lands that can be reclaimed in Arizona from the main stream of the river lie below Boulder Canyon. With storage this reclamation may go forward. Without storage it can not go forward. So Arizona is interested in that problem.

As to the floods, California, of course, is interested. Yuma is not so much so on account of the fact that she lies above sea level and does not stand in such imminent danger of complete and everlasting destruction, and in view of the fact that the United States has undertaken to protect her she is not so greatly interested. But, nevertheless, a great flood on the Colorado River, notwithstanding the fact that the United States has undertaken this protection, would completely ruin property values of the Yuma project and perhaps destroy the project itself.

So flood protection is important to Yuma.

And then, as a last consideration in which the whole basin is interested, there have been discussed here the Mexican requirements. Under the compact, if the surplus water is not sufficient to meet the Mexican demands, the upper basin is required to turn down half of the water necessary to make up the deficiency. We know that while we are debating this question the water is being put to use in Mexico, and doubtless that condition will continue. If it does, it is only reasonable to expect that some bright morning we will wake up to find that the surplus water has been used up, and then they will have to deliver up the water that they are putting to beneficial use.

So I say that the upper basin is—and certainly Arizona and Nevada are—interested in seeing this thing consummated at the earliest possible time in order to meet that Mexican situation.

So, to say that is a California project as distinguished from a project affecting other States, is a misnomer, to say the least.

Referring a little further to the flood question, at least one witness has told your committee that it would take 12 years for Imperial Valley to be filled with water. In justice to him, he did say that property values would be affected earlier than that.

A great flood in the Imperial Valley would have the immediate effect of cutting off the irrigation system. Imperial Valley is dependent wholly upon the Colorado River. All the water used in Imperial Valley for irrigation, for stock or household purposes comes from the river. A great flood that would cut off the irrigation system would immediately dry up the valley, and it is doubtful if facilities exist to get livestock out of the valley before they would perish by thirst. People would be compelled to abandon their property and leave, simply that they might have drinking water.

That is the first disaster that would befall Imperial Valley from a flood. But that is not the worst. Very soon the back cutting would start, as President Roosevelt many years ago referred to.

When the great flood of 1905 took place the water first spread over the valley as a lake, over large areas of it, but soon it began to channelize. If you will recall, the fall into Imperial Valley down toward the Salton Sea is three times as great as it is over the other way into the Gulf of California. The fall from the crest of the delta, or the river channel, toward Salton Sea is something more than 3 feet to the mile. This great body of water could not pond very long. It soon began to channelize. As it began to form into a channel, the channel started cutting back, as President Roosevelt said, in a series of cataracts; and this channel is across Imperial Valley to-day, as much as 50 to 75 feet, and extending well into Mexico back toward the Colorado River.

At the time the break was closed this back-cutting was taking place at the rate of half a mile per day. Great blocks of earth every few minutes were falling over into the canyon.

Doubtless another great flood would start back-cutting where it stopped before, and if it continued at the rate at which it was proceeding at that time, within four months' time it would be into the Colorado River itself.

The engineers have figures that that back-cutting would produce a channel at the head works of the Imperial irrigation district and

back up in front of the town of Yuma, so that the river would be 100 feet down into the ground.

With that condition, which would doubtless continue up to and destroy the Laguna Dam, in four or five months' time, possibly in one flood season, it would put the river entirely beyond control where it could not be turned out of Imperial Valley, at least for perhaps a century. Then the silt deposited would gradually cut it off, and perhaps a hundred years would be required for that process to take place. Twelve years to fill? It might take 12 years. It would not be material whether it was 12 or 20 years; when the river once broke in a serious sort of way Imperial Valley would be ruined.

There would not, in all likelihood, be a wholesale drowning in Imperial Valley. People could escape, generally speaking, with their lives, leaving all of their property, their life savings, behind them; but it is not conceivable that such a thing could take place without the loss of some life. There are prosperous little towns of from five thousand to thirteen thousand or fourteen thousand population each, standing on the banks of this gorge that is cut across Imperial Valley. It is not conceivable that in the efforts to close the break, to stem the tide of this water, to protect their property, there would not be some lives lost. Even if it is only one life, whose life is it going to be?

So the fact, if it be a fact, that it would take 12 years to fill the valley is wholly immaterial when a serious flood comes, then the valley is destroyed.

In these efforts to bring about agreements between the States we have discussed water with Arizona very much at length, but we find that water is not apparently the big stumbling block. Arizona's demand is for money. She wants revenue. She wants royalty on the power.

As we indicated this morning, in the very first definite written proposal that California made to Arizona she recognized this demand, and in that proposal California and Nevada joined and consented to a guaranteed tax. That is what we chose to call it at that time. Whether that is right or a misnomer I do not know. But, anyway, it meant a million dollars a year from this project to those two States.

Arizona promptly rejected it. Since that time various demands have been made. At the Denver conference the demand was for a reasonable tax, but with a minimum of 1 mill per kilowatt hour, or $3,600,000 a year from this project.

It was discussed. It has been discussed a great deal. Of course, California recognizes this very important fact. The revenue from this project is not for California to give.

The incidents that may flow from this project are property of the United States. It is only the Congress of the United States that can say whether this project shall produce Arizona $3,600,000 a year or not. It is not for California to say. If it were written into a compact, be it ever so solemnly done by our legislature, it would not be effective, because it is only the Congress that can deal with that project.

Arizona stated that she was willing to waive the settlement of the power if we would make an agreement that in any compact that is

made no power in any manner should be developed or installed until the power question was settled.

She did not recede from her water demands, mind you, but she said that she would discuss water and settle water upon this other condition. Now, what does that mean? It simply means this: As we indicated in demanding a seven-State compact, that had California entered into a compact with Arizona, even if they could agree on water, which they would not in the absence of power—but even if they could agree on water and had entered into a compact stating that no power should be developed or installed until that matter was settled—it would mean that California would be obliged, or the Congress of the United States would be obliged, to accede to the demands of Arizona, be it just or unjust, reasonable or unreasonable, for $3,600,000 a year. They could just as well say $5,000,000. And yet either California or the Congress—I think Congress is the only one that could do it—would be obliged to meet that demand or else no development would take place in the river or else the cost could not possibly be returned. Of course, California could not accede to that demand.

Now, I referred awhile ago to the message of President Roosevelt which was delivered to the Congress away back in 1907—on January 12, 1907. It will be recalled that the Colorado River had been flowing into the Imperial Valley at that time for nearly two years. And he sent this message to the Congress. I will read just a few extracts from it if I may [reading]:

> The Governor of the State of California and individuals and communities in Southern California have made urgent appeals to me to take steps to save the lands and settlements in the sink or depression known as the Imperial Valley or Salton Sink region from threatened destruction by the overflow of Colorado River. The situation appears so serious and urgent that I now refer the matter to the Congress for its consideration, together with my recommendations upon the subject.

And then further [continued reading]:

> The results have been highly alarming, as it appears that if the water is not checked it will cut a very deep channel which, progressing upstream in a series of cataracts, will result in conditions such as the water can not be diverted by gravity into the canals already built in the Imperial Valley. If the break is not closed before the coming spring flood of 1907 it appears highly probable that all of the property values created in this valley will be wiped out, including farms and towns, as well as the revenues derived by the Southern Pacific Company. Ultimately the channel will be deepened in the main stream itself up to and beyond the town of Yuma, destroying the homes and farms there, the great railroad bridge, and the Government works at Laguna Dam, above Yuma.
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> The actual amount of tangible wealth or securities possessed by the settlers to-day upon which money can be raised is believed to be very small. Nearly all individual property has been expended in securing water rights from the California Development Co., or from other organizations handling the water supply and controlled by this company. It is evident that the people have slender resources to fall back upon, and in view of the threatened calamity are practically helpless. The California Development Co. is also unable to meet the exigency. The obligations assumed by the sale of water rights are so great that the property of the company is not adequate to meet these obligations; in other words, a gift of the visible property of this company and of its rights would not be a sufficient offset to the assumption of its liabilities. Nevertheless, the people in their desperation were reported as trying to issue and sell bonds

secured by their property in order to give to the California Development Co. a million dollars to assist in repairing the break.

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If the river is not put back and permanently maintained in its natural bed the progressive backcutting in the course of one or two years will extend upstream to Yuma, as before stated, and finally to the Laguna Dam, now being built by the Government, thus wiping out millions of dollars worth of property belonging to the Government and to citizens. Continuing farther, it will deprive all of the valley lands along the Colorado River of the possibility of obtaining necessary supply of water by gravity canals.

The great Yuma Bridge will go out, and approximately 700,000 acres of land as fertile as the Nile Valley will be left in a desert condition.

* * * * * * *

The interests of the Government in this matter are so great in the protection of its own property, particularly of the public lands, that Congress is justified in taking prompt and effective measures toward the relief of the present situation.

Concluding, he said [continuing reading]:

If Congress does not give authority and make adequate provision to take up this work in the way suggested, it must be inferred that it acquiesces in the abandonment of the work at Laguna and of all future attempts to utilize the valuable public domain in this part of the country.

Senator HAYDEN. May I inquire whether there is anything in President Roosevelt's message which indicates that he recommended the construction of a power plant on the Colorado River?

Mr. CHILDERS. No; I do not think so.

Senator HAYDEN. You are aware that in President Roosevelt's time conservation was adopted as a governmental policy, and there was passed an act creating a Forest Service, which set aside forest reservations from the public domain in various States, and which thereby took the timberlands out of the taxation of the States. You also are aware that the Federal law now provides that 25 per cent of the proceeds of the sale of timber and other income from the national forests shall be paid to the State in which the timber is located.

I would like to inquire if you make any distinction between a natural resource of timber, and a natural resource of water power when it comes to compensation of the States.

Mr. CHILDERS. I do not know, Senator, whether I get your question exactly or not. Do you mean, should they be treated on the same basis?

Senator HAYDEN. Yes.

Mr. CHILDERS. Should a river and a forest be treated on the same basis?

Senator HAYDEN. Yes.

Mr. CHILDERS. Now, if I recall the revenue from the forest—let me put it this way: I rather doubt if there is any State in the Union that derives from their whole forest—that is, from the forest reservation of the United States within their boundaries, anything like $3,600,000 a year. Now, there is a nominal consideration, if I remember correctly, flowing from the national forest to the State; purely nominal, if I remember correctly.

Senator HAYDEN. I asked one of the State tax commissioners to estimate what would be the assessed value of the forest land in Arizona if privately owned and subject to taxation. His estimate

is that the State and the counties are now receiving from National Government approximately what the tax would be; so that my State is getting a fair deal in that respect.

Mr. CHILDERS. Well, it is very nominal from the forest. I am not prepared to say just what should be——

Senator HAYDEN (interposing). But the principle would be the same; the value of the property for purposes of taxation.

Mr. CHILDERS. That is true. The United States owns the lands out of which the forest reserves have been carved. It is United States property. Congress, in its wisdom, decided that some nominal percentage—I have forgotten just what—goes to the States. That was not done by interstate compact. The Congress, which had absolute control over those lands, decided that that should be done. And whatever was done was done. Now, the same thing might apply with rivers, or any other so-called resources that belong to the United States.

Senator HAYDEN. It has been done with respect to oil. As to oil developed upon the public domain—of the moneys received from that soucrce, 37½ per cent is paid to the State. That is very generally understood to be in lieu of taxation. I understand that the State of Wyoming has received something like $20,000,000 by reason of the discovery and development of oil in that State. I just wanted to know if you could draw any distinction in your mind between a natural resource like oil or timber or water power in such cases where they are held out of private ownership and conserved for the general use of the public. Would it not appear to you that the same logic would require that, if that policy is to be followed, there is to be some compensation to the State which thereby loses the power to tax?

Mr. CHILDERS. I think under the Federal water power act there is some provision whereby a nominal percentage of the money received from a permittee or licensee flows to the State. As I said before, Senator, in all those matters that you have mentioned, it is a matter solely in the hands of the Congress of the United States. It has absolute power over the public lands. In these cases you have mentioned the Congress saw fit to allow a certain percentage of the revenue to flow to the State. That may be wise. That is not for me to determine. That is for the Congress, not for me or the State of California.

Senator JONES. That is, it did not go to the State as a legal right?

Mr. CHILDERS. That is exactly it, Senator; it did not go to the State as a legal right, but as Congress thought wise.

Now, President Roosevelt's message was delivered to the Congress some 21 years ago. At that same time that he presented his message to Congress, or about that time, he directed letters to Mr. Harriman, who was President of the Southern Pacific Railroad Company, requesting—virtually demanding, that he take that flood situation in hand, and close the break.

Now, if I may recite just for a moment some of the history of that dramatic flood. The river was flowing into the valley, and the California Development Co., which was a New Jersey corporation, had used up all of its assets. It went to the bank and borrowed a small amount of money, I believe $5,000, to close a small opening in the bank of the river. By the time it got to the opening the $5,000

would not start the job. Then they went back and made arrangements to borrow another amount, I believe at that time something like $50,000. It took them a week or two to arrange the loan and get the money, and by the time they got back the $50,000 didn't go any farther than the $5,000 had gone at the time they came with it.

Thereupon the officers of the California Development Co. and those responsible for it, made an arrangement whereby all of its assets, stocks, and bonds, were turned over to the Southern Pacific Co., and they were to go in and do the best they could to close the break. I have been informed that the Southern Pacific spent something like $1,600,000 in their first effort. The first thing they did was to build a wooden structure on the river; this structure was some 600 feet long, and strongly built, with a view of letting the water through under control, relieving the natural force of the river, and then to make an effort to close the main opening. But they hardly had it completed until the river burrowed through under it, picked it up completely and turned it over. By that time the break, which had been something like 700 feet wide, became something like 1,500 feet wide and was wholly uncontrollable. Then the Southern Pacific quit. It was then that the President came to the Congress and asked for this relief, and also requested cooperation of the Southern Pacific.

Then the Southern Pacific went at the job again. Passenger and mail trains were sidetracked in order that rock trains might have the right of way to rush materials to the works. Thousands of carloads of rock were dumped into this opening, and finally the river was controlled.

Then Congress came in with, I think, about $1,100,000 in an effort to keep the river within its channel.

A levee some 24 miles in length was constructed. The first high water breached it in a number of places. Some 20 miles south of the international line the river turned westward into the Bee River channel, across the delta, to what is known as Volcano Lake. It ran into Volcano Lake for some 10 years. The river channel was on the crest of the delta. There was an effort to keep the river in that place. In the effort the people of the Imperial Valley connected with the Government levee and built west to the mountains, what is known as the Volcano Lake Levee. Year after year that was maintained, and gradually raised to a height of some 19 feet, but the river filled up with the deposit of silt, as it always does, at a rate of about 1 foot a year. So after it had been filling up at that rate for 10 years, it got to a point where it could not be any longer kept back of the levee. In 1919, I recall, for days and nights hundreds of men were kept on the job placing bags of earth on this levee, in an effort to confine the river. Had the wind changed and blown from the south, instead of from the north as it did most of the time, the breeze would have lapped the water over the top and taken out the levee, and that whole body of water would have rushed into the Imperial Valley. It would have been a very serious condition. Fortunately, as I say, the wind blew from the north, and they were able to hold the water in check until the river started going down. But there was a break, and for several days some 10,000 second-feet of water went through the levee, but because of being up on higher ground and because of the fact that the river was falling, they were able to hold it.

We have had a number of breaks through the levee even during the past few years. The Imperial irrigation district has spent large sums of money to protect the valley from the floods. That fight is going on all the time.

I have lived in the Imperial Valley now for 15 years. I have practiced law at El Centro during that time. Soon after I went into that community I became interested in water matters. Water affairs in the Imperial Valley means the Colorado River for, as I indicated to you a while ago, there is no water from any other source. The rainfall is negligible, and such as we have comes in torrential rains and cloudbursts.

I know some little about the problems there; some little of the triumphs and of the defeats.

When the Federal farm loan act was passed, the farm loan bank went into the Imperial Valley to loan money, as they did in other communities, the same as they do across the river in the Yuma project. I think I was attorney for perhaps the first committee that was formed for the purpose of obtaining those loans. A few loans were made, possibly 10 or a dozen of them. And then the money was promptly withdrawn, and whether it is in your record I am not sure, but it is in the record of the House hearings, the reason why it was withdrawn, and the reason, as was stated, was that the security was not sound on account of the flood conditions. And within the last two years I had a personal conversation with a member of the Federal Farm Loan Board, there is nothing secret about it, as the interview was published, wherein he told me that they were as anxious to loan money in the Imperial Valley as in any other farming community, and would do so when the flood situation was taken care of and the canal system taken out of Mexico. This is only typical of the adversities they have had.

So the farmers in the Imperial Valley have had a fight, and that fight is going on. They have spent large sums of money, and are spending those large sums to-day, even thought they are harrassed by these floods; they are harrassed by water shortage and they have international complications. But they are going on. They are doing the best they can, and now for some six or seven years they have come annually with their petition to the Congress of the United States for relief, the only agency that can give that relief.

Senator HAYDEN. What is the total bonded indebtedness of the Imperial Valley irrigation district?

Mr. CHILDERS. The total authorized bonded indebtedness is $16,000,000. That is being paid off so that at the present time the bonded indebtedness is about $15,500,000.

Senator HAYDEN. How is the interest paid?

Mr. CHILDERS. They are serial coupon bonds, and the interest is paid every six months.

Senator HAYDEN. The money is raised by assessments on the lands?

Mr. CHILDERS. The money is raised by assessments on the lands, yes, sir.

Senator HAYDEN. Is there any income from the Mexican lands?

Mr. CHILDERS. Yes, there is some money comes in from the Mexican lands.

Senator HAYDEN. About how much per year?

Mr. CHILDERS. About half a million dollars a year. That is just about what it actually costs to run the Mexican system.

Senator HAYDEN. I have been told that some new concessions have been granted by the Mexican Government to the Mexican land owners whereby they may divert water directly out of the Colorado River in Mexico without utilizing your system, and thereby deprive the Imperial irrigation district of revenue?

Mr. CHILDERS. It is a fact that in addition to their taking water from our system, there has been a permit issued, within the past few weeks, for the diversion of some 1,000 second-feet of water out at Bee River Dam, which is some miles down from our district heading.

Senator HAYDEN. Did the Imperial district protest against that additional permit?

Mr. CHILDERS. Yes, sir.

Senator HAYDEN. And it was granted over your protest, was it?

Mr. CHILDERS. It was granted over our protest.

Senator HAYDEN. The reason why I am asking these questions is to try to ascertain whether it is possible for the Mexican landowners to put any additional areas of land under cultivation by diversion of waters, without utilizing the Imperial Canal system.

Mr. CHILDERS. That is possible, and they are doing it to-day. I think the application, if I remember correctly, upon which this 1,000 second-feet was granted, was something over 300,000 acres of land, most of which can not be reached by our present system.

The CHAIRMAN. By whom was the permit granted?

Mr. CHILDERS. By the Government of Mexico at Mexico City.

Senator HAYDEN. Did you protest against it for the reason that it might deprive the Imperial irrigation district of revenue?

Mr. CHILDERS. Oh, no, no, Senator. We protested because it might endanger our levee. They take it out by means of a siphon, one end of the siphon is in the river, and they draw the water over the levee to the west. Our protest was because it endangered our system. And, of course, we are not anxious to see an extensive use made of water in Mexico.

Senator HAYDEN. But you have no fear of loss of revenue from that source?

Mr. CHILDERS. No; not to the loss of revenue, Senator. So far as the revenue is concerned we are not protesting on that ground at all.

Now, if I may continue for a moment, I will conclude. I was calling your attention to the fact that Congress can give the relief to which we think we are entitled. We have found, I think, that the power to do this work is certainly vested in the Congress. It is vested nowhere else. California has tried diligently and long to satisfy the demands of her sister States. She wants those States to prosper, the same as we want to prosper. But we do not feel that the years should slip by to a point where we will be ruined; and, in fact, our losses to date have been very great because we have had to wait year after year. We do not believe we are asking an injustice. We do not want an injustice done. We want Arizona and Nevada and the other States to have all the protection they can have for their future growth and development. We think we have offered every thing in water development we should be asked to offer, and those offers have been turned down. And the revenue from this

power only the Congress of the United States can give. We can not give it. Certainly these farmers should not be compelled, year after year, while their property is being wiped out, to have their petition to Congress unheard when Congress has the power to give that relief to which they are entitled.

If there are no questions, I think that is all of my remarks, Mr. Chairman.

The CHAIRMAN. Are there any other questions of Mr. Childers?

Senator JOHNSON. I have no more questions.

Senator HAYDEN. I would like to ask a question or two. You stated that it was not in the power of California to agree to any compensation or to the measure of compensation that Arizona and Nevada should receive for the use of their lands and water. I heard that statement made in Denver, wherein various proposals were made to the California delegation. The statement was made by the California Colorado River Commissioners that they did not desire to express an agreement to any particular figure or to any particular plan; that they feared if they were to agree to anything the administration, or the Congress, might not approve of it. It appeared to me, at least, as an observer, that that was the main difficulty in coming to an agreement. If the committee, or the Congress, or the administration, or from wherever source you desire to get that assurance, should indicate that the principle itself were sound, that the States were entitled to some compensation, would you be in a position to negotiate?

Senator JOHNSON. Suppose the committee should do that, would that be satisfactory to you?

Senator HAYDEN. I think it would be a satisfactory principle.

Senator JOHNSON. Would you be willing to go forward with the bill?

Senator HAYDEN. I would be glad to, Senator.

Senator JOHNSON. If the committee, then, went forward with the bill on the principle, and this committee thought it was appropriate, you would go forward with us in asking that the——

Senator HAYDEN (interposing). The point I want to develop——

Senator JOHNSON (interposing). That is the point I want to develop. Will you?

Senator HAYDEN. I think that the Senator from California is yielding too much. And the consumers of power in California are vitally interested in that matter.

Senator JOHNSON. Concede it. Now, I say to you, suppose, representing the State of California, we say to you that we will ask this committee to recognize this principle—we can not recognize amounts, because you realize the Federal Government has to agree——

Senator HAYDEN (interposing). Yes.

Senator JOHNSON. All right. Will you go forward with us and pass this bill?

Senator HAYDEN. Well, you ask about the whole bill and in detail. I can not say that. I will go this far——

Senator JOHNSON (interposing). Well, what——

Senator HAYDEN (interposing). If you will let me proceed, I can say this——

Senator JOHNSON. All right, sir.

Senator HAYDEN (continuing). If the California commission should ascertain that Congress is willing to concede the principle of compensation to the States for the use of their lands and waters, are you then willing to negotiate, and do you not feel that California has a very vital interest in the measure of that compensation?

Mr. CHILDERS. We have, but we do not have any right to either recommend or deny that it should do that thing. That is for Congress to decide and not for us.

Senator HAYDEN. Senator Johnson and I are about to agree that the principle should be established.

Senator JOHNSON. No; I am not agreeing to it at all.

Senator HAYDEN. I misunderstood you.

Senator JOHNSON. No; I say if we do agree—because that might be a very great inducement for me to agree to a governmental policy that I am doubtful about—but if we do agree, will you go forward with me and pass this bill?

Senator HAYDEN. I shall certainly assist you in any way that will carry out an agreement between the States.

Senator JOHNSON. I am obliged to you, and thank you for your frankness. Now, I want to say, in connection with that, that I regard this as a Federal policy, Senator; a Federal policy that has got to be established new, that is entirely new, and that will last for all time. I am taking the matter up, without expressing an opinion upon it, with the appropriate parties, to determine whether or not the present Government of the United States is willing to enter upon this new policy. I want to ascertain, if I can, their view. And so I say to you that if they shall be willing to enter upon that policy, and this committee then shall establish the principle—amounts it is impossible for you and me to establish, I assume; the Federal Government will have to do that in conjunction with the rest of you—will you and I then go forward and pass this much-needed bill?

Senator HAYDEN. I think the adoption of that principle and the establishing of it will do more to settle the Colorado River controversy than anything else that can be done.

Senator JOHNSON. You say it will do more to settle things than has been done before. Will it settle things? You have heard me say a hundred times I am willing to go more than half way to try to get this legislation, because I know what depends up it. And I have told you frankly that I am taking it up with the appropriate authorities to ascertain their view upon an entirely new principle behind Federal legislation because it is so——

Senator HAYDEN (interposing). Permit me to suggest that when you take it up with them that you point out that while it may be new with respect to water power, it is not new with respect to other natural resources.

Senator JOHNSON. I understand. What you said as to precedents will not be forgotten at all. And if the United States Government says it is willing, we can, so far as the legislative department is concerned—we can express our view irrespective of the administration—but if the United States Government is willing, in its administrative capacity, to recognize a principle that will stand, not as between you and me, but as between California and Arizona, and will stand for all time in the West, that is something then that will be definitely settled, and if it is settled in the fashion that you suggest

as a principle, then I shall expect you, from what you have just said, with your colleague, to go forward with me in this session of Congress and pass this bill.

Senator HAYDEN. I want to say, Senator, that I have always viewed the matter in this respect: That there were two parties interested primarily in the amount paid, the States wherein the power sites are located and the consumers of power, who, after all, pay the bill.

Senator JOHNSON. Of course.

Senator HAYDEN. The United States amounts to nothing more in this instance than a collection agency. The States must be satisfied that the compensation which they are to receive is reasonable, and the consumers of power that they are not unduly taxed.

Senator JOHNSON. Well, we will have our difficulties, I assume, just as we have in the past, but I hope we will compose those difficulties.

If you have concluded, Mr. Childers, I will call Judge Mathews.

The CHAIRMAN. We thank you for your statement, Mr. Childers. Judge Mathews.

STATEMENT OF W. B. MATHEWS, ATTORNEY AT LAW, LOS ANGELES, CALIF.

The CHAIRMAN. Mr. Mathews, for the record and for the benefit of the committee, give your full name, your occupation, and your address.

Mr. MATHEWS. My name is W. B. Mathews. I reside at Los Angeles, Calif. I am an attorney at law, and have been practicing that profession for a good many years.

I have been connected professionally and officially with the water and power interests of Los Angeles for more than 20 years. Besides this, I might say I am a member of the California-Colorado River Commission, a body of three persons provided for by statute and appointed by the governor of the State.

The rôle of last speaker has been assigned to me here, as it was in the hearings before the House committee. I shall be very brief, that being due to the committee, and certainly in line with my own desire.

As a member of the California-Colorado River Commission, I attended the various conferences in Denver, and succeeding those, in California, with a view of promoting an adjustment and settlement of the questions between the States. Those conferences, I can truthfully testify, were carried on in good nature, with courtesy prevailing, and there was no reason for complaint on the part of anybody as to the behavior of any representative of any of the States. We reached the point in the various sessions when it seemed to all participating that we could not well justify further use of time for the particular session, so we recessed until a later date.

As has been stated, the conferences at Denver related at the outset and for several weeks exclusively to water. That was appropriate. That was the subject assigned for the conferences at the outset. And not having succeeded in reaching an accord as to water, we were diverted to a consideration of the question of power. We soon

found that available data for that consideration were not sufficient, so we went to California. We spent several weeks in California. There was a good attendance on the part of all three States at the conferences. We reached the point finally in the conferences as to power when it seemed to all that further time could not reasonably be spent upon the subject. It became apparent in considering power that there was a party in interest who was not present; that we were undertaking to reach an agreement upon a matter where a party greatly concerned in what we were discussing should be consulted, and that was the Government of the United States. The next logical step was to adjourn the conferences and come to Washington. That point has been covered by Mr. Childers. The question of power involved a Federal question or, at least, a question of Federal policy. We had no precedent; at least, no established, controlling precedent or judicial decision to guide us in determining what we should say, agree to, or otherwise concur in, even tentatively. We did not have a project of the Government where power was being developed and where the plan or policy was being applied of distributing to the States a portion of the revenue on the principle that a State's resources were being employed. We had no rule or precedent of any sort to guide us. We had the Pittman resolution, in the adoption of which California did not participate. But that resolution, an examination of the authorities showed, was not based upon a single decision of the Federal courts, Supreme or lower down.

However, California is not averse to those States getting a revenue out of the project. We are disinclined to go through all the formality of agreeing to a proposition ourselves and ignoring the Government, with the chances that our agreement would be cast aside when we tried to apply it in Washington.

Senator HAYDEN. Then, as I understand you, you desire here in Washington to ascertain from those in authority what the Federal policy is to be, and when you have found out what that policy is you are willing to resume negotiations about power.

Mr. MATHEWS. We are willing to do more than that. We are willing to do what we can reasonably to have such policy initiated. But we do not agree that our plan of legislation, with which we have been concerned and which we have been seeking to promote all these years, shall be unreasonably postponed while we are trying to establish that policy. But we will not lay a single obstacle in the way of securing the initiation of such a policy. We do not think that California should be treated or regarded as an unfriendly neighbor of the other States. We think that this project lies at the heart of an economic program concerning all those States, and we are not averse, as I say, to having the principle of paying a portion of power revenues to the States established or recognized in connection with this legislation.

The California representatives, so far as they are present—I believe there are two of the three present who are members of the commission—are willing to engage in further negotiations of any plan with the representatives of the other States, with a view of bringing about an agreement upon the questions involved. But we do not think, in view of past experience, where earnestly we sought to bring about such an agreement, and where at times it seemed that

the agreement was imminent but did not come, that the legislative program should be deferred until negotiations should proceed, to the exclusion of our efforts to get the bill through. We are ready, however. We have been ready ever since we came—there has been no real opportunity, however—to contact with the representatives of the other States and see what can be worked out in reference to this so-called power policy.

It has been the position of Arizona—and I am not criticizing Arizona; I want Arizona to look after its own—if she doesn't, nobody else will—that we may have flood control, if we do nothing about power until an interstate agreement is consummated. Our project, while primarily for other purposes, requires the development of power. It is our only hope of getting the project. We must devise some way of meeting the expense. There is no other way to get it, except through the power. The appropriation asked is an enormous one. We can not have the slightest hope of getting Congress to sanction that appropriation, unless very definitely Congress could see that the program involved a method of recouping the Government's investment. The power and the project are inseparable in that sense.

The legislation that we have in hand here, I assure you, so far as I can speak for its purpose and innate motive, is not designed to secure for any State an undue advantage as against any other State.

Now, I know that Arizona has dwelt upon the fact that Arizona is a small State; that it has a limited population, and is not great in wealth. But I have not attached a great deal of importance to that. I have not attached any importance to that because it is my observation that, with Carl Hayden in the House, and now in the Senate, and Senator Ashurst in the Senate working for Arizona, that State is not handicapped by its size or limited population in getting what it wants. [Laughter.]

I remember—to take just a moment for historic reference—I remember a great speech delivered in yonder Capitol in the basement where the law library is. I was not there, of course, but I have often read it. I refer to the argument of Daniel Webster in the Dartmouth College case. You will recall the description of that great effort. He was urging with tremendous eloquence and power the constitutional grounds on which he plied, but the thing that gave his argument effect and final conviction with the great Chief Justice who presided at the hearing was when he said, regarding his alma mater, "It is, sir, as I have said, a small college, and yet there are those who love it." That was the remark that brought tears to the eyes of the Chief Justice and turned the tide in favor of Mr. Webster's clients.

Arizona may be small, but her size is the source of added strength to her efforts when she seeks to accomplish something for her citizens.

Now, Mr. Chairman and gentlemen, the proponents of this measure have been traveling a long road. We have been traveling for seven years. We are trying to obey the Scriptural injunction, "Be not weary in well doing," but really we are weary under the strain and the delay which have affected this project. We feel that the time has come for action. We feel that this committee has it in its power to initiate a program of construction that is needed to meet a very serious situation. We feel that that program of construction is one which, if initiated and carried out, will redound to the credit

of this committee, and to the credit of the National Congress, and will bring great benefits not only to the State of California, but also to the States of Arizona and Nevada, and that whole section where we are so glad to live.

We have done everything we can to bring this subject to you on its merits. We have explained. We have preached. We have urged. We have traveled up and down this country seeking to make our project appear as we believed it was, a meritorious project. And now we are at the point where we do feel that the next logical step is for the committee to give us a prompt and favorable report as was done last year, so that we may have a chance with the Congress itself.

There are in this project the essential elements of constitutional action. There are the elements of the flood control. The elements of protection and reclamation of property belonging to the Government of the United States, besides the conservation of the lives and properties of citizens of the United States, and the improvement of what there is of navigability in the lower Colorado River. There are present the primary considerations constituting the basis of constitutional action.

There are also the incidental and secondary elements which are worthy of your consideration. I live, as I have stated, in the city of Los Angeles. We have a great and growing population. I do not any longer utter that with pride or great satisfaction. I realize now, and I have been realizing it more and more with the passing years, that that implies a responsibility with regard to water and power, which takes away the sense of pride that formerly we felt when we spoke of our increasing population. We see the limit of our water supply almost within a few years. We have the responsibility of enlarging that supply by any possible method. We see what it means to undertake to provide that supply. We do not willingly go to the Colorado River for domestic water. But by universal consent that river is regarded as the only source of supply that will solve our future and the future of the other States of the coastal plains.

What does that mean for us? It means that in order that this project may be prefinanced according to the scheme of the bill; in order that the Government, if the project is authorized, may be willing to go ahead with construction—it means that my section of California will have to forego other needed public improvements and pledge its credit beyond even any reasonable limit, in order that the funds may be supplied to assure us this great project. Our obligations will run into the hundreds of millions. We are strong now. Our people are yet feeling the beneficial, wholesome effect of growth. But we want this project authorized so that we can use to the best advantage the credit that we must possess in the markets of the world in providing the funds for carrying this project to completion. We do not want to be affected by an actual shortage of water with its detrimental effects upon our credit before being called upon to assume with our sister cities the manual burdens of this enterprise.

I ask you, therefore, Mr. Chairman and gentlemen of the committee, to put yourselves in our position; put yourselves in contact with those very serious problems which we face day after day, and

realizing, as you doubtless would, if you were in our position, how serious our situation is, give us a prompt and favorable report upon the pending bill.

If there are no questions by the committee, Mr. Chairman, I thank you.

The CHAIRMAN. Are there any questions?

Senator HAYDEN. The differences between the States of California and Arizona are two: An agreement must be reached upon an apportionment of the waters of the Colorado River and upon this question of power. Do you conceive that progress has been made during the past year in adjusting those differences?

Mr. MATHEWS. Yes; we have been able to sit down and study the matters involved patiently, courteously, and seriously and there has been no misbehavior or shirking of duty or responsibility, to my knowledge, on the part of any of the representatives of any of the States concerned. We have made progress.

Senator HAYDEN. You feel that each State better understands the problems of the other and better apreciates its situation, and by that means that we are nearer together than we have been heretofore?

Mr. MATHEWS. Yes, sir.

Senator HAYDEN. And are willing to continue such negotiations to fruition.

Mr. MATHEWS. California is.

Senator HAYDEN. As I understand from your statements made at Denver and repeated here, you hope, while you are now here in Washington, to be able to obtain light from the Federal authorities which will enable you to agree upon a policy of compensation to the States?

Mr. MATHEWS. Yes; we are willing to make the utmost effort to ascertain the attitude of the administration and even of Congress upon that question; and, without any thought of impeding or interfering with any efforts to have the policy established that is necessary in order that revenue may be paid to the States contiguous to the project.

Senator HAYDEN. Thank you.

The CHAIRMAN. Are there any further questions of the witness?

Senator JOHNSON. No; I think not.

The CHAIRMAN. I want to take this opportunity to thank Mr. Mathews for his testimony before the committee.

Senator JOHNSON. One other thing, Mr. Chairman. Mr. Dowell, of San Diego, is here as one of the officials of that city. I think it is well understood, and he would state that fact, that San Diego is in bitter need of water, and therefore is very anxious indeed that this legislation be passed. With that understanding, I think it will not be necessary, Mr. Dowell, to call you. He has come here for this purpose and has been present, rendering assistance in the hearings.

The CHAIRMAN. Is there anything further?

Senator ASHURST. I ask permission, Mr. Chairman, to print in the record a letter from the American Engineering Council, in which they ask that certain action be taken.

The CHAIRMAN. Without objection, it may be done.

(The letter presented by Senator Ashurst is as follows:)

AMERICAN ENGINEERING COUNCIL,
Washington, D. C.

At the annual meeting of American Engineering Council, held in Washington, D. C., January 10, 1928, the following action was taken with reference to the Swing-Johnson bill:

The council unanimously adopted a joint report of its committees on public affairs and power which recommends that the council reaffirm its opposition to the Swing-Johnson bill.

In addition to the foregoing action, the council voted that the executive secretary be directed to make particular effort to bring this action of the council to the attention of Members of Congress and that a special committee be appointed if necessary to oppose the bad features of the Swing-Johnson bill and suggest constructive measures to meet the needs of the people of California.

Attested:

L. W. WALLACE,
Executive Secretary.

OFFICERS AND MEMBERS OF THE ASSEMBLY, AMERICAN ENGINEERING COUNCIL, FOR 1928

OFFICERS

President.—A. W. Berresford, New York City.
Treasurer.—H. E. Howe, Washington, D. C.
Executive secretary.—L. W. Wallace,, Washington, D. C.
Vice presidents.—L. P. Alford, New York City; O. H. Koch, Dallas, Tex.; I. E. Moultrop, Boston, Mass.; G. S. Williams, Ann Arbor, Mich.

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Dr. H. E. Howe, chemical engineer, Washington, D. C., American Society of Chemical Engineers.

H. M. Barnes, jr., electrical engineer, New York City, American Institute of Electrical Engineers.

A. W. Berresford, electrical engineer, New York City, American Institute of Electrical Engineers.

H. M. Hobart, electrical engineer, Schenectady, N. Y., American Institute of Electrical Engineers.

F. L. Hutchinson, electrical engineer, New York City, American Institute of Electrical Engineers.

Farley Osgood, electrical engineer, New York City, American Institute of Electrical Engineers.

A. G. Pierce, electrical engineer, Cleveland, Ohio, American Institute of Electrical Engineers.

Prof. Charles F. Scott, electrical engineer, New Haven, Conn., American Institute of Electrical Engineers.

C. E. Skinner, electrical engineer, East Pittsburgh, Pa., American Institute of Electrical Engineers.

Calvert Townley, electrical engineer, New York City, American Institute of Electrical Engineers.

C. C. Chesney, electrical engineer, Pittsfield, Mass., American Institute of Electrical Engineers.

F. J. Chesterman, electrical engineer, Pittsburgh, Pa., American Institute of Electrical Engineers.

Col. John H. Finney, electrical engineer, Washington, D. C., American Institute of Electrical Engineers.

M. M. Fowler, electrical engineer, Chicago, Ill., American Institute of Electrical Engineers.

H. A. Kidder, electrical engineer, New York City, American Institute of Electrical Engineers.

William McClellan, electrical engineer, New York City, American Institute of Electrical Engineers.

L. F. Morehouse, electrical engineer, New York City, American Institute of Electrical Engineers.

I. E. Moultrop, electrical engineer, Boston, Mass., American Institute of Electrical Engineers.

E. W. Rice, jr., electrical engineer, Schenectady, N. Y., American Institute of Electrical Engineers.

Prof. O. W. Sjogren, agricultural engineer, Lincoln, Nebr., American Society of Agricultural Engineers.

Ira Dye, mechanical engineer, Seattle, Wash., American Society of Mechanical Engineers.

Walter S. Finlay, Jr., mechanical engineer, Pittsburgh, Pa., American Society of Mechanical Engineers.

Dean E. Foster, mechanical engineer, Tulsa, Okla., American Society of Mechanical Engineers.

O. P. Hood, mechanical engineer, Washington, D. C., American Society of Mechanical Engineers.

Wilson P. Hunt, mechanical engineer, Moline, Ill., American Society of Mechanical engineers.

Charles Penrose, mechanical engineer, Philadelphia, Pa., American Society of Mechanical Engineers.

Charles M. Schwab, mechanical engineer, New York City, American Society of Mechanical Engineers.

E. N. Trump, mechanical engineer, Syracuse, N. Y., American Society of Mechanical Engineers.

Thomas L. Wilkinson, mechanical engineer, Davenport, Iowa, American Society of Mechanical Engineers.

D. Robert Yarnall, mechanical engineer, Philadelphia, Pa., American Society of Mechanical Engineers.

L. P. Alford, mechanical engineer, New York City, American Society of Mechanical Engineers.

Harold V. Coes, mechanical engineer, Chicago, Ill., American Society of Mechanical engineers.

Alex Dow, mechanical engineer, Detroit, Mich., American Society of Mechanical Engineers.

Dean A. M. Greene, jr., mechanical engineer, Princeton, N. J., American Society of Mechanical Engineers.

John Lyle Harrington, mechanical engineer, Kansas City, Mo., American Society of Mechanical Engineers.

Dean Dexter S. Kimball, mechanical engineer, Ithaca, N. Y., American Society of Mechanical Engineers.

Wilson S. Lee, mechanical engineer, Charlotte, N. C., American Society of Mechanical Engineers.

Gen. R. C. Marshall, jr., mechanical engineer, Washington, D. C., American Society of Mechanical Engineers.

Dr. Walter F. Rittman, industrial engineer, Pittsburgh, Pa., Society of Industrial Engineers.

State societies

Earl L. Carter, civil engineer, Indianapolis, Ind., Indiana Engineering Society.

John S. Dodds, civil engineer, Ames, Iowa, Iowa Engineering Society.

E. B. Black, civil engineer, Kansas City, Mo., Kansas Engineering Society.

E. S. Lanphier, civil engineer, New Orleans, La., Louisiana Engineering Society.

Prof. Edward Robinson, mechanical engineer, Burlington, Vt., Vermont Society of Engineers.

Local societies

Edgar D. Gilman, civil engineer, Cincinnati, Ohio, Engineers Club of Cincinnati.

James R. Withrow, chemical engineer, Columbus, Ohio, Engineers Club of Columbus.

O. H. Koch, civil engineer, Dallas, Tex., Technical Club of Dallas.

G. S. Williams, civil engineer, Ann Arbor, Mich., Detroit Engineering Society.

Wayne A. Clark, civil engineer, Duluth, Minn., Duluth Engineers Club.

Burritt A. Parks, mechanical engineer, Grand Rapids, Mich., Grand Rapids Engineering Society.

A. A. Krieger, civil engineer, Louisville, Ky., Engineers and Architects Club of Louisville.

Walter C. Lindemann, mechanical engineer, Milwaukee, Wis., Engineers Society of Milwaukee.

Joseph Kemper, civil engineer, Utica, N. Y., Mohawk Valley Engineers Club.
J. L. Hamilton, civil engineer, St. Louis, Mo., Engineers Club of St. Louis.
G. H. Herrold, civil engineer, St. Paul, Minn., Engineers Society of St. Paul.
F. W. Epps, civil engineer, Topeka, Kans., Topeka Engineers Club.
W. G. Hoyt, civil engineer, Washington, D. C., Washington (D. C.) Society of Engineers.
John F. Sprenkel, architectural engineer, York, Pa., Engineering Society of York.

MEMBER SOCIETIES OF AMERICAN ENGINEERING COUNCIL, WITH NUMBER OF MEMBERS

National societies

American Institute of Chemical Engineers	738
American Institute of Electrical Engineers	17,747
American Society of Agricultural Engineers	653
American Society of Mechanical Engineers	17,711
Society of Industrial Engineers	614

State societies

Indiana Engineering Society	376
Iowa Engineering Society	261
Kansas Engineering Society	200
Louisiana Engineering Society	370
Vermont Society of Engineers	162

Local societies

Detroit Engineering Society	611
Duluth Engineers Club	131
Engineers & Architects Club of Louisville	217
Engineering Society of York	164
Engineers Club of Cincinnati	609
Engineers Club of Columbus	131
Engineers Club of St. Louis	729
Engineers Society of Milwaukee	315
Engineers Society of St. Paul	202
Grand Rapids Engineering Society	124
Little Rock Engineers Club	43
Mohawk Valley Engineers Club	115
Technical Club of Dallas	129
Topeka Engineers Club	200
Washington Society of Engineers	655
Total	43,218

Senator ASHURST. Mr. Chairman, I ask if you have received a letter from the United States Chamber of Commerce?

The CHAIRMAN. That was placed in the record this morning, Senator.

Senator ASHURST. Mr. Chairman, I now express my appreciation of the courtesy of your committee toward the Senators and other citizens of Arizona. I also express my appreciation of the thrust with the rose-tipped sword of Mr. Mathews.

The CHAIRMAN. The chairman has not taken very much time in these hearings, and I do want to say a word.

Senator ASHURST. We are very much obliged to you, Mr. Chairman, and appreciate your kindness and courtesy in the hearings. You would make a good judge.

The CHAIRMAN. I believe the hearings, as they have been continuing during the past five days, have brought out many new facts and much information which will be of great value to the committee and

to Congress. Incidentally I think that the testimony of the witnesses, by the representatives of the various States who have been here, has given them a much better understanding of the requirements, the wishes, and the needs of their sister States.

One witness today referred to the fact that the low flow of the river was now more than taken up by appropriations which are prior to those of the upper basin States; not with the indication that there was any desire to attack the use of the waters by the upper basin States, but the intimation is there just the same that the upper basin States are in that danger.

On the other hand we are told that if legislation goes ahead without the concurrence of Arizona, then Arizona is going to take us into the courts of the United States, up to the Supreme Court, and we will be tied up for 10 years. Certainly none of us want to see any further delay than is absolutely necessary to work out this project in a manner that will be satisfactory and beneficial to all the States interested. Even Arizona has a large acreage that can only be brought under cultivation by the storage of additional water in the river. That is also true of the upper basin States, as it is of California.

Now, having heard all of the witnesses that desire to be heard, and having carried out the agreement of the committee, I declare the hearings closed.

Senator HAYDEN. Might I ask, Mr. Chairman, by unanimous consent, that there be printed in the record, so as to make it complete, the response of the Governor of Arizona to the proposal of the Governors of the upper division, as the response of the Governor of California was included in the record?

(The response of the Governor of Arizona, so requested to be printed, by Senator Hayden, is as follows:)

RESPONSE OF ARIZONA TO PROPOSAL OF THE GOVERNORS OF THE UPPER DIVISION, COLORADO RIVER BASIN STATES, WHICH WAS SUBMITTED TO THE LOWER DIVISION STATES UNDER DATE OF AUGUST 30, 1927

To the governors:

We solicited this meting—we believed that we would benefit by putting our case before you—we are not disappointed with what has occurred here and we are hopeful of the future. We will never be able to present our case to men more interested. We can not hope to find anywhere a group of men who are better qualified to solve a water problem. Our own belief in the justness of our position can not be questioned. Had we not thought that the undisputable facts supported our contention, would we willingly have come to those States, which were but recently so resentful of our refusal to sign the Santa Fe compact as to join in an offensive and defensive six-State alliance with our temporary enemy, not only to give her what she wants but to have the great Federal Government coerce us into submission—hold us while we were despoiled.

It is natural for you to be prejudiced against Arizona. You did not know when you awarded 7,500,000 acre-feet to the three lower basin States at Santa Fe that one State would seriously advance claims to a vested right in all and more of this amount of water. You were aware of the possibility of quick development in California and Mexico and you justly feared that they would take your water under the law of prior appropriation before you could yourselves utilize the natural resources which nature grudgingly showers on a semiarid West.

You knew little of the possibilities of Arizona. How could you when the people of our own State knew but little of them? We ourselves could not know until the recent surveys were completed.

Like Burke, "we can not indict a nation" or group of States, but we protest the early judgment formed against us before we were given the time and opportunity to ascertain our assets. Your verdict or judgment here speaks eloquently for your fairness—your sense of justice. We feel gratified that our confidence in the honor and integrity of western Americans has been justified. But may we not feel that had you possessed no early resentment, had more time elapsed in which fixed opinions could be gradually altered, had our State been more ably represented than by her present agents who feel humble in face of our responsibilities, your verdict would have been better for us. Were we not handicapped, perhaps many millions eventually might find homes and seek happiness in the great State of Arizona which is to be. No one who has sensed the importance of this river question will urge undue haste. We are dealing here with resources greater than those, the coveting of which brought on the great war from which a world has not yet recovered. We of the West know little of the crowding, little of intensive soil cultivation, but may we not expect the future to be as the past? "Time was ere England's woes began when every rood of soil maintained its man."

Irrigation made Egypt—Babylon. Civilization began when men crowded into the valleys of the Tigris, the Euphrates; the Nile irrigation produces the heaviest crops to-day—why will the population subsisting on the irrigated acre not be great? Your upper basin representatives have testified before the congressional committees that you wanted water allocations which would protect your future for 150 years. Arizona has no objection to your foresight. We know that 150 years ago, in 1777, there were but 4,000,000 people in the United States, against 120,000,000 to-day. We know that mankind has been ordered to be fruitful—to multiply and replenish the earth.

You will need all of the water reserved to you by the Santa Fe compact. The 20-year limit in which to use water which California sought to impose upon Arizona the first day of our session needs no rebuttal argument. Our representatives could not help but notice the manner in which you gentlemen received this suggestion. We were not surprised at your attitude, as we presumed you knew that the first 10 years had been estimated as needed for dam construction, etc. Our surprise came from hearing men say such things who came from a project which is 30 years old and which to-day lacks 30 per cent of farming the first unit, although water by the hundreds of thousands of acre-feet is wasting into the Salton Sea.

The able head of the Los Angeles Bureau of Power and Light has testified before a congressional committee that the utilization of the resources of the Colorado River will create between $14,000,000,000 and $15,000,000,000 of wealth in the Southwest. These figures are startling, but are subject at least to approximate check by anyone.

Do you know that the total valuation of the six States of the Colorado River Basin, which are unblessed with a seacoast, is but approximately four billions of dollars? We know of no progressive community that pays as low as 1 per cent in yearly taxation; yet 1 per cent of $15,000,000,000 is $150,000,000.

If property values created in California by the utilization of the resources of other States will pay more than $150,000,000 per year in taxation to procure for the people of that State those things they need and demand from good government—is it fair, is it rational, to assert that the people, who are conquering the waste places of the desert State, are to be denied the right to tax their own resources in order to reduce the present burdens caused by the small amount of our States held in private ownership, which is paying not only the maintenance of the whole State but also for its development?

When we came here to Denver we knew we had work to do.

We thought we would have to justify our refusal to accept the Santa Fe compact. We are now willing to withdraw all the arguments Arizona has made to you to justify our position on this question and have you decide the issue by reviewing the statements of our opponents as to their vested rights, their appropriations, their filings, their claims, and necessities. If California's contentions are true, this is a futile meeting—the river is already gone. It is theirs, and instead of being handed a compact to execute, we should have been given a legal dollar to sign a quitclaim deed in order to quiet their title to all of the water allotted to the lower basin.

We thought there might be congressional objection to expending $125,000,000 for a project which will benefit practically one State only, especially as this sum approximates the Government expenditures in all Western States during the 25 years in which the reclamation act has been in force.

We therefore investigated another dam site, and we are able to report to you and to the Government that storage for flood control, irrigation, and power use can be obtained for half the expenditure elsewhere than the site advocated by California. But it is a division of resources, not dam sites, we are attempting to adjust here—"Each thing in its place is best."

We thought that you would want to know how and where we were going to use the water we are asking for—although we had not asked you to submit your own plans for our inspection. We have submitted to you a feasible project including 1,400,000 acres (which can be developed progressively) as fast as the demand for agricultural products warrants. We have shown that the cost of putting water on this land will be one-third of what is now being paid on irrigation projects in our adjoining State, raising identical crops. It is true that we suggest to start part of this irrigation by pumping, but it can be changed to gravity at any time.

The tables prepared by California giving amounts of land subject to irrigation by gravity, and their figures on pump lift, can only be correct if you begin your ditches where they locate them. There is more than one dam site on the Colorado River. We are not limited to the 50 sites which have received mention. Were they destroyed to-day, 5,000 more remain.

We have shown you that approximately 4,000,000 acres can be irrigated by gravity from these dam sites in the Colorado River in Arizona—if sufficient water were obtainable. We have shown you that we could put our entire allotment of water by a gravity tunnel on Arizona land as cheaply as California can force one-quarter as much water over the coast range.

We have shown you by printed documents put out by the bureau of public works of California that it was the hope and intention of our neighbor State to pump water this 1,500 feet for irrigation. We admit that financially it will soon be feasible, but we insist that one-sixth this height is more feasible and economical. We have shown you from the testimony of Meade and Davis that approximately 250,000 more acres can be irrigated in Imperial Valley from the proposed all-American canal. But a similar Government subsidy of $37,000,000 would irrigate twice this acreage in Arizona. We have shown you that the apparent patriotic advocacy of providing irrigation for land for ex-soldiers was really a demand that the Government put water on lands in private and corporate ownership.

We have offered to take your own engineers over our projects in order that our contentions might be proven to your satisfaction. We have shown that the potential water power of California is three times as great as that of Arizona and that their ultimate irrigated area will be six times our own. We feel that this should reconcile California to the development of her own resources instead of coveting ours. We have shown you the only "royalty" involved in the power question is tribute proposed to be levied on the power users to pay for the construction and maintenance of the all-American canal.

We have listened patiently to the repeated statements that Arizona is to be given her tributaries; yet the written proposals have practically nullified the spoken word. Most of the water of our tributaries which can be used before it reaches the main stream has already been appropriated and will be vested in the lands by present laws. Certainly this portion is not a gift to us. The other portion, which flows from our mountains by canyons into the main stream, is not given to Arizona, but it is demanded that we share it equally with California. So it would be more proper to say that we are required to give half of the water of our tributaries to California and are permitted to retain the other half.

We desire again to call your attention to the fact that, according to the figures of the California representatives, that State will require 40 per cent more water to irrigate her land than will be required in Arizona, because of her inability to use the reflow. This is uneconomic. From a national viewpoint it is a waste of our resources.

We have listened with pleasure to expressions from five other States here, in approval of the theory that the States owned their waters and the beds of their navigable streams. It is significant that action on this matter has been postponed until after the water has been divided. If States have rights; if they own their appropriated as well as their unappropriated, their unused water, California having reached the limit of her own ability to grant her people water, must appeal to the generosity of Arizona and Nevada—not to the Federal Government. If we are not too sorely tried, that appeal will not be in vain.

The point early raised by California, that the Arizona tributaries should be included in stated percentages, is unfair unless a division were to be made on the basis of 17 to 1 in accordance with our respective areas. When the 72,500,000 other acre feet of annual water in California is considered Arizona is requesting but 9 per cent of the total water of the two States. But we admit that this statement is as unfair as is theirs that we are getting most of the water.

There have been many extraneous arguments introduced here. Vested rights of either white or Indian must be and are admitted, especially the latter because they rest on treaties as sacred as the one we are trying to make. But vested rights which vary with time have nothing to do with future appropriations.

When we first came to the upper States you asked us to try and settle the water questions first. We agreed—we knew that the upper basin States were more interested in the water than in the power question. Your own power was not being asked to finance competitive irrigation projects in an adjoining State. We knew that Nevada was interested mostly in power. We knew that great storage dams can be started, and construction be carried on for several years before it is necessary to install the power plant.

We do not demand that any State hurry, but as long as this question of power must be settled, we believe that it should be either definitely settled or definitely and honestly postponed so that California may not capture our power merely by refusing to discuss the question with us.

We think that this conference and that any conference must be hampered as long as the Swing-Johnson bill is hanging like a sword of Damocles over one of the States, or as we believe, over six of the States.

We can not criticize the policy—from the standpoint of expediency by California. But why should she here give up half of the Colorado River water to Arizona when she expects to get all of it from Congress? We think the Swing-Johnson bill will not pass. The bill proposing to sell Muscle Shoals to Henry Ford once had far better prospects of adoption. Like this one it was fundamentally unsound. It was not a law.

In view of the record of this conference, statements that have already been made by California and expressions that have been made by the governors of the upper basin States, we feel that we must again set forth the basis upon which we can consider the matter of water division.

We quote from our opening statement of the first day of the conference:

(1) That the right of the States to secure revenue from and to control the development of hydroelectric power, within or upon their boundaries, be recognized.

(2) That Arizona is prepared to enter into a compact at this time to settle all of the questions enumerated herein, or Arizona will agree to forego a settlement of item (1) and (2) and make a compact dividing the water alone, provided that it is specified in such compact that no power plants shall be installed in the lower basin portion of the main Colorado River until the power question is settled by a compact between the States.

Assuming that we have proceeded under one or the other of the above conditions and conceding that much merit exists in the proposal of the upper basin governors, we respectfully suggest that the following alteration would insure a more perfect and just agreement.

We believe that the division of water suggested in paragraph number (1) is unfair to Arizona in that California already has exhausted her ability to take additional water from the Colorado River and that therefore she should not be awarded the major benefits to be derived from the use of the water made available by using the storage facilities of other States.

We assert that Arizona has at all times been ready to assist California to secure drouth and flood protection, and silt elimination, and that the 50–50 proposition that we have offered is exceedingly generous in that besides providing water for all the land California now has under irregation, it will permit her to irregate 500,000 additional acres and also provide ample domestic water for her coast cities when her own sources of supply are developed. We believe that our legislature took cognizance of these facts in asking for an equal division of the river water. We believe that both Arizona and California must sacrifice some of the lands which they could put under cultivation in order to arrive at an agreement. There is no reason of law, justice, or economic development which has been shown which would warrant Arizona in making a sacrifice of 600,000 acre-feet of water to California.

It must be evident that Arizona would be abundantly justified as a matter of strict justice, in rejecting—in utterly and decisively casting aside—the proposal suggested, or any proposal failing to recognize her right to at least an even division of the water available for the use of Arizona and California out of the main stream of the Colorado River.

That we do not do so is due to a desire, the earnestness and sincerity of which we trust will no longer be questioned, for an amicable settlement of this controversy and out of a deep sence of appreciation of the labors and friendly offices of the governors of the States of the upper division. If, on the other hand, we still hesitate to accept, that hesitancy may be attributed to the fact that we have as yet no assurance that such a sacrifice on our part would result in a final settlement; no assurance of the protection of Arizona's tributaries against an undue share of the burden of supplying water to Mexico; no assurance of the recognition of Arizona's right to a fair revenue from the utilization of her hydro-electric power resources used to the further enrichment and the greater glory of California.

The insistance of that State's representatives that Arizona must bear the brunt of the Mexican burden; their apparent unwillingnes to proceed to a settlement of the power question; their evident purpose and the purpose of their State, with its vast resources to press for the enactment of the Swing-Johnson bill, which is so glaringly unjust to Arizona, fill us with foreboding.

Nevertheless, in the face of these disquieting circumstances, despite these misgivings, if the vital matters to which reference has here been made can be resolved affirmatively—and it must clearly be understood that it is only upon the condition that they are resolved affirmatively—we will accept the first item of your proposal, relating to the allocation of water. This price we will pay that the Colorado River problems may be solved. We must suggest, however, that no further sacrifice be asked of us. In the event that these negotiations fail and that this conference terminates without an agreement being reached, this acceptance hereby is and shall be deemed to be withdrawn as fully and completely as if it had never been made. Finally, we declare that this offer shall not be construed as representing Arizona's claims as to her rights in the Colorado River, and most emphatically we insist that at no other time or place, by any other tribunal, shall the proposal hereby accepted for the purpose at this time of bringing about a settlement of the Colorado River controversy be employed as a basis of other negotiations.

We interpret the intention of paragraphs (2) and (3) of the proposal of the governors to be intended to allocate to Arizona the use of her tributary waters as was so frequently expressed in these meetings. As we interpret these paragraphs as written, they do not accomplish that purpose. We have rewritten these two paragraphs in the light of this interpretation and, as rewritten, we accept them. As rewritten, the paragraphs read as follows:

"(2) The States of the lower basin, respectively, shall have the exclusive beneficial consumptive use of the tributaries within their boundaries before the same empty into the main stream, provided, the division of the waters of such tributaries situated in more than one State shall be left to the adjudication or apportionment between said States in such manner as may be determined upon by the States affected thereby.

"(3) The 1,000,000 acre feet of water allocated to the States of the lower basin by paragraph (b) of article 3 of the Colorado River compact shall be deemed to attach exclusively to the Arizona tributaries allocated to Arizona under the terms of paragraph (2) hereof, to be diverted from said tributaries before same empty into the main stream. Any allocation of water made to the Republic of Mexico shall be supplied out of water unapportioned herein and if it shall be necessary at any time for the lower basin to supply any water to Mexico, the same shall be supplied by California and Arizona out of the water allocated to them from the main Colorado River in equal amounts."

We accept paragraph (4) and (5).

The foregoing five paragraphs we consider to be one proposal relating to the division of water and can only be considered as an indivisible proposal. The change of any paragraph would necessarily mean the change of all and void this acceptance as herein provided and conditioned.

Respectfully submitted.

ARIZONA COLORADO RIVER COMMISION.

SEPTEMBER 22, 1927.

ARIZONA'S VIEWS ON POWER

ARTICLE I

The following rule shall apply to the use and storage of water under this agreement:

(*a*) The use of water for irrigation and domestic purposes allotted in article II hereof shall be superior to any right of storage for power purposes or navigation and any of said States may divert from the river the water allotted to it at any point on the river, provided that if any State shall take any water so allotted to it out of the main channel of the Colorado River at a higher elevation than the highest elevation of the bed of said river in said State, the works constructed for such purposes shall not interfere with a beneficial development of the fall of the river in any State other than the State taking out water at such higher elevation, and the State or States taking out water at such higher elevation shall fully compensate the other States affected thereby for the loss of power caused thereby in such States.

(*b*) The prior construction of any dam or reservoir shall not give any prior or superior right to such dam or reservoir to the flow of the river for the benefit of such dam or reservoir for power purposes, but the rights of all dams and reservoirs constructed under this agreement shall be on an equality, for power purposes, regardless of the date of construction thereof.

(*c*) Yearly and seasonal stored water shall be held at as high elevation on the river as practicable in order to reduce evaporation losses and provide regulation for power as well as for irrigation, domestic and flood-control purposes.

(*d*) Reregulation storage for seasonal and daily variations in demand shall be located as close to the land to be irrigated as practicable and water for irrigation and domestic purposes shall be supplied first from the nearest reservoir above the point of diversion of such water.

ARTICLE II

The territory of no State shall be entered upon for the purpose of constructing or maintaining works utilizing the water of the Colorado River except with the consent and subject to the laws of such State, but each of the States hereby agree to grant all necessary permits, licenses, sites, and rights of way over lands that may be required to carry out the provisions of Article III and VI hereof.

ARTICLE III

The United States recognizes the necessity for flood protection and development of the Colorado River and hereby agrees to grant the necessary sites, rights of way, and licenses over public lands for the construction and operation or works for the control and utilization of the Colorado River for flood protection, irrigation, and domestic uses of water and the construction of dams for power purposes in pursuance of the provisions of this agreement.

ARTICLE IV

Each of the States party hereto and the United States recognize the acute necessity for flood and drought protection for lands now in cultivation by irrigation from the waters of the Colorado River, and hereby pledge their good faith to grant the necessary permits, licenses, and sites for such construction, also rights of way to any district or agency that may be created in pursuance of the terms of this agreement for the immediate construction of a reservoir in the main channel of the Colorado River at such point as may be determined upon by the Federal Government, if it be a Government project, or by the majority of the States party to this agreement, if by some other agency. Such permits, licenses, sites, and rights of way shall include those necessary for the construction of the dam and reservoir and appurtenant works, including hydroelectric power plants and transmission lines: *Provided*, That no dam or other works shall be built in the bed of the Colorado River at any point in the river which when constructed will back up the water of the river so as to limit or interfere with the construction of a dam heretofore selected by any other State for the diversion of water for irrigation or domestic purposes in that State.

ARTICLE V

(a) It is expressly agreed and understood that the signatory States in this compact, and their political subdivisions, shall possess the right to derive revenue for public purposes from power developed within their territory or on their boundary.

Such revenue may be derived by any manner or kind of taxation in each State as may be imposed by such State under its constitution and laws, but whatever kind or manner of taxes are imposed the total revenue derived from such taxation in any State shall be limited to the amount that would be derived from a property tax at the rate levied by such State or taxing districts, therein upon other like or similar property within the State, upon the property employed or used in the production of such power on the same basis of valuation used by such State or taxing district in taxing other like or similar property therein. The value of the right to utilize natural resources for the production of power including dam sites, reservoir sites, the water and the fall thereof, in the production of said power may be considered as property used in the production of said power and included in the valuation upon which the limitation of such tax is based.

In order that the benefits of the development of the Colorado River may be distributed among the respective States as if said development were made by private capital the United States agrees that if it shall undertake the construction of any Federal project or projects on the main Colorado River wholly or partly within any of the States party hereto, it will make provision in the such sale or lease of power or power privileges from such project or projects for payment to the respective States of the same amount of revenue from the power produced by such Federal project or projects as such States would derive under this agreement, if such Federal project or projects had been constructed by private capital.

If in the opinion of any of the signatory States the taxes imposed by any other State upon a project constructed by the Federal Government or a project constructed on the boundary of two or more States are excessive, such State or States shall have the right to appeal to a board of equalization for an adjustment of the valuation limiting such taxation. The Colorado control commission shall constitute such board of equalization. In case of appeal, the decision of this board shall be final and binding, subject only to appeal to the Federal courts.

No revenue shall be received by or paid to any State on account of taxation of a power project except to the extent the project shall have been complete and placed in operation.

ARTICLE VI

Any State in which reservoir sites exist in the Colorado River or its tributaries, directly or through any district or agency created in pursuance of and hereafter authorized by the laws of said State, may build dams, hydroelectric power plants and appurtenant works in such State and operate or lease the same. Where the reservoir is situated in two or more States, such dams, power plants and appurtenant works may be built, operated, or leased jointly by the two or more States, or by any district or agency that may be created in pursuance of the laws of such States. Such State or States may sell or lease the power produced by such dams or power plants. The cost of the construction of all such development works shall be borne by the respective States, districts, or agencies created in pursuance of the laws of such States.

ARTICLE VII

Where development works are constructed in two or more States, the entire hydroelectric plant, including dams, reservoirs, power houses, and appurtenant works shall be considered a unit in all matters relating to the financing of construction, the operation lease and taxation, regardless of the location of the power plants with reference to State boundaries. All power and revenue from the sale or lease of power or valuation of such power or works for the purpose of taxation of such power, shall be divided among the States in direct proportion to the present amount of fall which the river makes in each State between the dam and the elevation of the bed of the stream reached by the back water when the reservoir is filled. Where the river forms the boundary between the States, each State shall be allotted one-half of the fall which occurs

in the present river bed on such joint boundary for the purpose of computing the relative proportions allotted to each State.

ARTICLE VIII

(*a*) The use of power developed by such dams and works shall never vest in perpetuity in any private person or corporation, but the States and citizens of States in which such power is developed shall have preferred rights in its use whenever the need for it may arise: *Provided*, That leases for the use of power for terms not exceeding 50 years may be made by any such State or any district or agency hereafter created in pursuance of law when approved in such manner as may be provided by the laws of such State in which the power sites are situated.

(*b*) Power developed by projects located on the borders of two or more States may be constructed in perpetuity to political subdivisions of States provided that there shall be reserved to each of the States in which the project is located, an amount to 20 per cent of the power developed.

ARTICLE IX

In the construction and operation of all dams and power plants for the utilization of the waters of the Colorado River, undertaken in pursuance of the terms of this agreement, the following rules shall apply:

Every dam constructed on the Colorado River shall be a unit in a comprehensive plan which will insure the maximum water for domestic and irrigation use and for the development of the maximum amount of power.

Where dams and power plants are located wholly in one State, the laws of that State shall goveren such construction and operation. Where such dams and power plants are located in more than one State, the States affected shall agree upon the plans and rules and regulations for such construction and operation and upon the agency to be adopted for such joint construction and operation; provided that in the event two States are affected and they shall be unable to agree upon any such matter, the Colorado River Control Commission shall decide the question.

ARTICLE X

In the event the United States shall undertake the construction, financing, and operation of any development on the Colorado River, for flood control, irrigation or power purposes, and requires the repayment of funds advanced for such purposes, such repayment to the Government shall be made in accordance with the United States reclamation act and amendments thereto.

Operation and administration of the same shall be under the direction of the Colorado River Control Commission.

After all obligations to the Government have been met, the entire benefits shall become the property of the State or States in which it is located.

ARTICLE XI

For the administration of the provisions of this compact, there shall be constituted a commission to be known as the Colorado River Control Commission, consisting of three members, one to be designated by each of the three signatory States.

Each State shall choose and fix the terms of office and salary of the members representing it.

The commission shall be allowed their necessary traveling expenses incurred in performing the duties of their office.

The commission shall have the authority to employ such assistants as may be necessary to carry out their duties.

The cost of administration shall be included in the cost of operation of the project or projects.

In case the commission is unable unanimously to agree in regard to policy or procedure, they shall call to their assistance such officials of Utah and New Mexico as is charged with the engineering duties in connection with the administering of the water resources of these States. These, with said commission, shall constitute a board which shall by majority vote decide the questions in dispute.

Basis of Negotiations Between Arizona and Nevada Relating to Power

Memoranda of Arizona's Views With Respect to an Agreement, Between the States of Arizona, California, and Nevada, To Form the Basis of Negotiations With Nevada's Representatives

We assume that the principles set forth in the Pittman resolution as submitted to the conference of governors will be accepted as the settled policy of the Colorado River Basin States, and be incorporated into State agreements. We further assume that the general principles set forth in the written proposition relating to power submitted to the conference by the Arizona commission on September 24 will meet with the approval of the several States interested in the proposition. Subject to such general principles and as further suggestions for a specific agreement among the lower basin States with reference to power the Arizona Colorado River Commission submits the following:

1. That an agreement be entered into by the lower basin States providing for the allocation of the waters of the Colorado River in accordance with Arizona's acceptance of the proposal of the governors of the upper basin States.

2. That any development on the Colorado River be made with the ultimate purpose of fully developing all of the resources of the river. That the location and plan of construction of any and all reservoirs, power plants, and irrigation works proposed to be constructed by the United States be determined by a board of five engineers, one to be selected from the engineers of the Federal Power Commission, one from the Army Engineer Corps, one from the United States Reclamation Service, one from the United States Geological Survey, and one engineer in private practice.

That the development selected and designated by said board of engineers shall be planned, constructed, and operated so far as practicable to obtain the maximum benefit for the States interested consistent with feasible and economical development.

That irrigation of land in Arizona, California, and Nevada shall be provided for as speedily as is economically feasible in order that each of said States may be able to fully use for beneficial purposes all of the water allocated to it. That irrigation works be planned within each of the three States with the idea of bringing under irrigation sufficient lands in each State so that no waters which can be utilized from the Colorado River will be allowed to go to waste to Mexico.

3. That allocation of power benefits be made to each of said States as follows:

(*a*) Power benefits from any reservoir wholly in one State shall be wholly to the State in which such reservoir is situated. Power benefits from any dam partly in Arizona and partly in Nevada shall be divided equally between Arizona and Nevada. Power benefits from any dam partly in Arizona and partly in California shall be divided equally between Arizona and California. The assent of Utah and New Mexico to this method of division of power benefits between Arizona and California and Arizona and Nevada shall be deemed and held to be an agreement of each of said States to divide equally with Arizona all power benefits from any reservoir partly in Arizona and partly in said State. If any lower basin State declines to accept this basis of equal division Arizona shall not be obliged to accept the same from Nevada or California.

(*b*) In the case of Government projects the period for the repayment of the Government of the construction costs shall be so adjusted as to permit of the sale or lease of power or power privileges from said project in addition to the costs of maintenance, operation, and betterments and repayments to the Government of one mill per kilowatt hour of power or power privileges sold or leased from such project, which shall be paid to the States interested in the proportions provided for in subdivision (*a*) of this section.

(*c*) Contracts made for the sale or lease of power or power privileges from such projects shall be made subject to readjustment of prices and terms at the end of 20 years after the beginning of operations and at periods of not less than 10 years thereafter.

(*d*) If the operation of any such project shall result in profits more than sufficient to meet the payments specified in subdivision (*b*) of this section such surplus profits shall be applied by the Secretary of the Interior either to the payments to the Government thereafter becoming due or be paid to the States interested in the proportions specified in subdivision (*a*) of this section.

(*e*) When the Government is fully repaid its investment in the project the entire benefits of the project shall go to the States interested in the proportion specified in subdivision (*a*) of this section.

(*f*) That in the event a subsidy is extended to irrigation projects in one State through the diversion of power receipts to the payment of reclamation costs an equivalent subsidy shall be extended to irrigation projects in all of the three States in proportion to the quanity of water apportioned to them.

4. The agreement should provide that the proposed development should include the building of reservoirs on the lower reaches of the river in order to bring the waters as close as practicable to and at higher elevations than the lands proposed to be irrigated, and thereby reduce pumping lifts, and provide storage for the supply proposed to be taken out of the river for the benefit of the coastal plains cities in southern California, and such development should include the building near Parker, between the States of Arizona and California, of a dam to a height of approximately 100 feet. Reservoirs should be built on the Colorado River, which taken in conjunction with the reservoirs referred to above should provide approximately 20,000,000 acre feet storage capacity.

The construction, operation, and maintenance of any and all Government projects hereby contemplated whose primary purpose is to provide water for irrigation and domestic supply for the States parties hereto, should be built by the Reclamation Service, under the direction of the Secretary of the Interior, and be supervised by a board of engineers, as suggested. Operation and maintenance of the Government projects should then be administed under the Secretary of the Interior through the Reclamation Service.

5. Until otherwise provided contracts for sale of power should be handled exclusively by the Secretary of the Interior through the Reclamation Service, but all contracts made after the Government is repaid for the sale of lease of power or power privileges not reserved for the use of the State or States in which the project is located should be let in the open market to the highest and best bidder.

6. The agreement should provide that the irrigation of lands under any and all of the Government projects contemplated should be under the reclamation laws or amendments thereto and only such charges should be assessed against the lands as will be necessary to repay construction costs expended exclusively for the benefit of such lands. However, each State should have the right to designate such lands as will be necessary to irrigate in order to use the waters allotted to each State and to reserve from sale any portion of the power to which it is entitled under the provisions of sub-division (*a*) of section 3, which may be necessary for use in pumping water to lands of higher elevation than those which can be served by gravity. The price to be paid for the power so reserved should be based on the amortized cost which will provide repayment to the Government until such time as the Government is fully paid and then only such operation, maintenance, and depreciation costs as will set up sufficient reserves to keep such plants in first class condition.

7. The agreement between Arizona, California, and Nevada should contemplate the creation of an interstate Colorado River authority to take over the control and management of the projects which are interstate in character.

Senator JOHNSON. We will now go forward and get an agreement.

The CHAIRMAN. The hearings are closed, and the committee will stand adjourned.

(Whereupon, at 4 o'clock p. m., the committee adjourned.)

APPENDIX

CONTENTS

APPENDIX

DEPARTMENT OF THE INTERIOR,
Washington, January 6, 1928.

Hon. LAWRENCE C. PHIPPS,
Chairman Committee on Irrigation and Reclamation,
United States Senate.

MY DEAR SENATOR PHIPPS: Discussions of development and control of the Colorado River in the Sixty-ninth Congress indicated that a correct solution of the problems involved would be promoted by a careful inquiry into the engineering, economic, and legal problems involved in this development by impartial, disinterested experts. I therefore sought and secured the cooperation, as special advisers, of the following gentlemen: Hon. Charles W. Waterman, United States Senate; Hon. James R. Garfield, former Secretary of the Interior; Prof. William F. Durand, Stanford University; Hon. James G. Scrugham, former Governor of Nevada; and Hon. Frank C. Emerson, Governor of Wyoming. To them I addressed the following letter:

To the Special Advisers—Colorado River Project:

It is understood that you, acting as special advisers to the Secretary of the Interior in connection with the Colorado River, will report severally and as individuals.

It is requested that you severally inquire specifically into the engineering, legal, and economic phases of the development of the Colorado River, visiting the levees and delta country of the lower Colorado and Boulder, Glen Canyon, and Topoc Dam sites and any other points of interest involved. The engineering and other data accumulated in the department or elsewhere will be made available to you for study. Some of the major questions to be determined include the following:

Whether the Federal Government has power to allocate the unappropriated waters of the Colorado River to the basin States, thus rendering a compact between the States unnecessary.

What the international relations to the canal now supplying Imperial Valley with water through Mexico would be and what rights Mexico would have if this Mexican canal concession be continued in force after the storage dam is built.

Where the most feasible site for a dam may be in Boulder Canyon; this to include a study of the relative merits of the Boulder and Black Canyon sites.

Your opinion is desired as to the engineering feasibility of the all-American canal.

Just what benefits the lower States will receive from the storage of water and the control of silt by the proposed dam.

Whether or not it is necessary to the solvency of the project that all revenues from power and other sources be applied to repayment to the Government of the construction cost of the project in 50 years.

It is my desire to submit a report to Congress at the forthcoming session, based on your findings and those secured from other sources, covering the essential features of the Swing-Johnson bill before the last Congress; also the probabilities of reimbursements to the Government for its expenditures in this connection, from reclamation through irrigation, protection against floods, supplying water for domestic uses, generation of power, leasing of power privileges or other sources of income.

I appreciate your willingness to render this service to the Government, particularly as you are all busy men of big affairs, and I hope that you will each largely exercise your own initiative in purusing your studies of the subject and in formulating your reports.

They have devoted a considerable part of their time during the last eight months to these investigations, and have submitted reports of their findings.

I have the honor of transmitting to you, as chairman of the Committee on Irrigation and Reclamation, two copies each of the reports of Mr. Garfield, Professor Durand, ex-Governor Scrugham, and Governor Emerson.

Very truly yours,

HUBERT WORK.

REPORT ON DEVELOPMENT OF THE LOWER COLORADO RIVER

CHEYENNE, WYO., *January 9, 1928.*

Hon. HUBERT WORK,
Secretary of the Interior, Washington, D. C.

MY DEAR MR. SECRETARY: I have the honor to transmit herewith my complete report as special adviser in connection with the proposed development of the Colorado River. The report, as contained in the following pages, will be found to be composed of three general divisions, viz:

1. Answers to specific questions propounded in letter of April 9, 1927.
2. Summary of conclusions relating to general problem of river development.
3. General information and discussions of conclusions specified in 2.

Respectfully yours,

FRANK C. EMERSON,
Special Adviser.

DIVISION 1

ANSWERS TO SPECIFIC QUESTIONS

Answers to questions propounded by the communication of April 9, 1927, signed by Acting Secretary E. C. Finney and addressed to the special advisers of the Secretary of the Interior upon Colorado River problems, are briefly given in the following:

1. Question. Whether the Federal Government by control of water rights has power to allocate the unappropriated waters of the Colorado River to the basin States and make unnecessary a compact between the States.

Answer. No, except by determination of the Supreme Court of the United States in litigation properly presented. While the Federal Government would have the right to fully regulate, if necessary, the water of the Colorado River for interstate and foreign commerce, the right does not rest in the Government to allocate the water of the river between the States except as such allocation might be in the aid of navigation. Each State is sovereign over that portion of the Colorado River contained within its boundaries and the allocation of water between the States themselves can only be accomplished by compact between them with the approval of the United States.

2. Question. Where the most feasible site is for a dam, now proposed in Black Canyon and known as the Boulder Dam site.

Answer. The most feasible site for a high dam upon the Colorado River to solve the major problems now existent upon the lower river is situated at Black Canyon (now commonly identified by name of Boulder Canyon), some 40 miles from Las Vegas, Nev.

3. Question. What the international situation is in relation to the canal now supplying Imperial Valley with water through Mexico and what rights Mexico might have when a storage dam is built?

Answer. The present international situation is a menace to the interests of the large area of land now irrigated in the Imperial Valley of the United States, principally by reason of the agreement entered into many years ago between the Imperial Valley interests and a Mexican corporation and whereby agreement was made to deliver to Mexican lands one-half of the water diverted from the Colorado River into the Imperial Canal. The situation has many complications adverse to lands in the United States. The best solution of the situation would be the construction of the all-American canal. For additional answer, see 14 of "Summary of conclusions and discussions relating thereto."

4. Question. Just what benefits the lower basin States will receive from the control of silt and storage of water by the proposed dam?

Answer. The lower basin States, especially California, will receive large benefits from control of silt and storage of water effected by the construction of the Black or Boulder Canyon project. The principal benefits may be listed as follows:

1. The menace from floods will be greatly reduced.

2. Supplemental supply of water to the usual direct flow of the river will be available for irrigation.

3. The reduction in the amount of silt carried by the river will lower the cost of canal maintenance and also materially reduce the silt being deposited yearly upon the lands of the Imperial Valley. For additional answer, see 3 and 5 of "Summary of conclusions and discussions relating thereto."

5. Question. Whether or not it is vitally necessary that all revenues from power be confined to repayment to the Government of the cost of the dam?

Answer. It is not vitally necessary that all revenues from power generated at the Black or Boulder Canyon Dam be confined to the repayment to the Government of the cost of the dam and appurtenant works. A major portion of the power revenues, together with reasonable charge for stored water available for irrigation, municipal and other purposes, would provide for the repayment of the cost of the project to the Government within the reasonable period of 40 years.

DIVISION 2

Summary of Conclusions in re Colorado River Development

1. The Colorado River is a natural resource of great potential value by reason of a combination of abundant water supply with characteristics of drainage basin and stream bed which presents striking possibilities for the development of agricultural lands through irrigation, the generation of power and the furnishing of water for important municipal, industrial, and other uses.

2. The need is now apparent for a major step forward in the development of the Colorado River and in its transformation from an instrumentality conveying grave menace of destruction of life and property to one of much greater usefulness than now effected.

3. At the present time the most urgent problems relate to the lower reaches of the Colorado River. Pressing for early solution are the following:

(*a*) Removal of the flood menace to Imperial, Yuma, and Palo Verde Valleys and other sections contiguous to the river.

(*b*) Proper disposition of the great amount of silt carried by the river.

(*c*) Supplemental supply of water by reservoir storage for the irrigation of lands under existing projects.

4. Any project to be undertaken upon the Colorado River should accommodate itself to a comprehensive and constructive plan for the ultimate development of the river as a whole to its greatest usefulness.

5. A reservoir of 26,000,000 acre-feet capacity, created by the construction of a comparatively high dam at Black Canyon on the Colorado River some 40 miles distant from Las Vegas, Nev., would afford satisfactory solution of the problems set forth in paragraph 3 herein and would also meet the requirements specified by paragraph 4 herein. In addition, such a reservoir project would make practical the development of a large amount of hydroelectric power as well as provide for the extension of present irrigated areas and for additional valuable uses of water for domestic, municipal, industrial, and other purposes.

6. A reservoir of 1,800,000 acre-feet capacity, created by the construction of a dam of moderate height at Bulls Head, some 66 miles below the Black Canyon Dam site, would provide a valuable auxiliary reservoir for the conservation of water escaping from the upper reservoir at seasons when the use of such water would not be required for irrigation and other purposes below. However, the need for the construction of this auxiliary reservoir will not arise for some time to come.

7. The reservoir project described in paragraph 5 and commonly known as the Boulder Canyon project, would constitute a great constructive undertaking and appears to afford the best solution of the entire situation applying to the lower Colorado River. The project is:

(*a*) Practical from the physical standpoint through ample water supply and favorable conditions for construction of the dam and appurtenant works.

(*b*) Feasible from the economic standpoint through ability to repay the entire cost of construction, maintenance and operation by revenues certain from sale of power or power privileges, and of rights to use of stored water.

8. The construction and operation of the described project is a logical, and, in some phases, even a necessary undertaking of the Federal Government, for the following reasons:

(*a*) The international situation applying to the river.

(*b*) Flood control as a national problem.

(*c*) Reclamation of land as an accepted Government activity.

(*d*) Magnitude of project and of various interests involved.

9. The Federal Government would have the right, under the commerce clause of the Constitution, to build a dam such as proposed at Black Canyon and create the described reservoir.

10. The international stiuation applying to the Colorado River is of much importance, but the construction of the described project need not await solution. In fact, the undertaking should prove of material assistance in solving the international problem.

11. The interstate situation applying to the Colorado River is also of much importance, and some satisfactory understanding should be had between the several States as to use of water from the river before any project of magnitude is constructed. The completion of the Colorado River compact now seems likely within a reasonable time, and opportunity should be given for this consummation.

12. The Federal Government would be justified in securing revenue from hydroelectric power made available by the construction of a dam at Black Canyon for the repayment of a major part of the cost of the project, but the Government should not enter into a development of the power possibilities beyond the extent essential for securing proper revenue for the purposes of repayment, with interest, of the cost of construction.

13. In the event the Federal Government should undertake the construction of the Black or Boulder Canyon Reservoir project, the laws of the States upon which the dam and reservoir would be located should be respected and complied with in every way, so far as such laws would apply.

14. The proposed all-American canal, while distinctly a separate undertaking from the described reservoir project, might well be constructed by the Federal Government as a further aid in the solution of the problems of the Imperial and Coachella Valleys, of California. This canal would accomplish the following valuable purposes:

(*a*) Eliminate the present serious problem of diversion of water from the Colorado River for use in Imperial Valley by transfer of the intake from the present location below Yuma to the Laguna Dam.

(*b*) Solve the problems which now obtain by reason of the location of a large part of the Imperial Canal in Mexico.

(*c*) Provide supplemental supply of water for the lands in the Coachella Valley, of California, which are now served by pumping of ground water, and for which the water supply is rapidly depleting.

(*d*) Provide for the reclamation of large additional areas of land in the Imperial and Coachella Valleys.

15. The proposed all-American canal is feasible of construction, and the lands which would receive the benefits therefrom should be able to pay the cost, without interest, to the Government if the project is undertaken.

16. The general principles of the measures introduced in Congress and identified under the name of the Swing-Johnson bill embody a plan generally satisfactory for the undertaking by the Federal Government of the construction of the Black or Boulder Canyon project and the all-American canal. The undertaking of these constructive projects would be of great value and would afford solution of the major physical problems now applying to the Colorado River.

DIVISION 3

General Information and Discussion of Conclusions in re Colorado River Development

INTRODUCTORY

The writer has been interested in, and had direct contact with, problems concerning the development of the Colorado River throughout the past several years. In the fall of 1921 an inspection was made of the situation applying to the lower river with special attention to the levees upon both the Arizona and California sides. Attendance was also had at a hearing upon Colorado

River problems as held by the Secretary of the Interior at San Diego, Calif., upon December 12, 1921. In the capacity of special adviser, the writer visited many points of important interest upon the river in the spring of 1927 in company with other advisers of the Secretary.

It was also my privilege to serve as a representative of Wyoming upon the Colorado River Commission which drafted the Colorado River compact and signed the same at Santa Fe, N. Mex., upon November 24, 1922. Participation has also been had in several important conferences since that time relating to the proposed agreement between the seven States of the Colorado River Basin. Further experience in Colorado River matters has come through service as State engineer of Wyoming during several years prior to induction into the office of governor of the same State.

In these and other relations the writer has had opportunity to become familiar with practically all phases of problems relating to Colorado River development, not only from the standpoint of the physical situation applying to the river system but also in regard to the political question of agreement between the several States of the river basin. The international problem, caused by the location of the lower 90 miles of the river and some 60 miles of the Imperial Canal in Mexico, has also come under observation.

SOURCES OF INFORMATION

In addition to knowledge gained through personal observation and conferences and visits to different sections of the river, information has been secured from many of the valuable publications found available concerning the Colorado River. Included prominently among these are Water Supply Paper No. 556, by E. C. La Rue, entitled "Water Power and Flood Control of Colorado River below Green River, Utah"; Senate Document No. 142, entitled "Problems of Imperial Valley and Vicinity"; report dated February 1924, by Bureau of Reclamation upon "Problems of the Colorado River Basin"; and report of July 14, 1919, by Messrs. Mead, Schlect, and Grunsky as the All-American Canal Board. From these and many other sources has been derived authentic information that has been used in arriving at the conclusions given in this report.

It will be recognized as necessary to accept, in many instances, data and information presented by men who are authority upon questions concerning Colorado River development, if a long and tedious examination and study of the subject is to be avoided. The experts who have contributed to the Colorado River information available have been of such standing as to allow of the acceptance of their reasoning and conclusions in many respects. Wherever question has arisen in the mind of the writer, the information and deductions of such authorities have been carefully checked.

THE COLORADO RIVER SYSTEM

The Colorado River Basin in the United States naturally divides itself into two great basins, separted by hundreds of miles of deep canyon cutting through high and rough plateaus. The upper basin embraces areas of land in the four States of Colorado, New Mexico, Utah, and Wyoming and these States furnish over 80 per cent of the flow of the river. Millions of acres of land are irrigable in the upper basin and possibilities exist for large development of hydroelectric power. The lower basin comprises areas chiefly in the States of Arizona, California, and Nevada, supplying less than 20 per cent of the water of the river but having extensive possibilities for use of water for domestic, agricultural, industral, and power purposes. Throughout the canyon regions separating the two basins, large power possibilities also exist although it is impractical to divert water in any amount for irrigation.

From the headwaters of the Green River in the high mountains of Wyoming to the mouth of the Colorado River as it empties into the Gulf of California in Mexico the river courses a distance of over 1,750 miles. The drainage basin of the river comprises about 242,000 square miles in the United States and 2,000 square miles in Mexico. In the course of the river from mountain to sea and from an altitude of over 10,000 feet above sea level to the Gulf the river has cut away great gorges which chronicle the history of past ages. In this cutting process the great stream has conveyed large amounts of silt from the upper and middle reaches of the river system and deposited this load of silt largely in the delta area upon the lower river. Serious problems have arisen by reason of these conditions.

DISCUSSION OF CONCLUSIONS

1. "The Colorado River is a natural resource of great potential value by reason of a combination of abundant water supply with characteristics of drainage basin and stream bed which presents striking possibilities for the development of agricultural lands through irrigation, the generation of power, and the furnishing of water for important municipal, industrial, and other uses."

Records of stream flow for the Colorado River system show an average annual supply of water in the reconstructed river at Yuma of over 21,000,000 acre-feet. Extensive additional uses of this great resource of water beyond the important uses now established are proposed. Present development from the river system is of great value to State and Nation, with the future holding promise of even greater accomplishment in realizing upon this important national resource.

Water is recognized as a most vital requirement for the maintenance of life and the conduct of industry. A large supply is available in the Colorado River for the needs of the many communities and municipalities located within the river basin or in territory adjacent thereto. To these will be added many more as development of the region proceeds.

It has been estimated by the Bureau of Reclamation that an adequate supply of water is available in the Colorado River system for the irrigation of lands under feasible projects to the extent of over 5,000,000 acres in the upper basin and 3,000,000 acres in the lower basin. These estimates may be taken as conservative. The major part of this development is in the future. Logical plans should be made to provide for the addition of valuable agricultural areas as projects become feasible.

As the river rushes from mountain to sea, the combination of large fall in stream levels with the abundant water supply available, provides extensive possibilities for the development of hydroelectric power. It is estimated that the canyon section of the river alone will provide for the generation of more than 3,000,000 firm horsepower after all other uses of the water of the river system have been developed. The value of this large amount of water power is evident both in relation to the conservation of such other consumable resources as coal and oil and in relation to its value in stimulating the development of the mineral, industrial, and other economic resources of the region. It is evident that practical plans should be made to develop, as times makes projects feasible, the power values of the river system.

2. "The need is now apparent for a major step forward in the development of the Colorado River and in its transformation from an instrumentality conveying grave menace of destruction of life and property, to one of much greater usefulness than now effected."

Development of both the upper and lower basins of the Colorado River system has been proceeding for many years. Further progress in the development of the upper basin will gradually continue indefinitely into the future and will be ruled as to time and value by economic conditions. There is no special urge at this time for development in the upper basin upon a large scale.

A different situation applies to the lower basin. At the present time the river in its largely uncontrolled state is a serious menace to property contiguous to the lower river and, to a limited extent, the river also carries threat to life. The need is now apparent for such regulation and control of the river as will prevent the destruction of life and property and at the same time provide for extensive additional development of the uses of the water of the river for valuable domestic, agricultural, industrial, and power purposes.

3. "At the present time the most urgent problems relate to the lower reaches of the Colorado River. Pressing for early solution are the following:

"(*a*) Removal of the flood menace to Imperial, Yuma, and Palo Verde Valleys, and other sections contiguous to the river.

"(*b*) Proper disposition of the great amount of silt carried by the river.

"(*c*) Supplemental supply of water by reservoir storage for the irrigation of lands under existing projects."

In its upper basin, the Colorado River system is composed of many branches. During most of the year the water runs fairly clear in the numerous streams and, while melting snows or heavy rainfall at times causes local floods of more or less importance, no serious problem of far reaching effect arises in connection with silt or river floods in the upper basin.

(*a*) In the lower basin the situation is different. The great river emerges from the canyon section to thrust itself upon the low alluvial plains of the section below. Heavy with silt by reason of its constant cutting process in the regions of heavy fall above, the river strikes the lesser gradient of its lower reaches. Silt carried in suspension above is caused to deposit as the river current decreases. Conditions arising from this action of silt in combination with large flow of water cause the serious flood menace to many areas below the canyon region of the river. At different points along its course from canyon to sea, the river in flood flow runs above adjacent lands and it is necessary for their protection to hold the river in its course by the construction of levees. Threat is especially great against the Imperial Valley, once the upper part of the Gulf of California, but many years ago cut off from the gulf by a great flat dam of mud built up by deposit of silt carried by the Colorado River.

The river flows virtually upon the rim of the great basin which holds Imperial Valley and all its valuable properties and is confined in its course by the levees running south from the international line at Andrade for many miles and then east to Volcano Lake. Yearly the river threatens to break through these protecting levees and again fill its old Salton Basin. In 1905 the river did take advantage of the temporary intake provided for the Imperial Canal and the entire stream poured its flow into Imperial Valley for a period of 18 months. Only by great effort was the break closed and the river returned to its meandering course upon the great fan-shaped cone of the Delta area.

To relieve the situation caused by the press of the river against the levees in the vicinity of Volcano Lake. the Pescadero Cut was recently constructed to take the river from its westerly course into Volcano Lake and throw it to the south to fill up low areas in that region. This relief will only be temporary, however, and it may be expected that unless other means of control of flood flow and of silt are found within a limited time, the river will be again threatening the Volcano Lake levees and the danger of flood to Imperial Valley will be much greater than ever before.

The problems of other sections of the lower river in relation to flood and silt, while at this time not carrying such serious threat, are of real importance and will profit by early relief.

(*b*) The silt problem of the lower Colorado River not only applies to conditions which help to create the menace from floods, but also has another feature by reason of its effect upon the Imperial irrigation system and upon the agricultural lands of the Imperial Valley. At the present time large yearly expenditures are required of the Imperial irrigation district in removing the great amount of silt which accumulates in the canal system. The individual farmer in the Imperial Valley finds his laterals built up year by year by reason of silt deposits, and his land subject to accumulations of silt which threaten the success of continuance of farm operations. A method of desilting the water of the river is therefore of importance in connection with the solution of the problems of the Imperial Valley and other sections of the lower river.

(*c*) Shortage of water for irrigation of Imperial Valley lands has occurred at different times heretofore. During the irrigation season of 1915 and of 1919 all the water of the river at the intake of the Imperial Canal at Hanlon heading was diverted, and still the supply was not sufficient. The flow available has been as low as 3,500 cubic feet per second. By reason of the contract existing between the Mexican corporation and the Imperial irrigation district only one-half of this amount was available for the more than 400,000 acres of land irrigated in Imperial Valley. The serious shortage of water under such conditions is apparent. The conservation of the flood flow of the river is therefore necessary if danger of inadequate supply is to be averted for the lands of this rich agricultural section.

4. "Any project to be undertaken upon the Colorado River should accommodate itself to a comprehensive and constructive plan for the ultimate development of the river as a whole to its greatest usefulness."

This conclusion needs no discussion, as it will be evident that the Colorado River is a great natural resource. and with its valuable potentialities should be developed according to a farseeing plan that will provide for its most useful service to mankind.

5. "A reservoir of 26,000,000 acre-feet capacity, created by the construction of a comparatively high dam at Black Canyon on the Colorado River some 40 miles distant from Las Vegas, Nev., would afford satisfactory solution of the problems set forth in paragraph 3 herein and would also meet the require-

ments specified by paragraph 4 herein. In addition, such a reservoir project would make practical the development of a large amount of hydroelectric power as well as provide for the extension of present irrigated areas and for additional valuable uses of water for domestic, municipal, industrial, and other purposes."

Large storage of water of the main Colorado River by reservoir construction stands out as the keynote to the solution of problems stated in conclusion 3. Fortunately, the river is well supplied with excellent reservoir sites, and therefore the physical situation is such as to provide answer for present problems as well as to assure the future development of the river to answer the economic needs of the region. A reservoir of large capacity is required in order to afford proper solution of the problems presented by the existing situation as set forth in conclusion 3. Storage capacity is advised as follows:

	Acre-feet
1. For flood control	9,000,000
2. For silt	7,000,000
3. For conservation of water supply for economic needs	10,000,000

The maximum flood flow of the main Colorado during recent years has been measured in amount as about 200,000 cubic feet per second. The La Rue report chronicles the fact that the high-water marks of a river flood at Lee Ferry in the year 1884 indicate a discharge of as high as 225,000 cubic feet per second at that time. From these figures it is evident that a safe control of the river would need to provide for a possible flood to the extent of at least 250,000 cubic feet per second in the main stream. The exceptional floods upon the Mississippi River during the past season point to the necessity of liberal allowance as to maximum discharge. The floods of the main river usually occur during the months of May and June, although frequently extending as late as August. The flow of the Gila River, as a main tributary of the Colorado joining the main stream at Yuma, has recorded a flood as great as any of those in the main river. The floods of the Gila usually occur during the winter months. At no time has there occurred a coincident of the floods in the main Colorado and the Gila. If peak floods in the two streams should occur at the same time it is certain that the levees upon the Colorado River below Yuma would be breached and disaster visited upon the Imperial and Yuma Valleys as well as upon lands in Mexico. The New England floods of last fall indicate that heavy discharge of streams may come at times when least expected and there is no assurance but that the Gila and Colorado Rivers might, at some time, produce heavy floods at the same period. While developments now under progress upon the Gila will eventually eliminate any menace from floods of that stream, it is evident that ample provision should be made for the storage of flood waters upon the main river.

Under present conditions danger to the levees of the lower river from floods arises more from undercutting than from overtopping. The estimate of the Bureau of Reclamation that a maximum flow of 40,000 cubic feet per second will prevent serious undercutting of levees, is accepted as reasonable. The study of the regulation of the lower river to this maximum, based upon a peak discharge of the main stream in a reservoir of 250,000 cubic feet per second, would indicate a storage capacity for flood control of about 9,000,000 acre-feet.

Silt.—Estimates as to average annual silt contents of the lower river vary from 80,000 acre-feet by the Geological Survey to over 130,000 acre-feet by the Department of Agriculture. The Bureau of Reclamation has estimated the silt carried in suspension at Yuma as 105,000 acre-feet per annum. Accepting a quantity of 125,000 acre-feet as a reasonable amount to be deposited annually in a reservoir in the canyon section of the river, a storage capacity of 7,000,000 acre-feet would provide for a silt accumulation of well over 50 years. Within this period of time it is probable that other reservoirs will be constructed at higher points on the river and such reservoirs would intercept the silt that would, prior to their construction, be deposited in the earlier constructed project. It is therefore probable that 7,000,000 acre-feet is more than ample allowance for storage capacity for silt. An allowance of as low as 5,000,000 acre-feet would not be unreasonable.

Conservation of water for economic needs.—The discussion of a shortage of water for present development in Imperial Valley was presented under conclusion 3. The need of additional conservation of water for other uses in the lower basin is apparent if proper advantage is to be taken of this great water

resource. The provisions of the Colorado River compact, whereby delivery of water by the upper basin to the lower basin is predicated upon a 10-year period rather than upon a definite annual delivery, points to the necessity of ample storage capacity for the yearly needs of the lower basin. Ten million acre-feet would afford adequate storage capacity for supply of all present development and in addition thereto a supply of water for extensive additional developments upon the lower river. A storage as low as 8,000,000 acre-feet would provide for all developments that may be anticipated during the next several years.

A reservoir of 26,000,000 acre-feet capacity has been specified in the conclusion set forth. If the lower figures given herein for silt capacity and for storage of water for economic needs were accepted, this capacity would be reduced to 22,000,000 acre-feet.

It is the conclusion, as expressed heretofore, that large storage (at least 22,000,000 acre-feet) is required in order to best meet conditions now applying to the lower Colorado River. Two outstanding sites for reservoirs of large capacity have been advanced as answering the purpose. These are Glenn Canyon, located at the upper end of the canyon section of the river, and Boulder or Black Canyon, located near the lower end of the canyon section.

An inspection of the dam sites at Glenn Canyon raises a serious question as to the feasibility of constructing a safe dam of the height required for large storage. The cost of a reservoir project at Glenn Canyon would be high at the best and the project would be located at such a distance from any power markets of mignitude as to make a sound plan of financing seem impossible. Although these conditions would appear to make the construction of a large reservoir at Glenn Canyon inadvisable at this time, a storage project so located would have the following distinct advantages:

1. Would fit well into a comprehensive plan for development of entire river.
2. Would provide for regulation of water at a point near the head of the main Colorado River.
3. By controlling stream flow, material saving in cost would be effected for all subsequent development below.

Reservoirs constructed at either Boulder Canyon or Black Canyon would not only fit well into a comprehensive plan for the development of the Colorado River as a whole, but would seem to present a set of conditions at either site that would make the construction of a great reservoir feasible from all standpoints. Important considerations may be listed as follows:

1. Excellent dam site both as to foundation conditions and side wall materials.
2. Materials for construction suitable and close at hand.
3. Reasonable accessibility.
4. Comparatively low cost of construction.
5. Located below all important tributaries except Williams and Gila Rivers, thus giving opportunity for adequate control of water and silt.
6. Reasonable distance from power markets and irrigable lands.
7. Combination of conditions making project economically feasible.

In each of the instances listed above, with one exception, a dam and appurtenant works at Black Canyon would rank in advantage above the same at the Boulder Canyon site, even though conditions at the latter would be uniformly favorable. The one exception finds the granites of Boulder Canyon superior over the breccia of Black Canyon in ability to carry heavy loads. However, the rock of Black Canyon has more than sufficient crushing strength to safely bear the loads arising from the proposed dam. The balance between the two sites as a whole is clearly in favor of Black Canyon.

The proposed project at Black (Boulder) Canyon fits in well as a part of a comprehensive and practical plan for the ultimate development of the main Colorado River. Feasible sites at Parker, Topoc, and Bulls Head below Black Canyon appear to offer advantages that will lead to the construction of projects at these points whenever additional needs for water control and conservation and for the generation of power, present themselves. Above Black Canyon there exist excellent sites for power dams at Bridge Canyon and Diamond Creek. The six-named projects would take advantage of practically all the fall of the river from Parker to the Grand Canyon National Park and would lend themselves to a plan of development whereby the several projects would coordinate in securing the greatest usefulness from the river's flow and fall.

6. "A reservoir of 1,800,000 acre-feet capacity, created by the construction of a dam of moderate height at Bulls Head, some 66 miles below the Black Canyon Dam site, would provide a valuable auxiliary reservoir for the con-

servation of water escaping from the upper reservoir at seasons when the use of such water would not be required for irrigation and other purposes below. However, the need for the construction of this auxiliary reservoir will not arise for some time to come."

Use of water for power development will not at times coincide with demands for water for irrigation. As the future develops the need for full conservation of water upon the lower river, an auxiliary reservoir to the Black Canyon project will no doubt be required. At Bulls Head is found a feasible site for a dam about 140 feet in height which would provide storage capacity of 1,800,000 acre-feet. Such a project was described heretofore as a logical part of a comprehensive plan for ultimate development of the lower river.

7. "The reservoir project described in paragraph 5 and commonly known as the Boulder Canyon project, would constitute a great constructive undertaking and appears to afford the best solution of the entire situation applying to the lower Colorado River. The project is—

"(*a*) Practical from the physical standpoint through ample water supply and favorable conditions for construction of the dam and appurtenant works.

"(*b*) Feasible from the economic standpoint through ability to repay the entire cost of construction, maintenance, and operation by revenues certain from sale of power or power privileges, and of rights to use of stored water."

Reasons for the construction of the Boulder or Black Canyon reservoir project as a solution of the problems of the lower river have been treated in some detail heretofore. Attention has been pointed to the fact that, in addition to the solution of the present serious problems upon the lower river, the proposed project would provide water and power for extensive additional developments of great value. Important among these is a supply of water for the future growth of Los Angeles and other coastal cities. Power would be made available at a comparatively low rate for industrial and other development throughout the entire region. The undertaking in itself would be of great magnitude but it would seem to carry with it values and benefits that would warrant its accomplishment as a great constructive development, well designed to meet the needs of the present situation upon the lower Colorado River.

(*a*) The project is declared practical from the physical standpoint through ample water supply and favorable conditions for the construction of the dam and appurtenant works. The present flow of the river at Black Canyon is about 17,500,000 acre-feet average per annum. After full development of the river above it is estimated that the average annual flow at Black Canyon will be about 10,500,000 acre-feet. It has been heretofore shown that bed rock and side wall conditions are favorable for the construction of a high dam at Black Canyon, that suitable materials of construction are found close by, that the location is easily accessible to railroad transportation, and that conditions are otherwise generally favorable for the construction of a safe dam at reasonable cost.

(*b*) The project is feasible from the economic standpoint through ability to repay the entire cost of the investment. The cost estimate of $41,500,000 as presented by the Bureau of Reclamation has been checked and found to be reasonably conservative. With 5,000,000 acre-feet of stored water available for sale for irrigation and municipal purposes and with 550,000 firm horsepower of electrical energy to supply a ready market, revenue is assured of such amount as to repay construction costs within a period of 40 years and at the same time provide for the cost of maintenance and operation of the project.

8. "The construction and operation of the described project is a logical, and, in some phases, even a necessary undertaking of the Federal Government, for the following reasons:

"(*a*) The international situation applying to the river.

"(*b*) Flood control as a national problem.

"(*c*) Reclamation of land as an accepted Government activity.

"(*d*) Magnitude of project and of various interests involved."

The location of the lower 90 miles of the Colorado River in Mexico and the opportunities of irrigating large areas of land in Mexico, presents an international situation carrying with it serious problems. These problems must be solved by the Federal Government and the control of the flow of the river through large storage facilities will be recognized as an important aid.

Flood control is recognized as an undertaking within the authority of the Federal Government and often as a serious responsibility. The situation upon the lower Colorado River is such as to demand the attention of the Government and calls for reasonable relief. The control of the river by a large

reservoir appears to be a necessary part of the flood relief for the Palo Verde, Yuma, and Imperial Valleys and other sections of the lower river.

Since 1902 the Federal Government has been engaged in reclaiming lands in the arid West by the construction of irrigation systems. In the proposed Black (Boulder) Canyon Reservoir project the reclamation of large areas of land in the lower basin will find an important place.

In addition to the rather sufficient reasons given in the preceding, the very magnitude of the proposed project is such and the interests involved are so varied and important, that the proposed project well lends itself to undertaking by the Federal Government.

9. "The Federal Government would have the right, under the commerce clause of the Constitution, to build a dam such as proposed at Black Canyon and create the described reservoir."

This conclusion is founded largely upon the interpretation of provisions of the Federal Constitution and of court decisions applying to the subject. Questions which arise will be recognized as mostly of a legal nature and it is not within the province of the writer to enter in detail upon the discussion. However, knowledge of the provisions of the Constitution and study of decisions of the United States Supreme Court relating thereto, indicate to the writer that the Federal Government will have the right, under the commerce clause of the Constitution, to build a dam upon the lower Colorado River and create the proposed reservoir for the storage of water and control of the river. The tendency of the court in arriving at the scope of authority of the Federal Government in connection with such projects has been clearly to justify the Government in undertaking the development of other uses of water as incidental to the purposes contemplated specifically by the commerce clause of the Constitution.

10. The "international situation applying to the Colorado River is of much importance, but the construction of the described project need not await solution. In fact the undertaking should prove of material assistance in solving the international problem."

This conclusion is again one which does not fall within the particular province of the writer to discuss in detail by reason of the fact that the questions raised involve international law and equity and upon these subjects the writer is not well informed. However, the physical situation applying to the lower Colorado River has an important bearing upon the problem. The construction of a large reservoir would allow the control of the river to rest largely in the United States. This fact might well prove of assistance in connection with negotiations between the two countries in an endeavor to formulate an agreement in regard to the use of Colorado River waters. The conservation of water is important in connection with the development of lands in Mexico as well as in the United States, and advantage should be taken of this fact in the process of negotiating an agreement between the two Nations.

It seems apparent that Mexican lands could not obtain a right to water stored in a reservoir constructed within the United States. except by agreement with this country. To obtain storage rights of great value would justify the Mexican Governmen in seeking an early settlement of international problems. Upon the other hand the representatives of the United States should use all reasonable effort to reach an equitable agreement in order that the uncertainties attaching to he present situation migh be removed.

11. "The interstate situation applying to the Colorado River is also of much importance, and some satisfactory understanding should be had between the several States as to use of water from the river before any project of magnitude is constructed. The completion of the Colorado River compact now seems likely within a reasonable time, and opportunity should be given for this consummation."

No other stream in the arid West affects so many States as does the Colorado River. Without an agreement between States there is little question but that the river sysem would be involved in litigation for years, in event any large additional developments are attempted upon any section of the river. Fortunately, much has been accomplished toward reaching an agreement between the seven States of the Colorado River Basin.

For more than seven years negotiations between the different States have been in progress. An outstanding development has been the formulation of the Colorado River compact, embodying a form of agreement between the seven States as to the use and division of the water of the entire Colorado River system. This form of compact was negotiated by the representatives of the

several States and the Hon. Herbert Hoover for the United States, serving as the Colorado River Commission. The document had the unanimous approval of the members of the commission upon November 24, 1922. Six of the seven Colorado River States ratified the compact in 1923 by proper legislative enactment, Arizona alone refusing to approve. In 1925, the plan, whereby the six Colorado River States approving the compact should agree to the acceptance, among themselves, of the terms and provisions of the compact regardless of the action of Arizona, was carried through by the said six States. In 1927, Utah withdrew from the six-State plan, and there is at this time no definite agreement in effect through legislative approval by any group of States.

The past year has developed the fact that Arizona will concur in the Colorado River compact, as formulated at Santa Fe, in event an agreement can be reached with California and Nevada in regard to use of water of the lower basin. Negotiations have been recently carried on in a competent manner looking to an agreement between these three States of the lower basin. Conferences were held at Denver, Colo., in August and September, 1927, as a result of a call by the governors of the four upper basin States for a meeting of representatives of the seven States. These conferences made progress in helping toward a compact between the three lower States and it is believed laid the foundation for final agreement. The completion of the Colorado River compact is of great importance, not only in view of equity to the several States of the Colorado River Basin, but also in view of the necessity of clearing the way by such interstate agreement for the development of the river. All reasonable time and opportunity should be given for the completion of either the Colorado River compact or of some other equitable agreement between the Sates of the river basin before any large project is undertaken. The title to water should be cleared before any major project is constructed at any point upon the Colorado River system.

12. "The Federal Government would be justified in securing revenue from hydroelectric power made available by the construction of a dam at Black Canyon for the repayment of a major part of the cost of the project but the Government should not enter into a development of the power possibilities beyond the extent essential for securing proper revenue for the purposes of repayment, with interest, or the cost of construction."

It seems only reasonable that the Federal Government should seek means to reimburse itself for the cost of its investment in the dam and appurtenant works proposed for construction at Black Canyon. The combination of a large supply of water with the head available at the proposed high dam provides a situation most favorable to the generation of a large amount of hydroelectric power. The sale of either the power privileges at the dam or of the power itself at the switchboard after generation in a Government-constructed plant seems to provide a reasonable means of revenue to the Government to repay its investment. In this instance there appears no valid argument why the Government should not enter business, but rather it appears only a business proposition for the Government to do so. It may be of interest to relate that the Government is generating hydroelectric power incidental to all three of its reclamation projects in Wyoming. By so doing a valuable service has been rendered to surrounding sections in each case. While the Black Canyon project is one of much greater magnitude than these Wyoming projects, the principle remains the same. It will be recognized that the Government should limits its engagement in the power development to the extent of reimbursing itself for its investment in the project.

13. "In event the Federal Government should undertake the construction of the Black or Boulder Canyon Reservoir project, the laws of the States upon which the dam and reservoir would be located should be respected and complied with in every way so far as such laws would apply."

This conclusion may be passed without discussion as it seems self-evident that the rights of the States in relation to the proposed project should be respected in every way and reasonable compliance given to State laws that may apply.

14. "The proposed all-American canal, while distinctly a separate undertaking from the described reservoir project, might well be constructed by the Federal Government as a further aid in the solution of the problems of the Imperial and Coachella Valleys of California. This canal would accomplish the following valuable purposes:

"(*a*) Eliminate the present serious problem of diversion of water from the Colorado River for use in Imperial Valley by transfer of the intake from the present location below Yuma to the Laguna Dam.

"(*b*) Solve the problems which now obtain by reason of the location of a large part of the Imperial Canal in Mexico.

"(*c*) Provide supplemental supply of water for the lands in the Coachella Valley of California which are now served by pumping of ground water and for which the water supply is rapidly depleting.

"(*d*) Provide for the reclamation of large additional areas of land in the Imperial and Coachella Valleys."

At the present time the Imperial Canal, carrying water from the Colorado River for the irrigation of lands in the Imperial Valley of California, diverts water through headworks located upon the west bank of the river in the United States a short distance north of the international line. The canal shortly runs into Mexico and for a length of some 60 miles continues its course in Mexico before returning to the United States with its supply of water for Imperial Valley lands. The proposed all-American canal would replace the present Imperial Canal and provide a solution for most of the difficult problems that now apply to the irrigation system of the fertile Imperial Valley. Under the proposed plan the canal to serve the Imperial and Coachella Valleys would divert water from the river at Laguna Dam, jointly with the canal serving the Yuma project. The Yuma project canal would then be enlarged and followed to the point across the river from the town of Yuma, where the Yuma Canal leaves its grade course to be carried under the river for the irrigation of the lands of the lower Yuma Valley. The all-American canal would continue on grade along the west side of the river to a point near the international line. It would then follow the course necessary to keep the canal entirely upon the United States side of the line. Heavy cuts for several miles through a section of sand hills will be necessary before the canal emerges into the Imperial Valley to joint the established irrigation system. The location of the proposed canal entirely within the United States in contrast with the present location of a considerable part of the Imperial Canal in Mexico, accounts for the name of "all-American."

(a) The diversion of water from the Colorado River into the Imperial Canal is now a serious problem, both as to quantity and quality of water. During periods of low flow it is necessary to maintain a low dam across the river in order to divert sufficient water. This dam is limited in height and must be replaced yearly by reason of its effect upon the levees and lands upon the east or Yuma Valley side of the river. With water from the river into the Imperial Canal also comes a large amount of silt in suspension, only to be deposited in the canal as the velocity of flow decreases. Two large suction dredges are kept constantly at work removing the deposited silt from the section directly adjoining the headworks. Many smaller dredges, in addition to numerous drag lines, are employed for the same purpose in the system below. Practically all of these difficulties would be removed by the transfer of the diversion from Hanlon Heading to the Laguna Dam.

(b) The location of a large portion of the present Imperial Canal in Mexico is the cause for further serious difficulties. With little thought for the future, the original promoters of irrigation in Imperial Valley caused an agreement to be made with a corporation controlling lands in Mexico whereby one-half of the water diverted from the Colorado River should be made available, upon demand, for use upon lands in Mexico. At the present time some 200,000 acres of land are irrigated under the canal in Mexico while over 400,000 acres are being irrigated in the Imperial Valley. The hardship of the old agreement is evident. The change to the proposed all-American canal will be a complete solution of this Imperial Valley problem.

It is estimated that an additional 600,000 acres are susceptible of reclamation in Mexico by use of water from the Colorado River and much of this acreage will be available under the Imperial Canal. The abandonment of this canal by American interests will no doubt check the Mexican development and thereby limit a large acquirement of water rights by beneficial use prior to the completion of a treaty between the United States and Mexico.

(c) The all-American canal would provide means for a supplemental supply of water to lands of the Coachella Valley which are now suffering from a depleting supply of ground water made available through pumping.

(d) By reason of its higher location than the present Imperial Canal, the proposed all-American canal would provide for the reclamation of about 200,000 acres of additional lands in Imperial Valley and 70,000 acres in the Coachella Valley.

The Imperial irrigation district entered a contract several years ago with the United States for the right of diversion at Laguna Dam of water for the lands of the valley. A considerable part of the contract price of $1,500,000 has already been paid.

15. "The proposed all-American canal is feasible of construction and the lands which would receive the benefits therefrom should be able to pay the cost, without interest, to the Government if the project is undertaken."

The proposed all-American canal does not present any serious difficulties, with the possible exception of the problem of construction and maintenance through the several miles of sand hills. Heavy cuts will be required in this section and some trouble will be encountered from drifting sands. However, the movement of the sand dunes is very gradual and with a lined section of canal with good gradient through the hills, the maintenanie problem will not be especially formidable. The construction of the canal through the section will not be unreasonably difficult.

The estimate of $31,000,000 as the cost of the all-American canal is upon the side of safety and may be accepted. With benefits to nearly a half million acres of present developed lands in Imperial Valley and the addition of 270,000 acres of new lands, the burden will be so distributed as to fall within the means of all lands to pay their proper share of the costs. The highest charge for a full water right for new lands is estimated at less than $100 per acre and this may be considered as reasonable. The economic feasibility of the all-American canal seems certain.

PROBLEMS OF THE COLORADO RIVER

Hon. HUBERT WORK,
Secretary of the Interior, Washington, D. C.

MY DEAR MR. SECRETARY: In accordance with your request under date of April 9 ultimo, I have the honor to report as follows upon findings of fact and conclusions regarding the general subject of the development and control of the Colorado River and in particular regarding the proposed development at the Boulder (Black) Canyon site.

The general scope of the inquiry desired by you was indicated by your instructions under date of April 29 ultimo and which are quoted here for reference as follows:

"*To the Special Advisers—Colorado River project*:

"It is understood that you, acting as Special Advisers to the Secretary of the Interior in connection with the Colorado River, will report severally and as individuals.

"It is requested that you severally inquire specifically into the engineering, legal, and economic phases of the development of the Colorado River, visiting the levees and delta country of the lower Colorado and Boulder, Glen Canyon, and Topoc dam sites, and any other points of interest involved. The engineering and other data accumulated in the department, or elsewhere, will be made available to you for study. Some of the major questions to be determined include the following:

"Whether the Federal Government has power to allocate the unappropriated waters of the Colorado River to the basin States, thus rendering a compact between the States unnecessary.

"What the international relations to the canal now supplying Imperial Valley with water through Mexico would be and what rights Mexico would have if this Mexican canal concession be continued in force after the storage dam is built.

"Where the most feasible site for a dam may be in Boulder Canyon, this to include a study of the relative merits of the Boulder and Black Canyon sites.

"Your opinion is desired as to the engineering feasibility of the all-American canal.

"Just what benefits the lower States will receive from the storage of water and the control of silt by the proposed dam.

"Whether or not it is necessary to the solvency of the project that all revenues from power and other sources be applied to repayment to the Government of the construction cost of the project in 50 years.

"It is my desire to submit a report to Congress at the forthcoming session, based on your findings and those secured from other sources, covering the essential features of the Swing-Johnson bill before the last Congress; also the probabilities of reimbursements to the Government for its expenditures in this connection, from reclamation through irrigation, protection against floods, supplying water for domestic uses, generation of power, leasing of power privileges, or other sources of income.

"I appreciate your willingness to render this service to the Government, particularly as you are all busy men of big affairs, and I hope that you will each largely exercise your own initiative in pursuing your studies of the subject and in formulating your reports."

Of the general ground indicated by these instructions, the present report is concerned only with those which are fundamentally of an engineering or economic character.

The actual ground covered by the present report is, perhaps, somewhat wider than that which might be assumed to be indicated by a narrow interpretation of your instructions, but the various phases of the general problem, as herein presented, seem all to find their place in the picture as a whole, and it is hoped

that the freedom of interpretation which has been exercised with regard to your instructions may be justified by the somewhat more complete treatment of the problem in its broader aspects which has resulted therefrom.

Very respectfully,

W. F. DURAND, *Special Adviser.*

SUMMARY OF CONCLUSIONS

(1) There is a definite flood menace in the Imperial Valley, Calif., due to seasonal floods in the Colorado River.

(2) The present method of river control through a system of levees maintained along the lower reaches of the river and especially just above the Delta region in Mexico can not be viewed as a permanent or lasting solution.

(3) The deposition of silt in the lower Delta of the river and the consequent building up of a great Delta system to level far above that of the surrounding territory may be viewed as the basic source of the menace which the present river conditions present.

(4) At the same time, the silt carried onto the land with water used for irrigation is in itself a source of trouble, of serious expense and of possible menace to the maintenance of the proper texture of the soil where such water is used.

(5) The present system of water supply from the Colorado River to the Imperial Valley, whereby the water, diverted on United States territory, passes thence and flows for some 50 miles through foreign territory before again entering United States territory in the Imperial Valley, is a source of difficulties of management and of possible serious menace to the continuity of supply, and thus to the entire life of the valley.

It is further a condition which seems repugnant to our most cherished ideals of basic right in such matters to independence from alien control and interference.

(6) There are in the States of Arizona, California, and Nevada large areas susceptible of irrigation and of large crop production if assured of an adequate and reliable supply of water for irrigation.

(7) The cities of southern California, and of which Los Angeles stands as a chief example, are facing the need of large additions to their present water supply, or failing in such addition they face restriction or limitation to the growth which they believe their agricultural, industrial, and climatic conditions generally entitle them to anticipate.

(8) The entire territory of the Southwest, and in particular that of southern California, is increasing its demand for electric power at a present rate which results in a doubling of the demand in from five to six years.

(9) The flood menace can be adequately removed by the provision of flood storage sufficient to regulate and reduce the maximum discharge during a flood period to a rate of flow not exceeding 40,000 second-feet.

(10) Such a degree of river control will serve to greatly reduce the significance of the present levee system, though presumably there may be indefinitely need for some measure of such control in the lower reaches of the river in Mexico.

(11) A storage reservoir suitably located and of adequate capacity will remove the dangers and troubles due to silt by trapping it, and thus preventing its passage by way of the river to the delta region or on to the land by way of water used for irrigation.

(12) The troubles, disadvantages, and possible menace incident to the present system of water supply for the Imperial Valley may be obviated by the construction of a canal entirely upon United States territory.

(13) The construction of such a canal is a practicable engineering project and its operation and maintenance do not promise any difficulties of a serious or controlling character.

(14) The supply of water needed for irrigation, at least up to the limit contemplated by the seven-State compact, may be found in a regulated and controlled condition of the Colorado River, and such regulation and control may be secured by adequate storage-reservoir capacity provided through the construction of a dam or dams at suitable sites.

(15) The use of available sites on the river for power development will result in the provision of electric power in large amounts and at costs which

will permit of its transmission to power markets for sale at figures showing a margin of advantage over power supply from other present available sources.

(16) The same character and degree of river control through storage for water and silt together with the provision of power as in (15) will provide the basic conditions needed for furnishing to the cities of southern California the enlarged water supply needed.

(17) The dam and reservoir as proposed at the Boulder (Black) Canyon site will meet the requirements as indicated in the preceding paragraphs, in the following respects:

(*a*) With a total storage capacity of 26,000,000 acre-feet, it will provide at the bottom a silt storage pocket of 5,000,000 to 8,000,000 acre-feet, sufficient to receive and store the entire silt burden of the river entering above this site, for a period of some 50 or 60 years.

(*b*) It will provide at the top of the reservoir as "active" or draw-down storage, a capacity of 8,000,000 to 10,000,000 acre-feet which will control all floods except the most unusual and which may be anticipated only at long intervals of time, to a maximum discharge of 40,000 second-feet.

(*c*) It will provide such additional active storage as will serve to meet all requirements for irrigation and general river control for some years to come, or until other sites are developed with additional storage and regulating capacity.

(*d*) It will provide for the development of some 550,000 firm horsepower at a cost which will meet the conditions of paragraph (15) and which cost includes interest, operation and maintenance, and provision for the repayment of the capital sum in a period not exceeding 50 years and presumably in a definitely shorter period.

(18) The territory within economic transmission distance for electric power from the Black Canyon site will provide a power market sufficient to absorb the entire power developed at this site within two or three years from the completion of the project: and under these conditions and under such prices as may be anticipated from competitive sources (as far as can be now foreseen), the economic soundness of the project and its capacity to pay out, as in the preceding paragraph, will be assured.

(19) The proposed development at the Boulder (Black) Canyon site will fit in effectively as an element in the best apparent general plan for the ultimate development of the river as a whole.

It combines further, in higher degree than any other site or combination of sites, the characteristics required to meet most effectively and adequately, as a first step in river development, the various conditions indicated under the heads of flood and silt control, storage for irrigation and general river control, large power development, and economic soundness and feasibility.

(20) The proposed development at the Boulder (Black) Canyon site is therefore indicated as the best first step in the general plan of ultimate complete river regulation, control, and utilization.

INTRODUCTORY

It should be stated at the start that the present study of problems of the Colorado River is intended to be limited to those presented in the so-called lower-basin States, or specifically, in the States of Arizona, California, and Nevada.

In approaching any general consideration of the problems presented in these States it seems well to first note specifically the conditions which give rise to problems, or in other words, those elements in the existing situation which call for relief or change. These are primarily: Menace due to flood conditions in the river; menace and general economic burden resulting from the silt carried by the river and deposited in the lower delta and on irrigated lands; menace due to drought. It will be shown later that the two sources or forms of menace due to floods and to silt are in reality closely interrelated and interdependent.

In addition to these major problems there are other important aspects of the situation in the Southwest centering about the problem of irrigation and the supply of water to irrigated lands or to those susceptible of irrigation, and which are of necessity closely related to any consideration of these major problems as above.

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There are furthermore other situations in the Southwest connected with the need of an increasing supply of domestic water and of industrial and domestic power, all of which find their place in any consideration of the major problems as noted.

FLOOD CONTROL

The existence of a flood menace and the need for some measure of flood control have been so fully set forth in the evidence taken at the various hearings before committees of Congress that it would seem proper to accept, without analysis in detail, the general trend of such evidence and to assume as a basic condition the existence of such a menace and the need for measures of relief and control.

The general problem of flood control involves the following chief factors:

1. The pattern and magnitude of the flood for which provision must be made. By pattern is meant the distribution of the daily discharge over the flood period as percentages of the maximum daily discharge. By magnitude may be implied either the maximum rate of flow or the total discharge over the flood period, or both. Thus a flood may be referred to as one of maximum rate of flow of 200,000 second-feet or again as one of a total discharge over the flood period of, say, 12,000,000 acre-feet. From the maximum rate of flow or the maximum daily discharge and the pattern the total discharge may be readily found.

2. The maximum rate of flow to which it is desired to limit the discharge.

Again, the menace of a flood in the Colorado River may develop in two different ways:

(*a*) An excessively high flood peak may overtop the levees or the banks of the existing channels in the delta cone and cut a new channel along a descending gradient toward or into the Imperial Valley.

(*b*) Rates of flow far below those carrying any menace of overtopping may and do undercut the present levees or banks with the hazard of dropping a section of the levee or bank into the river, thus effecting a breach followed by the cutting of a new channel as in (*a*).

There is naturally a considerable diversity of opinion and of evidence regarding rates of flow which may be considered reasonably safe from the danger of undercutting. However, recent observations and experience seem to point to a flow of about 40,000 second-feet as a limit above which undercutting more or less serious in character may be anticipated. The evidence and the opinions bearing on this point have been carefully considered, and the figure of 40,000 second-feet as assumed by the engineers of the Reclamation Service seems to form a reasonable and proper upper limit of flow, having in view the desired insurance against flood danger.

If, then, this figure be assumed as the limiting rate of flow, together with a given flood in magnitude and pattern, it becomes a matter of simple computation to determine the amount of storage required.

In 1921 this general problem was made the subject of an extended study by the undersigned, using the day pattern of the 1920 flood but with daily rates of flow increased to correspond to maximum-peak flows of 200,000 second-feet, 250,000 second-feet, and 300,000 second-feet. The results of such study indicate for the 200,000 second-feet maximum a required storage capacity of about 7,000,000 acre-feet; for the 250,000 second-feet maximum a required storage capacity of about 10,000,000 acre-feet; and for the 300,000 second-feet maximum a required storage capacity of about 13,000,000 acre-feet.

Past experience with the river shows that a flood of the order of 200,000 second-feet maximum flow must be considered as probable at intervals of a few years' separation, while there is evidence that at longer intervals floods of much higher maximum flow may occur.

Having in view these facts, a storage capacity of 8,000,000 acre-feet, available at the beginning of the flood period, would seem the minimum which should be considered safe or acceptable, and if the conditions in any particular year should be such as to indicate the likelihood of exceptionally large floods the part of prudence would perhaps dictate the drawing down of the reservoir level to a point which would provide a still larger capacity.

In any case it would not seem wise to count upon a proper safeguarding of the Imperial Valley against the menace of flood hazard with less than an active storage capacity of about 8,000,000 acre-feet, exclusive of silt and general regulation requirements.

General references

Problems of the Colorado River Basin, 1924[1]: Vol. I, pp. 3–8, 72; Vol. IV, pp. 1–56; Supp., pp. 1–3.

Hearings, 69th Congress, 1st sess., S. Res. 320; pp. 324, 333, 474, 497, 804.

Hearings, 68th Congress, 1st sess., H. R. 2903, pp. 711, 821, 823, 1226, 1250, 1382, 1392.

Hearings, 68th Congress, 2d sess., S. Res. 727, pp. 59, 67, 88.

Trans. Am. Soc. Civil Engineers, 1913, pp. 1480, 1513; and 1925, p. 422.

SILT

Quantity.—The quantity of silt carried by the Colorado River has been made the subject of extended study by both the Department of the Interior and the Department of Agriculture—by the former at and near Yuma and by the latter at and near Topock. The results reached by the latter study indicate a silt burden considerably greater than those resulting from the former. It is clear that direct measurements of rate of flow and of silt content can take cognizance only of the silt actually suspended in and flowing with the water. In order to obtain a measure of the total amount of solid material moved by the river, however, there must be added to this the amount of bed silt rolled or carried in sand waves along the bed of the stream.

Perhaps the most reasonable explanation of the difference in the two sets of measurements at Topock and at Yuma may be found in the assumption that at the former location, due to the steeper gradient of the river bed and consequent higher velocity of flow, most or practically all of the silt burden is in suspension and hence accounted for by the measurements taken, while at the latter point, with a flatter gradient and lower velocity, only a part of the total burden can be carried in suspension, the balance being carried as bed silt and rolled or transported as sand waves along the bed of the stream.

Of course any such general explanation will be modified by and dependent on the stage of the river, with the alternate phenomena of scouring and lowering of the bed in times of flood flow and of rebuilding and raising in times of moderate and low flow, but in any event the difference in these two sets of measurements would seem to find, at least partial explanation in the known differences in the general regimen of the river at the two points of measurement.

The general results at Yuma indicate an annual silt burden of the order of 90,000 to 100,000 acre-feet. Those at Topock, taking also into account certain other general indications regarding the relation of bed silt to suspended silt, seem to indicate a total annual burden of the order of 130,000 to 140,000 acre-feet. The latter result is therefore roughly 50 per cent greater than the former.

The special significance of these results in connection with the present study lies in the fact that to the extent to which the larger figures are to be assumed as possible or probably, in corresponding degree does the problem of silt storage in any reservoir to be constructed, and especially in the first one to be constructed, become of increasing importance.

Broadly, therefore, these considerations emphasize, for the first reservoir to be constructed, the significance of silt-storage capacity adequate for some considerable period of years and, hence, broadly, the importance of providing for this first step a reservoir of large capacity rather than of small or moderate capacity.

It will be especially noted at this point that the possibility of a total silt burden greater than that indicated by the measurements at Yuma in no wise affects the general practicability of economic justification of the broad plans for the utilization of the river. Should the results indicated by the measurements at Topock be assumed instead of those at Yuma, it would mean at the most a corresponding shortening of the effective life of any one reservoir. But we must assume that in the end and with the full development and control of the river there will be constructed a chain of reservoirs with an aggregate silt capacity adequate for several hundred years discharge, thus putting the date of ultimate trouble from this source into an indefinite future; and in any event giving a period of useful life long enough to many times over justify economically the measures needed to control, regulate, and utilize this great natural resource.

[1] In manuscript form, Bureau of Reclamation.

PRESENT AND FUTURE CONSEQUENCES OF THE SILT BURDEN

The consequences of the silt burden carried by the river may be conveniently summarized under two heads:

1. Deposition in the lower delta with consequent elevation of the river bed with resultant flood menace to the Imperial Valley, and conversely, the cost of maintaining a levee system to combat the same.

2. Present cost of desilting the canals of the Imperial irrigation district, together with the cost to the farmer of caring for the silt brought to and deposited on his lands, and what is perhaps most serious of all, the gradual sealing up of the present relatively porous soil with the fine silt carried in the smaller terminal channels, thus complicating the problem of drainage and presenting a serious menace to the maintenance of the proper texture of the soil. To this must be added the expense involved in the filtration of all water used in the valley to meet domestic and municipal requirements.

In a sense the entire problem of the relation of the river to the Imperial Valley may be said to be one of silt.

The deposition of the silt in the lower delta has the effect of building up the bed of the river or of building up a broad delta cone with the inevitable ultimate result of a break in its banks and menace of flow into the Imperial Valley. This condition is under partial control by the system of levees maintained along the lower reaches of the river just above the present delta cone. The best engineering opinion is in agreement, however, that the levees can hardly be looked on as a sure and satisfactory ultimate solution of this problem. The expense involved is furthermore a serious burden which must be borne ultimately by the land served with water. For the six years, 1921–1926, inclusive, the average expense per year under the head of river protection was $202,083 with conditions becoming more and more difficult as time goes on. Broadly, therefore, the flood menace is directly traceable to the silt and its continued deposition. This particular condition has been so fully covered in the various reports on the Colorado River and in the testimony taken in the various congressional hearings, that no further detailed reference to the matter would seem to be needed at this point.

On the other hand, the use of the water for irrigation as it comes to the point of diversion, means the handling of an enormous amount of silt which of necessity must be deposited in the various canals of the system or on the land itself. Under present conditions this total silt burden turned into the system of the Imperial irrigation district will aggregate something of the order of 14,000 acre-feet or 22,600,000 cubic yards per year.

In part deposited in the canals, this requires a constant program of dredging and piling along the canal banks. This, however, is no final solution and these constantly rising and widening banks along the canals are a source of continuously growing trouble and menace. On the land the silt is constantly building up the level near the points of entry from the feeder canals and either the latter must be raised or the silt must be leveled off and spread over a larger area. This, again, is no final solution since in any event the general level of the land must be raised and with it the level of the canals, thus decreasing their carrying capacity relative to the same point of diversion from the river.

Conservative figures show that the annual cost to the farmer of caring for this silt alone amounts to not less than $2 per acre of land served, to which must be added about $1 per acre expense in the canal system, thus making a total fixed charge against each acre of land in the valley of not less than $3 per year, or a total annual burden of not less than $1,500,000, due solely to the silt which is carried from the river into the canal system.

Summarizing, it is clear that the presence of silt gives rise to danger, expense, and future menace as follows:

1. Building up of the general level of the delta cone with danger of flooding Imperial Valley.
2. Expense in maintenance and continued extension and elevation of levees.
3. Expense to Imperial irrigation district in clearing its canals of silt.
4. Expense to farmers in valley in caring for silt deposited on land.
5. Expense to the entire valley in the filtration of all water for domestic and municipal use.
6. Menace in gradual elevation of land and in consequent reduced gradient between point of diversion and the land served, with consequent choice of either accepting reduced flow of present canals or of going to expense of enlarging cross sectional area.

7. Menace to land of becoming choked and relatively impervious from deposition of fine silt, of which the material carired on to the land is chiefly composed.

It follows that these various consequences of menace and expense can only be mitigated or removed by preventing this body of silt from reaching the lower reaches of the river and this can only be realized by providing a reservoir of adequate silt storage capacity to entrap and hold back this material which is furnished in principal part by tributaries to the river entering above the Grand Canyon section.

It should be noted, however, that the building of a large storage reservoir at any point on the river suited to entrap and hold the silt entering the river above the Grand Canyon section will not in itself furnish a complete and immediate solution of the silt problem. It would, however, immediately remove the menace of flood devastation and would enormously reduce the expense in connection with the other aspects of the problem.

Upon the completion of such a dam and reservoir there would remain in the bed of the river below the dam site, large quantities of silt to be picked up and carried along by the previously desilted water discharged from the reservoir. The river and its bed would thus have to develop and reach a new condition of equilibrium as regards silt bed and flow, and for some years there would be a silt burden carried into the lower reaches of the river, gradually decreasing in amount until some approximate condition of equilibrium is reached between the regulated flow of the river and its silt bed.

There would remain also the silt discharged by the Gila and by the Williams. Regarding these two items it will be sufficient to note that present plans and actual construction bid fair to furnish adequate protection so far as the Gila is concerned, while the amount discharged by the Williams is relatively so small as to constitute in itself an item of no serious importance.

While, therefore, it must be expected that it will be found necessary, perhaps indefinitely, to maintain some degree of levee system on the lower river and while for some years after the completion of a storage reservoir there would still be a silt problem, the expense of the former would be greatly reduced while the latter should rapidly decrease to a point representing no serious economic burden on either the land or the canal systems.

General references

Problems of the Colorado River Basin, 1924[1], vol. 1, pp. 3, 69.
Hearings, 69th Congress, 1st sess., S. Res. 320, pp. 27, 272, 322.
Hearings, 68th Congress, 2nd sess., S. Res. 727, p. 88.
Trans. Am. Soc. Civil Engineers, 1923, p. 255.
Report by Dept. of Agriculture on Silt Problems of Southwest.[2]
Annual Reports Imperial Irrigation District, 1924, p. 38 and 1926, p. 46.

DROUGHT

While the average flow of the Colorado River over a long series of years is about 22,000 second-feet, the daily flow during different years and in different seasons may vary between very wide limits and the records over the past 10 or 12 years give a number of instances where the flow over periods of some weeks or even months was not sufficient for the normal demands which had been created by existing developments.

Thus in 1924 for a period of 96 days all of the water in the river was diverted into the Imperial Canal and after the requirements in Mexico had been met there was, over this period, a serious shortage with regard to requirements in the Imperial Valley and crop losses resulted estimated at not less than $5,000,000. For some days during this period, scarcely enough water came into the valley to meet the requirements for stock and for domestic purposes.

Other shortages, less severe in extent but all carrying a menace of the same general character, have been experienced in 1915, 1916, 1917, 1918, 1919, 1922, 1925, and 1926.

With the known changing character of the precipitation in the Colorado River Basin from year to year, such conditions must be anticipated at unknown but not infrequent intervals. The increasing gravity of these conditions, with increase in the demands on the lower river from any source whatever, is obvious

[1] In manuscript form, Bureau of Reclamation.
[2] In manuscript form, Department of Agriculture, to be soon published.

and the only manner in which this menace (not only to crops but perhaps also to the conditions of life) can be removed is by provision for the storage of the flood waters of the river and of the excess run-off in periods and years of high general precipitation.

IRRIGATION

The chief subdivisions under which this phase of the general problem calls for consideration are as follows:

1. Assuming the general provisions of the seven-State compact, how much river storage should be provided, holding in view the needs of the lower basin?
2. What areas of lands in the lower basin may be viewed as economically susceptible of irrigation from the stored waters of the river, and of such areas how much is already under irrigation and how much represents additional areas to be brought in under conditions of irrigation storage?
3. At what rate should such additional lands be brought under irrigation and into crop-bearing condition?
4. To what extent should the amount of storage to be provided for the lower basin be influenced by the conditions likely to prevail for some years subsequent to the completion of the first stage of river development and before any large increase of consumptive use in the upper basin States?

Regarding the amount of storage which will be required to meet the conditions of the lower basin, it will be recalled that the provisions of the seven-State compact provide for the definite disposition of 16,000,000 feet of water from the main river with presumably 1,000,000 or more additional, unallocated at the present time. Considering the probable rate of development in the upper-basin area, it seems likely that for some years to come the amount of water entering at Lees Ferry the lower basin stretch of the river, will be of the order of 15,000,000 acre-feet, gradually decreasing with continued development in the upper-basin area. Ultimately it must be assumed that this figure will be reduced to the 7,500,000 acre-feet average contemplated by the compact.

However, having in view the particular condition of this compact which permits the upper-basin States to deliver to the lower basin an aggregate of 75,000,000 acre-feet over a period of 10 years in annual quantities as may be convenient to the former, it would seem essential to the lower basin to have available for such possible fluctuations in annual supply, a relatively large storage capacity—as large a capacity as can be reasonably justified on other grounds. In any case a storage capacity of the order of 10,000,000 to 12,000,000 acre-feet for irrigation and general time control of the river would seem as little as could be expected to give a reasonable approach toward security under these general conditions of operation.

Under 2 the evidence taken in the various hearings is very full, though somewhat conflicting.

The general conclusions may be summarized as follows:

ARIZONA

PRESENT

In Arizona, under present development, the areas under gravity irrigation are as follows:

	Acres
Yuma project	48,000
Under a pumping lift of 72 feet there is in the Yuma Mesa project under present irrigation service an area of	1,000
Under a pumping lift of 21 feet there is in the Parker project under present irrigation service an area of	7,000
Total	56,000

FUTURE

Major works already provided:	
By gravity, Yuma project	1,000
By pumping, Yuma Mesa project (72-foot lift)	43,000
Total	44,000

	Acres
Number of works constructed to date:	
By gravity—	
Mohave Valley	24,000
Parker project (Indian project)	104,000
Parker Valley (Gila-Parker project)	5,000
Cibola Valley	16,000
Total	149,000
By pumping—	
Bullshead, Hardyville and Fort Mohave Mesa (average 80-foot lift)	9,000
Gila Valley (Gila-Parker project) (average 235-foot lift)	632,000
Miscellaneous tracts (average 25-foot lift)	2,000
Total	643,000

CALIFORNIA

PRESENT

In California, under present development, the areas under gravity irrigation are as follows:

Palo Verde Valley	36,000
Yuma project	13,000
Imperial Valley	462,000
Total	511,000
The aggregate of miscellaneous small pumping lifts averaging about 20 feet is	1,000

FUTURE

Major works already provided:	
By gravity—	
Palo Verde Valley	43,000
Yuma project	3,000
Imperial Valley	53,000
Total	99,000
By pumping	None.
Number of works constructed to date:	
By gravity—	
Mohave Valley	1,000
Above Blythe (part of Gila-Parker project)	50,000
Palo Verde Mesa (part of Gila-Parker project)	12,000
Imperial Valley (All-American Canal)	[1] 211,000
Total	274,000
By pumping—	
Palo Verde Mesa (lift, 25 to 150 feet)	43,000
Chucawalla Valley (part of Gila-Parker project) (lift, 25 to 150 feet)	126,000
Imperial Valley (All-American Canal project) (lift, 30 to 125 feet)	[1] 59,000
Total	228,000

[1] Engineers of the Imperial irrigation district estimate 267,000 acres additional under gravity by the all-American canal, and 171,700 acres additional by pumping under a lift not exceeding 150 feet.

NEVADA

PRESENT

In Nevada, under present development, the areas under gravity irrigation are as follows:

	Acres
Various tracts irrigated from the Virgin River	7,000

FUTURE

With future development under gravity service there is possible a further area of	4,000
Under a pumping lift not exceeding 200 feet there is possible a further area of about	69,000

GENERAL SUMMARY

Total present, works provided	575,000
Total future, major works provided	143,000
Total future, no major works, gravity	423,000
Total future, no major works, pumping	940,000
Total under gravity	1,141,000
Total under both gravity and pumping	2,081,000

The above summary includes the latest and most carefully prepared estimates of the Bureau of Reclamation, and while precise figures can not be given for many of the items, it is believed that this table gives a reasonably accurate picture of the present and future possible development in the lower basin States of Nevada, Arizona, and California.

In Mexico the area under present irrigation is about 200,000 acres and while the additional area susceptible of irrigation either under gravity or by pumping lift is a matter of some uncertainty, there seems at least to be a general agreement that the additional under gravity is something of the order of 500,000 acres, making a total under gravity of not far from 700,000 acres.

Under (4) it should be noted that while this particular feature does not lie within the direct scope of the present report, the matter is mentioned simply to permit of the observation that while the provision of irrigation storage by the impounding of flood waters is desirable as a step toward the realization of potential wealth, it does not follow that the lands susceptible of service from such waters should be brought under cultivation irrespective of economic conditions in the domain of agriculture. Rather the impounding of such waters should be considered as only a first step and the lands should then be brought under cultivation and into crop-bearing condition only as justified by the several economic conditions affecting agriculture and food supply.

Under (5) it does not appear that the general conclusion reached above regarding the desired volume of storage in the lower basin should be modified with reference to the conditions likely to prevail for some years subsequent to the construction of such storage. The larger flow to be anticipated during such period together with the usual seasonal fluctuations serve to emphasize the need of generous irrigation storage capacity and to indicate that any case of doubt should presumably be resolved in favor of larger rather than of smaller storage allotted to irrigation requirements.

General references

Problems of the Colorado River Basin, 1924,[1] vol. 1, pp. 6, 9, and Vol. III.
Hearings, 67th Congress, 2d session, S. Res. 142, p. 48.
Hearings, 68th Congress, 1st session, H. R. 2903, pp. 234, 238, 821, 823, 1121, 1699.
Hearings, 69th Congress, 1st session, H. R. 6251 and 9826, p. 20.

ALL-AMERICAN CANAL

The proposed all-American canal has a significant bearing on the problem of the Colorado River from three different points of view:

[1] In manuscript form, Bureau of Reclamation.

1. For the supply of irrigation water to the Imperial Valley, it will furnish a source lying wholly within the United States and will thus relieve the administration of the canal of many difficulties and troubles to which it is now subject. It will furthermore give to the people of the United States a direct call upon their own water for purposes of irrigation or domestic use, without the hazards which may attach to its passage first through foreign territory.

2. With a point of diversion some 30 to 40 feet higher than that at the Rockwood gates, it will be possible to irrigate by gravity something over 200,000 acres more than by the use of the present point of diversion and main canal. Or otherwise, if the above area is to be supplied with water from the present canal, it would needs be by pumping rather than by gravity, with the greater costs attaching to the former method.

3. As an accomplished or even as an intended program of construction it will be of definite value in any negotiations with Mexico regarding the diversion or use of the waters of the Colorado River.

As a piece of engineering construction, the matter presents itself under two heads:

a. Its practicability.

b. Its cost.

Regarding the significance of the canal under (1) above, the evidence presented before the various congressional hearings is so definite and so full that the point does not seem to need further development here.

Having in view a long look ahead into an indefinite future, the proposal that the life of the Imperial Valley, together with its further development, should be dependent on water passing out of the river on United States territory and then flowing into and through foreign territory before reaching the valley would seem to be wholly repugnant to our most cherished ideals of independence and native right. Only by a canal and diversion works lying wholly within our own territory can these ideals be properly realized.

With regard to the significance of the canal under point 2 above, it is a simple fact of topography that with a difference of level of approximately 40 feet there is a difference of something over 200,000 acres susceptible of irrigation by gravity from the diversion proposed for the all-American canal as compared with the present diversion at the Rockwood gates. For such differential area this would require, with irrigation from the present diversion and canal, a pumping lift which would add in marked degree to the annual costs for all land so situated. With the all-American canal and the higher point of diversion, such excess annual charges would be avoided and the entire area would be brought under gravity service. It is, of course, not to be overlooked that such land must bear its share of the cost of the all-American canal and that this would represent an item to offset against the pumping charges. However, as contemplated, the fixed charges for construction will, in a reasonable term of years, be eliminated by the payment of the principal, while on the other hand pumping charges go on without reduction or end.

Again, therefore, taking the long look ahead, this particular feature of the canal and of its possibilities would seem definitely to range itself along with other arguments in favor of the construction of the canal as proposed.

With regard to the significance of the canal under point (3) above, it would seem obvious without extended argument or discussion that the specific statement on the part of the United States of intention to build such a canal, or still better the vesting in the Secretary of the Interior of authority to so build, is a measure absolutely essential in connection with such discussion as must come sooner or later with Mexico regarding the division or use of the waters of the Colorado River.

Passing now to the question of the engineering or economic feasibility of the canal under (*a*) and (*b*) above, it should be noted that the entire question reduces to one of cost. There is no question whatever of the engineering possibility of the undertaking. The operations required are all well known and are all within the domain of present well-established and approved engineering practice. The section of the canal through the so-called sand-dune district is the only part of the construction regarding which any serious question under this score has been raised.

Regarding this section it has been urged that the construction costs would be excessive, if not prohibitive, and that the canal could not be maintained clear of drifting sand except at an excessive or prohibitive cost under the head of operation. There are thus brought into the open two questions:

(1) The cost of construction in general and with special reference to the sand-dune section.

(2) The cost of maintaining the channel clear of blow and drift sand.

The question of the cost of an engineering structure resolves itself into two elements, the total quantities of the various elements of cost and the unit prices to be employed.

The former have been assumed as determined by the surveys as presented in the report of the all-American canal board made to the Secretary of the Interior in 1919. Regarding the unit prices to be employed, it should be noted that those used in the above report were representative of the industrial conditions prevailing immediately following the close of the war and that since that time there have resulted reductions in certain of these prices. Furthermore, in the eight years since the making of that report there have been made marked advances and improvements in the mechanical equipment required for work of this character. These improvements relate in particular to the amount of material which can be handled at one movement or operation and to the distance it can be placed from the line of excavation. The latter has been extended to such a degree as to eliminate, for much of the work, the use of dump cars and railway where formerly such would have been a necessary part of the equipment required for the undertaking.

The statement therefore seems justified that the downward trend in many of the unit prices since 1919 combined with definite improvements in the mechanical equipment required for work of this character have created a new situation with regard to the costs of such work and with the same margin for contingencies as assumed in the report of 1919, would justify a downward revision of the costs as presented in that report. Or otherwise if the estimate of cost be held the same, it would imply a very considerably increased margin for contingencies or unforseen factors in the undertaking.

Such a reestimate has indeed been made by a consulting engineer of Los Angeles, Mr. C. G. Frisbie, a consulting engineer with wide experience in work of this character and with large personal experience in and familiarity with the conditions in the Imperial Valley through which the canal is to pass.

These estimates show a probable cost of about $20,000,000 as against the $30,000,000 of the report of 1919.

The undersigned has gone over these estimates carefully with Mr. Frisbie and has become convinced broadly that the improvements made during the past eight years in the mechanical equipment for excavating and handling material as well as other collateral economic conditions are such as to justify the expectation of reduced unit prices and of the construction of the canal at an over-all cost somewhat below the figures originally estimated.

In reaching this conclusion, due regard has also been given to the statements of Mr. J. C. Allison in the hearings before Congress and also to statements from other sources urging special difficulties in construction and increased costs.

The general conclusion is therefore that there is ground for anticipating a construction cost of the canal at a somewhat lower figure than the $30,000,000 estimated in the report of 1919; or otherwise if the general estimate be still held at $30,000,000, it would imply a margin for contingencies or for unknown or unexpected conditions greater than would normally be allowed for any such piece of work.

Turning now to the question of maintenance and of freeing the canal of blow and drift sand, the same engineer referred to above, Mr. C. G. Frisbie, stands perhaps alone in familiarity with the phenomena of sand-dune movement based on personal experience and measurement with and on the dunes of the district through which the canal is to pass. His conclusions, based on this direct personal experience, have been presented to Congress in the hearing reported in Senate Resolution 320, 1927, page 59, and to which reference for details should be made.

In summary Mr. Frisbie presents the following conclusions:

1. The amount of flow or drift sand transported per year is surprisingly small. Winds of transporting velocity blow for only some 60 days of the year, and the rate of advance of the dunes as a measure of the general rate of transport is very slow indeed.

2. The canal might through this section be lined with concrete, though presumably this would not be necessary. In any event with a suitable gradient a velocity of flow can be assured adequate to transport as silt all sand blowing and falling into the canal.

3. Based on the measurements above noted, Mr. Frisbie estimates the amount of sand liable to fall into the canal by way of wind transport at the time of the most severe wind storms at not to exceed three-hundredths of 1 per cent

of the water carried in the canal—an amount so small as to insure its complete carriage in suspension by the water.

4. These general conclusions regarding the quantity transported as blow and drift sand have been justified by the experience with the new concrete-paved road which has recently been completed through that section of the country. The actual amount of sand accumulating on the roadway has been found to be surprisingly small, and there has never been any difficulty in maintaining the road clear and suited for travel.

5. These same general conclusions have been confirmed by many years' experience with the Suez Canal, which passes through desert abounding in sand dunes and subject to driving and drifting winds. Fears were entertained and prophecies were made regarding trouble to be feared from this cause, but time and experience have shown them to be without foundation.

6. Whatever the conditions might be with the sand dunes and the winds as they are, it is to be anticipated that a stretch of the canal bank on the prevailing windward side will be irrigated from the canal, and under these conditions experience shows that various forms of vegetation can be maintained either low growing and cover forming or shrubby and small treelike, in any case forming an effective sand break and greatly decreasing the amount which might otherwise fall into the canal.

From the above it seems a fair conclusion that while the blow and drift sand will present a problem in connection with the maintenance of the canal there seems no ground whatever for counting this problem as one of serious or of controlling importance, and in no case as likely to involve an item of expense of any serious import in connection with the operation of the canal.

General references

Problems of the Colorado River Basin, 1924 [1], p. 80.
Hearings, 69th Congress, 1st session, S. Res. 320, pp. 59, 227, 272, 296.
Hearings, 68th Congress, 2d session, S. Res. 727, p. 179.
Hearings, 68th Congress, 1st session, H. R. 2903, p. 1658.
Report, All-American Canal Board, 1919.
Hearings, 69th Congress, 1st session, H. R. 6251 and 9826, p. 20.

GENERAL PLAN OF DEVELOPMENT

From the preceding discussion of the elements in the existing situation which present problems for consideration, it is clear that, in a broad way, relief must be sought in the provision of capacity for reservoir storage and control. And furthermore that such reservoir capacity must be viewed in relation to the three measurably distinct purposes:

1. Control of floods.
2. General seasonal or time control.
3. Storage of silt.

At the same time it is clear that reservoirs require dams and that dams and reservoirs with regulated flow supply the conditions for power, while power with reservoirs and silt removal supply the conditions for municipal and domestic water.

The entire problem centers, then, about the provision of dams and reservoirs.

But any step or steps taken with primary reference to the problems of to-day or for the relief of the present situation should form a part of a larger and fully comprehensive plan for the development and control of the river as a whole.

It seems therefore appropriate at this point to consider the general principles which should control in the study of any such general plan for the development and control of the river as a whole.

Any comprehensive plan for the development and utilization of the Colorado River as a natural resource should be made in accordance with the following general principles.

The useful products to be derived from the river are:

1. Water for irrigation.
2. Water for domestic use.
3. Power.

[1] In manuscript form, Bureau of Reclamation.

At the same time, any such general plan must also provide for the relief, to the maximum practicable degree, from dangers and disadvantages inherent in the condition of present unregulated flow.

These are primarily three in number:

1. Danger from flood menace.
2. Danger from drought.
3. Dangers and disadvantages arising from presence of the silt burden in the waters of the river.

As has been shown, flood and silt menace are closely interrelated and interdependent.

To realize the first two of these useful products in the maximum degree, provision must be made for storing flood waters and preventing run-off to the sea, except as may be permitted, and generally for regulating and controlling the flow in accordance with the requirements of the time. The same provision will secure relief from drought menace.

To secure relief from flood menace, provision must be made for holding back and storing the flood discharge of the river with a regulated maximum discharge rate which experience has shown to be safe with reference to the elements which enter into the problem of flood menace.

To secure relief from the consequences of the silt burden carried by the river, provision must be made for holding back and storing this silt burden and thus preventing its passage to the lower reaches of the river.

To realize the third useful product, provision must be made for dropping the water from a high level to a lower level and thus of utilizing to the highest practicable degree the natural fall of the river from the headwaters to its point of discharge into the sea.

There are comparatively few rivers where the topogrgaphic conditions are such as to permit of a full impounding and a 100 per cent regulation and control of the stream flow. Fortunately the Colorado River is a stream where the topographic conditions will readily provide storage reservoirs adequate for the ultimate complete impounding of the full product of the watershed and its complete regulation and control in accordance with the requirements of the time.

The general plan should therefore contemplate such reservoir capacity as will make possible this ultimate ideal.

Again, there must be a natural balance between the size and distribution of the various reservoirs and the location and requirements of the territory to be served. Thus in the upper basin States there will naturally be reservoirs on the principal tributaries or branches which go to make up the main stream, and each such reservoir should be proportioned in capacity in accordancea with the amount of unregulated flow which it will receive, taken in conjunction with the amount and character of the flow which it is expected to deliver. And the same general principle will hold for all reservoirs on the main stream and throughout the entire system. In general, each reservoir must be capable of transforming the flow which it receives into the flow which it is desired that it should give.

There seems no doubt but that the topography of the Colorado River and its tributaries will abundantly provide in many alternate ways for the realization of these general conditions.

With reference to flood and silt control it is clear that the reservoir or reservoirs intended for such purpose should be located, if possible, below all important flood and silt bearing tributaries.

Again, since the reservoir capacity to be reserved for silt storage can not be considered as available for either flood or general river control, and since the two latter should be largely independent, it is clear that the total reservoir capacity required should be based on the summation of these various requirements individually.

Again, with reference to power, we are dealing with a product which depends on both water and head or fall, and the ideal plan would therefore contemplate the utilization of the maximum amount of water carried through the maximum amount of drop or fall. The ultimate maximum of head would be, of course, the entire fall from head waters to the sea and the ultimate maximum with regard to water would be the entire annual discharge of the river.

Actually where the plan of development must be carried out by a series of dams and reservoirs, neither of these ultimate ideals can be realized.

There must be a certain surface gradient from the head of a given reservoir to the dam, and in consequence the level at any given dam or power plant

must be lower than that of the tail water discharge at the power plant next higher on the river. It results that there must be some loss of head in passing from one plant or site to the next and that in the aggregate there will be a resultant over-all loss of said head, greater in general as the number of dams and reservoirs is greater.

Likewise with regard to water, the formation of reservoirs for storage and control must necessarily increase the surface area exposed to evaporation, and as a result of such excess evaporation there will be loss of water as compared with present river conditions.

It is further evident that such a utilization of head may be realized in a vast variety of ways and with no difference whatever except as the number of reservoirs may influence the aggregate amount to be subtracted for reservoir gradient. In particular it is clear that such a program of power development might be carried out with a small number of high dams and large reservoirs, or with a large number of low dams and small reservoirs, or with any combination of high and low and with no difference in total head except as noted above.

Referring again to loss of water through excess evaporation, it is clear that generally speaking the higher the dam and the larger the reservoir the greater will be the surface area as a whole and likewise the greater the average width and hence the greater the surface area per mile of river length. It follows, therefore, for a given river length, if the dams are high and few in number with the reservoirs large, that the aggregate reservoir surface area will be relatively large, while with the dams low and many in number with the reservoirs small, the aggregate reservoir surface area will be relatively small. But loss of water by evaporation is proportional primarily to the surface area. It is influenced also to some extent by depth, the shallower the reservoir, at least within limits, the greater the loss by evaporation. It follows, therefore, that for a series of reservoirs few in number and large in capacity the loss by evaporation over the same river length will be greater than for a series many in number and small in capacity, and that such loss will be proportional to the surface area except as it may be reduced by the greater depth of the larger reservoirs.

On the other hand, with dams and reservoirs many in number and with aggregate capacity relatively small, there will be hazard of inadequate storage capacity and of loss of water during flood periods.

Again, under the same conditions, the fluctuations in reservoir level will be increased, with consequent reduction in mean effective head for power and loss of power due to this cause.

At this point the relative costs of such alternate modes of development must be considered. In the building of dams, one of the chief items of expense is in the foundation and it may result that the building of a large number of small dams with the multiplication of preliminary "set up" work together with the multiplied costs of foundations may result in an overall cost for a given stretch of river greater than for a lesser number of larger and higher dams with correspondingly larger reservoir capacities. To this must also be added the generally greater costs per unit of power developed for small installations as compared with large.

From the sole point of power development over a stretch of river, we have therefore, for the choice of many low dams and small reservoirs, the following:

1. Reduced losses of water by evaporation.
2. Increased loss of head due to the aggregate of reservoir gradients.
3. Increased loss of head for power due to the wide fluctuations of reservoir level.
4. Likelihood of loss of water during flood stages of the river.
5. Costs generally increasing in the aggregate with small installations as compared with large.

For the choice of few high dams and large reservoirs, the indications are, of course, the contrariwise.

In any such case therefore it is clear that there will be some intermediate condition for which the combination result will be most favorable, giving to each element its proper value for the particular case. Such would then be an economic size of dam and reservoir for this particular set of river conditions and topography, viewed, however, solely from the requirement of power production.

However, it must be remembered that it has never been assumed that the conditions for power should be controlling. On the other hand, it has been accepted as the reasonable and proper policy that conditions as affecting flood control, storage for irrigation and domestic use, and for general river regulation should take precedence over power except as the sale of power may enter as a factor in considering the economic feasibility of any given project.

And finally, in the study of any plan for the development of the entire river, the end will be held constantly in view of selecting such a combination of dam and reservoir sites with heights of dam appropriate, as to give the optimum combination of these various desired features, including flood control, silt storage, general river regulation, supply of water for irrigation and for domestic use and power development, and all for the minimum total final cost.

It must be noted, however, that in the present condition of information regarding the Colorado River, especially as regards the character of possible dam sites and the detailed topography of possible reservoirs, it is not practicable to make any general study of this character. With the lapse of years and the accumulation of information regarding these matters, it will become possible to approximate more and more nearly to the elements of such a final solution. In the meantime, we must perforce depend on the exercise of the best judgment possible regarding the first steps to be taken.

General references

Hearings, 69th Congress, 1st session, S. Res. 320, pp. 532, 796, 890.

Hearings, 68th Congress, 1st session, H. R. 2903, pp. 964, 969, 1119, 1062, 1088, 1134, 1774, 1226, 1250.

FIRST STAGE OF DEVELOPMENT

Turning again to the conditions in the Southwest most urgently pressing for relief and to other collateral elements, all as entering into the general problem and as set forth in preceding sections, we are now in a position to ask as to what should be the first step in any general plan of river development, and as especially directed toward securing the maximum amount of relief for the present conditions as indicated.

From the various findings of fact and considerations adduced, it seems clear that the first stage of development on the Colorado River should comprise the most wisely weighted selection among the following desirable characteristics:

1. It should fit in as an element or part of a general scheme or plan for the ultimate development of the entire river.
2. It should provide reservoir capacity for silt storage of not less than some 5,000,000 to 8,000,000 acre-feet.
3. It should provide reservoir capacity for flood storage of 8,000,000 to 10,000,000 acre-feet.
4. It should provide additional river regulation and general storage capacity as large as may be consistent with other important requirements, and presumably in no case less than 10,000,000 to 12,000,000 acre-feet.
5. It should be located below all important flood-bearing and silt-bearing tributaries in order that through this one reservoir alone, as a first step, the maximum flood, silt, and general control may be realized.
6. It should lie as near as practicable to the areas of irrigable land which are to be served with water under control by the reservoir to be formed.
7. It should provide for the development of the maximum amount of power compatible with the other conditions, in order that the sale of this power may enter as an important or controlling factor into the economic feasibility of the undertaking.
8. It should be located as near to power-market territory as possible, in order that the transmission charges between power house and consumer may be a minimum.
9. For the best combination of these various features, the capital cost should be a minimum.

THE BOULDER CANYON DEVELOPMENT AS A PROPOSED MEASURE OF RELIEF FOR PRESENT CONDITIONS ON THE LOWER COLORADO RIVER

The construction of a dam and reservoir at Boulder Canyon is proposed as a measure of relief for the conditions discussed in the preceding paragraphs and as the first stage in the general program for the development of the river. The chief characteristics of this proposed development may first be briefly noted.

In order to avoid confusion with the name it should be noted that the name Boulder Canyon dam and reservoir was first given to a proposed dam to be located in Boulder Canyon and to the reservoir formed thereby. Subsequent investigation gave evidence that a site some 20 miles lower by the river, and located in Black Canyon, might be more advantageous in certain respects. The reservoir, in either case, would flood approximately the same territory.

Actually, therefore, it is one project with a choice of two dam sites and in order to emphasize this viewpoint it has seemed desirable to retain the original name for the general project. When, however, it is desired to distinguish the Black Canyon site and development in a specific manner it may be designated as the Boulder (Black) Canyon project or development.

Referring then in specific manner to the Black Canyon site the principal features of the proposed development may be noted.

These comprise a dam giving a reservoir level with maximum elevation above mean low water level of about 550 feet and with a total storage volume of 26,000,000 acre-feet.

Such a reservoir would extend up stream about 118 miles by the river, giving a 10-foot difference in level between maximum elevation at the dam and mean low water level at Bridge Canyon, an apparently available dam site at this point.

It is understood that the entire economic aspect of the project will turn on the development and sale of electric power generated at the dam site for transmission and sale in the nearest and best markets.

It will be necessary therefore to consider in some detail these questions of power and of available market for the same.

AMOUNT OF POWER TO BE ANTICIPATED FROM THE BOULDER (BLACK) CANON DEVELOPMENT

The amount of power which can be realized from any given hydraulic power site depends on three primary factors:

1. The average head available.
2. The average flow.
3. The efficiency of utilization.

The elevation of water level assumed is 550 feet giving a storage reservoir of 26,000,000 acre-feet capacity.

The average head available will depend on the seasonal and annual variations in flow, taken in conjunction with this amount of storage. With a large flow in the river, as at the present time, and without other storage, the average head available will presumably not be greater than 450 feet and may be less. With reduced flow and with other storage, as contemplated at a later stage of general river development, the available head may be held close to the full height of dam.

The average flow may be viewed under two sets of conditions:

1. For a period of years after the completion of the project and in advance of any extended further demand for water in the upper basin.

2. With full ultimate development in the upper basin and with only the average discharge of 7,500,000 acre-feet passing Lees Ferry together with the flow of the tributaries between Lees Ferry and Boulder Canyon.

The annual discharge may thus vary from a present value at Boulder Canyon of some 16,000,000 acre-feet to perhaps 9,000,000 or 10,000,000 acre-feet or from a rate of flow of about 22,000 second-feet to some 12,000 to 14,000 second-feet.

The over all efficiency of utilization depends upon the combined efficiency of the hydraulic and electrical apparatus employed. The figure employed by engineers of the Reclamation Service is 0.83 which seems reasonable and proper, having in view the established results of modern engineering practice in regard to these factors.

The amount of power estimated by the engineers of the Reclamation Service is 550,000 firm horsepower, with a mean head of about 430 feet and corresponding to a mean flow of 13,000 second-feet.

Using this same value for the overall efficiency, we then have combinations of head and flow, as in the following table, any or all of which would give the 550,000 horsepower as assumed in the economic estimates.

Head (feet)	Flow (second-feet)		Head (feet)	Flow (second-feet)	
	Efficiency =0.83	Efficiency =0.80		Efficiency =0.83	Efficiency =0.80
450	10,810	11,220	460	12,700	13,180
520	11,230	11,650	440	13,270	13,770
500	11,680	12,120	420	13,900	14,420
480	12,170	12,630	400	14,600	15,150

During the early years of operation, therefore, and with relatively wide fluctuations of reservoir level there will nevertheless be an excess of water and the assumed power should be realized, while in later years, with reduced flow, and enlarged total reservoir capacity on the river, the average head may be maintained at the higher figures, again giving assurance of the power as estimated.

If for any reason somewhat lower efficiencies should be realized, bringing the over-all figure down to 0.80 (a value certainly lower than reasonable expectation should warrant) the corresponding figures for flow are as shown in the second column of the table. Even with this reduced figure for efficiency, the combinations of head and flow are well within what may be reasonably counted on, either under present or more remote conditions or river flow.

COST OF POWER FROM BOULDER (BLACK) CANYON DAM AND RESERVOIR

The cost of electric power from a hydroelectric installation depends on the following chief factors:

1. The cost of the plant and structures; that is, the amount of capital required.
2. The fixed charges on the same.
3. The costs of operation.
4. The load factor on which the plant can be assumed to run; that is, the amount of useful product for which a market can be reasonably assumed.

With regard to plant and structures, the estimates developed by the engineers of the Reclamation Service, and in particular as set forth in the Weymouth report and supplements thereto, have been carefully examined and independently checked in many important features.

From this study the estimates of total quantities are believed to be correct and the unit prices reasonable and proper, at least in so far as such can be assumed for a period of years in the future. It results that the figures of cost for the dam and hydraulic structures seem reasonable and fair, assuming that the general plan of construction can be carried through as contemplated. It follows that the only ground for question with regard to these estimates would lie in the possibility of the development of some contingency or condition not contemplated in the program of construction.

Regarding this point it should be noted that while the proposed dam and hydraulic structures are greater in magnitude than anything of which we as yet have had experience, they nevertheless involve basic operations which are all well known and familiar in the engineering art of the present day. It will, of course, be admitted that in an undertaking of this magnitude the carrying through of a particular program of construction without trouble or setback can not be completely insured in advance. On the other hand the program of construction as proposed is the result of most careful study on the part of eminent and experienced engineers and has further had the benefit of serious and extended examination and criticism on the part of eminent engineers in civilian life. As the result of this examination and criticism it seems

a fair conclusion that the plan as proposed embodies the elements best calculated to insure a successful program of construction, and that so far as human foresight and sound engineering judgment can provide, the plan should carry through without serious modification or delay.

It follows that within what may be called a reasonable business hazard, the estimates for the dam and appurtenant structures should be accepted for what they purport to be, viz. the best estimates which human foresight and careful engineering study can furnish for these elements of the undertaking.

With regard to the power house and its equipment of hydraulic and electrical machinery, there is relatively sure ground in wide experience and in builders estimates, and the figures given may be reasonably accepted as reliable within a relatively small margin of probable variation.

The subject of the cost of the all-American canal has been dealt with in a separate section under that heading and to which reference may here be made.

The annual charges must include provision for interest, redemption, operation, and maintenance. The item of depreciation will be very small on the structures contemplated, and may be considered as included in the item for maintenance.

Interest is taken at 4 per cent. The annual charge for redemption must be sufficient to repay in full within the period of 50 years, and perhaps preferably in a shorter period if practicable.

The cost of operation and maintenance are well known for hydroelectric-power plants of the character contemplated and while the proposed plants will be of exceptional magnitude, these costs admit of close estimates and rest upon extended and well established precedent.

The same in general is true with regard to the all-American canal.

The general estimates by the Bureau of Reclamation for the structures proposed at Boulder Canyon and for the all-American canal are as follows:

Dam	$41,500,000
Power house and equipment	31,500,000
All-American Canal	31,000,000
	104,000,000

To this is added, for interest during construction, the sum of $21,000,000 making a total of $125,000,000. The amount added for interest during construction is in round figures, the interest on $104,000,000 for five years time at 4 per cent implying in general a 10-year period of construction.

It may be noted at this point that while the period of 10 years for the construction of the dam would seem to be in accordance with good engineering judgment, it may be doubted if the same length of time is necessary for the other two items. While the actual period of investment in the power house and equipment might extend over a period of perhaps 8 to 10 years, a portion at least will only be expended as required by the increasing demand for power, and it seems likely that the net construction period for interest payments on this item of the project might be perhaps not longer than 6 years on the average instead of the 10 as assumed, with interest on the full amount for 3 years instead of 5. The same would also seem likely in the case of All American Canal. An undertaking of this character can be attacked at a multiplicity of points and its completion presumably insured within a period of time definitely less than the 10 years assumed.

The purpose of this comment is to point out that to the extent to which there might be some saving in this item of interest during construction, to the same extent is there further allowance for contingencies in the general estimates of cost and return. Any possible saving on this item might be considered as increased margin for construction costs or as partial insurance against inadequate revenue during the early years of operation of the project.

Adopting therefore the $125,000,000 as the total capital sum, it will be of interest to examine the possibilities of operation and of repayment upon a program involving the following features:

1. Operation during an initial period of say 5 to 10 years during which no specific or set sums are to be set aside for redemption; the only charges for which definite provision is made being interest, operation, and maintenance.

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2. Full redemption of the capital of $125,000,000 within a further period of time which might vary from 25 to 40 years, depending on the total time within which it is desired that the repayment be completed.

It may be expected that actual experience during an initial period of 10 years would show a result better than that contemplated in (1). To the extent to which this might be so, to a corresponding degree would the actual results outrun the program.

The object of this proposed initial period of 10 years during which no bonds are to be called is for the purpose of giving to the bond issue a more desirable character from the viewpoint of the investor, and likewise to reduce the burden on the project during the early or development stage and before full returns could be assumed.

Redemption of bonds may be carried out in either of two ways:

1. By the usual annuity accumulation, where the entire amount is retired at the end of the given period.

2. By the use of a fixed annual payment for both interest and redemption, year by year, the balance after payment of the interest on the residual principal being applied to redemption.

It is well known in annuity theory that with the same rate of interest, these two methods will produce the same results. Presumably, however, the latter method would be preferred for the practical handling of the problem.

The Bureau of Reclamation estimates for operation and maintenance are as follows:

Storage and power	$700,000
All-American canal	500,000
Total	1,200,000

These figures, for normal operation and maintenance, appear perhaps ultra liberal, or otherwise they may be considered as involving a generous margin for contingencies.

Suitable computations, then, with these figures for operation and maintenance give, for varying periods of actual redemption, results as in the following table:

Redemption period	Combined interest and redemption payment	Total annual payment including operation and maintenance
Years:		
25	$8,000,000	$9,200,000
30	7,229,000	8,429,000
35	6,697,000	7,897,000
40	6,315,000	7,515,000

On the other hand, for the initial period of years and without redemption, the annual payments would cover, as a minimum, interest, operation, and maintenance, or a total of $6,200,000.

On the basis of some such scheme of redemption, it next becomes necessary to examine the sources of revenue which may be counted on to insure a gross return of not less than some $6,200,000 for a first period of years, followed by annual payments of from $7,500,000 to, say, $9,000,000 per year, depending on what total period is taken for the repayment of the capital sum.

The total revenue from sales of water has been estimated by the Bureau of Reclamation at $1,500,000. If this figure be reduced to $500,000 for the average of the first 10 years, say, it will leave for this period a balance of $5,700,000 to be realized from the sale of power.

On the other hand, for the following 30 years, assuming a 40-year period over all subsequent to completion of the project, and assuming a full revenue of $1,500,000 over this period, the amount to be realized from the sale of power will be $6,929,000, with similar figures for other periods of total repayment, as shown in the following table:

Redemption period	Revenue required from power assuming $1,500,000 from water	Sale price assuming product of 3,600,000,000 kilowatt-hours
Years:		*Cent*
25	7,700,000	0.214
30	6,929,000	.192
35	6,397,000	.178
40	6,015,000	.167

If the revenue from water be reduced to $1,000,000, the figures become—

Redemption period	Revenue required from power, assuming $1,000,000 from water	Sale price, assuming product of 3,600,000,000 kilowatt-hours
Years:		*Cent*
25	8,200,000	0.228
30	7,429,000	.206
35	6,897,000	.192
40	6,515,000	.181

Turning, now, to the question of the amount of revenue to be derived from power, reference may be made to the firm power to be counted on from the Boulder Canyon installation as discussed in the section under that heading. It is there shown reasonable to count upon a continuous or firm power of 550,000 horsepower, or, in round figures, on 3,600,000,000 kilowatt-hours sale product at the power-house switchboard.

The load factor which can be assumed for the plant will depend on the character of the demand for electric power in the territory in which the product of the plant is to be sold. In the present case it seems reasonable to assume that the market in which power from Boulder Canyon will be marketed will in general have the demand characteristics of Los Angeles and of southern California generally. For this the value of 55 per cent has been taken, which seems reasonable and proper, taking the known characteristics of the electric demand in southern California as a general standard.

This load factor of 0.55, taken with the firm power above, implies a peak load or station capacity of 1,000,000 horsepower, and this figure is used as the basis of all power-house estimates of cost.

With the above product at the switchboard, it then becomes necessary to examine the possible market within economic transmission distance for such an amount of power.

Regarding this question it may be noted that the record of the various hearings before Congress is particularly full on this point and gives strong evidence for the conclusion that by the time the dam and plant could be completed the demand due to normal growth in the territory susceptible of economic service from Boulder Canyon should be sufficient to absorb a very large percentage of the available power from the plant; and that within a period of two or three years from completion a market should be found for the entire product.

A careful independent study of this subject by Messrs. Ready and Butler, consulting engineers, of San Francisco, and the details of which have been carefully examined by the undersigned, support these same general conclusions.

Without entering into the minor details of these estimates, it would appear that an average sale price of 2¢ per kilowatt-hour realized over the first 10 years of operation and applied to 79 per cent only of the normal full output of the plant, would for this 10-year period furnish $57,000,000, and which, with $5,000,000 for the same period assumed from water, would make up the $62,000,000 needed over this 10-year period for interest, operation, and maintenance.

The following table shows similarly, for varying average sale prices at the canyon, the percentage of the total normal product to which they must be applied in order to realize the same results, and, conversely, the same percentages for which it might be assumed no market whatever could be found.

Average sale price per kilowatt-hour	Fraction of total normal output for which market must be found	Fraction of total normal output for which it may be assumed no market is found
Cent	*Per cent*	*Per cen*
0.18	0.879	0.121
.19	.833	.167
.20	.792	.208
.21	.754	.246
.22	.720	.280
.23	.688	.312
.24	.660	.340
.25	.633	.367

It would seem proper to expect that somewhere within the limits of such a range of operative conditions may be found a well assured business prospect for these first years of operation, during which the market must be developed and assured.

Assuming the same operating charges with the same income as above for the period of bond redemption, it is of interest to examine the effect of an increase in the assumed capital sum due to contingencies or unforseen causes of any character whatever.

To this end the following table is given:

Period of bond redemption	Capital sum		
	$130,000,000	$135,000,000	$140,000,000
Years			
25	0.223	0.232	0.241
30	.200	.209	.217
35	.185	.193	.200
40	.174	.181	.188

Sale price per kilowatt-hour at power-house switchboard to cover interest, operation, and redemption within the period stated.—It would thus appear that there is a very considerable possible margin of increase in the investment (if for any reason such increase became necessary) without exceeding, for the 30-year period of redemption, a sale price of 0.22¢, and with lower figures for longer periods of time.

It is obvious that the details of such a financial set-up may be endlessly varied. Without somewhat higher sale prices assumed, the margin against uncertainty could be correspondingly increased, or otherwise the revenue to be assumed from water could be correspondingly reduced. Thus, with an assumed sale price of 0.25¢, the revenue from power alone would serve for total operation and maintenance and for the redemption of the capital sum in about 26 years or in any longer period with a still higher margin for contingencies.

Or otherwise, higher returns from water than those assumed would permit of still lower possible prices for power, or again might be assumed as counting toward increased insurance against contingencies or future uncertainties.

It would thus appear that, with a fair and reasonable margin of safety, it should be possible to meet all the financial requirements of the project with a sale price of power at the power house close about 0.20¢ per kilowatt-hour, while a sale price of 0.25¢ should produce a situation with a large margin for uncertainties and contingencies, or otherwise permitting of repayment of the principal sum over a period of years definitely shorter than as assumed above.

In connection with the general subject of the economic aspect of the Boulder Canyon project, it is to be assumed that the Secretary of the Interior, in making contracts, especially under the general head of water service, will take under due consideration, on the one hand, the value of the service or relief rendered, and on the other the economic condition and capacity for payment on the part of the communities served. Under these conditions it may well result that the income under the general head of "water" will considerably exceed the $1,500,000 assumed in these estimates, and in such case the excess as above noted would stand as a still further margin against conditions at present unforeseen, or otherwise would shorten correspondingly the total time for the repayment of the capital sum.

COST OF DELIVERY OF POWER AT CONSUMER'S RECEIVING STATION

In order to determine the general economic aspect of Boulder Canyon power, an estimate of its price must be made at the consumer's receiving station, which, for purposes of the problem, has been assumed to be distant about 300 miles from the generating plant. The cost of power transmission is moreover closely dependent on the amount transmitted, and, to make the problem definite, this amount has been taken at 350,000 firm horsepower, or about 260,000 kilowatts at a load factor of 55 per cent, and hence with a peak load of about 470,000 kilowatts. Careful estimates, based on the schedule of charges and costs applicable to a municipal or publicly owned organization, indicate, per kilowatt-hour received at the consumer's main receiving station, a transmission cost of about 0.16¢.

Further, the loss of power in transmission has been taken at 12 per cent. Hence the effective cost at the receiving end at a point 300 miles distant will be found by dividing the sale price at the power-house switchboard by 0.88 and adding thereto the 0.16¢ for transmission.

The relation between the two costs at the power house and at the receiving station is shown by the following table:

Sale price at power house	Effective cost at receiving station	Effective cost including steam reserve
Cent	*Cent*	*Cent*
0.18	0.365	0.415–0.445
.19	.376	.426– .456
.20	.387	.437– .467
.21	.399	.449– .479
.22	.410	.460– .490
.23	.421	.471– .501
.24	.433	.483– .513
.25	.444	.494– .524

Costs of Boulder Canyon power at a market point 300 miles distant, including transmission and allowance for steam reserve, public ownership.—In order to develop the full comparison of Boulder Canyon power with power from competitive sources, the question of steam auxiliary or reserve for Boulder Canyon power must be considered. If such an amount of power as 350,000 firm horsepower or any considerable part of the Boulder Canyon output is to be brought a distance of 300 miles and compete with steam power generated on the spot, it must be compared on the basis of equal reliability. For many years to come it may be assumed that the water supply at Boulder Canyon will be adequate for the power contemplated, but there will be some hazards in transmission and these must be balanced by some installation of steam reserve.

The amount of such reserve to be considered as attributed to Boulder Canyon power will depend to some extent on how it is assumed to be fitted into the general picture of the power supply of southern California as a whole, and its cost chargeable to Boulder Canyon will vary according as it is considered strictly as a reserve or emergency station or as it may be assumed to be run in part on a high load factor, thus carrying a part of the base load. Various estimates in accordance with these alternate suggestions, and again referring primarily to a municipal or publicly owned plant, indicate an additional cost

per kilowatt-hour chargeable to Boulder Canyon power of 0.05¢ to 0.08¢, due to the need of some measure of steam reserve at the market end of the transmission line.

The final resultant costs of Boulder Canyon power at a market 300 miles distant and including cost of transmission and allowance for steam reserve—all as based on various sale prices at the power house, are shown in the accompanying table.

A comparison between these costs and those for steam power, under the various assumptions made, will serve to show the character and extent of the margin between the costs of power from the two sources, and will indicate the general schedule of prices at the power house within which it would be desirable to hold Boulder Canyon power in order to give to it any desired or specified margin of advantage over the cost of steam power, all with reference to publicly owned operation.

In the case of a privately owned plant and operation, the rates of fixed charges will be greater than in the case of public ownership and operation. In the general case, similar to the preceding, the indicated costs of transmission per kilowatt-hour are about 0.21¢ and the additional cost per kilowatt-hour for a suitable support in the form of steam reserve, from 0.06¢ to 0.08¢.

In the place of the preceding table, therefore, giving the cost applicable in the case of public ownership, the following prices are indicated for the case of private ownership.

Sale price at power house	Effective cost at receiving station	Effective cost, including steam reserve
Cent	*Cent*	*Cent*
0.18	0.415	0.485–0.515
.19	.426	.496– .526
.20	.437	.507– .537
.21	.449	.519– .549
.22	.460	.530– .560
.23	.471	.541– .571
.24	.483	.553– .583
.25	.494	.564– .594

Costs of Boulder Canyon power at a market point 300 miles distant, including transmission and allowance for steam reserve, private ownership.—As in the preceding case, then, a comparison of such resultant costs of Boulder Canyon power with all steam power and private ownership will indicate the sale price of the former at the Canyon necessary in order to realize or maintain any specified margin or difference between the two.

General references

Problems of the Colorado River Basin, 1924,[1] Vol. I, p. 11, 13, 20, Vol. V, Vol. VIII, Supp. pp. 1–5, 11–30, 99–350.
Hearings, 69th Congress, 1st session, S. Res. 320, pp. 77, 532, 629, 796, 890.
Hearings, 69th Congress, 1st session H. R. 6251 and 9826, pp. 9, 24.
Hearings, 68th Congress, 2d session, S. Res. 727, pp. 88, 98, 105, 1155.
Hearings, 68th Congress, 1st session, H. R. 2903, p. 1155, 1383, 1393.

THE COST OF STEAM POWER IN SOUTHERN CALIFORNIA

The cost of steam power in southern California is of importance in connection with the general economic problem of the Colorado River, since power from the latter must come into competition with power in southern California, generated upon its own ground.

It will presumably be accepted without discussion or argument that power from the Colorado River can be marketed in southern California at rates lower than those suited to the present hydraulic developments in that territory, or to any which can be foreseen in the future.

Regarding steam power, however, recent years have witnessed marked improvements in fuel economy and reductions in cost per unit of output, and the

[1] In manuscript form, Bureau of Reclamation.

probable future trend of progress regarding power from steam is by no means as clear as it seems to be with regard to power from hydraulic sources.

The elements in the cost of power from steam are as follows:

1. Cost of plant or capital investment.
2. Cost of fuel.
3. Operation and maintenance.
4. Fixed charges.

The undersigned has had occasion in recent months to direct an extended investigation bearing upon the subject matter of this section, and the results of which may be given in summary form herewith.

We may first consider the results to be expected from modern high-grade installations with steam pressure of 550 to 600 pounds per square inch and with a steam temperature of about 700° F., and including series feed-water heating and perhaps steam reheating as well.

1. For such plants the capital investment per kilowatt capacity will vary from $100 for large installations and favorable conditions to $110 or $115 for smaller installations or less favorable conditions. These figures, however, do not include land. This is so variable a feature that it can be hardly introduced into the estimates in any consistent way. Except in special cases, its effect on the final cost of power is slight.

2. At the present time the cost of fuel oil is about $1 per barrel. Certain users of fuel oil at the present time, however, are understood to be enjoying the advantage of a considerably lower price due to the terms of long-time contracts made some years ago when the prevailing prices were $0.70 to $0.80 per barrel.

Users of oil fuel are able also to realize marked economies by the installation of a double system of combustion, suited alternately to oil or to natural gas. Favorable contracts for such gas have been made (and are understood to be now operative) which give heating values equivalent to oil at about $0.80 per barrel.

On the other hand, it is understood that no time contracts for oil of any extended duration can now be obtained at any such price as $1 per barrel. The future trend of the price of fuel oil, looking forward to a period of 10 years, is doubtful in the extreme, and for longer periods of time is quite beyond the reach of any reasonable basis of estimate.

Without going here into details, the broad facts are these:

We are unquestionably exhausing our liquid-oil reserves.

A few years ago it was estimated that at the then rate of production such reserves would be practically exhausted in a period of 20 to 25 years.

Since those estimates some new fields have been discovered.

Methods of extracting oil from the ground are improving.

The demand is constantly increasing.

Enormous reserves are available in the oil shales, awaiting only the development of some economic method of extraction of the oil from the rock. No methods are at present known which will produce such oil in competition with its extraction in liquid form from the ground.

While California territory has been generally prospected for oil, there may be still large fields as yet unknown and uncounted. The same is, of course, true of other territory in the United States and to still higher degree in the world at large.

In a situation of such complexity and with such diverse and unknown elements the uncertainty of any forecast regarding the cost of fuel oil over any period of future time is clearly apparent. It may seem proper to conclude that over a long period of years the probabilities will be for a rise in price rather than for a fall, but as to how much or how soon, it is quite impossible to forecast.

In considering fuel-oil prices over any considerable period in the future it would seem proper to use figures of $1, $1.25, and $1.50. The first as possibly representing present conditions or those in the very near future while the higher figures seem within the limits of probability for a future period of any considerable extent.

In this connection it should also be noted that prices of power based on the low fuel prices which may be enjoyed at the present time as a result of earlier favorable contracts have no significance in the present inquiry, since the competition of Boulder Canyon power with that from steam will be based primarily on the fuel conditions of the next half century.

Following the questions of the cost of fuel per barrel or per unit of sale, there comes the question of heating value and of the cost of power in terms of heat.

California oils are usually taken at about 6,200,000 British thermal units per barrel, which corresponds to about 18,500 British thermal units per pound.

The heat economy of modern high-grade steam power stations may be said to range from about 12,500 British thermal units per kilowatt-hour station output as a minimum to 14,000 for what may be termed the upper level of high-grade practice and on to higher figures for less modern or less economical plants.

The heat economy will also vary somewhat with the station load factor—that is, the ratio between the average station load and the station capacity—but for present purposes the two figures above may be taken as representing for the usual station operating conditions (12,500) the very best which might be expected at the present time and (14,000) the upper average of modern high-grade practice.

On this understanding the fuel costs per kilowatt-hour for the three prices of oil per barrel will be as given in the following table:

Price of oil per barrel	Heat economy, 12,500	(British thermal unit per kilowatt-hour) 14,000
	Cents	*Cents*
$1.00	0.202	0.226
1.25	.252	.282
1.50	.302	.339

Fuel costs per kilowatt-hour.

3. Operation and maintenance for steam power plants are well standardized.

Operation will range from about 0.06 cent per kilowatt-hour for a station-load factor of 40 per cent to 0.04 cent for a station factor of about 60 per cent, with intermediate figures closely in inverse proportion to the station-load factor.

Maintenance will range close about 0.04 cent per kilowatt-hour with small change for station-load factor.

This will give for combined operation and maintenance and for varying station-load factors, costs per kilowatt-hour as in the following table:

Station-load factor	Operation and maintenance per kilowatt-hour
0.40	$0.100
.45	.093
.50	.088
.55	.084
.60	.080

COSTS OF OPERATION AND MAINTENANCE WITH VARYING STATION LOAD FACTOR

4. The rate of fixed charges to be applied in any given case will depend on whether the plant is publicly owned or privately owned, and on the particular scheme of financing which is assumed for the given case. For privately owned plants able to borrow money at some 4½ to 5 per cent and with some allowance for insurance, depreciation, and bond redemption, the over-all charge may vary from perhaps 8 to 9 or 9.5 per cent.

With privately owned plants and higher interest rates, the over-all rate may range from 10 to 12 per cent.

Again, the fixed charges in money, reduced to the kilowatt-hour basis, will depend on the amount of product sold; that is, on the load factor.

In any specific case the rate of fixed charges applied to an assumed station cost of $110 per kilowatt capacity and the same divided by 8760 multiplied by

the assumed load factor, will give that part of the total cost per kilowatt-hour attributable to the fixed charges.

In order to show the over-all cost per kilowatt-hour for varying rates of fixed charges and for load factors close about that assumed for Boulder Canyon. and likewise for varying costs of fuel oil, the following tables have been prepared.

Rate of fixed charges	Station-load factor		
	0.50	0.55	0.60
	Cents	*Cents*	*Cents*
0.08	0.515	0.493	0.473
.09	.540	.516	.494
.10	.565	.538	.515
.11	.590	.561	.536
.12	.615	.584	.557

Costs of steam power at 14,000 British thermal units per kilowatt-hour and oil at $1 per barrel.

Rate of fixed charges	Station-load factor		
	0.50	0.55	0.60
	Cents	*Cents*	*Cents*
0.08	0.571	0.549	0.529
.09	.596	.572	.550
.10	.621	.594	.571
.11	.646	.617	.592
.12	.671	.640	.613

Costs of steam power at 14,000 British thermal units per kilowatt-hour and oil at $1.25 per barrel

Rate of fixed charges	Station-load factor		
	0.50	0.55	0.60
	Cents	*Cents*	*Cents*
0.08	0.628	0.606	0.586
.09	.653	.629	.607
.10	.678	.651	.628
.11	.703	.674	.649
.12	.728	.697	.670

Costs of steam power at 14,000 British thermal units per kilowatt-hour and oil at $1.50 per barrel.

If, instead of an economy of 14,000 British thermal units per kilowatt-hour, the very best figure of which we have present record, be taken, viz, 12,500, the above figures of cost would be reduced as follows:

Oil at $1, reduction per kilowatt-hour of 0.024 cent; oil at $1.25, reduction per kilowatt-hour of 0.030 cent; oil at $1.50, reduction per kilowatt-hour of 0.037 cent.

A reduction in the capital cost of $10 per kilowatt capacity would furthermore reduce the cost per kilowatt-hour by an amount varying from 0.013 cent to 0.028 cent, according to load factor and rate of fixed charges, but averaging close to 0.02 cent.

There are within the present horizon of the production of power from fuel sources certain lines of development or of improvement which may influence in marked degree the economic situation in this regard within the next quarter century. The more important of these may be briefly summarized.

COAL FUEL INSTEAD OF OIL

As noted at an earlier point, we are exhausting our oil reserve. If, however, we should develop an economic method for the handling of oil shales, the date of ultimate exhaustion or of definite pinch in supply might be far

removed. However, as is well known, the reserves of coal are vastly greater than those of oil, and coal always stands as a competitor of oil and ready to take its place when and if economic conditions justify. However, so far as can be seen at the present time, there seems no likelihood of coal taking the place of oil in California so long as oil can be obtained at prices of $1 to $1.25 per barrel. If, then, coal is to take the place of oil we may reasonably assume that it will be on the basis of an equated price of oil not less than $1.25 per barrel and presumably greater. It does not appear, therefore, on the basis of the mere substitution of one fuel for the other, and over a future period for which it might seem possible to make any forecast, that any economies in the cost of power are to be anticipated.

ECONOMIES FROM THE PROCESSING OF COAL

The present evidence relating to power-plant economies, possible by the processing of coal and the sale of the by-products, is much confused not to say contradictory.

The following general conclusions, however, seem justified:

(1) In order to secure the economies which ideally assumed conditions would seem to indicate, there must be a balanced condition of market for the various by-products, assuring their regular and complete sale at established market rates.

(2) The program of operation should be on a very large scale—of the order of 10,000 or 20,000 tons of coal per day.

(3) It should preferably be carried on at the mine mouth in order to avoid hauling charges on the coal.

Based on various sets of ideal conditions, corresponding net economies can be figured out for a power plant using the resultant fuel product after the extraction and sale of the various by-products.

Counting the cost of processing as such against the value of the by-products, such net value of the by-products may vary from perhaps $1 to $2 per ton. If then they be set off against the original cost of the coal per ton, the remainder will be the net cost of the residual fuel from a ton of coal. In terms of heating value this remainder will vary from perhaps 65 per cent to 75 per cent of the orginal heating value of the coal.

Thus for example, if the original cost of coal is $5 and the net value of by-products other than fuel is $2, the net cost of the remaining fuel will be $3 and if this is equivalent to 0.75 ton of coal, the cost of fuel will be equivalent to coal at $4 per ton or a saving of $1 per ton in over-all fuel cost.

It would thus appear that with a low price of fuel at the start and with favorable prices for by-products, a marked saving in net fuel prices might be realized. On the other hand with higher prices of fuel at the start, the price realized for the by-products must be correspondingly higher in order to show any net advantage in the cost of heat per British thermal unit.

Broadly this entire subject is too new in its economic aspects to permit of any reasonable forecast regarding the conditions which may develop with the passing years, but it seems very clear that a profound change in the economic and industrial conditions affecting the consumption of coal by-products would become necessary in order to insure the needed market in case any considerable part of our national central station capacity should turn to this method of fuel treatment.

The particular condition which would seem likely to retard, at least, the adoption of such process in California is its relative distance from coal sources and the much greater advantage to be derived from treatment at the mine mouth than at distant points where freight charges must form a part of the cost of the coal to be treated.

MERCURY VAPOR-STEAM TURBINES

The best economy as yet suggested for this type of combined mercury vapor-steam cycle is about 10,000 British thermal units per kilowatt-hour.

If 14,000 British thermal units be considered as representative of high grade modern conditions with steam alone, the saving is 4,000 British thermal units, or about 30 per cent.

If 12,500 British thermal units be taken as representative of the very best present-day conditions, the saving would be 2,500 British thermal units, or 20 per cent.

It seems fair to assume then that the mercury-steam program holds the thermodynamic possibility of an improvement of 20 to 30 or possibly 33 per cent in thermal economy.

Additional capital expenses.—The largest mercury unit yet considered, at least so far as public announcement goes, is of 10,000-kilowatt output plus 125,000 pounds steam at a pressure of about 285 pounds and superheat of 100°. This steam used in a mordern turbine should give approximately 10,000 kilowatts more. The combined unit would thus rate at about 20,000 kilowatts.

The mercury boiler for this unit will contain 135,000 pounds mercury or 13.5 pounds per kilowatt of mercury turbine output or 6.75 pounds per kilowatt or combined unit output.

The present price of mercury is $1.60 per pound with small production at this price. Since 1921 the price has risen from about $0.64 per pound to its present figure, with a world production less by 50 per cent than in 1918. That is, in spite of advancing price, the production has fallen off in marked degree. It has been suggested that a price of $2 per pound should serve to stimulate production to an adequate degree.

If this price be accepted, the investment in mercury per kilowatt of combined unit capacity would be $13.50.

Regarding the cost of the combined unit in itself as compared with an equivalent steam unit, there is, and presumably can be, no definite information. It would seem reasonable, however, to expect a station price for such a combined unit definitely greater than that for a steam unit of equal capacity.

As the most that could be expected from a mercury-steam unit, therefore, we have, possibly, a fuel saving of the order of 9 cents with oil at $1.25 per barrel and partly offsetting this some increase in the fixed charges due to greater first cost of the plant.

Supply of mercury.—The United States production of mercury in recent years has been of the order of 700,000 pounds per year. The maximum recent production was in 1918, which reached a figure of 2,400,000 pounds.

The estimated central station capacity in the United States at the present time is of the order of 50,000,000 kilowatts.

To put this in terms of mercury-steam equipment would require something like 338,000,000 pounds mercury, using the 6.75 pounds referred to above.

The total world production of mercury in 1918 was about three times that of the United States, or 7,200,000 pounds. Considering either the maximum United States production against the possible United States demand, or the world production against the possible world demand, it is clear that a very great increase in production would be required.

Definite figures regarding the world's supply of mercury are not available. However, there is general evidence that this supply is very large and possibly great enough to meet all demands for mercury apparatus should the trend of development turn in that direction.

If this be assumed as the most favorable case, the principal question, so far as the mercury itself is concerned, would seem to turn on the price which would have to be paid for it under these competitive conditions, and regarding this question we have only conjecture to fall back upon.

In any case it hardly seems likely that the cost of power by way of this apparatus as compared with the best steam equipment now available can be reduced by a margin much larger than some 5 to 7 cents at least as based on fuel oil at about $1.25 per barrel.

HIGHER STEAM PRESSURES AND SUPERHEAT

The general effect of higher steam pressures and/or superheat is to widen out the thermodynamic range of temperature for the working fluid and thus to increase efficiency.

The effect of superimposing a mercury cycle upon a steam cycle is exactly of the same character. The elevation of the temperature of the steam in a steam turbine or the use of mercury vapor combined with steam are therefore two different ways of realizing the same general thermodynamic purposes.

Regarding the future trend of increased pressures and temperatures, it should be noted that so long as we are restricted to the present available materials of construction there can be no very great increase in temperatures.

On the other hand, increase in pressures may be carried to 1,200 or 1,500 pounds or even higher if desired.

The effect of carrying the pressure to higher levels without elevation of the ultimate temperature of superheat is to secure the input of a larger fraction of

the heat at the higher temperature level, and thus to elevate in effect the average thermodynamic level with corresponding increase in thermal efficiency.

It does not, however, seem in any way likely that with steam alone thermal efficiencies could be reached exceeding that which might be anticipated from a combined mercury-steam cycle.

In consequence it does not seem likely that for many years to come station thermal efficiencies sensibly better than 10,000 British thermal units per kilowatt-hour output can be anticipated, corresponding to something of the order of 8,500 British thermal units per kilowatt-hour for the turbine alone, or an actual thermal efficiency of about 40 per cent, which would correspond to an ideal cycle efficiency of about 55 per cent.

As noted for the mercury-steam cycle, this would correspond to an improvement of the order of 30 per cent in fuel economy over present high-grade conditions, and hence would give a saving on the general order of 8 or 9 cents with fuel oil at about $1.25 per barrel.

Against this must be offset any increase in fixed charges due to increased investment necessary to realize these higher fuel economies.

There are no available data as to how much this may be. Having in mind the conditions required for working steam under pressures of 1,200 pounds or higher, it seems very sure that the investment costs must be definitely higher in order to realize such working conditions, and in the absence of specific data or ground for definite estimate we can only conclude that the 8 or 9 cents above will surely be subject to some discount from this cause.

Here again, in absence of any more specific figure, we may conclude that as with the mercury-steam cycle, there seems no reasonable ground for anticipating in any future the conditions of which we can foresee an overall reduction in production cost greater than something of the order of 5 or 6 cents due to rise in operating pressures and temperatures for the turbine equipment, and as based on oil at about $1.25 per barrel.

COMPARISON OF BOULDER AND BLACK CANYON DAM SITES

Both of these sites have been the subject of careful and extended topographic survey and of geological investigation through borings extending into and under the bed of the river. They have also been the subject of careful examination by Prof. F. L. Ransome, formerly consulting geologist for the Department of the Interior, and whose report has been incorporated in the Reclamation Service report on the "Problems of the Colorado River" (1924).

From all of the evidence available and supplemented by personal visitiation of both sites the following conclusions seem to be justified:

1. Both sites, geologically and topographically, are admirably suited to the erection of a high dam and the formation of a large reservoir.
2. The rock formation at Boulder Canyon is generally granitic in character, while that at Black Canyon is an andesitic tuff breccia.
3. The latter shows less jointing and of the two may be held to indicate some advantage from the geological standpoint, though either or both indicate entirely safe and adequate conditions for the support of the dam and the retention of the water in the reservoir.
4. The area flooded in either of these would be substantially the same.
5. For the same height of dam above mean low-water level Black Canyon site would give slightly larger reservoir capacity.
6. For the same elevation of upper water level, the Black Canyon site gives considerably greater storage capacity, since the latter would include a stretch of relatively open territory lying between the two sites.
7. For an elevation of water level at Black Canyon 550 feet above mean low water or for an elevation of reservoir level of 1,195 feet above sea level, the values are approximately 26,000,000 acre-feet for Black Canyon, and 18,200,000 for Boulder Canyon, or an advantage of 7,800,000 for the former.
8. Building materials for the dam in the form of gravel deposits are more readily available for the Black Canyon site.
9. The Black Canyon site is, in marked degree, relatively more accessible by railroad from the outside world.
10. Bed rock for the dam foundation is at a definitely lesser depth at the Black Canyon site.
11. The average distance between the river walls is somewhat less at the Black Canyon site, thus decreasing the yardage volume of the dam.

12. Numbers 8, 9, 10, and 11 will affect in marked degree the probable cost of the dam and indicate a definite economic advantage for the Black Canyon site.

13. The Black Canyon site furnishes a more favorable location for construction camp and installation of construction plant, and likewise a more favorable location for the construction of a power house below the dam.

14. The Black Canyon site is some 15 miles nearer to the market for power in southern California, and will thus furnish, to this extent, more favorable conditions for the transmission of electrical energy.

The general conclusion is that the Black Canyon site offers definite and controlling advantages over that at Boulder Canyon.

General references

Problems of the Colorado River Basin, 1924,[1] Vol. V, generally, and pp. 1–11, 47.

THE BOULDER (BLACK) CANYON DAM AND RESERVOIR AS ONE ELEMENT OF A GENERAL SCHEME OF RIVER DEVELOPMENT

As elsewhere noted, the Boulder Canyon project as a first step in the general development and control of the river should, if possible, fit in with a general scheme of development to be ultimately followed.

As noted also, complete topographic, geologic, and hydrographic data are not at present available in such amount or character as to make possible at the present time any complete and final solution of this problem. It may also be doubted whether with full data any such final solution could now be reached, since many factors lying in the future and vitally affecting such a study can not with any assurance be made the subject of forecast at the present time.

The most that can be done at the present time is, therefore, to apply good judgment to such data as are available, and with special reference to possible developments immediately above and below this site, where the question of physical interference or of mutual dependence one upon the other may arise.

Observations supported by partial surveys indicate clearly the high probability of a favorable dam site at Bridge Canyon, about 118 miles above the Black Canyon site, and with mean low-water elevation at 1,207. While topographic information regarding this site is incomplete, it does not appear probable that the economic height of dam here would much exceed 566 feet. The storage capacity formed by a dam of this height is also a matter of some uncertainty, but in any case it would be relatively small and unimportant as an element in the provision of general river storage. Such a site should therefore be contemplated as primarily for power, leaving the matter of storage to be chiefly taken care of at other more favorable sites.

The height of the water surface proposed for the Boulder Canyon development (1,295 feet above sea level) would then give a static level at Bridge Canyon 10 feet below mean low-water level, representing the needed flow gradient in the reservoir and insurance against interference with the tail-water discharge from the Bridge Canyon power units.

Below the Black Canyon site there are three sites which have come under examination and discussion—Bulls Head, Mohave or Topeck, and Parker.

The former, located about 66 miles below Black Canyon, with mean low-water level at 502 feet, is well adapted for a dam of about 140 feet in height, giving a storage capacity of about 1,800,000 acre-feet (of which as much as 1,500,000 may be active), and particularly well adapted to the purpose of reregulation for the Boulder Canyon Reservoir, especially with more extended irrigation developments in the lower basin. It is obvious that the time program of water requirements for power and for irrigation will not coincide. With a large excess of water this may not be of importance, but with an irrigation requirement covering most or all of the available water in the river some means of transforming the flow according to the power program into that required for the irrigation program will be necessary, and such transformation the Bulls Head Reservoir is well adapted to perform.

So long as this reservoir is the only one available for such purpose, the necessary fluctuations of water level will reduce its significance from the standpoint of firm or reliable power.

[1] In manuscript form, Bureau of Reclamation.

Estimates indicate, however, that at a later stage of river development and with a suitable sharing of regulation with other reservoirs there should be available a head of about 100 feet and firm power of some 125,000 horsepower.

As developed in another section, it would appear unwise to consider a dam and reservoir at Topock or Mohave as any part of an ultimate plan for the development of the river.

At or near Parker, Ariz., about 170 miles below Black Canyon and at a mean low-water elevation of 358 feet, there appears to be a good site for a dam with an elevation of water level about 100 feet for creating a storage reservoir of about 2,300,000 acre-feet capacity. Such reservoir would serve the following purposes:

(1) It would give a water level from which large areas in Arizona and California might be irrigated.

(2) With a permitted fluctuation of water level of some 35 feet, it would provide flood and regulation storage capacity of about 2,000,000 acre-feet, thus reducing fluctuations of level at Black Canyon and Bulls Head, thus permitting of higher average head for power at the latter sites.

(3) It would permit of the development of some 60,000 horsepower of firm power.

It may be well at this point to sketch briefly the main features of what now seems to be the best plan of general development for the lower-basin section of the river.

This would comprise dams and reservoirs at the following sites:

(1) Parker.
(2) Bulls Head.
(3) Black Canyon.
(4) Bridge Canyon.
(5) Glen Canyon.

In this listing of sites the stretch of river between Glen Canyon and the lower limit of the Grand Canyon National Park is omitted. It may be expected that in any event this part of the river will not be developed for many years. Present information indicates, however, several promising sites available for use when the time comes to consider such development.

A series of dams and reservoirs as above indicated would secure the following results:

(1) They would, in the aggregate, supply the needed capacity for flood, silt, and irrigation storage with the minimum variation of level in the Black Canyon Reservoir, thus favoring this site for the development of power.

(2) Bridge Canyon, with small storage relatively, would be developed primarily as a power project.

(3) Power plants at Black Canyon and Bridge Canyon would, in the aggregate, secure the power from some 1,110 feet of river drop, about equally divided between the two, the latter site being only slightly farther from power markets than the former and in any event well within economic-transmission distance.

(4) Glen Canyon, with a dam about 390 feet in height and with a reservoir of total capacity some 8,000,000 acre-feet, of which about one-half might be active, would assume a rôle of marked importance in the general control and regulation of the river for both flood and irrigation conditions. Such storage capacity at this point would increase in marked degree the value of every development lower on the stream, and in particular the conditions for power at Black Canyon.

It would also share with Black Canyon the storage of silt, thus extending the active life of the chain of reservoirs with reference to silt accumulation.

Further reference to this project is made at a later point.

(5) More broadly with reference to the problem of silt accumulation, this entire chain of reservoirs, together with others to be constructed in the upper basin States on both the main river and its principal tributaries, will share in the ultimate accumulation and storage of silt, thus securing for such a system an active life of several hundred years before the accumulation would begin to present any serious problem. Again such life could then be greatly extended by raising the height of certain of the dams in the chain. Thus experience may indicate the feasibility of raising the Glen Canyon Dam, for example, 60 feet, with an increase in storage capacity of about 6,000,000 acre-feet. Or again it is well assured that the Black Canyon Dam may be raised to some height, the limit of which is entirely unknown at the present time, but with an increase in storage capacity of some 8,000,000 acre-feet for the first 50 feet above the present proposed height and at a still larger rate of increase for further increments in height.

It will be realized, of course, that with a dam at Bridge Canyon as proposed, such an increase in the reservoir level at Black Canyon would decrease the effective head for power at the former, but what would be lost at the upper site would be gained at the lower, so that there would be no net change in the over-all head available for power. The raising of a dam in this way may therefore be viewed simply as a means of obtaining more storage capacity, and careful estimates show that in no other way can the problem of silt accumulation be so cheaply disposed of as by increase of storage capacity through raising the height of the dams of the storage reservoirs.

It may be said, of course, that this furnishes no final solution. While this is so, the answer is that at this time, no final solution is needed. We do not know what the conditions of power development may be some hundreds of years hence, and any present plans which may be economically justified over a period of several generations in the future may be accepted as a proper basis for present action.

(6) The dam and reservoir at Parker will, as elsewhere noted, provide for large extensions in irrigated lands, and will take a share of general flood and irrigation stoage and of irigation regulation with reference to the special requirements of the irrigated lands below. It will also provide for the development of a considerable block of power.

(7) The dam and reservoir at Bulls Head will, as elsewhere noted, provide for some additional storage and will aid in the requirements of irrigation regulation and control.

It will also provide for the irrigation of some 25,000 to 30,000 acres of land in the Mohave Valley.

With a sharing of the functions of regulation with the Parker Reservoir, a considerable block of power may also be developed.

(8) As a whole and in summary, such a development will solve the problems centering about flood control, irrigation and silt, and will provide in the most effective way for the development of power, favoring especially, in the maintenance of the maximum available head, the plants at Black and Bridge Canyons where most of the power would be developed and where it is within economic reach of large and active power markets.

General references

Problems of the Colorado River Basin, 1924,[1] Vol. VII, p. 48. Supp. plates 241, 42, pp. 21, 40, 42.
Hearings, Sixty-ninth Congress, first session, S. Res. 320, pp. 481, 796.
Water Supply Paper 556, U. S. Geological Survey, p. 72.
Hearings, Sixty-eighth Congress, second session, S. Res. 727, p. 95.

SALT DEPOSITS IN THE RESERVOIR SITE

It will be appropriate at this point to refer to the question of mineral or salt deposits in the reservoir site for the Boulder Canyon development.

This question has been made the subject of careful examination by Geologist Ransome, whose conclusions are given in his report forming a part of the general report on problems of the Colorado River on file in the office of the Bureau of Reclamation. The matter has also been referred to in the evidence given before committees of Congress.

The conclusions are as follows:

In the Muddy Creek formation of the Virgin Valley there are extensive deposits of rock salt.

The total quantity does not permit of present estimate, but may be of the order of 25,000,000 tons.

The upper levels of the reservoir will lie above most of this deposit, and while some salt will go into solution the amount should not be sufficient to cause any appreciable salinity in the water.

The area of salt face exposed to the water will be only a negligible fraction of the entire reservoir area and the deposits are deeply buried, thus rendering solution a slow process.

Furthermore, the salt outcrops are in bluffs with a heavy insoluble overburden and the immediate effects of the action of the water on the salt will be to undermine this insoluble overburden which will then settle and cover

[1] In manuscript form, Bureau of Reclamation.

the exposed surfaces of the salt deposit, thus greatly retarding the progress of solution and in time rendering it negligible.

The same retarding effect will be produced by deposits of silt which will accumulate over all exposed faces not too far removed from the horizontal, thus forming a blanket which in time should become practically impervious to the passage of salt into solution through such cover.

While the estimate of total quantity above is admittedly based on in sufficient data, it is, nevertheless, of interest to compare such a quantity as 25,000,000 tons of salt with the water in the reservoir or with the flow over a period of years.

Thus, if we should assume this entire quantity of salt in solution in once filling of the reservoir, it would give only 1 part of salt by weight in 1,400 in water, an amount scarcely perceptible to the taste, an amount corresponding to a dilution of sea water with forty times its volume of fresh water. Naturally the solution of the entire deposit in once filling of the reservoir is not conceivable and the degree to which this is seen to be impossible represents a margin of safety with regard to trouble from this source.

Again, if due consideration be given to the retarding circumstances affecting the progress of solution of a salt deposit in the bottom of such a reservoir, it will be clear how slow must be the progress of solution as the years go by and that by no combination of circumstances can it be made to appear possible that an entire deposit of any such magnitude could pass completely into solution in any such period of time as, for example, 10 years.

But even if such a condition were assumed it would give a concentration of only 1 part in 10,000 or 100 parts in 1,000,000, a degree of salt concentration which is exceeded by many acceptable fresh-water supplies the country over.

Due regard for these various considerations would seem to furnish ground for all needful assurance regarding the freedom of the Colorado River water from any undue concentration of salt due to the solution of deposits now lying in the bed of the future Black Canyon Reservoir.

General references

Problems of the Colorado River Basin, 1924[1], Vol. V, pp. 21, 237.
Hearings, 69th Congress, 1st session, S. Res. 320, pp. 171, 650.

A DAM AND RESEVIOR AT TOPOCK OR MOHAVE AS AN ELEMENT IN A PLAN OF GENERAL DEVELOPMENT OF THE COLORADO RIVER

Various plans have been brought forward for the inclusion of a dam and storage reservoir at or near Topock, Calif., and a short distance below the city of Needles, as a part or, indeed, as the first step in such plan.

The evidence regarding this general suggestion is particulraly full in the various hearings before Congress and the main conclusions need only be summarized here as follows:

(1) With a mean low-water level of 427 feet the topographic conditions would apparently permit of the construction of a dam which would raise the water level from 160 to 180 feet, or to elevation 587 to 607. This would provide a storage reservoir of from 10,500,000 to 12,500,000 acre-feet capacity.

(2) The lower dam as above is estimated to cost about $16,000,000, to which must be added some $10,000,000 assessed damage as noted below.

(3) With increase in height of dam and with correspondingly increased storage capacity, the cost of dam mounts very rapidly.

(4) A storage capacity exceeding 12,500,000 acre-feet does not seem to permit of economic justification considered merely from the viewpoint of cost of dam and resultant storage. Furthermore, careful comparison shows that storage as such may be obtained much more cheaply at Blanck Canyon than at the Mohave site.

(5) Such a total storage capacity is entirely inadequate for the needful silt, flood and general regulation aggregate storage capacity as developed elsewhere, at least if the principles and controlling conditions as therein developed are to be accepted as valid.

(6) The power which might be developed at this site is unimportant in amount—so small that the project could in no wise be placed on a selfpaying basis as in the case of the Boulder (Black) Canyon site.

[1] In manuscript form, Bureau of Reclamation.

(7) The provision of such storage capacity at this site would require a reservoir which would cause incidental damage, as follows:

(a) It would flood the site of the city of Needles with extended railway terminals and shops.

(b) It would require the moving and reconstruction of some 20 miles of the Santa Fe Railroad.

(c) It would flood some 30,000 to 40,000 acres of irrigable land including the Mohave Indian School.

The cost of items (a) and (b) above, to be assessed against the project and counted as cost additional to construction proper, has been estimated at not less than $10,000,000.

(8) The reservoir created by such a dam would be relatively shallow in depth and large in area, thus aogmenting the loss of water by way of evaporation, especially in the relatively open country with the sweeping winds and high temperatures which are characteristic of the location.

Various sets of figures have been made by proponents of the Mohave Reservoir intended to show advantage in aggregate ultimate power or water or both by the use of this site. These attempted comparisons have involved the use of different stretches of the river in the two cases and of different total river heads; also naturally, of different dams and reservoirs, and of arbitrarily assumed conditions of operation and of evaporation for which no justification is apparent.

The upper level of the water in the Parker Reservoir as contemplated is 457 feet. The mean low water level at Bulls Head is 502 feet. The difference of 45 feet includes the valuable part of the Mohave Reservoir site as noted above and its omission from the plan of development will save it from flooding and destruction. In any case something like 10 feet out of the 45 would necessarily be lost between dams so that the net loss of actual head is some 35 feet, representing ultimately 40,000 horsepower. This power, furthermore, whether developed by itself or as a part of the proposed Mohave reservoir with upper level at 605 feet above sea level, would require a relatively high investment per unit of capacity and, in comparison with the damage as noted in (7) above and particularly in the permanent destruction of a large area of irrigable land, there seems no justification for the utilization of this amount of head for the sake of the power which it would produce.

Any advantage in possible power development which might thus be made to appear as a result of the utilization of this part of the total river drop should be considered as more than offset by the loss resulting, and any indication of a consequent reduction in total developed power should be considered as fully justified by the resultant avoidance of loss in other ways.

The argument regarding the loss of water has turned on conditions affecting evaporation. The loss due to evaporation has usually been assumed at 5 acre-feet per year per acre of exposed water surface and the excess evaporation due to river development would, therefore, be found by subtracting the present mean area of river surface from the mean area of reservoir surface and multiplying the difference by five. This is the method followed for plans of development which do not include the Mohave reservoir and large difference of area with resulting large excess evaporation losses result.

For plans of development involving the Mohave Reservoir, however, the assumption is made that since much of the land in the proposed reservoir site is relatively low and partly flooded or water-soaked during times of high water, the evaporation from such land will be practically the same as from the water surface, and that such may therefore be counted as effective present river area.

The mean area of the proposed Mohave Reservoir, so far as present data are available, would be about 118,000 acres. The present river surface over the same stretch may be taken at about 9,000 acres, making a difference of 109,000 acres, which, multiplied by 5, gives 545,000 acre-feet per year excess loss chargeable to the reservoir.

Instead of any such figure, however, the equivalent present area is taken at about 83,000 acres, or some 74,000 acres of bottoms are taken as equivalent to water surface. With such an assumption the excess area is reduced to 35,000 acres and the excess loss of water to 175,000 acre-feet. By applying one rule to Boulder Canyon Reservoir and another to Mohave, therefore, a greatly reduced loss due to evaporation is made to appear for any plan involving the Mohave Reservoir.

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Regarding any such special treatment of the subject of evaporation from the Mohave Reservoir, the following observations may be made:

(1) Even granting that these bottom lands may be flooded or more or less water-soaked in times of high water, such condition only prevails for a part of the year, and there is no proof based on measurement of any kind as to the loss of water per acre of land under these conditions.

(2) Granting that there is such loss at the present time, it is absolutely without significance so long as there is the great excess of water in the river which prevails under present conditions of water demand.

(3) At a later stage of development, and when economy of water becomes of importance, the river will be fully regulated, the Mohave lands will not be subject to inundation but will be under cultivation as a part of the irrigated area along the river borders, and no excess evaporation whatever could be charged to them under these conditions.

(4) The entire argument based on the special assumptions regarding evaporation in the Mohave Reservoir site is without merit.

On the other hand, it should be pointed out that as between the two reservoirs, one at Boulder Canyon and the other at the Mohave site, the evaporation per unit area in the latter will be markedly greater than that of the former and for the following reasons:

(1) The Mohave Reservoir will be relatively shallow, while that at Boulder Canyon will be deep.

(2) The Mohave Reservoir will have little or no protection from high banks and will therefore be subject to the action of sweeping winds, while the Boulder Canyon Reservoir will enjoy a measure of such protection.

(3) The prevailing temperatures are higher at the Mohave site than at the Boulder Canyon site.

Furthermore, as shown by Engineer Weymouth, it is possible on the basis of clearly reasonable and defensible assumptions based primarily on large aggregate reservoir capacity and consequent reduced fluctuation of water level, to show that a general scheme of river development from Glen Canyon to Parker and including Boulder Canyon and a limited number of other relatively large reservoirs, excluding the Mohave site, will give more and cheaper power and more and better regulated water than any competitive scheme with a multiplicity of smaller reservoirs and greatly reduced aggregate storage capacity.

We may therefore conclude that the proposal for the inclusion of the Mohave Reservoir as a feature of any plan of general river development can not be justified either economically or on the score of expediency; and in still more emphatic degree is it without merit as a proposed first step in such development.

General references

Problems of the Colorado River Basin, 1924,[1] Vol. VII, p. 88.
Hearings, 69th Congress, 1st session, S. Res. 320, pp. 481, 494, 796.
Hearings, 68th Congress, 2d session, S. Res. 727, pp. 91, 95.
Hearings, 68th Congress, 1st session, H. R. 2903, pp. 243, 1385–1388, 1390, 1398, 1553.
Water Supply Paper 556, U. S. Geological Survey, pp. 37, 42.

A PROPOSED DAM AND RESERVOIR AT GLEN CANYON

A number of proposals regarding the development and control of the Colorado River have brought forward a dam and reservoir at Glen Canyon as the first step in such development.

The evidence on this subject presented at the various hearings before Congress is especially full and the main conclusions only need be summarized.

(1) Topographically, the Glen Canyon site is well adapted to the construction of a high dam, with large capacity reservoir and power equipment.

(2) Geologically, the formation is of dubious reliability for dam exceeding perhaps 400 feet in height and giving a reservoir of some 8,000,000 acre-feet in capacity, of which perhaps one-half might be active storage.

(3) As a reservoir for flood control such a reservoir would not control the flow of several important tributaries which enter the main river below Glen Canyon.

[1] In manuscript form, Bureau of Reclamation.

(4) For the same reason as in (3) the reservoir would not intercept the silt from these tributaries which, at certain times of the year is high in percentage and very objectionable in quality, due to its fineness of grain, and in consequence of which it carries through on to the land and there deposits in an almost impervious layer.

(5) Glen Canyon is difficult of access from the outside world, and the cost of a railroad to or near the dam site would apparently be a serious charge against the undertaking.

(6) The rock at Glen Canyon is a sandstone, unfitted for building material for dam construction, and the nearest point at which proper material could be found is apparently at a considerable distance from the dam site, thus adding sensibly to the costs of the dam.

(7) The width of the river and the general topographical conditions at the dam site are such as to greatly increase the yardage of a dam at Glen Canyon as compared with Black Canyon, both dams being of the same height, and the storage capacity in relation to height is much less, thus making the cost of storage very much greater at Glen Canyon than at Black Canyon. For a dam about 400 feet in height at Glen Canyon, and giving a total storage capacity of some 8,000,000 acre-feet, the cost is estimated at $63,000,000, or more than twice that at Black Canyon for the same height, while the storage capacity of the latter would be some 30 per cent more than that of the former. Or otherwise, storage capacity of about 8,000,000 acre-feet may be obtained at Black Canyon with a dam of about 350 feet in height and costing perhaps $26,000,000. It would thus result that storage at Glen Canyon would be some two and one-half to three times as expensive as at Black Canyon.

(8) Power produced at Glen Canyon could not find a market in large quantity within present economic transmission distance and could not economically be carried the greater distance to the larger power markets in southern California. In consequence the project could not be placed on a self-paying basis as in the case of a project at Boulder Canyon.

(9) The Glen Canyon Reservoir is, by the river, some 360 miles farther from the lands susceptible of irrigation in western Arizona and California than is the proposed Boulder Canyon Reservoir, and control and supply of water for irrigation purposes would be correspondingly more difficult.

(10) A dam and reservoir at Glen Canyon would control and regulate the river with reference to all dam and reservoir sites below that point, and would therefore be of definite value in the construction of dams at such points.

(11) The site fits in well with the most carefully studied plans for the ultimate development and control of the river.

(12) It may be concluded that a dam and reservoir at Glen Canyon should be anticipated as a definite feature of the general plan for the ultimate control, regulation, and development of the river, but that it is not adapted to form the first stage in such plan.

General references

Problems of the Colorado River Basin, 1924,[1] Vol. VI.
Hearings, 68th Congress, 2d session, S. Res. 727, p. 91.
Transactions Am. Soc. Civil Engineers, 1923, pp. 228–240, 255, 256, 1925, p. 41.
Water Supply Paper 556, U. S. Geological Survey, p. 35.

THE BOULDER (BLACK) CANYON PROJECT AS THE FIRST STAGE OF DEVELOPMENT OF THE RIVER

With this review of the conditions and economic results to be anticipated from the proposed development at Boulder (Black) Canyon, together with incidental reference to certain other proposed developments, it will be in order at the present point to compare these conditions and results with those indicated in an earlier section as needful to meet the present situation, and as desirable for the first stage in the general development of the Colorado River.

(1) It has been shown under a separate heading that the proposed development fits in effectively as a feature of carefully studied general plans based on good engineering judgment and the best information available at the present time.

[1] In manuscript form, Bureau of Reclamation.

(2) It provides an aggregate storage volume of 26,000,000 acre-feet, of which 5,000,000 to 8,000,000 at the bottom may be considered as a silt pocket and of which 12,000,000 to 15,000,000 at the top may be considered as active or regulation storage, the upper 8,000,000 for flood regulation and the remainder for general seasonal or time regulation as may be required, and thus fulfilling the immediately pressing requirements regarding storage and regulation capacity.

It may also be noted that from the viewpoint of power production an aggregate of 26,000,000 acre-feet is as small as could be considered acceptable for the realization of these various functions of silt storage, control, and regulation. In carrying out the purposes of control and regulation the water surface of the reservoir must undergo considerable changes of level—the greater in general as the total capacity is smaller—and such changes in level become a disturbing element in connection with the reliable delivery of power. Furthermore, the less the volume in general the less the height of dam and the less the head available for power. It may thus be admitted that from the viewpoint of power alone a capacity larger than 26,000,000 acre-feet would have been desirable, had other conditions permitted. However, the location of Bridge Canyon as apparently a desirable site for the development next above on the river, and the level of the river at that point, serve to place a natural limitation on the height of a dam at Black Canyon and hence on the capacity of the reservoir at that site.

While, therefore, as careful estimate shows, the Black Canyon site should furnish reliably the 550,000 horsepower contemplated, it is clear that with a reservoir of total capacity less in marked degree, the amount of reliable power would decrease accordingly, due both to the decreased maximum head and to the greater fluctuation in level, and the entire economic aspect of the project would become doubtful in character rather than well assured.

(3) It is located below all important flood bearing and silt bearing tributaries, except the Gila, and as elsewhere noted, independent measures promise protection from this source.

(4) Its location in relation to the lands to be irrigated in Arizona and California is at the nearest point possible for the construction of a reservoir of large capacity and during the period while it stands alone on the river, with a large excess of water flowing, there should be no difficulty in securing to these lands a reliable supply always adequate for the varying seasonal demand. With later and more extended demands and with less water flowing, other developments, as at Bull's Head and Parker, will furnish all necessary further regulation needed, and the latter at a relatively short distance from the points of diversion for irrigation service.

(5) It provides for the development of the maximum amount of power consistent with the preservation of the Bridge Canyon site for a later stage of development. The amount of power reliably indicated is furthermore sufficient to insure the economic stability of the project and the repayment with interest of all capital advanced, within a period of 30 to 50 years, as economic conditions might determine.

(6) The site is at the point nearest to a large power market, at which power in large quantities can be developed; or specifically it is the point nearest to a large power market at which a dam and reservoir of large capacity can be constructed and at which the power development is sufficient in amount to secure the economic feasibility of the project with the repayment of the Government loan within a reasonable period of years.

(7) General reference has been made at an earlier point to the need of cities in southern California for an enlarged municipal water supply. This situation in the Southwest, and in which the city of Los Angeles stands as the largest consumer, is rapidly reaching a point where, if these cities are to continue the increase in population which agricultural, industrial, climatic, and economic conditions generally would seem to justify, a very considerable addition to the local sources of water supply for domestic and municipal use must be found. According to the carefully elaborated estimates of the engineers of the city of Los Angeles, this may be realized under entirely practicable economic conditions depending on the following elements:

(*a*) The withdrawal of the largely desilted water at some convenient point below the Boulder Canyon Reservoir.

(*b*) The further removal of residual silt by means of filtration galleries or other adequate agencies.

(*c*) The carriage by aqueduct from such point of intake to suitable main points of distribution or consumption.

(*d*) The utilization of cheap electric power for the pumping lift which such general plan will require.

The combination of desilted or at least partially desilted water at some convenient point of withdrawal from the river, together with the provision of cheap electric power for pumping, will place, therefore, the problem of an enlarged supply of domestic water for the cities of southern California on a practicable basis.

(8) The various studies made by the engineers of the Reclamation Service, and which have been reviewed by the undersigned, serve to indicate that the desirable aggregate of characteristics, including silt and flood control, general river regulation, and power development, can at no other site or combination of sites and in no other way be obtained as cheaply as at the Boulder (Black) Canyon site.

It follows from the preceding that the Boulder (Black) Canyon site does meet the requirements which are indicated for relief from the present situation, and in particular as the first stage of general development of the Colorado River as a whole, and a careful survey of the evidence, the main features of which have been noted elsewhere in the present report, shows, furthermore, that no other site or combination of sites possesses this aggregate of desirable or necessary features.

The broad conclusions would therefore seem to be justified:

That the proposed development at the Boulder (Black) Canyon site will meet the immediate requirements of the situation regarding silt and flood contral, general river regulation, and power development;

That the project as proposed is economically sound, and that the proceeds from the sale of power should pay all fixed charges, including interest on the capital, and likewise insure the repayment of the latter within a reasonable term of years;

That no other project or site or combination of such offers this aggregate of desirable or necessary features, together with economic soundness; and, finally,

That the Boulder Canyon project as proposed is the most desirable and advantageous first step in the general development and control of the Colorado River.

BENEFITS TO THE SOUTHWEST DERIVABLE FROM THE BOULDER (BLACK) CANYON DAM AND RESERVOIR WITH THE ALL-AMERICAN CANAL

In response to a specific item in the letter of instruction furnished the advisers, the following summary is given of the benefits which may be anticipated from the Boulder dam and reservoir with an all-American canal as proposed.

(1) The Imperial Valley in California will be relieved of the danger of flood destruction or damage and of the menace of seasonal drought.

(2) It will be relieved in large part of the financial burden of maintenance of levees on the lower reaches of the river.

(3) It will be relieved in large part of the financial burden of handling and disposing of silt in the canals and on the lands under irrigation supply from the river.

(4) The lands in the valley will be relieved of the danger of gradual loss of porosity and of workable agricultural texture due to the continued infiltration of the finer silt constituents.

(5) It will secure to the Imperial Valley for present and future irrigation projects and for domestic and municipal needs a reliable supply of water from the Colorado River coming direct to the valley through a main canal lying wholly within United States territory and therefore relieved of the troubles and hazards which necessarily attach to the present situation.

(6) These various conditions should exercise a pronounced influence in bringing about an increase in farm values, in making farm loans easier, and in improving generally the economic condition of the valley.

(7) It will provide for a large increase in California in the area of irrigable land in the Imperial and Coachella Valleys and will lay the foundation for a further considerable increase in the Chemehuevis, Palo Verde, and Chucawalla projects, with corresponding increase in national wealth.

(8) It will secure to Arizona an enlarged and improved water supply for the Yuma project with relief from the danger of floods due to the brush-mat dam now necessary at the Rockwood diversion and with provision for increase in irrigated areas, with consequent increase in national wealth.

(9) It will provide foundation for further development and increase of irrigated area in Arizona in the Mohave, Parker, and Cibola Valley projects, with corresponding increase in national wealth.

(10) It will secure to Nevada a reliable water supply for a very considerable increase in area of irrigable lands, especially including those admitting of service under a pumping lift up to 200 feet, and with a corresponding increase in national wealth.

(11) It will secure to the three States of Arizona, California, and Nevada the benefits of cheap hydroelectric power, with the stimulus to agriculture, industry, and general cultural development which such supply will insure.

(12) It will make possible, through the use of cheap electric power for pumping, the provision of a definitely needed supplementary supply of domestic water for the cities in southern California.

REPORT ON THE PROBLEMS OF COLORADO RIVER CONTROL

By J. G. SCRUGHAM

DECEMBER 16, 1927.

Hon. HUBBERT WORK,
Secretary of the Interior, Washington, D. C.

DEAR MR. SECRETARY: In accordance with your written request dated April 9, 1927, I herewith submit a report on certain phases of the proposed developments on the Colorado River. A summary of the principal conclusions reached in the report is as follows:

a. There is a constant flood menace to certain sections of the lower Colorado River Basin especially in Imperial Valley, Calif. The problem of this flood control primarily involves the problem of silt control. Both the flood and silt menace can best be minimized by the construction of a large dam and reservoir at the lower end of Boulder Canyon at a site called Black Canyon.

b. The cost of such protective works together with accessory structures can probably be repaid in a reasonable length of time through earnings from the following sources:

1. Rental of water power or the sale of electric power generated at the site of the impounding dam.
2. Charges for irrigation water supplies impounded and desilted by the works of control.
3. Charges for domestic water supplies impounded and desilted by the works of control.

The proper rental value of the water power or the sale price of the electric power generated may be accurately calculated by determining the lowest cost of other power at the principal consuming center and subtracting therefrom the cost of power transmission to such center from the point of generation. As these costs may widely vary over periods of years due to changing economic conditions, provision should be made for a review or readjustment of this sale price at suitable intervals.

c. It is the opinion of eminent constitutional authorities that the Congress of the United States, through its constitutional prerogative of regulating commerce among the several States, has full authority to construct such works of river control without further permission from the interested States. The Supreme Court of the United States has held that such constitutional authority carries with it the power to control and equate the flow of navigable streams such as the lower Colorado River. While the beds and banks of a navigable stream are owned by the State through which the stream flows or by the States abutting upon such stream, and while the States have sovereignty over the waters within and upon their borders, they can not use such title and sovereignty to prevent the Congress of the United States from exercising a constitutional authority that has been specifically delegated to it by the Sates. The right of the United States Government to construct works of control does not appear to carry with it the right to allocate the unappropriated waters of the Colorado River to the interested basin States. Such allocations should properly be made through compacts between the interested States, approved by Congress.

d. The engineering plans for the construction of the All-American Canal appear practicable. There have been recent developments in excavating machinery which will probably reduce the costs of the canal construction below the estimates previously made. No serious difficulties of operation and maintenance need be anticipated.

Respectfully submitted.

J. G. SCRUGHAM.

INTRODUCTORY

The Colorado River embraces in its drainage basin the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and a small part of the Republic of Mexico. Due to its steep gradient, it is one of the muddiest rivers of the world, annually depositing more than 100,000 acre-feet of silt per year at its delta. This great silt deposition and consequent continuous raising of the bed of the river in its lower reaches, is the primary cause of a constant flood menace to the low-lying agricultural lands in Arizona and California. In order that the silt may be trapped and the flood waters stored for beneficial use, it is obviously desirable to construct one or more impounding reservoirs of large capacity at suitable locations on the river. Due to the large volume of water discharged, considerable hydroelectric power can be generated as a by-product at comparatively small additional cost. The sale of this electric power, together with the receipts for services in impounding and desilting the stored water, should bring in sufficient revenue to repay all costs of construction in a reasonable length of time. In spite of its economic practicability and the urgent necessities of the territory involved, the development and control of the Colorado River has been delayed and opposed by many interests, largely through a misapprehension of the facts regarding the situation. The following report endeavors to set forth these salient facts in an orderly manner, together with the conclusions which may fairly be deduced therefrom.

FLOOD AND SILT CONTROL

The problem of flood and silt control involves primarily an investigation of the quantities of water and silt required to be impounded and the maximum safe rate of flow to which the discharge must be limited. It should be understood that the principal flood menace comes not from overtopping the protecting levees but from undercutting and dropping large portions of the levee or banks into the river. Investigations of engineers of the Reclamation Service and other reliable agencies indicate that a flow of 40,000 second-feet may be accepted as a safe maximum to prevent undercutting. Based on past records, provision should be made for floods of 250,000 second-feet peak maximum. With due allowance for safety factors and exclusive of silt storage, power, and irrigation requirements, it can be calculated that 8,000,000 to 10,000,000 acre-feet is the proper flood-storage requirement. The silt-storage requirement may be taken as 7,500,000 acre-feet, based on a 50-year amortization of the structure, and an annual deposit of 150,000 acre-feet of silt which is the maximum estimate of the investigators. This quantity is admittedly a widely varying factor, depending upon flood conditions. In view of its importance in the plans for flood control, an ample margin of safety is desirable. While the investigations of the United States Reclamation Service at Yuma indicated the annual silt burden carried by the river to be about 100,000 acre-feet, later investigations by the United States Department of Agriculture at Topock added nearly 50 per cent to this estimate. The difference can be partly attributed to larger allowances being made for bed silt or silt waves traversing the bottom of the stream. Attention may be called to the fact that the volume of such silt waves is often sufficient to convert a deep open channel into a sand bar in a comparatively few hours.

If the estimate of 100,000 acre-feet annual deposition be assumed instead of the estimate of 150,000 acre-feet, the life of the silt storage becomes 75 years instead of 50 years. Later silt storage can be handled by other reservoirs located higher up the stream. At the present time nearly 15,000 acre-feet of silt is deposited each year in the Imperial Valley irrigation system which must be removed by mechanical methods. The annual cost of such removal is reported to be about $2 per acre of land served. plus $1 per acre expense for cleaning the main canals. This cost will continue to increase due to the continual rising and widening of the canal and ditch banks. If the accumulated fine silt is spread too thickly over the irrigated lands, there is a dangerous tendency to make the soil imperious to air and water. Another menace coming from silt deposition on the land is the gradual reduction of gradient between the intake of the canals and the lands served with consequent reduction of the water flow. The acute danger to the Imperial Valley is, therefore, not only from the floods of water, but also from the floods of silt brought down by the normal flow of irrigation water. The silt menace will continue for several years after the impounding reservoir is constructed, as the desilted water

will again pick up previously accumulated bed silt until the flow below the dam scours a comparatively clean channel. Since no practicable large storage sites exist below the Williams and Gila Rivers, the silt from these sources will continue to discharge into the main river; however, the impounding dams to be constructed on the Gila will minimize the flood and silt dangers from this source, while the difficulties originating in the Williams River are said to be negligible.

GENERAL PRINCIPLES OF RIVER DEVELOPMENT

No works of control should be constructed without consideration of how they will affect a comprehensive plan for development of the useful natural resources contained in the Colorado River. These resources may be classified as water for domestic and irrigation uses and water power. With the increase of population and with the diminishing supplies of cheap coal and oil, these resources will have a gradually increasing value which should be equitably preserved for the seven Colorado River Basin States. Geographical and topographical location will automatically govern the accruing benefits to a large degree, but in so far as possible these future benefits should be safeguarded by compacts between the interested States. This was the basic motive which led to the drafting of the so-called Colorado River compact at Santa Fe, N. Mex., in November, 1922.

To secure the maximum of benefits from the river development there must ultimately be constructed a series of dams and reservoirs which will accomplish five things:

1. Storage of flood waters to prevent destruction of life and property.
2. Storage of silt to prevent damage to property below and to render water supplies more suitable for domestic and irrigation use.
3. Storage of water for power.
4. Storage of water for domestic uses.
5. Storage of water for irrigation uses.

Large capacity storage to accomplish items 1 and 2 should be provided at an early date as near to the delta lands as a suitable site can be found and such location should have a minimum of interference with the requirements of future structures to be designed and located to utilize the benefits listed under 3, 4, and 5, that is storage of water for power, domestic and irrigation uses. Locations for such feasible future structures have been selected by several competent engineers and are a matter of record in the files of the United States Reclamation Service. Some interference with such locations can not be entirely avoided in comprehensive plans for river development. In consideration of such plans it should be understood that there must be an economic balance between the requirements of the territory to be served and the location, size and cost of the proposed storage reservoirs.

This important factor has been overlooked in many of the schemes which have been put forth for Colorado River development. Owing to the precipitous and rocky nature of most of the territory through which the Colorado River traverses, after the construction of single large reservoir in the lower reaches to accomplish flood and silt control, it is probable that further developments in the near future will be principally for power purposes, particularly in view of the continued improvement in methods of long distance electrical transmission. There appears to be no valid reason why these strictly power developments can not later be constructed under the terms of the Federal Power Commission Act.

With all of the above factors in mind it appears entirely proper and practicable for the Federal Government to undertake the first step in river development, which is the construction of an adequate dam and reservoir for flood and silt control, reimbursing itself for the costs from sales of stored water and the large quantities of power which can be incidentally generated. Future developments of the river by private or municipal enterprise will suffer no interference therefrom.

SITES PROPOSED FOR INITIAL DEVELOPMENT

A number of locations have been proposed for the initial river development. Before considering the individual sites the following specifications may be set forth as desirable prerequisites:

1. Flood-water storage capacity of from 8,000,000 to 10,000,000 acre-feet.
2. Silt-storage capacity of approximately 7,500,000 acre-feet.

3. Irrigation and domestic water-supply and power-storage capacity of from 8,000,000 to 10,000,000 acre-feet.

4. The location of the impounding dam, in so far as practicable, should be below the main silt and flood bearing tributaries and as close as possible to

the territory to be served, in order that proper control may be accomplished and that transmission costs and losses may be reduced to a minimum.

5. The site should permit the creation of a maximum amount of power and irrigation development at a minimum of unit capital cost in order to repay

investments in the project. This item considers both engineering and economic feasibility.

6. The structure should not destroy or render valueless any undue amount of developed property or seriously interfere with future practicable river developments.

The most suitable sites on the Colorado River for the construction of dams and accessory works of control are listed as follows and their location shown on the attached map:

1. Glen Canyon.
2. Bridge Canyon.
3. Diamond Creek.
4. Bulls Head.
5. Topock.
6. Parker.
7. Upper Boulder Canyon.
8. Lower Boulder or Black Canyon.

GLEN CANYON

This site has much topographic merit and could be constructed to accomplish a large amount of storage and power generation. However, due to its isolated location, soft wall material, great distance from the areas to be served, and much higher unit costs of construction, as an initial development it does not favorably compare with the Boulder Canyon sites. A limit of 400 feet safe height for the dam has been set for geological reasons. This would give a storage capacity of about 8,000,000 acre-feet with comparatively high unit costs. The estimate for this dam is $63,000,000 or more than double the cost at the Boulder Canyon sites for the same storage. If the entire river were to be developed only for power regardless of expense, the Glen Canyon would then be the logical initial installation for regulation of the flow to all power developments below. Its value for storage of irregation water is much lessened on account of its very great distance from lands susceptible of irrigation.

BRIDGE CANYON AND DIAMOND CREEK

These adjacent sites have admirable topographic advantages for power developments. Due to the narrowness of the long canyons above, their storage capacity is very limited for purposes of flood or silt control. Owing to their future value as power sites the high water elevation of the Boulder Canyon dam should be fixed below the low water elevation of the Bridge Canyon site in order that there be no interference.

BULL'S HEAD SITE

The Bull's Head site is located 66 miles below the Black Canyon site. While well adapted for a dam of approximately 140 feet in height, the limited storage available, about 1,800,000 acre-feet, bars this site from favorable consideration for the erection of a major flood control or silt storage structure. However the location is admirably suited in many respects for use as an auxiliary regulating reservoir for the Boulder or Black Canyon installation, should future conditions of irrigation and power necessity warrant its construction. This need will arise from the fact that the water requirements of power and irrigation do not coincide. Water used for power at the high head Boulder Dam can be reimpounded at the Bull's Head site and held for irrigation demands. Under present conditions utilization of the Bull's Head site is not necessary.

TOPOCK SITE

This site has been strongly recommended by a number of interests as the best location for a flood and silt control dam for the lower basin agricultural lands. It lies a short distance below the town of Needles and the topography is favorable for the construction of an impounding dam of approximately 160 feet in height, providing a storage capacity of some 10,500,000 acre-feet. The cost of such a dam with works of control would be about $26,000,000. By increasing the height of the dam an additional 20 feet, some two million more acre-feet storage can be obtained but at considerably increased unit costs. The proponents of this site claim that the advantages of the Topock location are such as to warrant its substitution for the Boulder or Black Canyon site

in the coming legislation to be introduced in Congress looking to Colorado River control. The following facts speak for themselves in regard to the matter:

1. The total storage available within economic cost limits is inadequate to handle the water and silt requirements of the situation.

2. The construction of the proposed reservoir would flood and destroy the city of Needles with its extensive railway shops and yard facilities. It would also necessitate removal and reconstruction of 20 miles of the main line of the Santa Fe Railroad, lengthening the line and forcing it to traverse a most difficult terrain. In addition some 35,000 acres of irrigable land would be flooded including the Mohave Indian School. The cost of replacement of the railroad facilities and of condemnation of the town of Needles and required lands in the surrounding country would be in excess of $10,000,000 and would involve protracted legal proceedings. This cost would be an additional charge against the project.

3. The power which could be generated at the Topock Dam site is relatively small on account of the low head and would furnish nothing like the financial return to be expected from the Boulder Canyon sites.

4. The proposed Topock Reservoir would have relatively greater evaporation losses than the upper sites which have been considered, due to its shallower depth and more exposed surfaces.

5. The proposed Topock Reservoir would partially destroy the usefulness of the Bull's Head and Parker Dam sites.

The conclusion is justified that the Topock Dam site is entirely without merit as an initial development for Colorado River control.

PARKER SITE

The Parker site is located 170 miles below the Black Canyon site. Its topography would allow the construction of a dam to create a water elevation of about 100 feet and a storage of 2,300,000 acre-feet at a reasonable unit cost. On account of the small storage capacity this location can be eliminated from consideration as a major flood control and silt storage site but it possesses great merit as an auxiliary reservoir to the proposed Boulder Canyon construction. It will permit the irrigation of large areas of valuable land in Arizona and California, and in addition provide some 60,000 firm electrical horsepower for sale to assist in repayment of construction charges.

UPPER BOULDER CANYON AND LOWER BOULDER CANYON OR BLACK CANYON

These two sites, on account of their adjacent location and marked superiority to all other locations, are best considered together.

1. Both sites are topographically well adapted for the construction of a high dam and large impounding reservoir.

2. The rock formation at the upper boulder site is granite. At the lower boulder or black site it is a highly silicified adesitic tuff which is more monolithic in character.

3. For the same height of dam above low water, the Black Canyon site will give somewhat larger reservoir and storage capacity. For the same elevation of economic high water level the advantage is very much in favor of the Black Canyon site.

4. This lower site also has available large deposits of suitable gravel and other necessary construction materials which will reduce construction costs.

5. The Black Canyon site is readily accessible by rail and wagon road. The upper Boulder, Bridge, Diamond, and Glen Canyon sites are all very difficult of access.

6. The Black Canyon site has more suitable bedrock for dam foundations at distinctly less depth than other sites examined. The canyon walls are closer together and there are more favorable locations for the proposed power house and construction camps. All of these items will tend to reduce construction costs.

7. The Black Canyon site is closer to the territory to be served by the reservoir than any of the previously-mentioned sites thus reducing costs and losses of transmission.

A disadvantage which has been urged against both the upper and lower Boulder Canyon locations is the existence of extensive salt deposits within the reservoir area. The matter has been made the subject of most careful examination by the writer and a number of geologists, notably Dr. F. L. Ransome. The salt outcrops are generally in bluffs covered with heavy insoluble over-

burden. The total quantity is impossible to estimate, but the amount which would go into solution in the reservoir water is so neglible that it would not noticeably affect its salinity. The action of the water on the salt would be to undermine the insoluble overburden and cause it to settle on the exposed salt faces. This action, together with an additional covering of silt deposited from the reservoir water, can be depended upon to minimize the dissolving action. For all practical purposes the dilution of the salt will be so great as to render it harmless.

IRRIGATION

Inasmuch as the Colorado River runs largely through an arid country, one of its most valuable potentialities is the irrigation of agricultural lands. Assuming the adoption of the seven-State compact by all interested agencies, the storage of irrigation water becomes a factor of great importance in any major plan for river development. To determine the desirable amount of storage to be provided requires consideration of (a) the lands susceptible of profitable cultivation in the States affected, (b) the necessities of the lands already under irrigation, (c) the probable demand for new crop-bearing areas as the population of the country increases. Investigations made by the United States Reclamation Service indicate the following areas in the lower-basin States as irrigated or susceptible of irrigation from the Colorado River:

	Acres
Arizona:	
Now irrigated by gravity, Yuma	48,000
Now irrigated by pumping—	
Yuma	1,000
Parker	7,000
Total	56,000
Additional susceptible irrigation by gravity—	
Yuma	1,000
Mohave	24,000
Parker	109,000
Cibola	16,000
Additional susceptible irrigation by pumping—	
Yuma	43,000
Bull's Head	9,000
Gila	632,000
Miscellaneous	2,000
Total	836,000
Total for Arizona	892,000
California:	
Now irrigated by gravity—	
Imperial	462,000
Yuma	13,000
Palo Verde	36,000
Pumping, miscellaneous	1,000
Now irrigated, total	512,000
Additional susceptible irrigation by gravity, Yuma	3,000
Additional susceptible irrigation by gravity, Palo Verde	55,000
Additional susceptible irrigation by gravity, Imperial	264,000
Additional susceptible irrigation by gravity—	
Blythe	50,600
Mohave	1,000
Additional susceptible irrigation by pumping—	
Palo Verde	43,000
Chuckawalla	126,000
Imperial	59,000
Additional susceptible irrigation, total	601,000
Total for California	1,113,000

Nevada:	Acres
Now irrigated by gravity, virgin	7,000
Now irrigated, total	7,000
Additional susceptible irrigation by gravity, virgin and cottonwood	4,000
Additional susceptible irrigation by pumping	69,000
Additional susceptible irrigation, total	73,000
Total for Nevada	80,000
Total for lower basin	2,085,000
Mexico:	
Now irrigated by gravity, total	200,000
Additional susceptible irrigation by gravity, total	500,000
Additional susceptible irrigation by pumping	Unknown.

The estimates above given are generally much less than those presented by optimistic claimants in the various States. However the figures are undoubtedly ample and no greater estimates are justified by present economic and agricultural conditions. The seven-State compact arbitrarily obligates the four upper States to deliver to the three lower States an aggregate of 75,000,000 acre-feet in any 10-year period. Taking the river discharge variations in the past as a guide, it would appear that a water storage of from 8,000,000 to 10,000,000 acre-feet is desirable in the initial works of control, this storage is to be added to the space allowed for flood and silt control.

ALL-AMERICAN CANAL

Any discussion of irrigation potentialities of the Colorado River is incomplete without reference to the proposed all-American canal. Economically this canal will be an advantage in that it will permit the irrigation of an additional 200,000 acres by gravity and keep the sources of water supply and transmission entirely in the United States. Under present conditions, the fact that the main canal to the Imperial Valley is partly in Mexican territory is a continuous source of irritation. The proposed canal itself is undoubtedly feasible from an engineering point of view. All operations necessary for construction are of common practice and offer no special difficulties. Opponents of the project have represented that a section of the line known as the "sand dunes" would require prohibitive costs for construction and that drifting sand would quickly fill the canal. These fears do not seem to be well founded. The Suez Canal traverses similar sand dunes and no special construction or maintenance difficulties were encountered. Canals through sand hills were examined in certain localities in the United States and no serious troubles were reported. There has been a marked improvement in excavating machinery in very recent years which will tend to cut the unit cost of moving yardage to figures less than estimated in the report of 1919 made on the subject. There appears no doubt but the canal can be constructed within the estimated sums. In the matter of keeping the canal clear of drift sand, the testimony of observers is that there is appreciable sand movement only about 60 days a year and the rate of advance of the dunes is almost negligible. A concrete road now running through the low passes in the dunes reports very little sand accumulations and no difficulty whatever in keeping the road open for traffic. Even if the sand accumulations were much greater than anticipated, the lining of the sand dune canal section with concrete, increasing the gradient and covering the banks with vegetation would doubtless obliterate most of the difficulties.

POWER

In considering the value of the hydroelectric potentialities of the Colorado River it is necessary to compare the costs of such power with that generated by steam, using oil or coal for fuel. To estimate the cost of the hydroelectric power three factors must be known or assumed.

1. The average head of water.
2. The average flow of water.
3. The efficiency of the equipment used.

Using conditions at the lower Boulder or Black Canyon site as a basis for operation the following figures can be considered as applicable. Elevation of water level, 550 feet. Effective heads available, 400 to 540 feet. Average flows available, 12,000 second-feet minimum to 22,000 second-feet maximum. Efficiency of equipment, 83 per cent. Firm horsepower to be developed, 550,000. The flows of water required to obtain a firm output of 550,000 horsepower under the various probable heads are listed in the following table:

Flow of water required

Head in feet	Second-feet	Head in feet	Second-feet
540	10,810	460	12,700
520	11,230	440	13,270
500	11,680	420	13,900
480	12,170	400	14,600

The above-calculated flows are available under present river conditions and even lower heads can be used with higher stream flows. There will be a diminution of flow in later years on account of the increased use of water in the upper reaches. This will be largely offset by the higher heads available at the dam due to better regulation of the stream system. In calculating the profitable selling price of power, the following factors should be known or assumed.

1. Capital investment required.
2. Fixed charges.
3. Operation and maintenance costs.
4. Load factor.

According to the estimates of the United States Reclamation Service and capable independent engineers, the capital investment for the entire project will be as follows:

Dam and appurtenant structures	$41,500,000
Power house and equipment	31,500,000
All-American canal	31,000,000
Interest during construction	21,000,000
Total	125,000,000

The greatest uncertainty lies in the estimates of the cost of the dam. No structure of anything like such magnitude has ever before been constructed. However, in so far as engineering experience and human intelligence can be depended upon, the estimates are reliable. In matters like power-house equipment and canal excavations, the cost estimates are upon more certain ground.

In computing the item of fixed charges, interest is taken at 4 per cent. The redemption period of the bonds may be taken at 50 years from time of issuance. It is assumed that during the first ten years after commencement of operations the earnings of the project will be no more than sufficient to pay interest, operation, and maintenance charges, leaving 40 years as the actual period for bond retirement. During this period a fixed annual payment will probably be earned sufficient for both interest and redemption, as well as for the operation, maintenance and depreciation charges. These latter are estimated by the United States Reclamation Service to be $1,200,000 per year, of which $700,000 per year is charged to the dam and power house and $500,000 is charged to the all-American canal.

From the above data it can be computed that the average annual charges against the project for the first 10 years after completion will be as follows:

Interest 4 per cent on $125,000,000	$5,000,000
Operation, maintenance, and depreciation	1,200,000
Total	6,200,000

The annual charges for the following 40 years will be:

Combined interest and redemption	$6,315,000
Operation, maintenance, and depreciation	1,200,000
Total	7,515,000

Examining into the sources of revenue to meet these charges it is found that 550,000 firm horsepower will produce approximately 3,600,000,000 kilowatt hours of electric power at the switchboard. If this entire supply is marketed

at a net price of 2 mills per kilowatt hour the resulting revenue will be $7,200,000 annually. The United States Reclamation Service estimates an additional annual revenue of $1,500,000 from charges for water, after the organization period of 10 years.

Under the assumed conditions it appears profitable to sell the generated electric power for $0.002 per kilowatt-hour at the switchboard. If the various water consumers are charged a greater sum than the United States Reclamation Service estimates for desilting or impounding the waters or for repayment of all-American canal costs proportionate to value of the benefits they receive or are able to pay for, then the profitable sales price of electric power at the switchboard can be correspondingly reduced.

COSTS OF POWER TRANSMISSION TO CONSUMER

While it is not contemplated that the Government will enter into the field of power transmission or distribution, such cost estimates are an essential factor in determining the economic value of hydroelectric power from the Colorado River.

The factor of transmission costs will vary with the distance of the consumer from the generating station, the line loss, the load factor and the peak load transmitted, and also on the character of the regulating devices employed. For purposes of comparison with steam kilowatt-hour costs it may be assumed that the distance of the receiving station from the generating station is 300 miles, the line loss 12 per cent, the load factor 55 per cent, peak load transmitted 470,000 kilowatts.

Allowing for contingencies, the average transmission costs of electric power from the Boulder or Black Canyon site to southern California under these assumed conditions may be closely approximated at $0.002 per kilowatt-hour. This added to the assumed sale price, $0.002 at the point of generation, makes a total cost of $0.004 per kilowatt-hour at the receiving station. If an auxiliary steam plant is deemed necessary to supplement the Colorado River hydroelectric power, then the above unit cost will be correspondingly increased according to the kilowatt-hour expense necessary for auxiliary steam plant maintenance.

COSTS OF STEAM POWER

The period of repayment of the cost of the proposed Colorado River development is largely dependent upon the cost of competing power at the principal centers of consumption. Steam power is very cheaply generated, using fuel oil or gas at the prevailing low prices.

At a steam generating station the cost per kilowatt-hour will depend upon the following factors:

1. Capital investment required.
2. Fixed charges.
3. Operation and maintenance costs.
4. Fuel costs.
5. Load factor.
6. Thermal efficiency of equipment.

These factors can be assumed or determined with reasonable certainty based on prevailing practice. If this cost per kilowatt-hour is taken as the lowest at which such power can be generated at the centers of large consumption, then subtraction of the unit transmission cost will give the proper sale price of the Colorado River power per kilowatt-hour at the point of generation.

BENEFIT TO THE SOUTHWEST

The benefits of the proposed Colorado River development can be classified as agricultural, municipal, and industrial.

1. *Agricultural benefits.*—The menace of floods and silt will be removed from agricultural lands having a present value in excess of $100,000,000. This property will be greatly enhanced in value and interest rates on farm loans in the district will be correspondingly reduced.

2. There will be a material increase in crop productivity due to assured water supply.

3. A very large acreage of now valueless land can be made available for irrigation and cultivation as soon as warranted by economic conditions.

4. There will be a reduction of the cost of levee maintenance and silt removal. These items in the past have exceeded $1,000,000 per year in amount.

From the above it appears that the value of the service to be rendered to agricultural lands exceeds the investment required. However, precedent seems to have fixed the policy that agricultural benefits are expected only to pay actual operating expenses and amortization costs without interest.

Municipal benefits.—The insurance of an adequate domestic water supply for municipal needs is a benefit which may properly be charged to the communities which benefit therefrom. The pumping of such water supply will absorb a large proportion of the power generated. There is also a municipal benefit accruing from the creation of new industry and new taxable property.

Industrial benefits.—The southwestern part of the United States is favorably situated with respect to raw material supplies, climatic conditions, labor, and transportation. With the addition of an ample cheap power supply it appears that industrial development will be thereby stimulated. The proposed Boulder Canyon development is estimated to furnish 3,600,000,000 kilowatt-hours of electrical energy per year at a very low price delivered to centers of population and major use. The industrial development of the territory to be served can reasonably be expected to absorb the electrical power to be developed by the project in less than 10 years. There are especial opportunities for the development of electrochemical industries at or near the point of generation of power. The refining of zinc and copper and the manufacture of aluminum, cyanide, and carbides may be mentioned as possibilities. The industrial developments close to the point of generation may be made even more attractive if the States of Nevada and Arizona are allowed preferential power allocations or rates in lieu of their rights on the river.

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REPORT ON DEVELOPMENT OF THE LOWER COLORADO RIVER

By JAMES R. GARFIELD

JANUARY 5, 1928.

Hon. HUBERT WORK,
Secretary of the Interior, Washington, D. C.

MY DEAR MR. SECRETARY: In response to your letter relating to the Colorado River problem, I submit the following observations:

The problem is essentially a practical one. A clear understanding of facts will give a basis from which a wise solution of the problem may be evolved.

1. The river is both an interstate and international stream. Its watershed extends through seven States and is a boundary between some of the States. Its sources are all within the territory of the United States. Its final channel, delta, and mouth are in the territory of Mexico.

2. It is a navigable stream, both actually and potentially. From 1852 to 1917, many reports were made by governmental engineers upon the question of navigation; Congress has made various appropriations for the development of navigation, and at no time has Congress abandoned, directly or by silent acquiescence, the position that the stream is navigable. The amount of navigation is immaterial. In the days before the railroads reached that territory all the Government and other supplies were brought up the river to points several hundred miles within the territory of the United States. If the flow of the stream is controlled by the erection of a dam at Boulder Canyon, the lower stretches of the river would readily be made useful for navigation and the great area of the reservoir above the dam would make possible its use for navigation into regions hitherto inaccessible.

3. The entire watershed is a unit. The use in any large way of any particular place along the course of the river for the development of irrigation or power must be considered in connection with the entire river. Its use and development can not physically be limited by State or international lines. Whether a particular point is developed in territory where the doctrine of appropriation and beneficial use obtains, or in territory where the doctrine of riparian ownership obtains, is for practical purposes of but little moment. One universal natural law obtains, namely, that water arising in mountain peaks of necessity finds its way to the sea. Man may retard, impound, and use the water at special points, but the use at that point is absolutely dependent upon the sources of supply above and upon the right of drainage below. The effect of this natural law is greatly increased in a river subject, as the Colorado River is, to both seasonal and unexpected floods of great volume.

The jurisdiction of a single State is not broad enough to deal with all the problems that necessarily arise in the construction and development of such a project as that under consideration. The United States alone has the power properly to safeguard the interest and rights of all those who may be affected by such a major development, and is, furthermore, the only political agency that can deal with and settle the international question arising with Mexico.

4. The development of the lower Colorado in a large way has thus far been for the purpose of irrigation. The two principal projects are that of the Federal Government at Laguna Dam and that of a private company at a headgate near the international boundary, from which water is carried in canals through Mexican territory and back into the Imperial Valley, Calif.

The interest of Mexico in the Colorado is immediate and vital. The private company to which reference is above made, namely, the California Development Co., appropriated, under the laws of California, 10,000 second-feet, and thereafter entered into a contract with the Mexican Government by the terms of which the Mexican Government permitted it to construct and maintain canals through Mexican territory in which water was carried back to the Imperial Valley in California. In consideration of this right the company agreed to furnish for lands in Mexico water up to one-half of its total appropriation of 10,000 second-feet. As a result of this contract, about 200,000 acres in

Mexico have been put under cultivation, and possibly 500,000 more acres may be developed. This canal system is now controlled by the water users of the Imperial Valley.

The United States was not a party to this contract, is not bound by it, nor is it in any way responsible for the operations conducted under the contract. At the time of the break of the levees which resulted in the creation of Salton Sea in California, the Federal Government by act of Congress appropriated funds for safeguarding Laguna Dam.

Since 1904 notes at various times have been exchanged between United States and Mexico relative to the Colorado River. Three international commissions have been appointed, one of which is about to sit. The first two commissions did not formulate final reports. The third commission is authorized by Congress to study and report upon the problems, to the end that there may be a reasonable and just agreement made between the two countries. It is of the utmost importance for all future development of the Colorado within the territory of the United States that an early agreement with Mexico be effected. The question is more far-reaching than merely the use of the waters of the Colorado. An unsettled problem of this character between the two countries can always give rise to unnecessary friction and misunderstanding. There are those who have expressed the view that the United States is free from any obligation to consider Mexico in the use made within the United States of the Colorado. The facts, as a practical question, show such a position to be untenable. The United States demands and requires the continuous discharge of the river into the sea through Mexican territory. On the other hand, Mexico requires and demands its continuous use of the flow of the river for irrigation purposes. Hence the necessity of an international agreement under which there will be a clear definition of the rights and obligations of the two nations. Need of such an agreement is accentuated because of the unusual geological formation of the territory and of the delta in Mexico and continuing into California. The Imperial Valley Basin is about 300 feet below sea level. Any break or change in the course of the Colorado in Mexico which results in the turning of the channel to the north throws the entire flow into the Imperial Valley Basin. This is not theoretical; it has actually happened and may happen again. The results would be most disastrous not only to the Imperial Valley but to other areas along the lower stretches of the Colorado. Such a change once threatened and will again threaten the Laguna Dam.

5. The United States Government is not only the political sovereign whose jurisdiction is broad enough to deal with all the phases of the problem but it is likewise the largest landowner along the bed of the Colorado. Hence whatever theory of the use of water is adopted in any particular State the use of the public domain in that State can only be obtained under congressional act, and Congress may impose in such act whatever conditions it deems wise.

6. Since the flood which resulted in the creation of the Salton Sea the study of the problem of harnessing the Colorado has been continuous. The various sites along its course for the major dam have been most thoroughly investigated. The purposes of such a dam are threefold—(*a*) flood control; (*b*) irrigation and domestic use; (*c*) power.

(*a*) *Flood control.*—The people most interested in flood control are the settlers of the Imperial Valley. They are in danger whenever a great flood arises. The United States Government has, however, no direct responsibility for that condition. The United States is directly interested in flood control because of the large interests that have been developed under the Laguna Dam.

(*b*) *Irrigation and domestic use.*—There is a possibility and need of a very large increase in areas in Arizona and California for further irrigation and for the more permanent supply of water on the already irrigated areas.

(*c*) *Power.*—The construction of a dam high enough to meet irrigation needs makes possible the development of a very large amount of power as incidental to the major purposes of the dam. The construction of a dam sufficiently large to properly care for flood control, irrigation, and domestic use would necessitate the expenditure of a sum very much larger than could properly be borne by the water users under the irrigation project. The incidental development of power would enable the Government to obtain revenues sufficient to repay the entire excess cost of construction and development over and above that which could properly be borne by water users.

7. The seven-State compact was evolved for the purpose of compromising the differences of opinion which have arisen between the people of the various States regarding the development of the Colorado. It is unfortunate that the

compact has not been ratified by all the States, but failure of ratification does not prevent the Federal Government from going forward with the construction if Congres so decides. It is also true that no single State could, either directly or indirectly through a corporation created within its jurisdiction, proceed with the development.

The Federal Power Commission, which under the general act of Congress would have jurisdiction to grant a license for the construction of a dam for power purposes, is prohibited by the joint resolution adopted March 4, 1927, from issuing or approving a license affecting the Colorado River or its tributaries until and unless the compact has been approved by Congress or, in the event that the contract is not sooner approved, until March 5, 1929.

8. The right of Congress to construct the proposed dam is derived from the commerce clause of the Constitution, its control over the public domain, its control over navigable streams, its obligations to deal with international relations and interests, its powers under the reclamation law, and its rights as a landowner. In the exercise of these powers it may do such things as are necessary and incident to the exercise of those powers. Its right to exercise these powers has been sustained by the Supreme Court of the United States. Whether the exercise of these powers in particular cases affects or infringes upon private rights can only be determined by the Federal courts when an instance arises.

9. *The all-American canal.*—As part of the Imperial Valley project, it is proposed to construct an all-American canal, to the end that the Imperial Valley settlers may not be subject to the dangers arising from a break of the levees in Mexico. The expense of such a canal is great, but the landowners of Imperial Valley are ready and willing to assume the burden of that cost. The results of constructing an all-American canal would be to make unnecessary the use of the canal system in Mexico now controlled by the water users of the Imperial Valley. Whether an abandonment of that contract by the water users of the Imperial Valley would involve those users in controversy with the owners of land in Mexico now using one-half of the water flowing through the canal is a question with which the Federal Government is not involved. It is purely a private contract, and any questions arising under that contract would have to be determined as all other private controversies in courts of appropriate jurisdiction.

10. Approximately 160,000 acres of land would be submerged in the event a dam was constructed sufficiently high to impound 26,000 acre-feet of water. Of this total acreage all but approximately 13,700 is in the public domain; that is, is owned by the United States Government. The site of the proposed dam is in a portion of the river which forms the boundary between Arizona and Nevada. From this it is apparent that neither of those States could authorize its construction. The United States alone can do so.

Furthermore, there are within the proposed area approximately several hundred mining claims. The adjustment of these claims is wholly a matter under Federal jurisdiction.

11. Various filings for diversion from the river have been made during the past 30 years. A complete schedule of those filings is in the Department of the Interior. Whatever rights exist or whether those rights would be affected or impaired by the construction of the Boulder Dam can only be determined by the Federal courts unless the parties compromise any questions by agreement. Such questions are exactly similar to those which arise under either a reclamation project or the construction of a dam authorized by the Federal Power Commission.

In assembling these facts I have examined all the records in the department having to do with the Colorado River. Included in the records are not only the reports of Government officials but likewise reports from engineers and lawyers representing the various interests involved.

My conclusions from this examinaton are as follows:

The Colorado River should be considered as a unit and whatever is now done should be the basis for the future development of the river for many years to come. I am satisfied that the most favorable site for first construction is at Boulder Canyon. At that point the opportunity is afforded to construct a dam which would impound approximately 26,000,000 acre-feet of water, thus assuring, as far as it is humanly possible to assure, the storage of floods and permit a flow in the river below at such times and in such quantities as would provide for future irrigation and prevent the disasters which have been and will be attendant upon unregulated floods.

Such a dam would likewise provide for the development of further irrigated areas as rapidly as the needs of agriculture demand.

The construction of the dam at this site will take care of the problem of silt for many years and will give the time and opportunity for the construction of dams farther up the river whenever it is deemed necessary and wise to go forward with such construction.

The cost of such construction from the estimates now offered is far more than can be borne by the users of water on irrigation projects. Furthermore, those water users should not be charged with the expenditure made for the purpose of flood control. The Government may reimburse itself for all costs in excess of those which may be charged against the water users by the development and sale of power.

The total estimated cost, which includes the construction of the all-American canal, may be reduced in the amount of such construction provided an agreement can be made between the Imperial Valley water users and the users of water in Mexico, under which the canal system in Mexico may still be used when freed from the danger of disaster by reason of floods which would result should be the dam be constructed as proposed.

It is therefore most advisable that if Congress authorizes the construction of the dam it should likewise give the Secretary of the Interior discretionary power to build or not to build an all-American canal.

I have examined the reports and estimates regarding the cost of power development and the probable revenue to be derived therefrom. I am satisfied that results of such construction would enable the Government to repay its entire expenditures over and above those allocated to the water users within a period of 40 to 50 years.

It is urged by some that Congress is without authority to authorize appropriations for the development and sale of power. I am of the opinion that this position is not sound. Such appropriations would be incidental to the main purpose of the construction of the dam and would clearly come within the general powers of Congress. The question is not academic for the reason that the United States has already constructed through the Bureau of Reclamation a number of power plants and has sold the power for the purposes suggested in the present instance and no attack upon the exercise of that power has been successful.

It is further urged that the construction of a power plant of the magnitude suggested in this instance is an improper interference with the vested interests of private power companies. With this I can not agree. The United States Government does not propose to enter into the business of the distribution of power but proposes merely to sell power at the switchboard in large units to either public authorities or to private companies at a price merely sufficient to cover the cost of construction. Furthermore, the problem is no different from that which would arise whenever a private company enters upon a new power development. It is to be remembered that private companies have expressed their willingness and have taken first steps toward the construction of a dam at Boulder site and other sites along the river. Surely the Government should not be precluded from utilizing its own property for the benefit of all the people within the area affected because of the fear that such utilization might interfere with some existing properties. The same argument might be used regarding all reclamation projects, namely, that the increase of arable acreage brings additional competition to the farmers in the production of agricultural products.

Congress will look to the good and welfare of all classes of business interests.

Many legal questions have been raised dealing with powers of the several States through which the Colorado River runs; the question of whether the Colorado is subject to ownership by the State; whether the doctrine of beneficial use or riparian rights should govern and whether Congress has the power to allocate water between the various States. Many of the discussions on these points fail to take into consideration the practical questions which I have attempted to outline. The purpose of the seven-State compact was to settle by agreement the conflicting opinions expressed on many of the legal points to which reference is made. It is unfortunate that the compact has not been ratified; on the other hand, if it be ratified, there will still be questions concerning which individuals will disagree and the determination of which can only be effected through the Federal courts.

The decisions of the Supreme Court of the United States on many questions involved are numerous and with all of which you are thoroughly familiar. I

think for the purpose of this report there is no need to refer to any of these decisions. Their general effect conclusively establishes the right of Congress to do that which is suggested in the construction and development of the Boulder Dam.

The question for Congress to decide is whether the time is now at hand for authorizing this construction. I am of the opinion that no further discussion of legal problems arising either under the form of State sovereignty or private claims with be upheld. Such discussion unless presented to a court of competent jurisdiction will not lead to agreement between the contending parties.

Finally, I submit that the United States is not justified in constructing a dam solely for flood control.

That it is justified in constructing a dam at Boulder Canyon which will impound approximately 26,000,000 acre-feet.

That it construct a power plant and dispose of the power at the switchboard.

That the entire revenue derived from the water users and from the sale of power be first used to repay the United States Government its total expenditure.

That the question of what action the Government will take when that expenditure is repaid be made at the time when that payment is completed.

That the question of the construction of the all-American canal be left to the discretion of the Secretary of the Interior; and

That an agreement with Mexico be reached at the earliest possible moment.

Very truly yours,

JAMES R. GARFIELD.

[The United States Daily, Wednesday, April 20, 1927]

POWER OF MR. WORK TO NAME ADVISERS ON DEVELOPMENT OF COLORADO RIVER QUESTIONED BY SENATOR KING

USE OF APPROPRIATION ALSO IS QUESTIONED—FULL TEXT OF LETTER CONTENDING STATES SHOULD CONTROL WATERS OF STREAM

APRIL 18, 1927.

Hon. HUBERT WORK,
Secretary of the Interior,
Washington, D. C.

DEAR MR. SECRETARY: On the 9th instant the Acting Secretary of the Interior, pursuant to your directions, appointed Prof. William F. Durand, Hon. Frank C. Emerson, Hon. James R. Garfield, Hon. James G. Scrugham, and Hon. Charles W. Waterman as "special advisers in connection with the proposed development of the Colorado River.

The letters of appointment stated that the advisers were to "act as individuals, and in no sense were their appointments to constitute them a committee, board, commission, or other similar body." This limitation obviously was to meet the provisions of section 9 of the act of March 4, 1909, which prohibits the use of any public moneys or appropriations made by Congress for the payment of compensation or expenses of any commission, council, or other similar body or the members thereof in connection with any work, unless the creation of such commission, etc., shall be authorized by law.

WILL ACT AS BOARD, SENATOR CONTENDS

Undoubtedly, the persons named will act together and to all intents and purposes will be a "board or commission," for the purpose of making certain investigations and submitting findings of fact based thereon. I assume there is authority for the appointment of these persons, though it is rather difficult to distinguish them, in view of the duties and responsibilities with which they are charged, from a board or commission or other similar body such as contemplated in the act of Congress referred to. But if there is any authority for their appointment it can be found only in some act relating to reclamation projects; and the duties and functions of these "advisers" could legally relate only to the investigation of actual or prospective reclamation projects whether Congress in general or specific terms had granted such authority. Congress has not authorized the construction of any reclamation project in connection with Black Canyon or Boulder Dam, or by the use of the waters of the Colorado River (I am not including in this statement the Yuma or any other reclamation project heretofore authorized and in process of construction), nor, so far as I am advised, has it authorized, in any specific terms, investigations by the Interior Department to determine the feasibility of constructing another reclamation project in the lower Colorado River Basin. Whether there is authority given in some general language dealing with the reclamation service, under which it has authority to make preliminary surveys or investigations for the purpose of determining the wisdom of developing a reclamation project in the Colorado Basin, I shall not stop to inquire. Indeed, for the present purpose, I shall assume such authorization exists.

But conceding the fact, I respectfully submit that neither the Interior Department nor any persons named by it as "advisers" or agents could go beyond such authorization or investigate or make findings in reference to matters unconnected with the reclamation of arid lands belonging to the United States. The Interior Department has no authority, as I interpret the law, to investigate the economic phases of the development of the Colorado River. It

may only make investigations for the purpose of determining whether its waters are available for reclamation projects and to ascertain whether it is practical and feasible to build a dam, and canals, under the reclamation act, for the purpose of reclaiming unoccupied lands of the United States.

QUESTIONS AUTHORITY TO MAKE INVESTIGATION

The Interior Department has no authority to investigate the feasibility or the economic or industrial possibilities or benefits to be derived from the erection of power plants or the steps to be taken to prevent the interference with or to improve navigation. If there is any authority upon the part of the Federal Government to make investigations upon any of the streams within the United States in connection with power development, then the Federal Power Commission alone possesses such authority. And under the acts of Congress, the War Department has control over improvements upon navigable streams, and it is well settled that the authority of the Federal Government with respect to flood control results from its power under the interstate commerce clause of the Constitution to regulate commerce and to prevent the navigation of streams from being interfered with. If I believed that the appointment of the persons referred to was solely for the purpose of determining whether, within the Colorado River Basin, and by utilizing the waters of the Colorado River or any of its tributaries, a reclamation project was advisable or desirable, and that they were to act as advisers of the Interior Department in respect thereto, I should make no comment upon the unique and remarkable letters transmitted by the acting secretary to the persons named. But a careful examination of these letters, including the instructions given to the advisers, has led me to the conclusion that the investigations to be made go far beyond the field of determining whether a reclamation project is advisable.

Questions and matters of far greater importance are to engage the attention of these "advisers." Indeed, it would seem that there is no relevancy between some of the questions which they are called upon to investigate, and the question of ascertaining whether a reclamation project within the Colorado River Basin is feasible. Certainly some of the questions to be investigated under the instructions given do not come within the authority of the Interior Department or any of its officials, nor can the department, in my opinion, employ as a reason for the investigation of these other extraneous (though highly important) matters any funds within its control, and particularly funds appropriated for, and in connection with, reclamation activities.

UTILIZATION OF FUNDS TO PAY ADVISERS IS CHALLENGED

While I have assumed the authority of the Secretary of the Interior to appoint "advisers" with respect to reclamation projects per se, and to utilize funds to pay such advisers for their services, I do not concede the authority of the Interior Department to appoint advisers to find upon all of the matters submitted to the persons named, nor the right to use any funds within the control of the department to pay them for services of the character referred to in some of the instructions given to the appointees.

Permit me to briefly refer to some of the duties devolved upon those "advisers," and the matters which they are to investigate and upon which they are to make findings. First they are required to specifically inquire into the engineering and economic phases of the development of the Colorado River, as distinguished from the legal problems. It is manifest that this is a direction to the "advisers" to consider all questions and all matters relating to the development of the Colorado River. The Colorado River flows through various States and is hundreds of miles in length. A study of the engineering and economic phases of the development of the river requires the consideration of many matters, disconnected from and not associated with reclamation projects. The hearings before the committees of Congress indicate that a number of dams might be built in the Colorado River for power purposes only. There was considerable testimony with respect to the development of hydroelectric power and the market for the same, and some of the testimony emphasized the power feature, giving it a paramountcy over any other use to which the waters of the river might be put.

There is no limitation in the instructions referred to, that the inquiries and investigations must be with reference to reclamation projects. As stated, they are intended to embark the "advisers" upon activities and inquiries beyond

the power of the Interior Department to authorize. May I be permitted to suggest that if a reclamation project is contemplated, or if the Interior Department is acting upon the assumption that it will proceed to build power plants and transmission lines and flood control dams, then the department, or those who are to have the matter in charge, should be deeply concerned in the engineering problems involved. The uncertain flow of the Colorado River, the deep canyons through which the waters flow, the suggested points where dams may be built—these and other matters direct attention to the difficult engineering problems that are to be met.

ESTIMATE CITED ON DEVELOPMENT COST

In this connection it is not improper to remark that the lowest cost of the essential projects embraced in the so-called Swing-Johnson bill is fixed at $125,000,000. Those who have had any experience with the engineers of the Reclamation Service and with the construction of dams, canals, power plants, and transmission lines will be compelled to admit that if the minimum is fixed at $125,000,000 the completed projects will cost perhaps double that sum.

It occurs to me that before the scope of the plan projected by the Interior Department is undertaken one of the most important responsibilities is to get accurate, complete, and comprehensive data in regard to the costs of the executed plan and the engineering problems that will be encountered. The available data dealing with the engineering problems are far from satisfactory. Before any development of the Colorado River is undertaken I respectfully submit that engineers of the highest standing and who are not interested in the matter should be named to exhaustively study the engineering questions and problems involved in such development. Legislation by Congress is needed to accomplish this result, and the importance of the subject is such as to require that this step be taken. The necessity of a study of this character becomes apparent when it is realized that the plan of the Interior Department and the proponents of the Swing-Johnson bill call for the Reclamation Service to have charge of the stupendous enterprise.

The record of the Reclamation Service ought to convince the Interior Department that engineering advice and guidance should be obtained from other sources. The recent comprehensive report submitted to the Secretary of the Interior by the fact finding commission appointed to investigate the various reclamation projects and the work of the Reclamation Service reveals some of the costly and unfortunate mistakes made by the Reclamation Service; and the Interior Department is now engaged in the melancholy task of liquidating some of the losses resulting from the tragic errors committed by the engineering branch of the Reclamation Service. The fact finding commission after a searching and fair investigation proved that millions of dollars had been lost to the Government by reason of the mistakes and incompetency of the Reclamation Service.

TIME LIMIT DECLARED TOO SHORT FOR INVESTIGATION

Without detracting in any way from the high standing of the "advisers," named, I respectively submit that within the time limit prescribed, and with the broad field to be investigated, it will be impossible for them to adequately deal with the vital engineering questions involved, and difficulties and problems that are present.

I observe that the advisers are prohibited from considering or passing upon the legal questions involved. That there are legal questions of vital importance must be conceded. I shall refer to some of them later. I assume, because of this prohibition, and because of the attitude taken by the Reclamation Service, and some branches of the Interior Department, that the legal questions are regarded by the department as unimportant, or that they have been settled.

In view of the position heretofore taken by the Interior Department, and particularly the Reclamation Service, with respect to the authority of the Federal Government, to control the streams and waters within the sovereign States of the Union, perhaps it should be expected that the "legal" principles involved had been definitely determined to their satisfaction at least, and that therefore no advice was required concerning the same.

As I have indicated, there can be no objection to those charged with the execution of the reclamation act seeking to obtain competent advice upon engi-

neering, technical, scientific, and legal questions involved. Indeed, the record of the Reclamation Service shows how unfortunate the Government has been in not having competent directors and advisers.

REFERENCE MADE TO STATES' COMPACT

This leads me to a brief reference to the personnel named in the appointment as "advisers" to the Secretary of the Interior. They have been selected, one each, from the States of California, Nevada, Wyoming, and Colorado and one from the State of Ohio. As is well known, the States of Wyoming, Colorado, Arizona, Utah, Nevada, and California are the States directly and vitally interested in the Colorado River and its tributaries. In order that the conflicting rights of these States might be settled and that there might be no obstacles to the future development of the river, a compact or agreement was prepared by representatives of these States and a representative of the Federal Government, and duly submitted to the States for ratification.

It is not necessary to state all of the terms of the compact. It is sufficient to say that the upper basin States were accorded certain rights and the lower basin States, namely, California, Nevada, and Arizona, certain other rights. There has been much discussion in regard to the compact, much of it intemperate and irrelevant. That a compact between the interested States is important and necessary has been conceded by those familiar with the question and those who recognize the rights and prerogatives of the sovereign States of the Union. Prior to the formulation of the compact no one contended that an agreement among the States with respect to the subject matter referred to was not imperatively required. No one challenged the proposition that the States of the Union had an exclusive right to control the rivers and streams and the waters thereof within their boundaries. No one, except some Federal bureaucrat was sought to infringe upon the rights of the States and to impose an oppressive Federal bureaucracy upon them, had the temerity to assert that the Federal Government had the right to control the waters flowing within the various States of the Union. Of course it is admitted by all that the Federal Government has authority to prevent individuals or States from interfering with the navigability of interstate streams; this under the power to regulate interstate commerce.

The compact referred to makes provision for the division of the waters of the rivers and defines the rights of the upper and lower basin States. It contains no provisions for erecting dams or power plants or engaging in the reclamation of arid lands. It leaves the upper States free to deal with their rights as defined as they may seem fit and permits the lower States to agree among themselves as to the rights of each respectively in the waters of the river to which under the compact they are entitled.

Before any development of the river was to be undertaken, whether for irrigation or power purposes, it was considered necessary by the six States that some agreement be entered into by them. Arizona has failed to ratify the compact. California ratified the agreement and subsequently attached reservations to her act of ratification—reservations which require the Federal Government to expend an enormous sum for the construction of a dam at Boulder Canyon and for the construction of an all-American canal and for the development of hydroelectric energy.

Utah ratified the compact but subsequently rescinded her act of ratification. The States of Wyoming, Colorado, and Nevada ratified the compact, and their acts remain unchanged.

Arizona has taken the position that the construction of a dam at Boulder Canyon would seriously injure the State and prevent the irrigation of a large area of land which is susceptible of reclamation, and that a dam if built should be at a point much higher up the river. Arizona is seriously concerned in this matter and believes that the action foreshadowed in the instructions to the advisers, if carried out, will prevent that State from agricultural and other development and will condemn seven to eight hundred thousand acres of arid lands to perpetual sterility. The contention is also made by the people of Arizona that if a dam is built at Boulder Canyon and power there developed the States of Arizona and Nevada—they being the owners of the river bed—should receive some revenue from the sale of such power. Arizona has therefore withheld her act of ratification, pending action by Nevada and California respecting their several rights in the channel of the river, as well as the waters flowing therein.

The Colorado River flows hundreds of miles through the States of Arizona and Utah, and these States supply most of the water in the river. These two States are, therefore, for many reasons profoundly interested in the Colorado River and in the adherence of the six States to the compact. If advisers are desired by the Interior Department to aid in determining what policy it will adopt for the development of the Colorado River, it would seem, if the other States named are to furnish advisers to the Secretary, Utah and Arizona should not be ignored. But advisers from these States have not been named. Apparently there is no reason for failing to select advisers from these States, except that they have not ratified the compact and their views may not be in entire accord with those of the Interior Department.

I respectfully submit that Utah and Arizona should have been considered when advisers were selected, because, theoretically at least, such advisers are to aid in settling any controversies respecting the waters of the Colorado River and to bring the six States into proper accord.

And I may be permitted to say that, in view of the differences between the States and their vital interests in the questions involved, the Interior Department should not take a partisan position in the matter or irrevocably commit itself to a policy, as it appears to have done, as is shown in the testimony given and statements made by officials of the department, and as indicated in the last paragraph in the instructions to the advisers—the paragraph requiring them to base their findings upon the "essential features of the Swing-Johnson bill—and the probabilities of reimbursement to the Government for its expenditures in this connection."

It would seem from this paragraph that the development of the Colorado River was to be in accordance with the "essential provisions of the Swing-Johnson bill" and that the advisers appointed were to fortify the views of those, whether in the Interior Department or otherwise, who are committed to the provisions of that measure.

I respectfully submit that no course should be taken by the Interior Department that would tend to prevent the six States from reaching an amicable and satisfactory agreement among themselves with respect to the development of the Colorado River and the utilization of the waters thereof. These States and their inhabitants are the one who are principally concerned in the development of the Colorado River. They own the bed and banks of the stream; and the States referred to, not the Federal Government, control the waters of the Colorado River and its tributaries. The laws of these States determine how appropriations of water shall be made; and the control of the waters of the river, including its tributaries, is exclusively within the States through which the river and its tributaries flow. The Federal Government, as I shall show, has no control over these waters, except if the Colorado River is navigable, to precent interference with navigation.

STATES SHOULD CONTROL DEVELOPMENT, SENATOR SAYS

I respectfully submit that the instructions given to the advisers will be calculated to prevent the ratification of the compact by all the States. They will be regarded as an expression of the purpose of the Interior Department to take control of the waters of the river, regardless of the rights of the States, and to allocate them to the States without reference to the compact, and to construct a dam at Boulder Canyon and carry out the essential provisions of the so-called Swing-Johnson bill. Certainly these instructions will be regarded as an expression of a desire on the part of the Interior Department that advice shall be given that will tend to relegate the States to a subordinate position and assign to the National Government the undisputed control and ownership of all unappropriated waters of the Colorado River.

I submit that the instructions given to the advisers are tantamount to a declaration that the Government controls the waters of the Colorado River, and that the States have no authority over the same and that no compact is required in order that the Federal Government may proceed to build dams, construct canals and erect power plants and engage in various activities in connection with the utilization of the waters of the river.

SECRETARY ACTION DECLARED UNWISE

I make no complaint about the distinguished gentlemen named as advisers. They are men of character and standing. Senator Waterman is a lawyer of ability, and the Interior Department would act wisely if it should seek his

opinion concerning the validity or propriety of the extraordinary announcement in instructions, that the Federal Government "controls the water rights" of the Colorado River. Of course, if it "controls the water rights" of the Colorado River, it controls the water rights of all streams in the public-land States, if not in all States of the Union. In my opinion, if it was wise for the Secretary to appoint advisers (but I do not concede that it was wise or within his power to appoint advisers other than for the purpose of investigating whether the construction of a project under the reclamation act was feasible and wise in the Colorado Basin), then some of the persons selected should have been engineers of the highest standing, and experts whose knowledge of irrigation projects and their development was such as entitled their opinions to great weight.

Certainly advisers under such circumstances should not be persons with preconceived and predetermined views, nor should they be restricted and limited in their duties and functions, but empowered to explore the entire subject and fully advise upon every phase of the same. But that course has not been pursued. Three of the persons named are known to be committed to the Boulder Dam project. They have advocated it with zeal and energy; presumably they are already prepared to make findings "covering the essential features of the Swing-Johnson bill."

It is worthy of note that while the advisers are directed to consider certain matters, they are told in the concluding paragraph of the letters naming them and constituting their instructions that—

"It is the desire of Secretary Work to submit a report to Congress at the forthcoming session based on your findings and those of the other advisers covering the essential features of the Swing-Johnson bill now before that body and the probability of reimbursements to the Government for its expenditures in this connection."

It would seem that the report of the Secretary is to relate only to the essential features of the Swing-Johnson bill and that the advisers are to furnish the information upon the questions, dealing with the essential features of the Swing-Johnson bill. Apparently they are not to be free to recommend some other bill, or suggest some other plan for the development of the Colorado River. The "essential features of the Swing-Johnson bill" must be preserved, and their findings must relate to those essential features. I again call attention to the fact that they are directed to report upon matters over which the Interior Department has no jurisdiction. They are not to investigate and report upon reclamation projects alone.

It is known in advance—and it is not a criticism of the three persons referred to—what their opinions are and what their advice will be. It is an act, therefore, of futility to name them; and in view of the statements made by the Secretary of the Interior approving the Swing-Johnson bill, it would seem there was nothing to be gained by an investigation of the kind referred to in the instructions and by persons, a majority of whom at least, share the views of the Secretary respecting the Swing-Johnson bill.

REPRESENTATION PROPOSED FOR OTHER TWO STATES

I respectfully submit that if advisers are to be employed by the Secretary of the Interior for four of the States ratifying the compact, then representatives should be selected from the two other States. Certainly, the Secretary desires to hear both sides of the question and to obtain all possible information. Everyone familiar with the question knows the vital importance of this question to Arizona. The people of Arizona believe that the project which apparently the Secretary of the Interior has indorsed will condemn a great part of their State to sterility, and injure her and her people not only for the present but for all time.

And Utah is interested in this matter, particularly in view of the proposition contained in the instructions that the Federal Government and not the States control the waters of the Colorado River. In my opinion, the Secretary of the Interior should have selected not persons who have fully made up their minds upon the questions involved, but engineers of national reputation, persons wholly dissociated from the controversy, and who would bring to bear technical skill, and who possess broad and comprehensive views, to the end that a wise and just policy might be recommended for adoption by the States and those directly concerned. But if the plan is to select as advisors, partisans from at least three of the States and a representative from a fourth State with whose views I am

unacquainted, I respectfully submit that the number of advisors be increased and that one be selected from the State of Arizona and one from the State of Utah.

If this suggestion shall be accepted, I beg leave to submit the names of a number of persons from whom one for the State of Utah might be elected. If the selections be from the congressional delegation, I suggest either Senator Smoot or Congressman Leatherwood. If outside the congressional delegation, I beg to present the names of Gov. George H. Dern, Hon. William R. Wallace, and Dr. John A. Widtsoe.

Governor Dern has given careful study to the question involved and his views would be of value. Mr. Wallace has been chairman of the State Conservation Commission for many years and has devoted much of his time to the study of reclamation and irrigation problems and the development of the Colorado River. Doctor Widtsoe was one of the members of the fact-finding commission, and his valuable services in connection with that important work demonstrate his fitness to advise in regard to matters referred to in the letters in question.

The most serious and important provision in the letters of instructions given to the advisors is found in the provision which, in effect, assumes that the Federal Government controls the waters of the Colorado River, or the water rights in the Colorado River. The language employed is as follows:

"Some of the major questions to be determined include the following: 'Whether the Federal Government, by control of water rights, has power to allocate the unappropriated waters of the Colorado River to the basin States and make unnecessary a compact between the States.'"

If it had not been for this instruction I would not have troubled you with this communication, but my interpretation of these words has constrained me to submit this letter. As I interpret these words, it seems that you take the position that the Federal Government "controls the water rights" of the Colorado River. Obviously the waters of the Colorado River are referred to, and, of course, if the Federal Government has control of the waters of this river, or the "water rights" therein, it possesses the same authority over the waters of all other streams, navigable and unnavigable, in the United States. It seems to me that the position taken in these instructions is a challenge to a doctrine and policy which has prevailed in the United States from the beginning of the Republic. The meaning of these words can not be mistaken. The words assume that the Federal Government "controls the water rights" of the Colorado River. The words "water rights" undoubtedly mean the waters, certainly the unappropriated waters, of the river. That this is the interpretation intended to be placed upon these words is clear when the concluding words of the sentence are examined.

The position boldly stated in this sentence is this:

"The Federal Government controls the waters of the Colorado River, and that being true, it has the power to allocate unappropriated waters to the States interested therein and therefore no compact among them is necessary."

The premise of the sentence is that the Federal Government "controls the water rights" of the river. So controlling them, the Interior Department is willing to have the opinion of the persons named upon the question of the power of the Government to allocate the unappropriated waters among the States of Utah, Nevada, Colorado, Wyoming, Arizona, and California, thus making unnecessary any compact. Of course, if the Government owns and controls the unappropriated waters of the river, it would seem that it would have the right to make disposition of the same and the States would have no voice in their allocation.

PROTESTS AGAINST DEPARTMENT'S POSITION

I can place no other intrepretation upon these words than an intent upon the part of the Interior Department to deny to the States the right to enter into an agreement among themselves with respect to the waters of the Colorado River and the tributaries thereof. If not, why are the advisers not permitted to investigate and pass upon the question as to the rights of the States in and to the waters of the Colorado River and the tributaries thereof? Why assume that they have no control over or rights in these waters, and that the Federal Government alone has the authority to control them? It would seem as though the Interior Department was making it impossible to obtain any other opinion from the advisers than that which is apparently desired; namely,

that the Federal Government can allocate all unappropriated waters of the river as it pleases, to individuals or to States, and that the latter have no voice in the matter.

I respectfully protest against this position of the Interior Department and its officials. I protest against the proposition that the Federal Government controls the unappropriated waters, or any of the waters or water rights of the Colorado River. There are some Americans who fail to understand our form of Government; they do not seem to appreciate the fact that the States are sovereign within their spheres and that the Federal Government possesses such authority only as by the States was granted to it. According to repeated decisions of the Supreme Court of the United States, the Federal Government possesses only delegated and enumerated powers. Its authority is limited and the States never have granted to the Federal Government the power to control the waters within their borders.

The thirteen original States were sovereign and independent governments and each of these sovereign States or Nations separately held in trust for its people the ownership, dominion, and control of its waters. All advantages and the usufruct profits and emoluments to be derived from such waters belonged to the people of the several States where such waters were located, subject to the legislative control of the States, for the benefit of the people therein. The courts have consistently held that following the American Revolution the Colonies of Great Britain became sovereign States and as such they possessed all the powers, prerogatives, and rights of the British Crown under the common law, which included the absolute jurisdiction and control of the streams, their waters, banks, beds, and soils within their respective borders.

This doctrine was announced in the early case of Martin *v.* Waddell (16 Pet. 410) and in the case of Pollary, Lessee, *v.* Hagen (3 How. 229) the Supreme Court of the United States declared that "the shores of navigable waters, and the soils under them, were not granted by the Constitution to the United States, but were reserved to the States, respectively. Secondly, the new States have the same right, sovereignty, and jurisdiction over this subject as the original States." The court also stated that there was no authority conferred upon the Federal Government and that it has no constitutional capacity to exercise municipal jurisdiction, sovereignty, or eminent domain within the limits of the State or elsewhere, except in cases where it is expressly granted.

EQUAL RIGHTS ACCORDED STATES

The court in its opinion met the suggestion that States subsequently admitted into the Union did not have the same authority as the original States, and declared—

"Alabama is therefore entitled to the sovereignty and jurisdiction over all the territory within her limits, subject to the common law, to the same extent that Georgia possessed it before she ceded it to the United States. To maintain any other doctrine is to deny that Alabama has been admitted into the Union on an equal footing with the original States, the Constitution, laws, and compact to the contrary notwithstanding. But her rights of sovereignty and jurisdiction are not governed by the common law of England as it prevailed in the Colonies before the Revolution, but as modified by our own institutions."

And the court then refers to the former decision in the case of Martin et al. *v.* Waddell (16 Peters 410), and reiterates the view that—

"When the Revolution took place, the people of each State became themselves sovereign; and in that character hold the absolute right to all their navigable waters and the soils under them for their own common use, subject to the rights since surrendered by the Constitution."

The court stated that—

"To give to the United States the right to transfer to a citizen the title to the shores and the soils under the navigable waters would be placing in their hands a weapon which might be wielded greatly to the injury of the State's sovereignty and deprive the States of the power to exercise a numerous and important class of police powers."

In the case of Weber *v.* Board of State Harbor Commissioners (85 U. S., 18 Wall 57 [21, 798]), the Supreme Court, speaking through Mr. Justice Field, said that the title to the shores under the tidewaters of the bay was acquired by the United States under the cession from Mexico as well as the title to the upland, but the Government held it only in trust for the future State, and that—

"Upon the admission of California into the Union upon an equal footing with the original States, absolute property in and dominion and sovereignty over all soils under the tidewaters within her limits passed to the State, with the consequent right to dispose of the title to any part of said soils in such manner as she might deem proper, subject only to the paramount right of navigation over the waters, so far as such navigation might be required by the necessities of commerce with foreign nations or among the several States, the regulation of which was vested in the Federal Government."

In the case of Escanaba & L. M. T. Co. *v.* Chicago (27 U. S. L. ed. 442) the same court declared that—

RIGHTS OF DOMINION AND SOVEREIGNTY CITED

"The States have full power to regulate within their limits matters of internal police, including in that general designation whatever will promote the peace, comfort, convenience, and prosperity of the people. This power embraces the construction of roads, canals, and bridges and the establishment of ferries, and it can generally be exercised more wisely by the States than by a distant authority."

The court further declared that on the admission of Illinois into the Union—

"She at once became entitled to and possessed of all the rights of dominion and sovereignty which belonged to the original States. She was admitted and could be admitted only on the same footing with them. * * * Equality of constitutional right and power is the condition of all the States of the Union, old and new. Illinois, therefore, as was well observed by the counsel, could afterwards exercise the same power over rivers within her limits that Delaware exercised over Blackbird Creek and Pennsylvania over the Schuylkill River."

In numerous cases the Supreme Court has held that the title to the beds of navigable streams, together with their banks, is held by the States within which the streams are found, and that the Federal Government has no authority to interfere with the ownership or with the title held by the States, and that its authority in respect to the waters of such streams extended only to preventing interference with their navigation. Of course, if the streams are not navigable the Federal Government has no authority whatever over them, or over the waters flowing therein.

I repeat that the Federal Government has no authority whatever to control the waters of navigable streams. It may not appropriate them or control them or allocate them to States or individuals. It may only, under its authority to regulate interstate commerce, prevent such interference with the flow of streams as would constitute impediments to navigation. It is worthy or note that the Colorado River is not being used for navigation and can scarcely be denominated a navigable stream. Indeed, the compact which was assented to by a representative of the Federal Government in effect declares it to be nonnavigable, and the program of the Interior Department is to construct one or more dams, the effect of which would be to prevent navigation if the Colorado River were otherwise navigable.

In the case of the Port of Seattle *v.* Oregon & Washington Railway Co. (65 U. S. L. ed. 500) the court states that, subject to the power of Congress to prevent interference with navigation in navigable streams, the State of Washington upon its organization as a State became the owner "of the navigable waters within its boundaries and of the land under the same."

In the case of Hardin *v.* Jordan (140 U. S. 381) the court held that the title to the bed of the stream was in the State and that lands under the waters were subject to State regulation and control. The court stated:

"The State may even dispose of the usufruct of such lands, as is frequently done by leasing oyster beds in them and granting fisheries in particular localities; also by the reclamation of submerged flats and the erection of wharves and piers and other adventitious aids of commerce."

The court further declared that the rights of the States to control the shores of the tidewaters and the land under them is the same as that exercised by the Crown of England, and in addition the right to regulate and control the shores of the navigable lakes and rivers.

The States have the right to determine the extent to which their prerogatives shall be exercised in the control of the waters within their borders, together with the beds and banks of the navigable streams therein. And also to deter-

mine whether the riparian doctrine or the doctrine of appropriation shall prevail within their limits. And where Congress grants portions of the public domain to settlers, though bordering on or bounded by navigable waters, the rights of the States are not impaired to exercise dominion over the use of the shores as well as the beds of the streams (Shively *v.* Bowlby, 152 U. S. 1).

I repeat that the title to the soil under navigable waters is held by the States in trust for the common use, and as part of their inherent sovereignty, and any act of legislation concerning their use relates to the public welfare and is within the exercise of the police powers of the States. The States may change the common-law rule of riparian rights and, as I have indicated, can adopt the doctrine of appropriation as it is understood in the Western States.

In the case of the United States *v.* Rio Grande Dam & Irrigation Co. (174 U. S. 690), the Supreme Court referred to the common-law rule that riparian owners were entitled to the continual natural flow of the stream but that States may change the common-law rule and permit the appropriation of the flowing waters for such purposes as they deem wise. The court refers to the fact that it was early developed in the history of the Western States that the mining industry and the reclamation of arid lands compelled a departure from the riparian rule. Reference is made in this decision to the Hudson River, which is navigable as far north as Albany. One of the streams contributing to the volume of the Hudson River is Croton River, which is nonnavigable. Waters of this river were taken for the domestic use of the city of New York. Mr. Justice Brewer in the decision states that unquestionably the State of New York has the right to appropriate the Croton River waters, and the United States may not question this appropriation unless thereby the navigability of the Hudson is disturbed.

New York would have challenged the assertion of any power of the Federal Government to control the waters of the Croton or Hudson Rivers. It is worthy of note that quite recently some officials of the Federal Government have attempted to interfere with the rights of New York to control its own waterways, and as I am advised, the Federal Government has receded from its arbitrary and unconstitutional course and has been compelled to admit the rights of the sovereign State of New York and its authority to control its own internal and domestic affairs, including the waters and waterways within its borders.

In the case of United States *v.* Cress (243 U. S. 316) the court states that—

"The States have authority to establish for themselves such rules of property as they may deem expedient with respect to the streams of water within their borders, both navigable and nonnavigable, and the ownership of the lands forming their beds and banks."

This, of course, is subject to the authority of Congress, to prohibit interference with navigation.

SOVEREIGN POWER OF STATE OVER WATER RIGHTS ASSERTED

I respectfully insist that the sovereign State of Utah has an absolute right to control the waters of the Colorado River and its tributaries within the State. It controls the beds and banks of the streams.

It has the right to adopt the riparian doctrine or the doctrine of appropriation; and having adopted the latter it is within its sovereign authority to prescribe the methods of appropriation and to determine how the right to the use of water may be secured and the character and title and ownership that may be acquired or enjoyed in such waters.

It holds the beds of the streams and the waters flowing therein in trust for the people of the State. The Federal Government may not trespass upon its undoubted sovereign rights and prerogatives, nor allocate to any person or State any of the waters arising therein or flowing therefrom.

And the same sovereign power is possessed by California and each of the States interested in the Colorado River. I am asking no claim for Utah that I am not making for California and Arizona and all other States.

I have referred to the case of United States *v.* Rio Grande, etc. There it was held that though the Rio Grande was navigable in its lower reaches, it was not navigable nearer its source and in that part of the river found within New Mexico, and also that navigability was not established by the mere fact that logs and rafts were floated down the same occasionally in time of high water.

A navigable stream is one which is navigable in fact or susceptible of being used in its ordinary condition as a highway for commerce over which trade and

commerce are, or may be, conducted in the customary modes of travel and trade on water. The court accordingly held that the Rio Grande within the limits of New Mexico was not navigable and that the control and use of the waters by the Territory and people of New Mexico was not to be prohibited or interfered with by the Federal Government.

The could held that even where the waters were navigable, in the absence of congressional legislation, the State has the power to authorize dams and bridges and adopt measures which might operate as obstructions to navigability.

FEDERAL RIGHT CONCEDED WHEN NAVIGATION IS IMPERILED

The power of the State is conceded even in navigable streams to control the waters therein until Congress asserts its authority where navigation is threatened or interfered with. But it must be understood that the power of the Federal Government extends no further than to prevent interference with navigation.

It has no authority, as I have stated, and its attempt to assert such authority would be illegal and usurpatory, to attempt to control the waters of the stream or distribute them to corporations or individuals, or to allocate them to the States through which the stream or its tributaries flow.

In other words, the States have supreme control over the rivers and streams and lakes within their borders, and may provide for their use, distribution, consumption, appropriation, etc., without let or hindrance from the Federal Government, with the sole exception that the latter, if navigation is threatened or interfered with, may intervene not to control or distribute or assert ownership in the waters of the river beds or banks but merely to prevent obstruction interfering with navigation.

The act of 1866 recognizes the customs, laws, regulations, and decisions of the courts of the various States with respect to waters and waterways within their borders. (See Broder *v.* Water Co., 101 U. S. 274.)

In the case of Kansas *v.* Colorado (206 U. S. 46) action was brought in the Supreme Court of the United States by the State of Kansas against Colorado to restrain the diversion of waters of the Arkansas River for the irrigation of land in Colorado.

The United States filed a petition in intervention, claiming the right to control waters of the river to aid in the reclamation of arid public lands. The petition was dismissed, and the reasons are clearly stated in the syllabus of the case in the following words:

SUPREME COURT CITED IN WATER-RIGHT CASE

"The Government of the United States is one of enumerated powers; that it has no inherent powers of sovereignty; that the enumeration of the powers granted is to be found in the Constitution of the United States, and in that alone; that the manifest purpose of the tenth amendment to the Constitution is to put beyond dispute the proposition that all powers not granted are reserved to the people, and that if in the changes of the years further powers ought to be possessed by Congress they must be obtained by a new grant from the people.

"While Congress has general legislative jurisdiction over the territory and may control the flow of water in the streams, it has no power to control a flow within the limits of a State, except to preserve or improve the navigability of the stream; that the full control over these waters is, subject to the exception named, vested in the State."

The court in the opinion reaffirmed the accepted view that new States, when they come into the Union, have all the prerogatives, sovereign rights, and powers of the thirteen original States. The court stated that one cardinal rule underlying all the relations of the States is that of equality of rights. Each State stands on a level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own view to none.

The further statement is made that a State may determine for itself what policy to establish with respect to the control and utilization of water in the streams and waters within its own borders, and that Congress can not enforce any rule upon the States.

ADMISSION INTO UNION TRANSFERS RIGHT TO STATE

The contention was made in this case that Congress has expressly imposed the riparian doctrine on all the territory embraced within the States of Kansas and Colorado prior to their organization as States, but the court held that these States, when admitted into the Union, were endowed with full powers of sovereignty which belong to other States, and that each State had the right to determine for itself what rule and policy it would adopt with respect to the streams and rivers and waters within its borders.

The very life of this Republic depends upon the preservation of the sovereign rights of the States. Local self-government is the basis of democratic institutions. If States are destructible, the Union is destructible. To preserve an indestructible union which is the result of grants of powers from the States, the States themselves must be preserved. If the Federal Government may go into the States and assume jurisdiction and control over the streams therein, and determine the rights to the use of waters, the manner of distribution, construct dams, build power plants and power lines, and engage in the manufacture or sale of electricity, and exercise the authority vested in the States, including its police powers as well as a sort of proprietary interest, then there is no limit to its authority to interfere with local self-government and the domestic affairs of the States.

And yet some officials in the Interior Department have contended and are now insisting that the Federal Government possesses such power, and they are determined that it shall exercise to the full extent such power.

I take the liberty of inviting attention to a statement made by Hon. Delph B. Carpenter, of Colorado, who, as I am advised, is largely responsible for the form and phraseology of the six-State compact. He is a man of ability and legal learning. He testified on April 16, 1916, before the Committee on Irrigation and Reclamation of the House of Representatives, and his testimony appears in part 2 of the hearings.

SAYS COMPACT WAS DESIGNED TO PROTECT STATES' RIGHTS

Beginning on page 146 of his testimony he refers to the effort made by executive departments to deprive the States of their undoubted authority to regulate and control the waters within their limits. Speaking of the Colorado River compact, he states that it was conceived and concluded for the purpose of protecting the autonomy of the States and defining the respective jurisdictions of the States and the United States, and assuring the peace and future prosperity of an immense part of our national territory. With it there will be no overriding of State authority by national agencies. Otherwise interstate and State-national conflict, strife, rivalry, and interminable litigation, will be inevitable. He states that the Swing-Johnson bill was not proposed by the upper States, but had its origin with the California representatives, without awaiting the ratification of the compact by Arizona, and that the rights of the appropriations within the State are mere rights to the use of the property of the State, subject to its sovereign will and to the exercise of eminent domain, in adopting the use of the resources to State progress. Mr. Carpenter, on page 148 of the hearings, states that:

"The water laws of each State are mere rules of State administration for the use of a natural resource imperative to State existence. The usufructory right of citizens (appropriators), inter se-se, are thus fixed and determined subject always to the superior right of the State to regulate, control, readjust, take by eminent domain, and otherwise provide for the use of the precious element according to its will."

He refers to the reclamation act and to the fact that prior to and at the time of its enactment it was expressly agreed that there would never be national interference with the State rights and control of waters. Colorado, New Mexico, Utah, and Wyoming, the upper States of the Colorado River Basin, promoted the legislation. Mr. Carpenter further states:

"The Congressman from Wyoming fathered that act. At a critical period of its consideration before Congress it was charged that the act would lead to the creation of a great Federal bureau which would gradually usurp and override the powers and jurisdiction of the States, would wrest from the States the control of the uses of water imperative to State existence, and would destroy the State administrative systems. In answer to the charge so made Congress-

men from the arid States guaranteed that such a condition would never exist; that the States would be protected in their autonomy and that the Federal Government would never seek to override State jurisdiction and control of water supplies." (See Cong. Rec. vol. 35 part 7, pp. 6679, 6680.)

ORDERS OF SECRETARY DECLARED ILLEGAL

He refers to the breach of the pledge and declares that to the authority of the great evil which is seeking to undermine and destroy the authority of States and place the control of water supplies in the keeping of appointees of distant Federal courts or of persons responsive only to Federal authority and absolutely indifferent to and wholly removed from State laws. He refers to executive interference in the form of illegal orders made by the Secretary of the Interior and executive branches and the refusal to grant rights of way for private projects over public lands, though so required under the act of March 3, 1891. He instances an embargo placed against private development in Colorado and New Mexico at all points in the basin of the Rio Grande above Elephant Butte Reservoir. This action, though private capital was willing and ready to construct a reservoir, prevented development for several years. Mr. Carpenter declares that the real purpose of the Federal Government was to prevent any construction on the headwaters of the stream while encouraging constriction along the lower river through which a monopolistic claim could later be asserted. Not until 1925 was this oppressive order annulled pursuant to a legal opinion in which it found that such embargo orders were illegal.

He mentions a similar experience on the North Platte where the Interior Department prevented further construction of irrigation works on the North Platte and tributaries in North Park, Colo., and the State of Wyoming at points about the Pathfinder Reservoir, and thus again completely overriding local development at the headwaters and substituting Federal control for local jurisdiction. Mr. Carpenter refers to the fact that employees of Federal bureaus impose obstacles to the development of various irrigation and other projects by the people of the States. Citizens of the States, ready, willing and able to build irrigation works have been refused the privilege of crossing or occupying a few tracts of Federal lands necessary to be crossed or occupied in building the projects.

POLICY SAID TO DISCOURAGE INVESTMENT IN IRRIGATION

Their importunities were ignored. Employees of Federal bureaus defiantly laughed in the presence of chief executives, representatives and senators of the States. Individuals were threatened with suits if they proceeded to cross public lands without Federal authority. The effect of this unfortunate policy has been to discourage the investment of private capital in irrigation works and to divert expenditures into other channels.

Mr. Carpenter also testified that employees of the Reclamation Service appeared at various capitols of the States or origin of waters of the Colorado River and proceeded to make an investigation of the river problems within the States, and synchronizing with their activities legal phases of the river were considered by Government counsel, and the final analysis of all problems was included in a series of typewritten reports bound in four volumes, and since kept in the confidential files of the Bureau of Reclamation at Washington and Denver. Mr. Carpenter states that this report was "startling and fantastic in the plot outlined, the gist of which was that not the States but the Reclamation Service was to become and continue to be the repository of all knowledge on the subject of water supply, reclamation, and other like matters in the Colorado River drainage, and that control of the river must be taken away from the States and placed in the hands of the Reclamation Service; that the status of existing vested rights of individual appropriators would have to be worked out by court proceedings in the United States Supreme Court by reason of the fact that States were interested" and that litigation would be precipitated which would result in the Reclamation Service being designated as the authority to control the Colorado River drainage territory.

Mr. Carpenter's statement is a serious indictment of Executive agencies of the Federal Government. The position taken by the Interior Department, as revealed in the instructions to Mr. Garfield and the other advisers, is in harmony with the plan referred to in the testimony of Mr. Carpenter which contemplates the assumption by the Federal Government of complete jurisdiction over all the waters and waterways within the States.

WESTERN STATES DECLARED TO WANT FULL SOVEREIGNTY

Hon. George H. Dern, Governor of Utah, in an address delivered at the Regional Conference of the Chamber of Commerce of the United States, at Colorado Springs in December, said:

"It is obvious that the controversy that is raging over the Colorado River is essentially between a nationalistic viewpoint and a State viewpoint. Who owns the Colorado River—the States in which it rises and through which it flows, or the United States? Why should the State of New York have any more of a proprietary interest in the Colorado River than the State of Utah has in the Hudson River?

"We of the West are getting sick and tired of the doctrine that everything in our States that is worth anything belongs to Uncle Sam. We should like to have some semblance of independent sovereignty for ourselves and be real States, like the Eastern States."

Governor Dern perceives that there is a struggle between the State in their efforts to protect their rights and Federal bureaucracy which is attempting to place all the streams and waterways of the United States whether navigable or non-navigable under the control of the Federal Government. There are some persons who are attempting to disguise the issue and divert attention from the real question. Accordingly they declare that electric power interests are seeking to control our rivers and therefore the Federal Government must take over all of the streams and particularly those which are navigable and have power possibilities.

I have stated that the Federal Government has no authority to control the waters or waterways of the United States. If there are electric power combinations, the States can and should deal with them. The States have the right to authorize the formation of corporations and to govern and control them. They can control all public utilities and fix rates for services rendered to the public. The States can interdict the operation, within their borders, of corporations injurious to the public welfare. And the duty rests upon the Federal Government to enforce the provisions of the anti-trust and Clayton Acts, and prosecute and dissolve trusts and monopolies. The people have it within their power to prohibit illegal or oppressive combinations or monopolies; and when they exist, it is because public servants are derelict in the discharge of their duties, or because sufficiently comprehensive punitive statutes are not enacted.

PROPOSALS FOR FEDERAL CONTROL CRITICIZED

Our dual form of Government is not a mistake. The people within the States can protect themselves against monopolies or combinations hostile to the interests of the people. There is nothing in the record of the Federal Government to indicate its superior wisdom or justice or competency to govern the people. There are certain national powers which it alone can exercise. Unfortunately, in exercising these powers it often makes serious blunders and permits or develops evils hurtful to the people. Paternalistic and socialistic movements, more or less formidable, are being proposed, and it is the purpose of some of the supporters of these movements to have the Federal Government own and control what are denominated "key industries" of our country. The railroads are to be owned and operated by the United States, the coal mines, electric-power plants, the steel mills and the iron mines—these are to pass into the hands of the Federal Government.

The proposition announced in the appointment of the "advisers" is in line with this policy, as it declares that the Federal Government "controls the waters" of the Colorado River. It would follow, therefore, that it can distribute them and utilize them for power and other purposes. It ignores the States, as I have stated, and is a challenge to their authority and sovereignty.

CONSTITUTIONS OF STATES PROVIDE FOR CONTROL

The Western States have with unanimity declared their control over the streams and waters within their borders. Article XIV, section 1, of the constitution of California is as follows:

"The use of all water now appropriated or that may hereafter be appropriated for sale, rental, or distribution is hereby declared to be a public use and subject to the regulations and control of the State in the manner to be prescribed by law."

Colorado's constitution contains the following provision:

"The water of every natural stream not heretofore appropriated within the State of Colorado is hereby declared to be the property of the public and the same is dedicated to the use of the people of the State subject to appropriation as hereinafter provided."

New Mexico's constitution contains this provision:

"The unappropriated water of every natural stream, perennial or torrential, within the State of New Mexico is hereby declared to belong to the public and to be subject to appropriation for beneficial use. In accordance with the law of the State, priority of appropriation shall give the better right."

The constitution of Utah states that all existing rights to the use of any of the waters of that State for any useful or beneficial purposes are hereby recognized and confirmed, and the legislature of Utah has declared that the waters of all streams and other sources in the State, whether flowing above or under the ground, in known or defined channels, is the property of the public.

Wyoming's constitution declares that water is essential to industrial prosperity and its control "must be in the State which, in providing for its use, shall equally guard all the various interests involved."

It further declares that—"the waters of all natural streams, lakes, or other collections of still water within the boundaries of the State are hereby declared to be the property of the State."

COMMON-LAW DOCTRINE OF RIPARIAN RIGHTS

The constitution of Arizona declares that the common-law doctrine of riparian rights shall not obtain or be of any force or effect in the State and that "all existing rights to the use of any of the waters in the State for all useful or beneficial purposes are hereby recognized and confirmed."

In 1864 the bill of rights adopted by the Legislature of Arizona affirmed that "all streams, lakes, and ponds of water capable of being used for the purpose of navigation or irrigation are hereby declared to be public property and no individual or corporation shall have the right to appropriate them exclusively to their own private use, except under such equitable regulations and restrictions as the legislature shall provide for that purpose."

Nevada has, by legislation, provided that "all natural water courses and natural lakes and the waters thereof which are not held in private ownership, belong to the State and are subject to appropriation for beneficial uses."

These constitutional provisions are affirmations of the rights of the sovereign States. None can successfully contest them. The Federal Government, through its executive agencies, may try to destroy local self-government, or impinge upon the rights of the States, but its efforts should be resisted and its ambitions frustrated.

If the Interior Department can control the waters of the Colorado River, it can take over and control every stream in the State of California, as well as the other States to the compact.

California has repeatedly asserted through it legislature and by its courts, its right to control all the waters within it boundaries. In 1911 a conservation commission was created to obtain data with respect to irrigation problems, and to enable a revision and reformation of the State laws relating to the use of water, water power, mining, irrigation, etc. It did not recognize the right of the Federal Government to control its streams, either for irrigation or for power or for any othe puposes. In 1913 the Legislature of California enacted a comprehensive statute regulating the use of water within the State. Under this act all unappropriated waters flowing in any river, stream, canyon, ravine, or other natural channel, were declared to be waters of the State of California and subject to appropriation in accordance with the provisions of the act.

CALIFORNIA HAS ADOPTED DUAL SYSTEM OF LAWS

While California has adopted the dual system of irrigation laws—that is, riparian and appropriation—it has more and more emphasized the importance of water for irrigation, culinary, and other beneficial purposes; and to secure the best results the appropriation doctrine is more and more being accepted and applied. It is to be observed that in California the doctrine of appropriation applies to land owned by the United States or by the State, and that water rights acquired by appropriation are protected as against riparian

owners subsequently acquiring land from the Government. The people of California would not under any circumstances be willing to surrender to the Federal Government the control of the rivers and streams of their great State. They would be unwilling to permit Congress to assume control over the same for power or industrial or other purposes. The same is true of every other State in the Union, and yet the Reclamation Service, and officials in some other branches of the Government, propose this revolutionary and paternalistic doctrine, the enforcement and application of which would change our form of government, weakening the States and aggrandizing the Federal Government. The States have the right to all the benefits, profits, and emoluments that may result from a proper use of the waters flowing therein. If used for industrial or power purposes, or as sources of revenue, by corporations, the States are entitled under their sovereign and police powers to prescribe the terms under which such use shall be made. The States may impose license fees or prescribe measures from which revenues may be derived to aid in meeting the expenses of State government.

BELIEVES IN STRENGTHENING RATHER THAN DEVITALIZING

I believe in local self-government and in strengthening rather than devitalizing the States. They should be permitted, if desired, to derive revenue from the power developed by streams, State or interstate.

I respectfully submit that in reason and under the decisions of the courts, the Federal Government has no authority to control the waters of the Colorado River, and the Interior Department has no authority to project plans for that purpose. The States in which the waters of this river rise and through which they flow have exclusive jurisdiction over them, subject only to the right of the National Government to prevent interference with navigation. Neither Congress nor any executive department of the Government should interpose obstacles to prevent the States interested in the Colorado River from asserting their jurisdiction or from reaching an amicable understanding as to their respective rights in and to the waters of the river.

Undoubtedly an agreement can and will be reached among the interested States which will fully protect the rights of each and permit the development of the Colorado River. Each of the upper States has the right to insist that no proceedings shall be taken which will jeopardize its rights. The situation is such that the lower basin States may be ready to appropriate a portion of the waters of the river before the upper States are in position to appropriate and use any considerable portion of the river. The provisions of the compact recognize the rights of the upper States and propose a reasonable division of the waters of the river. The States alone, without compulsion or coercion on the part of the Federal Government, should be permitted, as is their right, to agree among themselves with respect to this important matter. When the rights of the upper States are fully protected by agreement, the lower States can find no reason to separate them or to perpetuate differences.

FORESEES FORMATION OF SIX-STATE COMPACT

Speaking for myself, I can see no objection to Nevada, Arizona, and California agreeing as to a division of the water to be allocated pursuant to a six-State compact. They can, and doubtless will, agree with respect to the development of electric power and the disposition to be made of the same.

I submit that there is no justification in assuming, as the Interior Department has assumed, that there is only one plan for the development of the Colorado River. Many plans have been suggested. There are many who deny the power of the Federal Government to engage in industrial or other enterprises who concede that States would have the authority to engage in like undertakings. The States are not subject to the same limitations as the Federal Government. States, in the absence of prohibitions in their constitutions, would have the right to construct dams and impound water and build power plants and distribute the electrical energy developed from such plants for the benefit of the people, and indeed for private revenue to the State. The suggestion has been made that the State of California alone, or the State in connection with some of its municipalities, or the municipalities of southern California, be permitted to join in the construction of a dam in the Colorado River and in the development of power to be used in California, Nevada, and Arizona.

Another suggestion has been made that a corporation be formed in which the State of California and the municipalities in southern California be permitted to hold substantial or controlling interests for the purpose of developing power and obtaining water for irrigation and domestic purposes.

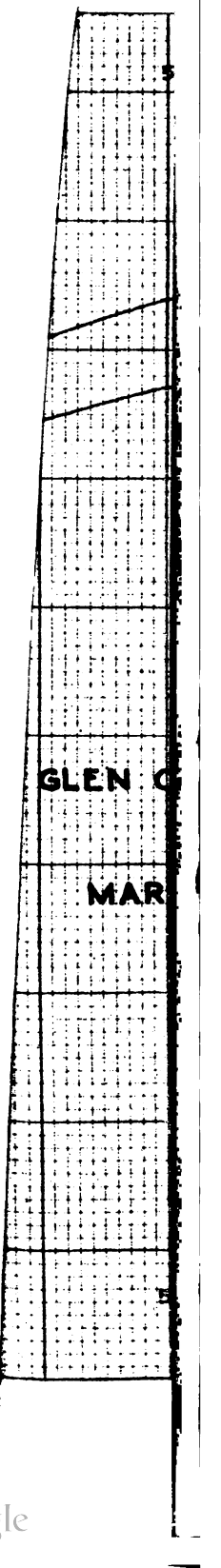
This suggestion contemplates that the Government likewise becomes a stockholder subscribing an amount which would represent approximately the cost of constructing a dam adequate for flood control and protection. These and other suggestions have been made. Some may be without merit and fantastic. Some may possess real merit. Certainly the field of investigation, if the Interior Department is authorized to investigate, should not be limited to considering only those matters relating to the plan embraced in the Swing-Johnson bill. If the Interior Department is authorized to make any recommendations to Congress in regard to the development of the Colorado River, it ought to explore every avenue for facts and obtain all possible information in order that its findings, if it should make findings and recommendations, will be based upon grounds which can not be questioned.

ACTION OF DEPARTMENT OF THE INTERIOR PROTESTED

I am submitting this communication by way of protest against the contention of the Interior Department that the Federal Government controls the waters within the States, including the waters of the Colorado River; and further as a protest against the action of the Interior Department in ignoring the States of Utah and Arizona in selecting advisers and investigators; and further as a protest against the apparent determination of the department, if it seeks advice and authorizes an investigation upon any matter beyond the mere determination as to whether a reclamation project is feasible within the Colorado River Basin, to limit the advice to be given and the investigation to be made to those matters and facts only which are embraced within the measure known as the Swing-Johnson bill.

Respectfully yours,

WILLIAM H. KING.



REPORT ON MARBLE GORGE DAM SITE (GLEN CANYON RESERVOIR SITE), COLORADO RIVER, ARIZ.

By La Rue and Jakobsen, Consulting Engineers, Los Angeles, Calif.,
August, 1927

Los Angeles, Calif., *August 5, 1927.*

To the Colorado River Commission of Arizona,

Hon. Geo. W. P. Hunt,
Chairman, Phoenix, Ariz.

In accordance with telegraphic instructions from the Colorado River Commission of Arizona dated Cheyenne, Wyo., June 23, 1927, we made a field examination of the Marble Gorge Dam site and submit herewith out report.

Very respectfully,

E. C. La Rue,
B. F. Jakobsen.

INTRODUCTION

Purpose and scope of report.—The purpose of this report is to show whether or not the conditions at the Marble Gorge Dam site are favorable for the construction of a high dam.

The report contains a general description of the Glen Canyon Reservoir site, a description of the rock structure of the Marble Gorge Dam site and information relative to the accessibility of the site, transportation problems, availability of materials for the construction of the dam, a design for an arch dam, with an estimate of its cost.

Field work.—We examined the dam site from the rim of the canyon and where the surface had been blasted away in preparing for the construction of a bridge; we were able to observe the unweathered Kaibab limestone which would form the abutments of the dam. We made a trip to the bottom of the canyon at Badger Creek rapids, which point is 3.4 miles down stream from the dam site. While walking down the side canyon which leads to Badger Creek rapids we observed the character of the rock in the canyon walls. In this canyon all of the Kaibab limestone and Coconino sandstone is exposed and some 200 feet of the Hermit shale. We examined and photographed the shale where the weathered rock had been blasted away to expose the unweathered rock in its natural state. The Shinarump conglomerate was examined to determine its suitability for the concrete aggregate.

Office work.—By preparing a cross section and profile a reasonably accurate picture was obtained which shows the rock structure in the walls at the dam site and the probable character of the rock which would form the foundation for the dam. With these data available a dam was designed to raise the water to elevation 3,543 feet above sea level.

In estimating the cost of the dam due consideration was given the availability of construction materials, water for camp and construction purposes, accessibility of the dam site, cost of transporting cement and other materials to the site, and availability of coal for fuel, etc.

In the design of the dam every precaution was taken to present a safe design conforming strictly with modern engineering practice.

GLEN CANYON RESERVOIR SITE

Glen Canyon covers the 186-mile section of Colorado River between Cataract Canyon, Utah, and Lees Ferry, Ariz. A detailed topographic survey of the reservoir site has been made. The storage capacity of the site is given in

Plate I. For further information relative to the Glen Canyon reservoir site see Water Supply Paper 556, Water Power and Flood Control of Colorado River below Green River, Utah, published by the United States Geological Survey in 1925.

MARBLE GORGE DAM SITE

Location.—The Marble Gorge dam site is located on Colorado River, 4.4 miles below Paria River and about 5 miles below Lees Ferry, Ariz. See Plate II.

Physical characteristics.—A description of the Marble Gorge dam site is given United States Geological Survey Warter Supply Paper 556, under the heading "Marble Gorge Bridge Site." See pages 52 and 134 of that report. The Marble Gorge bridge site is about 1,000 feet upstream from the point where the Hermit shale first appears above the water surface. In 1923, when Messrs. LaRue and Moore examined this site, they were under the impression that the river had cut through the Coconino sandstone and that the Hermit shale would form the foundation for the dam.

The dam site considered in this report is about 1,400 feet upstream from the point where the Hermit shale first appears above the river. The formation is dipping toward the east and at this dam site about 30 feet of the Coconino standstone appears above the river. On April 11, 1927, Dr. F. L. Ransome, geologist, University of Arizona, and Mr. E. D. Wilson, geologist of the Arizona Bureau of Mines, made an examination of the Marble Gorge dam site which included a trip down a side canyon which joins the river at Badger Creek rapids. All of the rock from the rim to the river is exposed in the walls of this side canyon. Dr. Ransome reported the thickness of the Coconino sandstone as 150 feet, and says:

"The Hermit shale is a fine-grained, deep red rock that when exposed to the weather breaks up into flakes and gives the general impression of being a soft, crumbling material. Where scoured clean, however, in the bottom of the side canyon down which we traveled, the shale appears as a surprisingly hard, compact rock. This is particularly true for a distance of 50 feet or more below the Coconino sandstone. It appears also to be less pervious than the over lying Coconino, as there, was some seepage of water from the sandstone along the contact with the shale."

At a later date your commission arranged to have the weathered surface of the shale blasted away so that the true character of the unweathered rock could be determined. Sound rock was found 1 foot from the exposed surface. Samples of this shale were tested and found to have a compressive strength of 20,000 pounds per square inch, this verifying Doctor Ransome's conclusions.

The writers traveled down the side canyon leading to Badger Creek rapids and were able to verify the conclusions reached by Doctor Ransome as to the character of the Hermit shale. We photographed the shale where the surface had been blasted away. See photograph No. 2, Plate III.

Photograph No. 1, Plate III, shows the north wall of Marble Gorge at Badger Creek Rapids. Assuming the wall in the picture to be 600 feet high the Coconino sandstone measures about 140 feet in thickness.

The cross section, Plate IV, shows the character of the rock in the walls at the Marble Gorge dam site, with the rock structure below the water surface shown as it appears in the wall above the river at Badger Creek. In our opinion the depth to bed rock at the dam site may not be greater than 80 feet below the water surface. If this assumption is correct the river has not cut through the Coconino sandstone at the site here considered and there would be sufficient hard rock below to form a satisfactory foundation for a high dam, especially a high dam of the arch type.

The profile, Plate V, shows roughly the position of the formations at the dam site with respect to the water surface of the river. There is but little change in the topographic features of the canyon for a distance of 2,500 feet upstream from the dam site. With the information now available, we are convinced that with diamond-drill borings the foundation rock in this 2,500-foot section of the river will be found entirely suitable for a high dam of the arch type.

Plan of development.—The purpose of this report is to show whether or not a safe dam can be built at the Marble Gorge site and at what cost. The dam may be operated in the interest of flood control, irrigation, or power development, or the dam may serve all three needs. A dam for flood control only can

be built at the lowest cost. If the dam is also to provide irrigation storage, there would be a relatively small additional cost, as it would be necessary to install control gates.

We are of the opinion that the dam should be built so that it will fit in as a unit of the comprehensive plan of development given in United States Geological Survey Water Supply Paper 556. The dam here suggested would have a maximum storage capacity of 11,000,000 acre-feet. By means of gates in the spillway the water level above the Marble Gorge Dam may be maintained so that it would not interfere with the development of power in Cataract Canyon, Utah, or on the San Juan River.

A storage capacity of 11,000,000 acre-feet is adequate to reduce the maximum flood flow to 40,000 second-feet or less, provide water for domestic use, future irrigation development and the development of power. However, a higher dam could be built but in our opinion it would result in a waste of money as a greater storage capacity is unnecessary as an initial development.

A dam of the arch type is best adapted to fit the conditions at the site. To be conservative the dam has been designed with a spillway around the dam, which with the valves in the dam permits a discharge of 200,000 second-feet. Due to the storage capacity above the spillway crest a peak flood of 400,000 second-feet could be taken care of without damage to the dam. If such a flood should occur when the reservoir is nearly empty its peak would be reduced to about 40,000 second-feet.

Accessibility of site.—The dam site is in a box canyon, about 450 feet deep. The dam would rise to the rim of the canyon. The relatively level mesa on both sides of the canyon affords an ideal location for construction camps.

The dam site is near the site where a bridge is to span the Marble Gorge of the Grand Canyon. This steel bridge will have a span of about 600 feet and will be one of the highest bridges in the world. It will span the canyon at an elevation 465 feet above the river. The contract has been let and the bridge should be completed early in 1928. The dam site will therefore be on a park-to-park highway and is easily accessible by automobile at the present time.

If cement is obtained from the South the shipping point would be six miles east of Flagstaff, Ariz. The distance from the railroad to the dam site is 125 miles. If the Union Pacific should build to the north rim of the Grand Canyon, a 60-mile branch would connect this railroad with the dam site.

Adaptability of plan.—If a dam should be built at the Marble Gorge site the great storage capacity of the Glen Canyon Reservoir site would be fully utilized. This conforms with the comprehensive plan of development presented by the United States Geological Survey after 15 years of study. See United States Geological Survey Water Supply Paper 556.

There are 10 dam sites below the Marble Gorge site where some 2,500 feet of head may be utilized for the development of power. At the present time, without storage, the total power capacity of these 10 sites is 1,750,000 horsepower. With the Marble Gorge Dam built to store 11,000,000 acre-feet of water the power capacity of these 10 sites would be increased to 4,340,000 horsepower.

The Marble Gorge Dam, utilizing the Glen Canyon Reservoir site, would relieve the flood menace, provide water for domestic use and future irrigation development, more than double the amount of power that could be developed on the lower river, and greatly reduce the cost of all dams subsequently built on the river below.

Due to the accessibility of the Marble Gorge dam site for construction purposes and the relatively small volume (1,370,000 cubic yards), of the dam of the arch type, we believe the dam can be built in four years.

DESIGN OF ARCH DAM

Valves and spillway.—The elevation of the crest of the dam is at 3,543 feet above sea level, giving a storage capacity of 11,000,000 acre-feet. In the design and the cost estimate provision has been made for twenty 58-inch needle valves, similar to those installed in the Pathfinder Dam of the United States Reclamation Service. These valves will discharge in excess of 40,000 c. f. s. when the water is near the crest of the dam. Since they will operate under a high head, lowering the water surface 20 or 30 feet does not materially decrease their discharge capacity. If it is desired at a later date to install a power plant in connection with this dam, the penstocks required can be connected directly to any of these valves.

An open spillway, neary rectangular in shape, 30 feet deep by 300 feet wide has been provided around the dam. This is capable of discharging 165,000 c. f. s. when the water stands level with the crest of the dam, giving a total discharge capacity, including needle valves, of 205,000 c. f. s. This spillway capacity is much greater than should ever be required if the reservoir is intelligently utilized, but has been tentatively provided for an extreme emergency.

Spillway gates have been provided for in the estimate. As a precaution they should be made automatic, such for example that when the water rises to 15 feet above the spillway crest, that is to within 15 feet of the crest of the dam, one section of gates 100 feet long will be automatically opened, giving an outflow of 19,000 c. f. s. in addition to the 40,000 c. f. s. discharged through the needle valves. When the water rises another 5 feet, a second section 100 feet long is opened, giving a discharge of 60,000 c. f. s. through the spillway, and when the water rises still 5 feet more or to within 5 feet of the crest the last section 100 feet long is opened, giving a discharge of 125,000 c. f. s. through the spillway, and the entire spillway becomes operative. With this arrangement a large flood can be handled so that the peak is very much reduced, even though the flood in its inception finds the reservoir full to the spillway crest. There is a storage capacity in the reservoir of 2,000,000 acre-feet between the spillway lip and the crest of the dam.

If the entire spillway is made available by opening all the gates, 10 feet over the spillway represents 32,000 c. f. s. and 20 feet over the spillway represents 90,000 c. f. s. in addition to the 40,000 c. f. s. provided by the needle valves. The spillway capacity was computed from the well-known Francis formula:

$$Q=3.33\ L.\ H.\ 1.5\ c.\ f.\ s.$$

in which L. is the length of spillway crest in feet and H the height in feet of the water surface over the spillway lip.

The type of dam here proposed, the single-arch type (see Plate VI), is well adapted for overflow purposes and has been used as such extensively in recent years, as for example the Kerckhoff Dam, near Fresno, Calif., designed by B. F. Jakobsen, the Melones Dam, near Oakdale, Calif., and others. But even without any provisions for overflow the dam will withstand a considerable overflow without being damaged. If, however, a soft rock is encountered in the abutment walls near the top of the dam, overflow water should be confined to the middle portion of the dam by raising the wing walls a few feet; this would add but little to the cost.

Site.—The section used as a basis for our estimates of cost is the one shown in Plate XXIII of United States Geological Survey Water Supply Paper No. 556 by E. C. La Rue (see Plate VII), and this was checked with a survey made by the Arizona State Highway Department. This section is typical of the canyon for a distance of 2,500 feet upstream. Detailed surveys will show the exact location of the best site for the dam.

An examination of the site, and of the recently made excavation for bridge piers, and of the rock exposed in a side canyon leading down to the river at a point opposite Badger Creek, the Geological Reports of Professor Ransome, Mr. E. D. Wilson, and Mr. Chester Hoatson, our own examination of the rock and especially of the shale, and finally the results from actual compression tests on this shale, made by your commission (which tests after all are the most direct and conclusive evidence), lead us to conclude that the site is eminently well-suited for a high dam and we have no hesitancy in recommending that the site be core-drilled to prove the foundation. We would expect to find bedrock not more than 80 feet below the water surface; however, a considerable greater depth would not invalidate our conclusions, but would add to the cost. The estimate of cost is based upon the assumption that bedrock is 100 feet below the water surface. Two additional estimates were made, one assuming bedrock only 60 feet below the water surface, and the other assuming bedrock 130 feet below the water surface.

The fact that the bedding planes upward about 1:16 in a downstream direction must also be accounted a decided advantage. If one or several of these bedding planes should have their frictional resistance greatly impaired by seepage water acting as a lubricant between beds, there would still remain the positive force of gravitation to resist a displacement in a downstream direction, since such a displacement would require the whole mass to be lifted. The slope of the bedding planes, as it actually exists, is of at least equal importance with the quality of rock to be found in the abutments.

According to the report of the geologists and according to our own observations at the site, the shale appears tight. However, a considerable amount of drilling in the foundation and subsequent pressure grouting has been provided for in the estimate. This grouting should be undertaken as a matter of precaution, and while the dam is under construction, for the purposes of filling any voids that may occur in the rocks of the abutment and securing a greater degree of water tightness and also a greater strength. Such pressure grouting was found extremely beneficial on both the Pacoima and Santa Anita Dams and can be carried out at a relatively small cost.

All other things being equal, a single-arch dam should be given preference over the gravity type, partly because of its greater inherent safety (there is no record of the failure of any arch dam, while several gravity dams have failed), and partly because the arch dam transfers the load more directly to the upper strata of rock. These rocks are exposed above the water surface and are therefore better known than the rock lying below the river bed, which can only become known through diamond-drill borings and then not to the same extent as the more accessible rock above the stream bed.

Four tests on shale specimens 1 by 2 inches, each an average of 3 samples, taken from the site or from the side canyon above referred to, and tested in compression by your commission, gave an average strength of 8,662 #/sq. in., 19,047 #/sq. in., 21,073 #/sq. in., and 21,458 #/sq. in. The first sample is likely to have been taken from a spot locally weak. It was taken from Tunnel No. 2 at a place 3 feet from the surface, and it seems probable that better rock would have been encountered farther below the surface. But even so, the least strength found was 6,305 #/sq. in., which would still provide a greater factor of safety than would be required. The excavation contemplated in the design is 20 feet at the upstream face and 10 feet at the downstream face, as an average. It is evident from these compression tests that the shale is able to withstand with a great margin of safety any stresses that can be safely imposed on the concrete in the dam.

Concrete.—A concrete compression test consisting of three samples was also submitted by your commission. The concrete cylinders were 2 inches diameter by 4 inches long, mix 1:3 by weight and were made from Shinarump conglomerate; they gave an average of 4,275 #/sq. in. at seven days. A similar test on sand cylinders gave an average of 3,639 #/sq. in. at seven days, 1:3 mix, by weight. These indications are satisfactory for the purpose of this report, but additional tests should be undertaken to determine the actual mix to be used in the construction of the dam. A very considerable saving can be effected by proper control of the aggregates and the water going into the mix. The experience at the Pacoima Dam and the Big Santa Anita Dam of the Los Angeles County flood-control district has shown that such control is thoroughly practical under actual construction conditions.

The dam proposed in this report has been designed with a maximum stress of slightly less than 650 #/sq. in., as given in detail later. The design is based upon a concrete with a strength of 2,000 #/sq. in. at 28 days. Long-time tests on concrete specimens as reported in Bulletin No. 5, Structural Materials Research Laboratory, Lewis Institute, Chicago, Ill., and in a private letter from Professor Abrams of the Lewis Institute, show that concrete, when not allowed to dry out, increases its strength with age and proportional to the logarithm of its age. A concrete showing a strength of 2,000 #/sq. in. at 28 days showed 4,800 #/sq. in. at the end of 5 years, and a concrete having a strength of 2,500 #/sq. in. at 28 days tested 5,700 #/sq. in. at the end of five years.

According to Mr. Mensch (see Transactions of the American Society of Civil Engineers, vol. 85 (1922), p. 254), concrete in a bridge seven years old, tested to destruction, gave an ultimate computed strength of 5,830 #/sq. in., and 12-inch concrete tubes cut from the structure and tested in a compression machine gave 6,610 #/sq. in.

A concrete having a strength of 2,000 #/sq. in. at 28 days may therefore be expected to give a strength of about 4,000 #/sq. in. at the end of two years. Practically all of the concrete in the dam would be two years old, or older, before the maximum stress could be brought upon it, and the factor of safety with a maximum stress of 650 #/sq. in. would therefore be greater than 6.

This factor of safety is ample and moreover would increase with time.

At the Pacoima Dam of the Los Angeles County flood-control district, a nearly 400-foot high single-arch dam, it was found that concrete 28 days old averaged

2,650 #/sq. in. as reported by B. F. Jakobsen (Transactions of the American Society of Civil Engineers, vol. 90 (June, 1927), p. 585.) The samples were taken on the dam from concrete going into the dam and without the knowledge of the mixer crew. The maximum size of the aggregates was only 3 inches, and the cement used was one barrel per cubic yard. The excellent results were secured by proper proportioning of clean aggregates and by a rigid control of the water going into the mixing. The methods outlined by Professor Abrams were used, and the maximum water-cement ratio employed was 1; i. e., 1 cubic foot of water to each sack of cement; the average water-cement ratio was somewhat below that and probably not far from 0.9; i. e., 0.9 cubic foot of water per sack of cement used.

From the experience obtained at the Pacoima and Santa Anita Dams and the extensive laboratory experiments made under Professor Abrams's direction and published in the various bulletins of the Lewis Institute, it has been determined that by using aggregates up to a maximum size of 9 inches, as will be used on the big San Gabriel dam of the Los Angeles County flood-control district, a concrete giving a strength of 2,000 #/sq. in. at 28 days can be secured with 3.2 sacks of cement per cubic yard. In the cost estimate 3.25 has been used for the mass concrete.

As already stated, a maximum stress of less than 650 #/sq. in. has been used in the design. It is thought that a maximum stress of 750 #/sq. in. or even 800 #/sq. in. may be used in the final decision with a concrete having a 2,500 #/sq. in. at 28 days. This would call for somewhat more cement per cubic yard, but would result in a reduction in the total cost, as it would reduce the volume of the dam by a greater percentage than the cement would need to be increased. But the decision on this point should wait until after additional compression tests have been made on concrete made from the aggregates available at the site.

A considerable number of tests on concrete mixed with impure water have been made by Professor Abrams and published in Bulletin No. 12 of the Structural Materials Research Laboratory, Lewis Institute, Chicago, Ill., and analysis of a considerable number of samples of Colorado River water have been published by the United States Geological Survey, Water Supply Paper No. 596–B (1927). Judging from these results, no difficulty whatever is expected from the use of mixing water from the Colorado River. As a precaution, however, it may be well to make few tests as a check on this; the water should be taken from the river at its various stages, as far as possible.

Dimensions and stresses.—As stated, it has been assumed that bedrock will be found 100 feet below the water surface and that on an average a depth of exacavation of 20 feet at the upstream face and 10 feet at the downstream face will suffice (see Plate VII). The central angle of each arch is measured approximately as the intersection of the neutral radius with the excavated abutment section, or it has been taken as somewhat smaller, especially in the thicker arches. The dimensions of the dam are as follows (see Plate VI):

Dimensions of single-arch dam—Elevation of crest 3,543 feet

Elevation	H	$2\phi_1$	t/r_m	r_m	t
3,543	0			420	12
3,493	50	105	0.05	397	20
3,443	100	120	.1114	360	40
3,343	200	130	.3005	312	94
3,243	300	130	.5000	287	144
3,143	400	140	.6800	227	144
3,043	500	140	.8685	183	159

in which H is the distance from the crest of the dam, $2c_1$ is the central angle, t is the radial thickness in feet, and r_m is the mean radius in feet.

The stresses were calculated from equations (138) and (139) of "Stresses in thick arches of dams," by B. F. Jakobsen (Transactions of the American Society of Civil Engineers, vol. 90, June, 1927, p. 597), and the yielding of the abutment was taken into account, using the mean values of the coefficients given in a footnote on the page referred to. In calculating the stresses no

allowance was made for cantilever action, and it was assumed that each arch supports the full water pressure. The stresses thus calculated are therefore, especially in the lower portions of the dam, in excess of the actual stresses and the dam has a greater factor of safety than the stress calculations indicate.

A rough calculation made to determine the effect of cantilever action shows that the lower 50 feet of the dam can act as a gravity dam and would be safe even in case no arch action at all could take place in this lower 50 feet of dam. What actually will take place is an interaction of arch and cantilever which will reduce the maximum stresses and add to the safety of the structure.

The lateral deformations due to the weight of the concrete above any arch were also neglected, as it was assumed that it would be compensated for by the shrinkage of the concrete in setting. It is intended that the dam will be properly pressure grouted at the contraction joints, which will be provided with split pipes for this purpose, so that pressure grouting may be effected after the concrete has set and the chemical heat has been dissipated. In addition, every effort must be made during construction to keep down the shrinkage by adequate construction methods and by using as lean and as dry a concrete as will give the required strength and workability.

Stresses in dam in pounds per square inch—Water level with crest of dam

Elevation	H	Abutment		Crown	
		Upstream	Downstream	Upstream	Downstream
3,493	50	271	618	520	357
3,443	100	181	645	504	298
3,343	200	67	634	384	133
3,243	300	70	633	403	77
3,143	400	141	642	408	74
3,043	500	214	602	404	120

As will be seen the maximum stresses occur at the downstream face of the abutment and they are all of them less than 650 #/sq. in. when the reservoir is filled to the crest of the dam. It will also be seen that no tension exists in any of these arches; this is of importance because concrete can not be relied upon to withstand tension, especially not across contraction joints.

It has been customary in the past to compute the stresses in an arch dam by the cylinder formula,

$$s = p_e r_e / t \text{ lbs. per sq. in.}$$

in which p_e is the water pressure in lbs. per sq. in.
r_e is the upstream radius, in feet, and
t is the radial thickness in feet.

The stresses as computed by the cylinder formula are generally much smaller than the actual maximum stresses. For sake of comparison, and because in engineering literature the cylinder stresses have been extensively used in the past, the cylinder stresses are given herewith.

Stresses in dam, in pounds per square inch, computed from the cylinder formula—water level with the crest of the dam

Elevation	H	S
3,493	50	445
3,443	100	410
3,343	200	332
3,243	300	327
3,143	400	342
3,043	500	358

These cylinder stresses are given for the reasons stated, but no particular importance attaches to them other than a purely historical interest. The cylinder formula does not take account of the influence of the central angle on the

stress distribution and is for that reason incorrect, and a dam which has fairly low stresses when computed by the cylinder formula may actually have very high stresses. This matter is referred to here, because if the cylinder stresses represented the true stresses there would be no good reason for keeping these stresses as low as shown in the table for cylinder stresses, since the design is predicated upon a concrete having a strength of not less than 4,000 #/sq. in. at the time full load can occur. For example, for H=300 ft. we have a cylinder stress of only 327 #/sq. in. or a factor of safety greater than 12, which is uncalled for especially in view of the small factor of safety of most gravity dams. At this elevation (H—300) the maximum stress is actually about twice the cylinder stress, giving a factor of safety of about 6.3, which is ample and yet not unreasonably high.

In this connection it should also be stated that even if the cylinder stresses had as great a probability of being correct as the stresses based upon a more rational theory and upon sounder assumptions the fact that the cylinder stresses are smaller than the other stresses should preclude them from being used in designing, since, all other things being equal, those assumptions which lead to the safer structure should be adopted.

There is admittedly some uncertainty regarding the exact value of the central angle and also regarding the modulus of elasticity of the concrete and the rock as well as regarding the coefficients used to express the yielding of the rock abutment due to normal stresses, shear stresses, and bending stresses. This is more especially true for the thicker arches, in which case also the influence of the yielding of the abutment upon the stress distribution is greater. For these reasons additional stress calculations were made for the lowest and thickest arch considered—i. e., H=300 feet at elevation 3,043 feet—which is only 50 feet above the assumed bottom of the excavation. Three cases were considered, as follows:

A. The central angle was assumed as 120° instead of 140° and the stresses were calculated as before. Their values are, when given in the same order as before,

189; 566; 297; and 8 #/sq. in.

B. Central angle 140°, but the coefficients were decreased 50 per cent, which is equivalent to decreasing the influence of yielding of the abutment by that much. The same result would be obtained if it were assumed that the modulus of the rock was twice as great as the modulus of the concrete, instead of both being equal. The stresses are then

158; 703; 376; and 132 #/sq. in.

C. Central angle 140°, but the coefficients were increased 50 per cent, and this is equivalent to assuming that the modulus of elasticity of the concrete was 50 per cent greater than the modulus of elasticity of the rock. The stresses are then

237; 560; 424; and 87 #/sq. in.

A central angle larger than 140° was not investigated, since a larger central angle leads to a more advantageous stress distribution. It will be seen that even with these extreme variations, which are considerably greater than those that are likely to occur, the stresses are still within safe limits and tension does not exist.

DESIGN OF GRAVITY DAM

From the evidence previously adduced, and subject only to the proper proving of the foundation by core drilling, we reached the conclusion that the site was suitable for a high dam of either the arch type or the gravity type, whichever may happen to be most economical and efficient. The concrete yardage in the single-arch dam was found to be 1,370,000 cubic yards. A gravity dam was designed to fit this site and assuming the same amount of excavation—that is, an average of 15 feet on each side. A straight gravity dam was considered, having a base width of two-thirds of the height and its vertical section a triangle, except that the crest width was assumed as 12 feet, the same as the arch dam.

The yardage in this dam is 1,750,000 cubic yards, which is 380,000 cubic yards more than the arch dam. The gravity dam, therefore, requires about 28 per cent more concrete than the arch dam. The maximum stress in this gravity dam was found to be 825 #/sq. in., while the maximum stress in the arch dam is less than 650 #/sq. in., so that the maximum stress in the gravity dam is 27 per cent higher than in the arch dam. Also the gravity dam has no

provision for uplift except what may be effected by drainage, while the arch dam is safe for any unlift. A properly designed gravity dam for this site would, therefore, have to be made thicker in order to reduce the maximum stresses to the maximum allowed for the arch dam, and this, of course, would still further increase its volume, which is already 28 per cent in excess of the arch dam. Therefore, on the basis of equal safety and equal cost, the arch dam is much the better for this site.

COST ESTIMATE FOR ARCH DAM

The following estimate of cost for the single-arch dam as described was derived from actual cost of work and from bona fide public bids. No data were used which was more than two years old, and in no case was a low bid used or cost data from any actual work, unless it was known that the bid was consistent—that is, that it was not "loaded" and that the contractor made a fair profit on the particular part of the work under consideration.

No cost data were taken from organizations which may have the advantage of money free of interest and of overhead expenses charged only partly, or perhaps not at all, against a particular piece of work. This may result in cost data 25 to 35 per cent below the actual cost which is obtained when these items are properly allowed for.

It is, therefore, believed that the estimate of cost is fair, consistent, and conservative, and that the work can be completed within the estimate, when under competent supervision and as long as the price level remains approximately the same as at present. This last reservation must be insisted upon, as we can not predict future price levels and have not made any unusual allowance in our estimate of contingencies to cover fluctuations of price level.

Estimate of cost of Marble Gorge Dam, Colorado River, Ariz.:

Elevation of crest, 3,543 feet.

Reservoir capacity, 11,000,000 acre-feet.

Bottom of excavation at elevation, 2,993 feet.

Excavation 100 feet below water surface and assuming 20 feet of water at the site.

Excavation for dam and spillway, including river control		$3,440,000
Concrete in place, including cement		9,533,000
Pressure grouting of foundation and contraction joints, miscellaneous work, and rights of way		285,000
20–58" needle valves and spillway gates		1,314,000
		14,572,000
Camps, engineering, and supervision, preliminary work and contingencies, 15 per cent		2,186,000
Total		16,758,000
Interest during construction, 10 per cent	$1,676,000	
Road from Flagstaff to dam site, 125 miles, at $8,000	1,000,000	
		2,676,000
Grand total		19,434,000

The two last items, interest during construction and the road from Flagstaff, have been added here for sake of completeness, although if the dam is to be mainly for flood control—that is, for a nonprofit-yielding purpose—it is not customary to include interest during construction. Moreover, the dam becomes effective for flood-control purposes long before it is completed.

The new road from Flagstaff to the dam site is not properly chargeable to the dam, since, as already stated, this road is part of a park-to-park highway and a bridge is now under construction at the dam site at a cost of nearly $400,000. It is reasonable to assume that this bridge would not be erected unless it was the intention to improve the road leading to it. Also, the price allowed for trucking over the road is large enough so that the trucking contractor can afford to expend a considerable sum of money on improving and maintaining the road, as it would be in his interest to do.

As already stated, no core drilling has as yet been undertaken at the site, and we are therefore limited to judging from surface indications as to the probable depth to foundation. This has been assumed as 100 feet in the

estimate. If this depth is found to be only 60 feet, $1,500,000 may be deducted, giving a cost of $15,258,000, exclusive of interest during construction and cost of road. If, on the other hand, the excavation will need to go down 130 feet below the water surface, $2,300,000 must be added, giving a cost of $19,058,000, exclusive of interest during construction and cost of road.

CONCLUSIONS

1. A safe dam can be built at the Marble Gorge dam site.
2. A dam to raise the water to El. 3,543 feet will impound 11,000,000 acre-feet of water. Such a dam will cost, exclusive of interest during construction and cost of road:
   (*a*) $15,300,000 with depth to bedrock assumed at 60 feet.
   (*b*) $16,800,000 with depth to bedrock assumed at 100 feet.
   (*c*) $19,100,000 with depth to bedrock assumed at 130 feet.

RECOMMENDATIONS

Our preliminary studies of the Marble Gorge dam site lead us to conclude that the conditions at the site are favorable for the construction of a high dam. We therefore recommend:

1. That the foundation condition in the Marble Gorge for a distance of 2,500 feet upstream from the bridge site be determined by diamond-drill borings.
2. That detail surveys of this section of the river be made to elevation 3,609 feet above sea level and to a scale of 100 feet to the inch.

Respectfully submitted.

(Signed) E. C. La Rue,
Member, American Society of Civil Engineers.
(Signed) B. F. Jakobsen,
Member, American Society of Civil Engineers.

[Senate Document No. 246, Sixty-fourth Congress, first session]

POWER OF THE FEDERAL GOVERNMENT OVER DEVELOPMENT AND USE OF WATER POWER

REPORT OF THE SUBCOMMITTEE TO THE COMMITTEE ON THE JUDICIARY, UNITED STATES SENATE, OF THE SIXTY-SECOND CONGRESS, SECOND SESSION, PURSUANT TO S. RES. 44, DIRECTING THE COMMITTEE ON THE JUDICIARY TO REPORT TO THE SENATE ON THE POWER OF THE GOVERNMENT OVER THE DEVELOPMENT AND USE OF WATER POWER WITHIN THE RESPECTIVE STATES

Mr. Nelson, from the subcommittee of the Committee on the Judiciary, submitted the following report, to accompany Senate resolution 44:

To the Committee on the Judiciary:

Your subcommittee, which was directed to report on the following resolution:

"*Resolved*, That the Committee on the Judiciary of the Senate be, and it is hereby, directed to report to the Senate, at as early a date as possible in the next regular session of Congress, upon the power and authority of the National Government over the development and use of water power within the respective States, and especially:

"First. Has the National Government any authority to impose a charge for the use of water power developed on nonnavigable streams, whether State or interstate?

"Second. Has it any authority in granting permits to develop water power on a navigable stream to impose and enforce conditions relating to stated payments to the Government, regulation of charges to consumers, and determination of the right to make use of such developed power?

"Third. Has it authority in disposing of any of its lands, reserved or unreserved, necessary and suitable for use in connection with the development or use of water power on a nonnavigable stream, whether State or interstate, by lease or otherwise, to limit the time for which such development may continue, or to impose and enforce charges for the use and development of such water power, or to control and regulate the disposition of such water power to its consumers?"

have considered the same and report as follows:

The interrogatories embraced in the foregoing resolution involve the rights of riparian owners, the rights of the States, and the rights of the Federal Government in the navigable and nonnavigable streams and watercourses of the country. A solution and understanding of these several rights will tend to answer and solve the questions propounded.

NAVIGABLE STREAMS

The rule of the common law, that only those streams are held navigable in which the tide ebbs and flows, and only so far as such ebb and flow, has not been adopted and does not prevail in this country. With us the question of navigability is one of fact in each case. If a stream can be used for commerce or trade, in any form, to any substantial extent, even for the floating of rafts of logs or lumber, it is held to be a navigable stream. (The *Genessee Chief*, 12 How., 443; the *Daniel Ball*, 10 Wall., 557; the *Montello*, 20 Wall., 430; Barney *v.* Keokuk, 94 U. S., 324; Waterpower Co. *v.* Water Commissioners, 168 U. S., 349.)

Most of our streams and watercourses are, in fact, more or less navigable in some of their reaches, and the nonnavigable portions serve as feeders for, and are so connected with, the navigable sections that it is difficult and scarcely

practicable to apply a separate rule for each. This must needs be so where ample regulation of the navigable section can only be secured through regulation of the nonnavigable section. In such cases, for the purposes of interstate commerce, the Federal Government has full regulative power over the entire stream, the nonnavigable as well as the navigable sections.

In U. S. *v.* Rio Grande Irrigation Co. (174 U. S. 690), the Supreme Court, in passing upon certain statutes relating to the use of water for mining and irrigation purposes, makes this declaration:

"To hold that Congress, by these acts, meant to confer upon any State the right to appropriate all the waters of the tributary streams which unite into a navigable watercourse, and so destroy the navigability of that watercourse in derogation of the interests of all the people of the United States, is a construction which can not be tolerated. It ignores the spirit of the legislation and carries the statute to the verge of the letter and far beyond what under the circumstances of the case must be held to have been the intent of Congress (p. 706-707)."

TITLE OF THE STATES IN THE BEDS AND WATERS OF NAVIGABLE STREAMS

The several States of the Union are each primarily the proprietors of, and have the sovereignty over, the beds and waters of the navigable streams and watercourses within their respective borders, subject only to the rights of the Federal Government, under the interstate commerce clause of the Constitution (par. 3, sec. 8, art. I), and to the rights of the Federal Government as owner of the riparian lands (par. 2, sec. 3, Art. IV), which rights will hereafter be referred to and enlarged upon.

In the case of Martin *v.* Waddell (16 Pet. 367), where the question of tidelands and tidewaters was involved, the Supreme Court of the United States makes this clear and comprehensive declaration:

"For when the Revolution took place the people of each State became themselves sovereign; and in that character hold the absolute right to all their navigable waters, and the soils under them, for their own common use, subject only to the rights since surrendered by the Constitution to the General Government."

The same doctrine was laid down by the court in the case of Pollard *v.* Hagan (3 How. 212), and it was held to apply to the newer States in as full a measure as to the original States of the Union. In this case the court concludes its opinion as follows:

"By the preceding course of reasoning we have arrived at these general conclusions: First, The shores of navigable waters and the soils under them were not granted by the Constiution to the United States, but were reserved to the States respectively. Second. The new States have the same rights, sovereignty, and jurisdiction over this subject as the original States. Third. The right of the United States to the public land and the power of Congress to make all needful rules and regulations for the sale and disposition thereof conferred no power to grant to the plaintiffs the land (tidewater land) in controversy."

In the case of Barney *v.* Keokuk (94 U. S. 324), Justice Bradley declares that the correct principles were laid down in the foregoing cases, and then adds:

"These cases related to tidewater, it is true; but they enunciate principles which are equally applicable to all navigable waters."

The rule laid down in the foregoing cases is reaffirmed and amplified with the citation of numerous authorities in the case of Shively *v.* Bowlby (152 U. S. 1).

RIPARIAN TITLE

It is the rule of the common law that a grant of land upon the borders of a navigable stream carries the grant only to the high-water line, while a grant of land bordering upon a nonnavigable stream carries the title to the center of the stream, subject to the public easement in the water of the stream. While this is the rule of the common law, the Supreme Court of the United States, in the case of Hardin *v.* Jordan (140 U. S. 371), has determined that the limits and extent of the riparian ownership are governed by the law of the State in which the land is situated. Justice Bradley, who delivered the opinion in this case, after discussing the question and citing numerous authorities, concludes as follows:

"We do not think it necessary to discuss this point further. In our judgment the grants of the Government for lands bounded on streams and other waters, without any reservation or restriction of terms, are to be construed as to their effect according to the law of the State in which the lands lie" (p. 384).

The case of Shively *v.* Bowlby, heretofore cited, approves of and adheres to this rule, and the following cases indorse and adhere to the rule: Barney *v.* Keokuk (94 U. S. 324), St. Louis *v.* Myers (113 U. S. 566), Packer *v.* Bird (137 U. S. 661), St. Louis *v.* Rutz (138 U. S. 226), Mitchell *v.* Smale (140 U. S. 406), Grand Rapids *v.* Butler (159 U. S. 87), Water Power Co. *v.* Water Commissioners (168 U. S. 349), Kean *v.* Calumet Canal Co. (190 U. S. 452), United States *v.* Chandler Dunbar Co. (209 U. S. 447).

The rule of riparian ownership as to grants of land bordering on streams is diverse in the various States. Some States hold that the grant extends only to high-water mark; other States hold that it extends to low-water mark; while another class of States—and perhaps the most numerous—hold that the grant extends to the middle of the stream, subject to the public easement in the water of the stream. But whatever may be the law in this respect as to the effect of the grant, it only relates to the proprietorship in the banks and bed of the stream and not to the ownership of the water in the stream.

In those States which hold that the title of the riparian owner extends only to the high or low water mark the title to the bed of the stream is deemed to be in the State, and whether the title to the bed of the stream is in the riparian owner or in the State, in either case the sovereignty over and the paramount title to the water of the stream is deemed to be in the State, but it holds it not absolutely but in trust for all lawful public uses and in subrogation to the rights of the Federal Government.

PROPRIETORSHIP AND CONTROL OF THE WATER IN STREAMS

While the riparian proprietor may be the absolute owner of the bed of the stream, he has no such proprietorship in the water of the stream. The water is a movable thing, and as to that he has only a usufruct. His rights in the water are subject to the sovereignty and control of the State, to the rights of the other riparian owners, and to the public easement or use. Lord Chief Justice Hale in his De Juris Maris (Hargrave, p. 6), in the quaint law language of those days, states:

"Though fresh rivers are in point of propriety, as before, prima facie of a private interest; yet, as well fresh rivers as salt, or such as flow and reflow, may be under these two servitudes, or affected with them—viz, one of the prerogatives belonging to the King, and another public interest, or belonging to the people in general."

Commenting on a case in which the riparian owner claimed the title up to the thread of the stream in the Severn River as against the King, Lord Hale says (Hargrave, p. 36):

"But though the subject may thus have the propriety of a navigable river part of a port, yet these cautions are to be added, viz: First, that the King has yet a right of empire or government over it in reference to the safety of the kingdom and to his customs, it being a member of a port, prout inferius dicitur; second, that the people have a public interest, a jus publicum, of passage and repassage with their goods by water and must not be obstructed by nuisances or impeached by exactions, * * *. For the jus privatum of the owner or proprietor is charged with and subject to that jus publicum which belongs to the King's subjects; as the foil of an highway is, which though in point of property it may be a private man's freehold, yet it is charged with a public interest of the people, which may not be prejudiced or damnified."

Sir J. Leach, vice chancellor, in the case of Wright *v.* Howard (1 Simons & Stuart's Reports, 203), an English case in chancery, decided in 1823, explains the right of a riparian as follows:

"The right to the use of the water rests on clear and settled principles. Prima facie, the proprietor of each bank of a stream (not tidal) is the propritor of half the land covered by the stream, but there is no property in the water. Every proprietor has an equal right to use the water which flows in the stream, and, consequently, no proprietor can have the right to use the water to the prejudice of any other proprietor. Without the consent of the other proprietors, who may be affected by his operations, no proprietor can either diminish the quantity of water, which would otherwise descend to the proprietors below, nor throw the water back upon the proprietors above."

Chancellor Kent, in his Commentaries, states the common-law rule in these words:

"Every proprietor of lands on the banks of a river has, naturally, an equal right to the use of the water which flows in the stream adjacent to his lands, as it was wont to run (currere solebat), without diminution or alteration. No proprietor has the right to use the water to the prejudice of other proprietors above or below him unless he has a prior right to divert it or a title to some exclusive enjoyment. He has no property in the water itself, but a simple usufruct while it passes along. Aqua currit et debet currere ut currere solebat is the language of the law. Though he may use the water while it runs over his land as an incident to the land, he can not unreasonably detain it or give it another direction, and he must return it to its ordinary channel when it leaves his estate. (3 Com., 439.) (Stein *v.* Burden, 29 Ala., 127.)"

In the case of Head *v.* Amoskeag (113 U. S., 9), involving the right of the riparian owner to construct and maintain a milldam on his own land under a statute of New Hampshire, Justice Gray, who delivered the opinion of the court, declares:

"We prefer to rest the decision of this case upon the ground that such a statute, considered as regulating the manner in which the rights of proprietors of lands adjacent to a stream may be asserted and enjoyed, with a due regard to the interests of all, and to the public good, is within the constitutional power of the legislature (p. 21)."

He further declares:

"The right to the use of running water is publici juris and common to all the proprietors of the bed and banks of the stream from its source to its outlet. Each has a right to the reasonable use of the water as it flows past his land, not interfering with a like reasonable use by those above or below him (p. 23)."

In the case of the United States *v.* Rio Grande Co. (174 U. S., 690), in considering a nonnavigable reach of the Rio Grande River, in the Territory of New Mexico, Justice Brewer, who delivered the opinion of the court, after quoting the foregoing paragraph from Chancellor Kent, adds:

"While this is undoubted, and the rule obtains in those States in the Union which have simply adopted the common law, it is also true that as to every stream within its dominion a State may change this common-law rule and permit the appropriation of the flowing waters for such purposes as it deems wise."

That the sovereignty and control over, and paramount title to, the waters in a stream is in the State is further established by that line of decisions sustaining the rule of public ownership, and "prior appropriation," prevailing in the mining and semiarid States, and acquiescing in its application to the lands of the United States. (Jennison *v.* Kirk, 98 U. S., 45; Broder *v.* Water Co., 101 U. S., 274; Gutiers *v.* Albuquerque Co., 188 U. S., 545; Boquilla Cattle Co. *v.* Curtis, 213 U. S., 339.)

The case of Kansas *v.* Colorado (206 U. S., 46) was a controversy between two States, one recognizing the doctrine of public ownership and prior appropriation and the other the common-law rule. Chief Justice Shaw, in the case of Elliott *v.* Fitchburg Railway Co., (10 Cush., 191), describes the rights of the riparian owner under the common-law rule in the following terms:

The right to flowing water is now well settled to be a right incident to property in the land; it is a right publici juris, of such a character that, while it is common and equal to all through whose land it runs, and no one can obstruct or divert it, yet, as one of the beneficial gifts of Providence, each proprietor has a right to a just and reasonable use of it as it passes through his land; and so long as it is not wholly obstructed or diverted, or no larger appropriation of the water running through it is made than a just and reasonable use, it can not be said to be wrongful or injurious to a proprietor lower down. What is such a just and reasonable use may often be a difficult question, depending upon various circumstances. To take a quantity of water from a large running stream for agricultural or manufacturing purposes would cause no sensible or practicable dimunition of the benefit, to the prejudice of a lower proprietor; whereas, taking the same quantity from a small running brook passing through many farms would be of great and manifest injury to those below, who need it for domestic supply or watering cattle; and therefore it would be an unreasonable use of the water, and an action would lie in the latter case and not in the former. It is therefore to a considerable extent a question of degree; still the rule is the same, that each proprietor has a right

to a reasonable use of it, for his own benefit, for domestic use, and for manufacturing and agricultural purposes. * * *

That a portion of the water of a stream may be used for the purpose of irrigating land we think is well established as one of the rights of the proprietors of the soil along or through which it passes. Yet a proprietor can not under color of that right or for the actual purpose of irrigating his own land wholly abstract or divert the watercourse or take such an unreasonable quantity of water or make such unreasonable use of it as to deprive other proprietors of the substantial benefits which they might derive from it if not diverted or used unreasonably. * * *

"This rule, that no riparian proprietor can wholly abstract or divert a watercourse, by which it would cease to be a running stream, or use it unreasonably in its passage and thereby deprive a lower proprietor of a quality of his property, deemed in law incidental and beneficial, necessarily flows from the principle that the right to the reasonable and beneficial use of a running stream is common to all the riparian proprietors, and so each is bound to use his common right as not essentially to prevent or interfere with an equally beneficial enjoyment of the common right by all the proprietors. * * *

"The right to the use of flowing water is publici juris and common to all the riparian proprietors; it is not an absolute and exclusive right to all the water flowing past their land, so that any obstruction would give a cause of action; but it is a right to the flow and enjoyment of the water, subject to a similar right in all the proprietors to the reasonable enjoyment of the same gift of Providence. It is, therefore, only for an abstraction and deprivation of this common benefit or for an unreasonable and unauthorized use of it that an action will be."

The assertion of public ownership and of prior appropriation, already referred to, is thus described by Justice Field in the case of Jennison *v.* Kirk (98 U. S. 453). After describing the system of discovery and appropriation and development of mining claims, he adds the following:

"But the mines could not be worked without water. Without water the gold would remain forever buried in the earth or rock. To carry water to mining localities when they were not on the bank of a stream or lake became, therefore, an important and necessary business in carrying on mining. Here, also, the first appropriator of water to be conveyed to such locality for mining or other beneficial purposes was recognized as having, to the extent of actual use, the better right. The doctrine of the common law respecting the right of riparian owners was not considered as applicable, or only in a very limited degree, to the conditions of miners in the mountains. The waters of rivers and lakes were, consequently, carried great distances in ditches and flumes, constructed with vast labor and enormous expenditures of money, along the sides of mountains and through canyons and ravines, to supply communities engaged in mining as well as for agriculturists and ordinary consumption. Numerous regulations were adopted, or assumed to exist, from their obvious justness, for the security of these ditches and flumes, and for the protection of rights to water, not only between different appropriators, but between them and the holders of mining claims. These regulations and customs were appealed to in controversies in the State courts, and received their sanction; and properties to the value of many millions rested upon them. For 18 years, from 1848 to 1866, the regulations and customs of miners, as enforced and molded by the courts and sanctioned by the legislation of the State, constituted the law governing property in mines and in water on the public mineral lands."

These water rights, by prior appropriation, as described by Justice Field, were recognized and confirmed by congressional legislation in 1866 and in 1870. Those acts are now sections 2339 and 2340 of the Revised Statutes. Justice Field further adds:

"It will thus be seen that the Federal statutes merely gave a formal sanction to the rules already established. Those rules had been built up in reliance on the tacit acquiescence of the United States, the true owner of the lands and waters on which apropriations were made, and these statutes acquiesced therein expressly as 'a voluntary recognition of a preexisting right' rather than the establishment of a new one."

In the case of Broder *v.* Natoma Water Co. (101 U. S. 274) the Supreme Court, in referring to the contention that these statutes established a new right, uses the following language:

"We are of the opinion that it is the established doctrine of this court that rights of miners, who had taken possession of mines and worked and devel-

oped them, and the rights of persons who had constructed canals and ditches to be used in mining operations and for purposes of agricultural irrigation, in the region where such artificial use of the water was an absolute necessity, are rights which the Government had, by its conduct, recognized and encouraged and was bound to protect before the passage of the act of 1866, and that the section of the act which we have quoted was rather a voluntary recognition of a preexisting right of possession, constituting a valid claim to its continued use, than the establishment of a new one."

While the common-law rule prevails—in some instances with slight modifications—in all of the States, except the so-called semiarid or mining States, there can be no doubt that it is in the power of these common-law States, by virtue of their sovereignity, to modify or change the rule of the common law. In the language of Justice Brewer (in U. S. *v.* Rio Grande Co., 174 U. S. 702–703):

"It is also true that as to every stream within its dominion a State may change this common-law rule and permit the appropriation of the flowing waters for such purposes as it may deem wise."

The same justice, in the case of Colorado *v.* Kansas (206 U. S. 94), describes the power of the State as follows:

"It may determine for itself whether the common-law rule in respect to riparian rights or that doctrine which obtains in the arid regions of the West of the appropriation of waters for the purposes of irrigation shall control. Congress can not enforce either rule upon any State. (See also McGilvra *v.* Ross, 215 U. S. 70.)"

We append hereto Exhibit A,[1] which names most of the States in which the rule of prior appropriation prevails, and also gives the constitutional and statutory provisions, with some of the decisions of the courts relating to the subject in each of these States.

PROPERTY AND RIGHTS OF THE UNITED STATES

Except as the owner of riparian lands and except for the purpose of regulating interstate commerce, the United States has no property in or sovereignty over the streams or watercourses within the boundaries of the several States. The sovereignty and ultimate control is in the State, and the proprietorship is either in the State or in the riparian owner, or in both, according to the constitutions and laws of the several States, and the power of the Federal Government over the streams is no greater in the so-called public-land States than in the States east of the Mississippi River. In Kansas *v.* Colorado (206 U. S. 92), already cited, Justice Brewer declares:

"As to those lands within the limits of the States, at least of the Western States, the National Government is the most considerable owner and has power to dispose of and make all needful rules and regulations respecting its property. We do not mean that its legislation can override State laws in respect to the general subject of reclamation. While arid lands are to be found mainly, if not only, in the Western and newer States, yet the powers of the National Government within the limits of those States are the same (no greater and no less) as those within the limits of the original thirteen, and it would be strange if, in the absence of a definite grant of power, the National Government could enter the territory of the States along the Atlantic and legislate in respect to improving by irrigation or otherwise the lands within their borders."

THE RIGHTS OF THE FEDERAL GOVERNMENT AS RIPARIAN OWNER

Through the treaty of independence and subsequent treaties with Great Britain, through cessions from foreign countries, and some of the original States of the Union, and through discovery and exploration, and by virtue of its national sovereignty, the Federal Government became the proprietor of a vast domain of unsettled and undeveloped lands. Chancellor Kent (1 Com., 257) describes the title of the United States to this domain in the following language:

"Upon the doctrine of the court in Johnson *v.* McIntosh, 1823 (8 Wheat., 543), and Fletcher *v.* Peck, 1810 (6 Cranch, 142, 143), the United States own the soil as well as the jurisdiction of the immense tracts of unpatented lands

[1] See p. 20.

included within their territories, and of all the productive funds which those lands may hereafter create. The title is in the United States by the treaty of peace with Great Britain, and by subsequent cessions from France and Spain, and by cessions from the individual States."

By paragraph 2, section 3, Article IV of the Constitution, Congress was given plenary control over this public domain in the following terms:

"The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; * * *."

The power thus conferred on Congress is as full and complete as the power, conferred by another paragraph of the Constitution, to regulate foreign and interstate commerce. The power of Congress is paramount and plenary in each case. Justice Brewer, in the case of The United States *v.* Rio Grande Co. (174 U. S., 690, 703), declares:

"Although this power of changing the common-law rule as to streams within its dominion undoubtedly belongs to each State, yet two limitations must be recognized: First, that in the absence of specific authority from Congress a State can not by its legislation destroy the right of the United States as the owner of lands bordering on a stream to the continued flow of its waters, so far at least as may be necessary for the beneficial uses of the Government property. Second, that it is limited by the superior power of the General Government to secure the uninterrupted navigability of all navigable streams within the limits of the United States. In other words, the jurisdiction of the General Government over interstate commerce and its natural highways vests in that Government the right to take all needed measures to preserve the navigability of the navigable watercourses of the country even against any State action."

The right of the Federal Government as riparian owner is that of a riparian owner at common law. (Sturr *v.* Beck, 133 U. S., 541; Lux *v.* Haggin, 69 Cal., 336.) This right vested in the Federal Government when it acquired its public domain and of this right it is not divested on the admission of a State into the Union, for this right is expressly reserved by the Constitution. The title of the Federal Government to the public lands in the States where the rule of prior appropriation prevails antedates the admission of those States into the Union, and over that title the Constitution reserved plenary power of disposal and regulation to the Federal Government. It is only when the Federal Government has entirely parted with that title and it has passed into other ownership that the power of regulation on the part of the Federal Government becomes extinct. The water on the riparian land of the Federal Government is an appurtenance of the land of which it can not be divested without its consent, no more than of its riparian lands. In the case of the United States *v.* Winans (198 U. S., 371) it was held that the Federal Government had the power to reserve a fishing right for the Yakima Indians in the Columbia River, and that such reservation, though made when the State was a Territory, bound the future State. And in the case of Winters *v.* The United States (207 U. S., 564) it was held that the Federal Government had the right to reserve the water in the Milk River for the benefit of the Indians and officers of the Government on the Fort Belknap Reservation, in Montana, and that this reservation of the water, though made while Montana was a Territory, bound it after it became a State. The court affirms and asserts the doctrine and rule in these terms:

"Another contention of appellants is that if it be conceded that there was a reservation of the waters of Milk River by the agreement of 1888, yet the reservation was repealed by the admission of Montana into the Union, February 22, 1889 (c. 180, 25 Stat., 676), 'upon an equal footing with the original States.' The language of counsel is that 'any reservation in the agreement with the Indians, expressed or implied, whereby the waters of Milk River were not to be subject of appropriation by the citizens and inhabitants of said State, was repealed by the act of admission.' But to establish the repeal counsel rely substantially upon the same argument that they advance against the intention of the Government to reserve the waters. The power of the Government to reserve the waters and exempt them from appropriation under the State laws is not denied, and could not be. (The United States *v.* The Rio Grande Ditch & Irrigation Co., 174 U. S., 690, 702; United States *v.* Winans, 198 U. S., 371.)"

In the case of Camfield *v.* United States (167 U. S., 518), the court declares:

"While we do not undertake to say that Congress has the unlimited power to legislate against nuisances within a State, which it would have within a Territory, we do not think the admission of a Territory as a State deprives it of the power of legislating for the protection of the public lands, though it may thereby involve the exercise of what is ordinarily known as the police power, so long as such power is directed solely to its own protection. A different rule would place the public domain of the United States completely at the mercy of State legislation."

These opinions of the Supreme Court of the United States have been concurred in by some of the courts of those States in which the rule of prior appropriation prevails.

Judge Rudkin, of the Supreme Court of the State of Washington (now a Federal district judge), in the case of Kendall *v.* Joyce (48 Wash., 492–493), declares:

"It has never been contended that a mere squatter on public land who subsequently sells out or abandons his claim acquires, or can acquire, riparian rights in a stream flowing through the land. Riparian rights are a mere incident to ownership in the soil, and, while they may relate back by fiction of law to the date of the settlement or filing, by virtue of the patent subsequently issued, yet they do not vest until patent issues, for up to that time the patent to the land with all its incidents is vested in the United States, utterly beyond the power or control of State legislatures. And the party thereafter acquiring title from the Government acquires the land with all its incidents."

In the case of Cruse *v.* M'Cauley (96 Fed. Rep., 369), the United States Circuit Court for Montana, through Judge Knowles, declares:

"It must be conceded that the United States, as the proprietor of the land over which the South Fork of McDonald Creek flowed, had a right to the flow of the waters thereof over its land, as an incident thereto. In the eastern part of Montana the United States acquired its title to land by virtue of what is called the 'Louisiana purchase.' There can not be one rule as to the right to the flow of water over its lands in Montana and another rule as to its lands in Iowa and Missouri. In these last-named States there can be no doubt of the rule that the National Government would be entitled to water which is an incident to its land. As the United States then owns the waters which are an incident to its lands, it can dispose of them separate from its lands if it chooses. Section 2339, Revised Statutes, provides:

"'Whenever by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes, have vested and accrued and the same are recognized and acknowledged by the local cumtoms, laws, and decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same.'

"The practical construction of this statute has been that, as long as land belonged to the United States, the waters flowing over the same was subject to appropriation for any of the purposes named, when such appropriation was recognized by the local customs, laws, or decisions of the courts. But if the water was not so appropriated when it flowed over the public domain, it was not subject to appropriation after the land over which it flowed became private property. Patents of the United States to lands contain this clause:

"'Subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes,' etc.

"Certainly this means subject to such water rights as existed at the time when the patent took effect. * * *

"If a person receives a patent from the United States for land subject only to accrued water rights—that is, existing water rights—and as an incident to or a part of this land there is water flowing over the same or upon the same, he would have all the rights the United States had at that time. I do not think any State law or custom can take away such rights, except for some public purpose."

The Federal Government has the undoubted right to lease its riparian and other lands with all their appurtenances. (United States *v.* Gratiot, 14 Pet. 526.)

Congress has also the undoubted power to create and establish forest reserves on the lands of the United States within any State, and to authorize the Secretary of Agriculture to make proper rules and regulations for the use of the same, and to charge a compensation for the use of any portion of the

reservation; and such a statute amounts to a revocation of the implied license to graze the public lands, referred to and sustained in the case of Buford *v.* Houtz (133 U. S. 320). (See United States *v.* Grimaud, 220 U. S. 506; Light *v.* United States, 220 U. S. 523.)

In this connection it may be observed that the right to occupy and use the public lands of the United States for canals and ditches, for the appropriation of water for agricultural and mining purposes, is based upon and conferred by the following acts: July 26, 1866 (R. S., sec. 2339), and July 9, 1870 (R. S., sec. 2340). There is, in addition to these acts, the right-of-way law contained in the act of March 3, 1891. (26 Stat., p. 1101.) It is through these laws, and not by virtue of any State authority, that the use of the public domain for the appropriation of water is conferred and acquired.

It is further to be noted that the act of June 25, 1910 (36 Stat. 847), confers the following-described power upon the President in these terms:

"That the President may, at any time in his discretion, temporarily withdraw from settlement, location, sale, or entry any of the public lands of the United States, including the District of Alaska, and reserve the same for water-power sites, irrigation, classification of lands, or other public purposes to be specified in the orders of withdrawals, and such withdrawals or reservations shall remain in force until revoked by him or by an act of Congress."

In the light of the constitutional provision and of the interpretation placed upon it by the decisions of the Supreme Court and other courts in respect to this subject, it seems clear that the Federal Government, through Congress, has the power to lease its riparian lands, with the waters appurtenant thereto, situate within the several States, for such a period, on such terms, and for such rent as Congress in its discretion may prescribe, but the lessee would, at most, only acquire the common-law usufruct in the water of the appurtenant stream, as defined by Chancellor Kent and Chief Justice Shaw.

THE POWER OF THE FEDERAL GOVERNMENT UNDER THE INTERSTATE-COMMERCE CLAUSE OF THE CONSTITUTION

For the purpose of promoting and regulating foreign and interstate commerce Congress is given plenary power over all the navigable waters of the United States, to the end of improving and maintaining their navigability; and this power is not limited to the navigable sections of streams, but extends to the tributaries and feeders of the same, for without the control of these the power over the navigable sections might become wholly impotent. (United States *v.* Rio Grande Co., 174 U. S. 690.) Neither can any limits be placed upon the methods of improving the navigability of streams nor upon the means by which commerce can be carried on upon the same.

Science has in recent years evoked from the great store house of nature the hidden and well-nigh limitless power of electricity and utilized the same in various ways for the promotion of commerce, industry, and the domestic and social well-being of mankind. The bounds of such power and use can not well be defined or foretold. That such power has become and may still much further become one of the great instrumentalities of commerce is evident. While sail, aside from the oar, was the only known motive power on water the limits of navigation was confined to tide water. The discovery of steam extended navigation on our streams far beyond the limits of tide water, and who can tell how much further hydoelectrical power generated by a dam in a stream may extend navigation on that or some other stream? The water in a stream may not only be used to float and carry a vessel, a boat, or a barge, but it may also be used to furnish the motive power for the navigation of the same. And a dam erected in a stream carrying interstate commerce can well be utilized for this double purpose; and Congress, having jurisdiction over the improvement and regulation of an interstate navigable stream, has ample power to resort to all reasonable means for the improvement of navigation and the promotion of commerce on such a stream. (Gibbons *v.* Ogden, 9 Wheat. 1.)

If, for the purpose of improving the navigability of a stream carrying interstate commerce, the Federal Government constructs and maintains a dam, with locks and gates, on its riparian lands or on lands in which it has acquired an easement for such construction and maintenance, the Government has the undoubted right to establish and maintain, in connection with such dam, an electric power plant for the purpose of furnishing motive power to operate

such locks and gates. And the Federal Government has the right to sell, lease, or rent, for compensation, any surplus power that may arise from and be an incident to such an improvement of navigation. (Kaukauna Water Power Co. *v.* Green Bay & Mississippi Canal Co., 142 U. S. 254.)

This case relates to the construction of a dam for purposes of navigation and the use of the surplus water incident thereto. In 1846, Congress made a grant of land to the State of Wisconsin for the improvement of the navigation of the Fox and Wisconsin Rivers. The State assumed the grant and the work. In the act of assumption it was provided among other things:

"Whenever a water power shall be created by reason of any dam erected or other improvements made on any of said rivers, such water power shall belong to the State, subject to the future action of the legislature."

The court in passing upon the effect of this reservation to the State, declares:

"But if, in the erection of a public dam for a recognized public purpose, there is necessarily produced a surplus of water, which may properly be used for manufacturing purposes, there is no sound reason why the State may not retain to itself the power of controlling or disposing of such water as an incident of its right to make such improvement. Indeed, it might become very necessary to retain the disposition of it in its own hands, in order to preserve at all times a sufficient supply for the purposes of navigation. If the riparian owners were allowed to tap the pond at different places and draw off the water for their own use, serious consequences might arise, not only in connection with the public demand for the purposes of navigation, but between the riparian owners themselves as to the proper proportion each was entitled to draw—controversies which could only be avoided by the State reserving to itself the immediate supervision of the entire supply. As there is no need of the surplus running to waste, there was nothing objectionable in permitting the State to let out the use of it to private parties, and thus reimburse itself for the expenses of the improvement."

The court, after further comments and the citation of three Ohio cases, adds:

"The true distinction seems to be between cases where the dam is erected for the express or apparent purpose of obtaining a water power to lease to private individuals, or where in building a dam for a public improvement a wholly unnecessary excess of water is created, and cases where the surplus is a mere incident to the public improvement and a reasonable provision for securing an adequate supply of water at all times for such improvement."

Also, see Green Bay Co. *v.* Patten Co. (172 U. S. 58), relating to the same water power and dam after the Federal Government had taken over the work and improvement.

In general, it may be said that whenever the Federal Government is engaged in improving the navigability of a stream on which there is interstate commerce, if by reason and in consequence of such improvement, and as an incident thereto, surplus power is created, the Federal Government has the right to lease or sell such power on such terms and for such compensation as it may deem just.

Congress, as in the case of Wisconsin, Ohio, and other States, can delegate the work of improving portions of navigable rivers to States, municipalities, private corporations, and individuals, and if in connection with such improvement and as an incident thereto surplus power is created, Congress may authorize those to whom the right of improvement is delegated to lease and secure compensation for such surplus power. In such cases those to whom the power of making the improvement is delegated are the agents for and stand in place of the Federal Government. But unless such work of improvement is primarily made for the purpose of improving the navigation on streams or other waters carying interstate commerce, the Federal Government could not confer the power to obtain compensation for the use of the water.

Provision has been made in several acts of Congress for the utilization of surplus water power on navigable streams. In a part of the cases the dam or other improvement has been carried on and made directly by the United States; in other cases by private parties. Senate Document No. 57, first session Sixty-second Congress (see Exhibit B[1] appended hereto), contains a list of the cases where so-called water-power privileges have been granted. The case of the Black Warrior River in Alabama has been added to the document since it was issued.

[1] See p. 32.

ANSWER TO THE INTERROGATORIES PROPOUNDED IN THE RESOLUTION

Coming now, in the light of the Constitution and of the construction and interpretation put upon it by the courts in the authorities we have cited, to the direct consideration of the interrogatories propounded in the foregoing resolution, and before attempting to directly respond to the same, it must be borne in mind that it is always difficult to give a satisfactory and instructive answer to a hypothetical or abstract question. It is much easier to solve a concrete case.

As to the first interrogatory, the only answer we can make is this: That whether a stream is navigable or nonnavigable, State or interstate, the rights of the Federal Government as riparian owner are practically the same; and barring any power that may rest in the Federal Government under the commerce clause of the Constitution, that Government has manifestly the right to lease, for compensation and on such terms as it sees fit, its riparian lands with the water appurtenant thereto, but the lessee would not acquire a greater right or interest in such water than the usufruct as defined by the common law, and such right or interest would be subject to and charged with any right acquired under the act of July 26, 1866 (R. S., sec. 2339). The Federal Government has no water power aside from the usufruct to lease in such case; and if the utilization of the water in a stream is sought beyond such usufruct and for other purposes, authority therefor must be obtained from the State where the residuary power over the water resides.

Responding to the second interrogatory, we are of the opinion, divorcing the question from riparian rights, that the Federal Government, in authorizing the construction and maintenance of a dam on a navigable stream by States, municipalities, or private parties, for the chief and primary purpose of improving the navigation of the stream, has the same right to prescribe the terms and compensation for the use of the surplus power, created as an incident to the main improvement, as the Government would have in case it had itself built the dam or made the improvement, and that the Government having delegated the power of building such dam to private parties might well confer upon them as compensation for the work thus undertaken the right to do what the Government itself could do in case it had itself constructed the work. In this connection, and as a further response to the interrogatory, it must be noted that the mere grant by the Federal Government of authority to construct a dam in a navigable river, not for purposes of navigation, but really for the creation of a water power, is merely a license or permit, the effect of which is that if the dam is constructed and operated conformable to plans approved by the Government, it will not be deemed an obstruction or impediment to navigation. And in such case the Government would be authorized to charge a nominal license fee for inspecting and passing upon the plans and for watching over the work to see that it conforms to the plans and is properly maintained; but the regulative power of the Government would not extend to the use of the water for other purposes than navigation and interstate commerce. In such a case it seems to us that the Federal Government has no water power to sell or charge compensation for, for it is only authorized by the Constitution to regulate interstate and foreign commerce, which in this case means navigation.

As to the third interrogatory, it may be remarked that it has in part been responded to in the answer to the first interrogatory. And as a further answer we will add that the Federal Government has under the Constitution plenary power to sell or lease its riparian lands with the water appurtenant thereto, and that if on any such land there is a water-power site, that, as a part of the riparian land, can of course be sold or leased. The Federal Government has no water power distinct or separable from its riparian lands or any water-power sit on the same. The only water power the Federal Government owns is the common-law usufruct in the water appurtenant to its riparian lands. In leasing its riparian lands with their appurtenant water, which is all the Government has to lease within the limits of a State, it can no doubt prescribe such terms as it sees fit in respect to rent, duration of lease, and the uses to which the leased premises may be put. It can say in its lease to the lessee, "If you succeeed in creating and maintaining a water power on the premises I lease you, you will be required to rent such power on such and such terms. This condition will be in your lease; without it I will not lease you the premises. If you accept a lease with this condition and fail to comply with the condition, your lease will be forfeited." In this connection it must

be borne in mind, however, that the leasing of the water-power site as a part of the riparian lands of the Federal Government does not in and of itself confer the right to create a water power. At most, as we have already stated, it merely confers the common-law right of usufruct in the water. If any other or further use of the water in the stream is required, the right to such use must be obtained from State authority, and, therefore, it is difficult to see how water power can be established in such cases without the cooperation or consent of the State.

Several acts have been passed by Congress relating to obstructions, and the construction of dams, in navigable rivers. Among these, to which we call your attention, is the act of September 19, 1890 (26 Stat., 426), which contains important provisions for the removal or change in bridges that are found to be an obstruction to navigation by the Secretary of War, and other provisions relating to the construction of wharves, piers, bridges, etc.

The act of July 13, 1892 (27 Stat. 88), relates particularly to the construction of wharves, piers ,and bridges over navigable waters, and requires the approval of the Secretary of War for any improvement or bridge. (See sec. 3, p. 110.)

Section 10 of the act of March 3, 1899 (30 Stat., 1121), prohibits the creation of any obstruction to the navigable capacity of any of the waters in the United States not affirmatively authorized by Congress, etc., and prohibits the construction of any breakwater, jetty or other obstruction in any river or water of the United States, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War. Section 9 of the same act prohibits the construction of any bridge, dam, etc., over any navigable river without the consent of Congress and without the approval of plans by the Chief of Engineers and Secretary of War.

The act of June 21, 1906 (34 Stat., 386), relates to the construction of dams by parties other than the Federal Government, and the act of June 23, 1910 (36 Stat., 593), is amendatory of the preceding act, and lays down many important rules and regulations for the construction of dams in navigable rivers, etc.

EXHIBIT A

CALIFORNIA

California was admitted into the Union in 1850, and the only provision in the act for admission of September 9 (9 Stat., 453) relating to water rights is "that navigable waters are declared common highways and forever free to the inhabitants of the State and citizens of the United States without any tax, impost, or duty therefor."

Section 1 of article 14, constitution, 1879 (p. 443, vol. 1, Am. Chs. Cons., and Oc. L.), provides:

"The use of all waters now appropriated or that may hereafter be appropriated for sale, rental, or distribution is hereby declared to be a public use and subject to the regulation and control of this State, in the manner to be prescribed by law."

Section 1410, California Civil Code, provides:

"The right to the use of running water flowing in a river or stream, or down a canyon or ravine, may be acquired by appropriation."

Section 1411, California Civil Code, provides:

"The appropriation must be for some useful or beneficial purpose, and when the appropriator or his successor in interest ceases to use it for such purpose the right ceases."

Section 1422 (which, as originally enacted, provided that "The rights of riparian proprietors are not affected by the provisions of this title," i. e., the title relating to the appropriation of water, was enacted March 21, 1872, with section 1410 and following sections, but repealed March 15, 1887. (Stats. and Amendts., p. 114.) This repealing act contains the following provision:

"The repeal of this section shall not in any way interfere with any rights already vested."

One who bases his right on appropriation of water over land then part of the public domain acquires no right superior to those attaching to riparian lands which at the time of the appropriation were private. (Hargrave *v.* Cook, 108 Cal., 78.) 1895.

In the case of Hill *v.* Newman (5 Cal., 446), Justice Bryan in explaining a water right said:

"The right to running water is defined to be a corporeal right, or hereditament, which follows or is embraced by the ownership of the soil over which it naturally passes * * *. From the policy of our laws, it has been held in this State to exist without private ownership of the soil—upon the ground of prior location upon the land, or prior appropriation and use of the water."

And in the case of McDonald & Blackburn *v.* Bear River & Auburn Water & Mining Co. (13 Cal.; 232, 233), Justice Baldwin put it in this language:

"The ownership of water as a substantive and valuable property, distinct, sometimes, from the land through which it flows, has been recognized by our courts; and this ownership, of course, draws to it all the legal remedies for its invasion. The right accrues from appropriation; this appropriation is the intent to take, accompanied by some open, physical demonstration of the intent and for some valuable use. We have held that there is no difference in respect to this use, or rather purpose, to which the water is to be applied; at least, that an appropriation for the uses of a mill stands on the same footing as an appropriation for the use of mines."

The rule of the common law as to riparian rights in its extreme rigor are not adapted to the conditions existing in this State. It is relaxed to a certain extent, and moreover right to the use of water may be procured by prior appropriation thereof where the absolute title to the soil has not passed from the Government or State. But where the title to the riparian soil is in private parties it seems to be the law that they are under the protection of the common-law rule. The rights in water acquired by a riparian proprietor are attached to the soil and pass with it (Lux *v.* Haggin, 69 Cal., 255) and may be lost only by grant, condemnation, or prescription. (Hargrave *v.* Cook, 108 Cal., 77; Bathgate *v.* Irvine, 126 Cal., 142; Eddy *v.* Simpson, 3 Cal., 249; Pet *v.* Santa Rosa, 119 Cal., 392; Gould *v.* Stafford, 77 Cal., 66; Union M. and M. Co. *v.* Ferris, 2 Sawy., 176; Union M. and M. Co. *v.* Dangby, 2 Sawy., 450; Land & Water Co. *v.* Hancock, 85 Cal., 219.)

Justice Heydenfeldt, in a leading case (5 Cal., 147), said:

"The miner who selects a piece of ground to work must take it as he finds it, subject to prior rights, which have an equal equity on account of an equal recognition from the sovereign power. If it is upon a stream the waters of which have not been taken from the bed, they can not be taken to his prejudice; but if they have been already diverted, and for as high and legitimate purpose as the one he seeks to accomplish, he has no right to complain, no right to interfere with the prior occupation of his neighbor, and must abide the disadvantage of his own selection."

Chief Justice Murray, in Hill *v.* King (8 Cal., 338), speaking on this subject said:

"The only test as between parties where the lands belong to the United States or this State is priority of location, and whether a party locates above or below the claim of another his right depends or originates in appropriation alone; he must take subject to the higher right of those who were first in point of time to appropriate. If the parties both claimed as riparian proprietors, then each alike would be entitled to the reasonable use of the water for proper purposes. But in such case the supra-riparian proprietor must so do the same as to do his neighbor the least possible injury."

IDAHO

The constitution of Idaho, 1889, section 1 of article 15, contains the same provision as section 1 of article 14 of the California constitution, supra (pp. 943, 944, vol. 2, Am. Ch., Con., and O. L.), with the additional provision that the use "of all water originally appropriated for private use, but which after such appropriation has heretofore been or may hereafter be sold, rented, or distributed" is also a public use.

Section 3 provides:

"The right to divert and appropriate the unappropriated waters of any natural stream to beneficial use shall never be denied. Priority of appropriation shall give the better right as between those using the water; but when the waters of any natural stream are not sufficient for the service of all those desiring the use of the same, those using the water for domestic purposes shall

(subject to such limit as may be prescribed by law) have the preference over those claiming for any other purpose; and those using the water for agricultural purposes shall have preference over those using the same for manufacturing purposes. And in any organized mining district, those using the water for mining purposes, or milling purposes connected with mining, shall have preference over those using the same for manufacturing or agricultural purposes. But the usage by such subsequent appropriators shall be subject to such provisions of law regulating the taking of private property for public and private use as referred to in section 14, article 1, of this constitution."

Section 3240, Revised Statutes, puts the control of water within the borders of the State in the State and declares that all waters are the property of the State; section 3242 provides for acquiring the right to the use of water by appropriation, and section 3243 that it must be for a useful and beneficial purpose.

The State engineer is prohibited from granting permits to divert waters of a lake, pond, or pool situated wholly upon lands of a person or corporation except to the owner. (Chap. 230, Sess. Laws, 1911.)

In the case of Drake *v.* Earhart (2 Idaho, 716) it was held that a prior appropriator of the water of a sream, all of which he claimed, had used, and needed for irrigation, was entitled to the whole as against a patentee of land through which the stream flowed, though no custom to that effect was shown.

Said Chief Justice Beatty (p. 720):

"The important question * * * is what, if any, rights the appellant has to any of that water as a riparian proprietor. His claim is not based upon prior or any appropriation under our territorial laws, but upon the fact that the sream in question flows by its natural channel through his land; hence that he is entitled to the use thereof allowed by the common law. This doctrine of riparian proprietorship in water as against prior appropriation has been very often discussed and nearly always decided the same way by almost every appellate court between Mexico and the British possessions and from the shores of the Pacific to the eastern slope of the Rocky Mountains, as well as by the Supreme Court of the United States. While there are questions growing out of the water laws and rights not fully adjudicated, this phantom of riparian rights, based upon facts like those in this case, has been so often decided adversely to such claim and in favor of prior appropriation that the maxim 'first in time, first in right' should be considered the settled law here. * * * It is the lineal descendant of the law of necessity."

It is very evident, therefore, that in the State of Idaho, according to the constitution, statutes, and decisions of the courts, all waters are in full control of the State, subject to appropriation for beneficial uses and the sale, rental, or distribution thereof.

MONTANA

Section 15, article 3, constitution, 1889, provides (p. 2302, vol. 4, Am. Ch., Con., and O. L.):

"The use of all water now appropriated or that may hereafter be appropriated for sale, rental, distribution, or other beneficial use, and the right of way over lands of others for all ditches, drains, flumes, canals, and aqueducts necessarily used in connection therewith, as well as the sites for reservoirs necessary for collecting and storing the same, shall be held to be a public use."

Section 4432, Revised Statutes, 1907 (in part):

The State is the owner of all land below the water of a navigable lake or stream.

Section 4840, Revised Statutes, 1907 (approved Mar. 16, 1901):

"The right to the use of any unappropriated water of any natural stream, watercourse, spring, dry coulee, or other natural source of supply, and of any running water flowing in the streams, rivers, canyons, and ravines of this State, may hereafter be acquired by appropriation."

Section 4846, Revised Statutes, 1907, gives the United States, through the Secretary of the Interior, the right to appropriate the waters of streams or lakes within the borders of the State in the same manner as an individual.

In the case of Columbia Mining Co. *v.* Holter (1 Mont., 300), Chief Justice Warren, in speaking of the doctrine of prior appropriation, used this language:

"By appropriation a man acquires only the right of possession and user of water, qualified by the right of others to its use, in such manner as shall not materially diminish or deteriorate it at the place of his appropritaion in quantity or quality."

From the above sections it would appear that the right of the United States to the streams and waters therein in this State is no greater than that of an individual—i. e., to acquire a right therein by appropriation.

WASHINGTON

Section 1, article 17, constitution, 1889 (p. 4001, vol. 7, Am. Ch., Con., and O. L.):

"The State of Washington asserts its ownership to the beds and shores of all navigable waters in the State up to and including the line of ordinary high tide, in waters where the tide ebbs and flows, and up to and including the line of ordinary high water within the banks of all navigable rivers and lakes: *Provided*, That this section shall not be construed so as to debar any person from asserting his claim to vested rights in the courts of the State."

Section 2:

"The State of Washington disclaims all title in and claim to all tide, swamp, and overflowed lands patented by the United States: *Provided*, The same is not impeached for fraud."

Section 1, article 21:

"The use of the waters of the State for irregation, mining, and manufacturing purposes shall be deemed a public use."

Justice White:

"The provision of article 17, section 1, of the constitution was evidently for the purpose of establishing the right of the State to the beds of all navigable waters in the State, whether lakes or rivers, or fresh or salt, to the same extent the Crown had in England in the sea and in the arms and inlets thereof and in the tidal rivers, and to eliminate the distinctions existing under the rule of the common law in this respect."

A lower riparian owner can not be deprived of his right to the usual and undiminished flow of water without the exercise of eminent domain, even where the upper proprietor is a municipal corporation which seeks to divert the waters for necessary public use. It was contended that by section 1, article 17, the State could authorize the diversion of a stream for the use of the inhabitants of a city, it being a public use and a paramount necessity superior to every other use. Justice White said further:

"Though this section has no effect, as has been held by this court in Eisenbach *v.* Hatfield (2 Wash., 236) and Harborland Commissioners *v.* State (2 Wash., 530), of vesting in the State the entire and exclusive ownership of the beds and shores of all navigable waters, it should not be construed as affecting the rights of riparian proprietors upon nonnavigable water courses, though their source is in navigable waters. The use of the water in such nonnavigable streams is not inconsistent with the retention of the fee in the bed of navigable waters in the State. The provision of section 16, article 1, of the constitution protects private property from confiscation for public use; and the proviso to article 17, section 1, clearly indicates that so far as rights had become vested, notwithstanding the other provisions of this section, the owner thereof should have the right to assert them in the courts; and, if this language means anything, it is that those rights should be protected and guarded by the courts. (24 Wash., 499, 500. 501, New Whatcom *v.* Fairhaven Land Co.)"

Section 6316, Remington & Ballinger's Code, 1910:

"The right to the use of water in any lake, pond, or flowing spring in this State or the rights of the use of any water flowing in any river, stream, or ravine of this State, for irregation, mining, or manufacturing purposes, or for supplying cities, towns, or villages with water, or for waterworks, may be acquired by appropriation and as between appropriators the first in time is the first in right."

Section 6325, Remington & Ballinger's Code, 1910, gives the right to any person, corporation, or association of persons, and section 6326 the right to riparian proprietors to appropriate surplus and unappropriated waters for purposes of irrigation and mining.

Section 4102 provides for the procuring of right of way across intervening lands for ditches, etc.

"The common-law doctrine of riparian rights in the use of waters of a stream has become a rule of property in this State." (Nesalhous *v.* Walker, 621, 45 Wash.)

A prior appropriator of water over public lands can not be defeated of his rights by subsequent homesteaders on the land. (Thorpe *v.* Tenem, 1 Wash., 566.)

SOUTH DAKOTA

Article 17, section 210, constitution, 1889 (p. 2885, vol. 5, Am. Ch., Con., and O. L.):

"All flowing streams and natural watercourses shall forever remain the property of the State for mining, irrigating, and manufacturing purposes."

Section 4798, Revised Codes, 1905:

"The owner of the lands owns the water standing thereon or flowing over or under its surface, but not flowing in a definite stream. Water running in definite stream formed by nature, over or under the surface, may be used by him as long as it remains there; but he may not prevent the natural flow of the stream or of the natural springs from which it commences its definite course, nor pursue or pollute the stream."

Section 7604:

"All waters within the limits of the State, from all sources of water supply belong to the public, and except as to navigable waters are subject to appropriation for beneficial use."

Section 7639 gives the United States the right to appropriate waters within the State the same as an individual.

The homestead settlers have superior rights over subsequent miner's claims. (Sturr *v.* Beck, 6 N. Dak., 71; 133 U. S. 541.)

A reparian owner may use reasonable quantity of water for irrigation purposes. An appropriator who acquires subsequent rights can not complain of use made of water by upper riparian proprietor. (Lone Tree Ditch Co. *v.* Cyclone Ditch Co., 15 S. Dak. 519.)

In the case of Bigelow *v.* Draper (6 N. Dak. 152) Justice Corless said:

"At common law the owner of lands through which a nonnavigable stream flowed was possessed of the title to the bed of the stream as well as of the right to a reasonable use of the water. The land under the water was his, the right to a reasonable use of the stream was as much his property as the land itself. The course of the stream could not be so diverted as to cause it to cease to flow in its accustomed channel upon his property. These doctrines of the common law were in force in the Territory of Dakota at the time of the adoption of the constitution of this State. By virtue of them the riparian owners in the Territory were vested with specified property rights in the bed of all natural water courses, and in the water itself. Such rights were under the protection of the fourteenth amendment to the Federal Constitution, which protects property against all State actions that does not constitute due process of law. It follows that section 210 of the State constitution would itself be unconstitutional in so far as it attempted to destroy those vested rights of property, if it should by construction be given a scope sufficiently wide to embrace such matters. For this reason we feel constrained to hold, despite its broad language, that section 210 was not framed to divest the rights of riparian owners in the waters and beds of all natural water courses in the State.

SOUTH DAKOTA

Section 192, Revised Code, 1903:

"The ownership of land below ordinary high-water mark and the land below the water of a navigable lake or stream is regulated by the laws of the United States, or by such laws of the State as the legislature may enact."

Section 278, Revised Code:

"The owner of the lands owns the water standing thereon or flowing over or under its surface, but not flowing in a definite stream. Water running in definite stream formed by nature over or under the surface may be used by him as long as it remains there, but he may not prevent the natural flow of the stream or of the natural springs from which it commences its definite course, nor pursue nor pollute the stream."

Section 289, Revised Code:

"Except where the grant under which the land is held indicates a different intent, the owner of the upland, when it borders upon a navigable lake or stream, takes to the edge of the lake or stream at low-water mark, and all navigable rivers shall remain and be deemed public highways. In all cases where the opposite banks of any streams not navigable belong to different persons the stream and the bed thereof shall become common to both."

Section 2563, Revised Code:

"Any person or persons, corporation, or company, who may have or hold a title or possessory right to any mineral or agricultural lands within the limits

of this State shall be entitled to the usual enjoyment of the waters of the streams or creeks in said State for mining, milling, agricultural, or domestic purposes: *Provided*, That the right to such use shall not interfere with any prior right or claim to such waters when the law has been complied with in doing the necessary work."

Section 2567, Revised Code:

"The waters of the streams or creeks of the State may be made available to the full extent of the capacity thereof for mining, milling, agricultural, or domestic purposes, without regard to deterioration in quality or diminution in quantity, so that the same do not materially affect or impair the rights of the prior appropriator."

Sections 2564 and 2568 give right of way through and over any tract or piece of land for the above purposes and provide for damages for such cutting over lands.

To the contention that the provisions of section 278, Revised Code, were of no effect after the adoption of the prior appropriation doctrine, Justice Corson, in the case of The Lone Tree Ditch Co. *v.* Cyclone Ditch Co. (15 S. Dak., 525), said:

"The Government has by these provisions (secs. 2339 and 2340, U. S. Rev. Stats.) recognized the right to appropriate water and taking the same from its natural channel. The legislature of this State has properly provided for the making of such appropriation, but the right of the riparian owners to the use of such waters which have become vested are such as are prescribed by section 2771, Compiled Laws (sec. 278, Rev. Code). In our opinion, therefore, the provisions of section 2771 are still in force, and this seems to have been the opinion of the Supreme Court of the United States in Sturr *v.* Beck. * * *

"In that State (California) as in this, two systems prevail: One for acquiring the use of water for irrigation purposes by appropriation, and the other the common-law right to the use of water not so legally appropriated for irrigation purposes, by the riparian owner."

UTAH

Section 1, article 17, constitution, 1895 (p. 3728, vol. 6, Am. ch., Con., and O. L.):

"All existing rights to the use of any of the waters in this State for any useful or beneficial purpose are hereby recognized and confirmed."

Section 1288x5, Compiled Laws, 1907, provides that right to the use of unappropriated waters may be acquired by appropriation for a beneficial use; section 1288x6, that the application to State engineer must be made before commencing actual appropriation; section 1288x17, date of receipt of application determines priority; section 1288x19 that the water of all streams and other sources is the property of the public subject to the use thereof.

Section 1288x10, as amended March 20, 1911, provides that—

"An application for water made by a homesteader, desert entryman, or person in possession of land under contract to purchase the same, such water to be used exclusively upon the land of such person may be approved without reference to prior conflict."

Section 1288x21 provides for secondary rights in water; for acquiring right of way over adjacent land for ditches, and so on, by eminent domain; and for just compensation to the owner of land injured thereby.

A municipal corporation took possession and control of the waters of a certain stream with the express consent of the original locators and held the stream more than seven years; held, that it acquired the ownership of the water under the statute of limitations. (Springville *v.* Fulmer, 7 Utah, 450.)

A prior appropriator of water of a certain stream can not so increase his demands and use the water as to deprive a subsequent appropriator of his rights acquired before such increased demands and use.

Justice Cherry, in the case of Becker *v.* Marble Creek Irrigation Co. (15 Utah, 228, 229), said:

"The waters of a prior appropriator are fixed by the extent of his appropriation for a beneficial use, and others may subsequently appropriate any water of a stream not so used by a prior appropriation; and such latter appropriation becomes a vested right, and entitled to as much protection as the former, and a right of which he can not be deprived except by voluntary alienation or forfeiture by abandonment. The rights of the former being thus fixed, he can not

enlarge his rights to the detriment of the latter by increasing his demands or by extending his use to other lands, even if used for a beneficial purpose."

As illustrative of the necessity and importance of applying the doctrine of appropriation in this State, hear what Justice Blackburn, in the case of Stowell *v.* Johnson (7 Utah, 225), has to say:

"Riparian rights have never been recognized in this Territory, or in any State or Territory where irrigation is necessary; for the appropriation of water for the purpose of irrigation is entirely and unavoidably in conflict with the common-law doctine of riparian proprietorship. If that had been recognized and applied in this Territory, it would still be a desert, for a man owning 10 acres of land on a stream of water capable of irrigating 1,000 acres of land or more, near its mouth, could prevent the settlement of all the land above him."

So it is apparent that in the State of Utah the doctrine of prior appropriation is applied to the use of water in its extreme rigor.

WYOMING

The following are sections of the Wyoming constitution, 1889, relating to water rights (p. 4117, vol. 7, Am. Ch., Con., and O. L.):

"Section 31, article 1. Water being essential to industrial prosperity of limited amount and easy of diversion from its natural channels, its control must be in the State, which, in providing for its use, shall equally guard all the various interests involved (p. 4119, id.).

"Section 32, article 1. Private property shall not be taken for private use unless by consent of the owner, except for private ways of necessity and for reservoirs, drains, flumes, or ditches on or across the lands of others for agricultural, mining, milling, domestic, or sanitary purposes, nor in any case without due compensation (p. 4119, id.).

"Section 1, article 8. The water of all natural streams, springs, lakes, or other collections of still water, within the boundaries of the State, are hereby declared to be the property of the State (p. 4138, id.).

"Section 3, article 8. Priority of appropriation for beneficial uses shall give the better right. No appropriation shall be denied except when such denial is demanded by the public interests (p. 4138, id.)."

Section 917, Revised Statutes, 1899, and the following sections give the right to persons, associations, and corporations to appropriate water for beneficial uses by first making application to the State engineer before constructing any ditches or commencing any work for the diverting of the water.

Chapter 68, Session Laws 1909, defines water rights and its preferred uses, and declares that the right to the use of water shall attach to the land.

To the contention that the State could not acquire ownership in the waters of the State by mere assertion, Chief Justice Potter, in the case of Farm Investment Co. *v.* Carpenter (61 Pacific, 259), and:

"In this State the doctrine prevails that the right to the use of water may be acquired by priority of appropriation for beneficial purposes, in contravention to the common-law rule that every riparian owner is entitled to the continued natural flow of the water of the stream running through or adjacent to his lands. The appropriation consists in a diversion of the water by some adequate means and its application to a beneficial use. * * * (Moyer *v.* Preston, 6 Wyo., 308.)"

"At the outset, however, it is strenuously insisted that the declaration contained in the constitution, that the waters of the natural streams, etc., are the property of the State, is meaningless and of no force and effect. It is argued that the State no more than an individual can acquire property by mere assertion of ownership, and that the United States as the primary owner of the soil is also primarily possessed of title to the waters of the stream flowing across the public lands. This contention demands more than a passing notice. So far as any proprietary rights of the United States are concerned, the question would seem to be settled in favor of the effectiveness of the declaration by the act of admission which embraces the following provision, 'and that the constitution which the people of Wyoming have formed for themselves be, and the same is hereby, accepted, ratified, and confirmed.' * * * The common-law doctrine of riparian rights relating to the use of water of the natural streams and other natural bodies of water not prevailing, but the opposite thereof, and one inconsistent therewith, having been affirmed and asserted by customs, laws, and decisions of courts, and the rule adopted permitting acquisition of rights by appropriation, the waters affected thereby become, perforce,

publici juris. It is therefore doubtful whether an express constitutional or statutory declaration is required in the first place to render them public. * * * If any consent of the General Government was primarily requisite to the inception of the rule of prior appropriation, that consent is to be found in several enactments by Congress, beginning with the act of July 26, 1866, and including the desert-land act of March 3, 1877."

The act of July 26, 1866 (14 Stat., 253, ch. 262, sec. 9), above referred to, which is now section 2339, United States Revised Statutes, and section 2340, Revised Statutes, reads as follows:

"SEC. 2339. Whenever, by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes have vested and accrued, and the same are recognized and acknowledged by the local customs, laws, and the decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the right of way for the construction of ditches and canals for the purposes herein specified is acknowledged and confirmed; but whenever any person, in the construction of any ditch or canal, injures or damages the possession of any settler on the public domain, the party committing such injury or damage shall be liable to the party injured for such injury or damage.

"SEC. 2340. All patents granted, or preemption or homesteads allowed, shall be subject to any vested and accrued water rights, or rights to ditches and reservoirs used in connection with such water rights, as may have been acquired under or recognized by the preceding section. (July 9, 1870, 17 Stat., 218.)"

The desert-land act of March 3, 1877 (19 Stat., 377), which applies to the States of California, Oregon, Nevada, Washington, Idaho, Montana, Utah, Wyoming, Arizona, New Mexico, and the Dakotas, sanctions the prior appropriation of water and provides that—

"All surplus water over and above such actual appropriation and use, together with the water of all lakes, rivers, and other sources of water supply upon the public lands and not navigable, shall remain and be held free for the appropriation and use of the public for irrigation, mining, and manufacturing purposes, subject to existing rights."

NEVADA

Chapter XVIII, section 1, laws 1907:

"All natural watercourses and natural lakes, and the waters thereof which are not held in private ownership, belong to the State and are subject to appropriation for beneficial uses."

Section 355, Compiled Laws, 1900:

"All existing rights to the use of water, whether acquired by appropriation or otherwise, shall be respected and preserved and nothing in this act shall be construed as enlarging, abridging, or restricting such rights."

Section 356, Compiled Laws, 1900, provides that no right except usufructuary right can be acquired, i. e., for beneficial purpose, and there shall be no absolute property in waters of lakes or streams.

In the case of Walsh *v.* Wallace (26 Nev. 327) it was held that the act of 1866 did not introduce any new system or policy, but merely confirmed to the owners of water rights on public lands the same rights which they held under the local customs. Chief Justice Massey said further:

"And it has been held by this court that the dictrine of riparian rights is so unsuited to the conditions existing in this State of Nevada and is so repugnant in its operation to the doctrine of appropriation that it is not a part of the law and does not prevail here."

NEBRASKA

The common-law rules as to rights and duties of riparian owners are in force in every part of the State of Nebraska, except as altered or modified by statute. (Meng *v.* Coffey, 67 Nebr. 500; Crawford *v.* Hathaway, 67 Nebr. 325.)

Section 6821, Cobbey's Annotated Statutes, 1911:

"The water of every natural stream not heretofore appropriated within the State of Nebraska is hereby declared to be the property of the public and is dedicated to the use of the people of the State, subject to appropriation, as hereinbefore provided."

Section 6844, Cobbey's Annotated Statutes, 1911:

"Water for the purpose of irrigation in the State of Nebraska is hereby declared to be a natural want."

Section 6822, Cobbey's Annotated Statutes, provides that water in the streams within the State may be appropriated for beneficial uses, priority of appropriation to have the better right; also that domestic purposes are preferred over any other purpose and agricultural purposes over manufacturing purposes.

Riparian owners on navigable rivers hold to the thread of the stream subject to the public easement of navigation. A riparian right is not an easement, but a part and parcel of the land itself; it is a property right, and as such is entitled to protection the same as private property. (Kinkhead *v.* Turgeon, 74 Nebr. 580; Cline *v.* Stock, 71 Nebr. 70.)

In the case of Crawford *v.* Hathaway (67 Nebr., 325) the court held that the right of a riparian proprietor as such to use water for irrigation purposes is limited to riparian lands. Even though he does not use the water on riparian lands, that does not permit him to divert the water to nonriparian lands.

COLORADO

Secion 5, article 16, constitution, 1876 (p. 507, vol. 1, Am. Ch., Con., and O. L.):

"The water of every natural stream not heretofore appropriated within the State of Colorado is hereby declared to be the property of the public; and the same is dedicated to the use of the people of the State, subject to appropriation as hereafter provided."

Section 6, article 16, constitution, provides that priority of appropriation gives the better right as between those using for the same purpose, and the right to divert unappropriated streams shall never be denied. (When there is not sufficient water, domestic purposes have preference over any other purpose and agricultural over manufacturing purposes.)

Section 7, article 16, constitution, provides for the acquiring of right of way over public, private, and corporate lands for ditches, canals, and flumes for domestic purposes, irrigation, mining, manufacturing, and drainage, upon the payment of just compensation.

Section 2256 et seq. (ch. 69), Mills's Annotated Statutes, 1891, relates to the appropriation and use of water.

The common-law doctrine is also inapplicable to the State of Colorado. Said Chief Justice Hoyt, in the case of Fort Morgan Land and Canal Co. *v.* South Platte Ditch Co. (18 Colo., 1):

"Under our constitution the water of every natural stream in this State is deemed to be the property of the public. Private ownership of water in the natural stream is not recognized. The right to divert water therefrom and apply the same to beneficial uses is, however, expressly guaranteed. By such diversion and use a priority of right to the use of the water may be acquired."

And Justice Helm, discussing the doctrine of prior appropriation in the case of Wheeler *v.* Irrigation Co. (10 Colo., 582), says:

"Our constitution dedicates all unappropriated waters in the natural streams of the State to the use of the people, the ownership thereof being vested in the public. We shall presently see that after appropriation the title to this water, save, perhaps, as to the limited quantity that may be actually flowing in the consumer's ditch or lateral, remains in the general public, while the paramount right to its use, unless forfeited, continues in the appropriator."

See also the following cases: Stricker *v.* Colorado Springs (16 Colo., 67); Coffin *v.* Left Hand Ditch Co. (6 Colo., 446, 447); Yankee *v.* Nichols (1 Colo., 551).

OKLAHOMA

Section 3915 of the Compiled Laws of 1909 declares the rivers and streams of the State to be the property of the public, and that use of the water in the streams may be acquired by appropriation.

Section 3918, Compiled Laws, provides for the procuring of right of way over private and public lands for irrigation, etc., by condemnation.

Section 3920, Statutes 1909:

"The appropriation of water must be either for irrigation, mining, milling, construction of waterworks for cities and towns, or stock raising."

Section 23, article 2, constitution, 1907 (p. 4275, vol. 7, Am. Ch., Con., and O. L.):

"No private property shall be taken or damaged for private use with or without compensation unless by the consent of the owner, except for private

ways of necessity or for drains and ditches across lands of others for agricultural, mining, or sanitary purposes, in such manner as may be prescribed by law."

In regard to appropriation of waters for beneficial uses, Chief Justice Burford, in Gates *v.* Settlers' Milling, Canal & Reservoir Co. (91 Pac., 858), said:

"It seems the settled law in States where irrigation problems have been dealt with that, in order to acquire a vested right in the use of water for such purposes from the public streams, three things must concur: There must be the construction of ditches or channels for carrying water; the water must be diverted into the artificial channels and carried through them to the place to be used; and it must actually be applied to beneficial uses, and he has the best right who is first in time."

OREGON

The act for admission of Oregon, February 14, 1859 (11 Stat., 383), section 2, declares:

"* * * And said rivers and waters, and all the navigable waters of said State, shall be common highways and forever free, as well to the inhabitants of said State as to all other citizens of the United States, without any tax, duty, impost, or toll therefor."

Section 6525, Lord's Oregon Laws, 1910:

"The use of the water of the lakes and running streams of the State of Oregon for general rental, sale, or distribution for purposes of irrigation, and supplying water for household and domestic consumption, and watering livestock upon dry lands of the State, is a public use, and the right to collect rates or compensation for such use of said water is a franchise. A use shall be deemed general within the purview of this act when the water appropriated shall be supplied to all persons whose lands lie adjacent to or within reach of the line of the ditch or canal or flume in which said water is conveyed, without discrimination other than priority of contract upon payment of charges therefor, as long as there may be water to supply."

Section 6526, Lord's Oregon Laws, 1910, gives to corporations the right to appropriate and to divert water from its natural bed or channel, to condemn land for the purpose of right of ways for ditches, and to condemn the rights of raparian proprietors upon the lake or stream from which such appropriation is made.

Section 6551, Lord's Oregon Laws, 1910:

"The use of the water of the lakes and running streams of the State of Oregon for the purpose of developing the mineral resources of the State, and to furnish electrical power for all purposes, is declared to be a public and beneficial use and a public necessity, and the right to divert any unappropriated waters of any such lakes or streams for such public and beneficial use is hereby granted."

Section 6575, Lord's Oregon Laws, 1910:

"All water within the State from all sources of water supply belong to the State."

Sections 6594 and 6595 provide that all waters within the State may be appropriated for beneficial use, and preserves the vested rights of riparian proprietors who have made actual application of water for a beneficial use provided such use has not been abandoned for a continuous period of two years. (Enacted 1909.)

In this State it has been held that a riparian owner holds to high-water mark on navigable streams and to the middle of nonnavigable streams.

Each riparian owner is entitled to a reasonable use of the water for domestic purposes, and also, in addition thereto, a reasonable use for irrigation, even though such use may diminish the flow to lower riparian owners. (Shaw *v.* Oswego, 10 Oreg., 371; Jones *v.* Conn, 39 Oreg., 30.)

In the case of Kahler *v.* Campbell (13 Oreg., 596) it was held that where two settlers on Government land severally divert a stream at a point above them, and subsequently one of them acquires title to the land at that point, prior appropriation and not common-law riparian rights govern.

A settler upon a nonnavigable stream may elect to rely upon his riparian rights or make an appropriation; but he can not do both. (Williams *v.* Altnow, 51 Oreg., 275.)

EXHIBIT B

[Senate Document No. 57, Sixty-second Congress, first session]

Memorandum of acts of Congress concerning power privileges at Government dams.

Names of rivers	Grantee	Date of act	Provisions of act	By whom improvement made
Muskingum, Ohio.	General authorization.	Aug. 11, 1888 (25 Stat., 417).	The Secretary of War authorized and empowered to grant leases or licenses for the use of the water powers, at such rate and on such conditions and for such periods of time as may seem to him just, equitable, and expedient.	United States.
Green and Barren, Ky.	----do----	Sept. 19, 1890 (26 Stat., 447).	The Secretary of War authorized and empowered to grant leases or licenses for the use of the water powers, at such rate and on such conditions and for such periods of time as may seem to him just, equitable, and expedient, with added condition that leases are not to extend beyond the period of 20 years.	Do.
Cumberland, Tenn., at Lock No. 1.	----do----	June 13, 1902 (32 Stat., 408).	The Secretary of War authorized to grant leases or licenses for the use of the water power at such rate and on such conditions and for such periods of time as may seem to him expedient. (See also act of June 28, 1902.)	Do.
Tennessee River at Hales Bar.	City of Chattanooga or other private corporation.	Apr. 26, 1904 (33 Stat., 309).	Grantee to purchase necessary lands and deed same to United States to construct lock and dam and give them to United States completed, free of all cost except expenses connected with preparation of plans, superintendence, cost of lock gates, etc., and to furnish United States free electric current for operating locks and for lighting. Grantee to have use of water power for 99 years.	Private.
Mississippi at Des Moines Rapids.	Keokuk & Hamilton Water Power Co.	Feb. 9, 1905 (33 Stat., 712).	Grantee to build a lock and dry dock and appurtenant works, and United States to have ownership of them. Grantee to provide suitable power plant for lighting and operating the lock, dry dock, and appurtenances, and to provide fishways.	Do.
Cumberland and tributaries.	Cumberland River Improvement Co.	Mar. 3, 1905 (33 Stat., 1132).	Right to collect tolls to cease at expiration of 40 years from date of completion of Lock and Dam No. 21, Cumberland River, and United States may then assume the possession, care, operation, maintenance, and management of the lock or locks constructed by the corporation, but without in any way impairing the right or ownership of the water power and dams created by the corration.	Do.
Coosa, Ala., at Lock No. 2.	General authorization.	May 9, 1906 (34 Stat., 183).	United States reserves right to control dams and pool level and to construct locks. Land for lock and approaches to be conveyed to United States free of charge, and United States to have free water power for building and operating locks. Fishways to be constructed.	Do.
White, Ark., at Lock No. 1.	Batesville Power Co.	June 28, 1906 (34 Stat., 536).	The Secretary of War authorized and directed to fix from time to time reasonable charges to be paid for use of power.	Do.

Memorandum of acts of Congress concerning power privileges, etc.—Continued

Names of rivers	Grantee	Date of act	Provisions of act	By whom improvement made
Coosa, Ala., at Lock No. 12.	Alabama Power Co.	Mar. 4, 1907 (34 Stat., 1288).	Dam to be built so that the United States may construct a lock in connection therewith. The grantee to have the right to use Government land necessary for the construction and maintenance of the dam and appurtenant works, to convey to the United States free of cost such suitable tract or tracts as may be selected by the Chief of Engineers and the Secretary of War for establishment of locks and approaches, and to furnish the necessary electric current to operate locks and for lighting grounds.	Private.
St. Marys, Mich.	General authorization.	Mar. 3, 1909 (35 Stat., 821).	Water power to be leased by the Secretary of War upon such terms and conditions as shall be best calculated, in his judgment, to insure the development thereof. A just and reasonable compensation to be paid for use.	United States.
Wabash, Ind., at Mount Carmel.	do	Mar. 3, 1909 (35 Stat., 819).	Secretary of War authorized to grant leases or licenses for periods not exceeding 20 years at such rate and on such conditions as may seem to him just, equitable, and expedient.	Do.
Mississippi, from St. Paul to Minneapolis.	do	June 25, 1910 (36 Stat., 659).	A reasonable compensation for leases of water power shall be secured to the United States.	Do.
Coosa, Ala., at Lock No. 4.	Ragland Water Power Co.	Feb. 27, 1911 (36 Stat., 939).	The dam to be property of the United States free of charge. Grantee to have water-power rights for 50 years. United States to have right to construct a lock and to have free electric current for operating and lighting. Grantee to raise height of dam at Lock No. 4 and to stop leaks. Beginning in 1925, grantee shall pay to United States $1 per 10-hour horsepower, with an increase if natural flowage is increased by storage reservoirs.	Private.
Wabash, at Mount Carmel, Ill.	Mount Carmel Development Co.	Feb. 14, 1889 (25 Stat., 670). Feb. 12, 1901 (31 Stat., 785).	Withdrawal of water shall be under the direction and control of the Secretary of War.	United States.
Rock River, near Sterling.	Sterling Hydraulic Co.	Mar. 2, 1907 (34 Stat., 1103).	Secretary of War authorized to permit erection of a power station in connection with United States dam. Grantee to waive certain claims against United States.	Do.
White, Ark., above Lock No. 3.	J. A. Omberg, jr.	June 29, 1906 (34 Stat., 628).	Grantee to purchase lands, construct lock and dam, and give them to the United States free of charge and furnish United States electric current to operate locks, light grounds, etc. Grantee to have use of water power for 99 years.	Private.
Black Warrior River, Ala., Lock and Dam No. 17.	General authorization.	Aug. 22, 1911 (p. 32 laws, 1st sess. 62d Cong.).	Secretary of War authorized to change detailed plans and specifications so as to increase height of pool level over the dam crest of Lock No. 17, and for the development of water power.	United States.

VIEWS OF MR. CULBERSON

Sovereignty, dominion, and control of the flowing waters of all streams, navigable or otherwise, within its borders are reserved to a State, subject only to such powers as are vested in the Federal Government by the commerce clause

of the Constitution, and such rights as may accrue to it as the actual owner of riparian lands.

"The opinion (in Shively *v.* Bowlby, 152 U. S. 1) refers to all the cases which we have above cited and many others upon the various questions which are discussed in the case and recognizes the rule that it belongs to the States to decide as to the character and extent of the riparian rights of owners upon navigable streams within such States.

"The jurisdiction of the State over this question of riparian ownership has been always, and from the foundation of the Government, recognized and admitted by this court. (Water Power Co. *v.* Water Commissioners, 168 U. S. 366.)

"While this is undoubted, and the rule obtains in those States in the Union which have simply adopted the common law, it is also true that as to every stream within its dominion the State may change this common-law rule and permit the appropriation of the flowing waters for such purposes as it deems wise. * * *

"Although this power of changing the common-law rule as to streams within its dominion undoubtedly belongs to each State, yet two limitations must be recognized: First. That in the absence of specific authority from Congress the State can not by its legislation destroy the right of the United States as the owner of lands bordering on a stream to the continued flow of its waters, so far at least as may be necessary for the beneficial uses of the Government's property. Second. That it is limited by the superior power of the General Government to secure the uninterrupted navigability of all navigable streams within the limits of the United States. (U. S. *v.* Rio Grande Co., 174 U. S. 702–703.)

"Grants by Congress of portions of the public lands within a Territory to settlers thereon, though bordering on or bounded by navigable waters, convey of their own force no title or right below high-water mark and do not impair the title and dominion of the future State when created but leave the question of the use of the shores by the owners of uplands to the sovereign control of each State, subject only to the rights vested by the Constitution in the United States. (Shively *v.* Bowlby, 152 U. S. 58.)

"But it is useless to pursue the inquiry further in this direction. It is enough for the purposes of this case that each State has full jurisdiction over the lands within its borders, including the beds of the streams and other waters [citing numerous authorities]. (Kansas *v.* Colorado, 206 U. S. 93.)

"As to those lands within the limits of the States, at least of the Western States, the National Government is the most considerable owner and has power to dispose of and make all needful rules and regulations respecting its property. We do not mean that its legislation can override State laws in respect to the general subject of reclamation. (Ib., p. 92.)"

The fact that a stream may constitute the boundary between the United States and a foreign country does not change the general rule. Concerning a question of riparian right on the Sault Ste. Marie River, the boundary river between the United States and Canada, the court said: "The fact that it is a boundary has not been held to make a difference;" that is, a difference in the rule of law applying to riparian rights in the State of Michigan. (U. S. *v.* Chandler-Dunbar, etc., 209 U. S. 453.)

It being clear, then, that dominion, sovereignty, and control of the flowing waters of a navigable stream within its borders rest with the State, and that it may enact such laws as it deems suitable for the disposition and control of such waters for manufacturing, irrigation, or other industrial purposes, so long as the navigability of the stream is not affected, can the National Government, eliminating here the question of its possible actual riparian ownership on the borders of a stream, exercise similar power; and if so, under what warrant? Clearly, not at all, unless it be under the commerce clause of the Constitution. As to this, Senator Nelson, in his confidential report to the Judiciary Committee, says, on page 11:

"If, for the purpose of improving the navigability of a stream carrying interstate commerce, the Federal Government constructs and maintains a dam, with locks and gates, the Government has the undoubted right to establish and maintain, in connection with such dam, an electric power plant for the purpose of furnishing motive power to operate such locks and gates. And the Federal Government has the right to sell, lease, or rent, for compensation, any surplus power that may arise from and be an incident to such an improvement of navigation. (Kaukana Water Power Co. *v.* Green Bay & Mississippi Canal Co., 142 U. S., 254.)"

And, no page 12:

"Also, see Green Bay Co. *v.* Patten Co. (172 U. S., 58), relating to the same water power and dam after the Federal Government had taken over the work of improvement.

"In general, it may be said that whenever the Federal Government is engaged in improving the navigability of a stream on which there is interstate commerce, if by reason and in consequence of such improvement, and as an incident thereto, surplus power is created, the Federal Government has the right to lease or sell such power on such terms and for such compensation as it may deem just."

And, on page 13:

"Responding to the second interrogatory, we are of the opinion, divorcing the question from riparian rights, that the Federal Government, in authorizing the construction and maintenance of a dam on a navigable stream by States, municipalities, or private parties, for the chief and primary purpose of improving the navigation of the stream, has the same right to prescribe the terms and compensation for the use of the surplus power, created as an incident to the main improvement, as the Government would have in case it had itself built the dam or made the improvement, and that the Government having delegated the power of building such dam to private parties, might well confer upon them as compensation for the work thus undertaken the right to do what the Government itself could do in case it had itself constructed the work.

The propositions laid down above are believed to be too broad. The exercise of such a power by the National Government is inconsistent with the established rule that such control of the waters rests exclusively with the State. It might result in the National Government leasing, selling, giving away, creating a monopoly in all the flowing waters within a State, or in its exercising such power at one point on a navigable stream under rules, regulations, and upon terms different from and in actual conflict with the rules, regulations, and terms established by the State for all other portions of the stream within its borders. As intimated by the Supreme Court in Kansas *v.* Colorado (206 U. S., 92), the National Government would be without power to adopt such a course with reference to lands which it actually owned and wholly controlled within the limits of a State: "We do not mean that its (the National Government's) legislation can override State laws in respect to the general subject of reclamation."

To sustain the right of the Federal Government to dispose of surplus power and water incidentally created in the course of improving the navigability of a stream, reliance is placed upon two decisions of the Supreme Court, i. e., in the cases of Kaukana Water Power Co. *v.* Green Bay & Mississippi Canal Co. (142 U. S., 254) and Green Bay, etc., Co. *v.* Patten Co (172 U. S., 58).

The case first cited is not in point. The right of the Federal Government to sell or dispose of incidentally created surplus water power was not involved.

Briefly, the facts in this case were: Congress granted public lands to the future State of Wisconsin for the improvement of the navigation of the Fox and Wisconsin Rivers. The State accepted the grant and undertook the work of improving the Fox River, reserving to itself all water powers created and appurtenant to such improvement, "subject to future action of the legislature." Unable to complete the work, the State incorporated and transferred to an improvement company the incomplete work, vesting in the company complete title to all the improvements, water powers to be created, rights, powers, and franchises. The improvement company mortgaged the property, was unable to meet its indebtedness, the mortgage was foreclosed, and complete title passed under foreclosure sale to the Green Bay & Mississippi Canal Co., the appellee.

This company in turn became seized in fee of all the improvements and all the appurtenant rights, powers, and franchises. Finding the operation of the dam and canal unprofitable, this company in turn sold the improvements to the United States Government, reserving, however, to itself the water power created by the dam and the use of surplus waters not required for purposes of navigation. Another company, claiming the right as a riparian owner, thereafter attempted to draw water from the pond formed by the dam, and thus deprive the Green Bay Co. of its use, control, and dominion over it. The Supreme Court of Wisconsin directed an injunction against the intruding company, and the case went to the Supreme Court of the United States on the ground that it involved the validity of a State statute, because repugnant to the Constitution of the United States. Mr. Justice Brown, for the court, among other things, said (p. 272):

"With respect to such rights (riparian rights) we have held that the law of the State, as declared by its supreme court, is controlling as a rule of property. (Barney *v.* Keokuk, 94 U. S., 324, etc.)"

Upon the question as to the validity of the State statute, he said (p. 273):

"But if, in the erection of a public dam for a recognized public purpose, there is necessarily produced a surplus of water, which may properly be used for manufacturing purposes, there is no sound reason why the State may not retain to itself the power of controlling or disposing of such water as an incident of its right to make such an improvement."

There is indeed no sound reason for denying such a right to the State. Such a right is entirey consistent with the doctrine of the State's dominion and sovereignity over the flowing waters of the navigable streams within its borders. But there is no word in the entire opinion in regard to the power of the Federal Government to assert and reserve such a right, and certainly there can be no parity in application of the construction of a rule dealing with the reserved rights of the State to the limited constitutional grants to the National Government. What there is sound reason for conceding to the State, there is under the circumstances equally as sound reason for denying to the Federal Government. The first proposition from the report quoted supra gains no support from the case cited.

The other case, that of Green Bay, etc., Canal Co. *v.* Patten Paper Co. (172 U. S. 58), is another suit against the same company as above. In this suit the right of the United States to control and dispose of the surplus waters created by the improvement to navigation heretofore described was brought directly into question. As said by Mr. Justice Shiras for the court (pp. 68–69):

"Whether the water power, incidentally created by the erection and maintenance of the dam and canal for the purpose of navigation in Fox River, is subject to control and appropriation by the United States, owning and operating those public works, or by the State of Wisconsin, within whose limits Fox River lies, is the decisive question in this case.

"Upon the undisputed facts contained in the record we think it clear that the canal company is possessed of whatever rights to the use of this incidental water power that could be validly granted by the United States."

The court then reviews the history of the whole enterprise, i. e., the granting of land by act of Congress to the future State of Wisconsin for the express purpose of the improvement of the navigation of the river; the acceptance of the grant by the legislature of the State and the accompanying express reservation of title in the State to the water power incidentally created "subject to the future action of the legislature"; the act authorizing the relinquishment of such water powers to the persons undertaking the work of improvement; the act creating a corporation authorized to undertake the work and take all the powers, rights, and franchises possessed by the State; the failure of the company so created, foreclosure of the mortgage, and acquirement of all its property, rights, and powers at the sale by purchasers, who were incorporated under another act of the legislature, specifically investing them with such rights, powers, franchises, etc.; the sale by this last company (appellant in this case) of all the property to the United States Government, under an act of the Legislature of Wisconsin authorizing the sale and an act of Congress providing for the purchase, and the reservation by the company in its conveyance of title to the personal property, water powers, and appurtenances. With reference to this reservation by the company, the court said (p. 80):

"The substantial meaning of the transaction was, that the United States granted to the canal company the right to continue in the possession and enjoyment of the water powers and the lots appurtenant thereto, subject to the rights and control of the United States as owning and operating the public works, and that the United States were credited with the appraised value of the water powers and appurtenances and the articles of personal property. The method by which this arrangement was perfected, namely, by a reservation in the deed, was an apt one, and quite as efficacious as if the entire property had been conveyed to the United States by one deed, and the reserved properties had been reconveyed to the canal company by another.

"So far, therefore, as the water powers and appurtenant lots are regarded as property, it is plain that the title of the canal company thereto can not be controverted; and we think it is equally plain that the mode and extent of the use and enjoyment of such property by the canal company fall within the sole control of the United States. At what points in the dam and canal the water

for power may be withdrawn, and the quantity which can be treated as surplus with due regard to navigation, must be determined by the authority which owns and controls that navigation. In such matters there can be no divided empire."

Evidently questioning the inherent right of the National Government under the Constitution to dispose of this surplus water power by virtue of its ownership of the dam, the court adopted the fiction of transfer and retransfer, so that the chain of title might be complete and a foundation laid for the Government's claim of authority to dispose of the surplus water. An abstract of the title would begin then with the acknowledged ownership by the State of the entire property, including the right to control and dispose of the surplus water power, and continuing, through the transfer by the State of its title and all appurtenant rights and powers to the first company; the foreclosure sale under mortgage and purchase by the second company, vesting it in turn with the complete title and all appurtenant rights and powers; the transfer by the second company to the national company of its title and all appurtenant rights and powers, all these transfers being duly authorized by acts of the Wisconsin Legislature; and finally the retransfer of the right to the use and enjoyment of such water powers by the Government to the second company, but a retention of all other property conveyed, including whatever power of control may have vested in the company by the State. As Mr. Justice Shiras says (p. 76):

"We have here the case of a water power incidental to the construction and maintenance of a public work and, from the nature of the case, subject to the control of the public authorities, in this instance the United States."

And, at page 79:

"The legal effect and import of the sale and conveyance by the canal company were to vest absolute ownership in the improvement and appurtenances in the United States, which proprietary rights thereby became added to the jurisdiction and control that the United States possessed over the Fox River as a navigable river."

In other words, the United States bought the right to dispose of this surplus water power. It never possessed it under the commerce clause of the Constitution giving it control of the navigation of the river. It was a proprietary right, coming down by regular conveyance from the State of Wisconsin. The National Government always had the right under the Constitution to prevent the State of Wisconsin, or its successors in title to this dam and appurtenances, from destroying or impairing the navigability of the river by an improvident diversion of the flowing water, but it never had the right, until it acquired it by purchase, of disposing of the surplus water power so created, and the court does not say it did. The State had such a right, and the court in the first case, supra, specifically recognized not only its right but its power to dispose of it.

So far as the authority of the National Government in the premises is concerned, what this case really does decide, and that is not now an open question, and was not so then, is, that the National Government has plenary power to maintain the navigability of streams uninterrupted, and further, that in the exercise of that power, it can determine at what points in its dams erected in aid of navigation water may be withdrawn, the quantity that may be withdrawn so far as it affects the question of navigability, and all other matters affecting that question solely. As is said by the court (p. 80): "In such matters there can be no divided empire." The power to sell surplus water incidentally created by improvements in aid of navigation is not given the National Government, in terms at least, by the Constitution.

The sole and exclusive right of the States to control the disposition of the flowing waters within their boundaries, limited only by nonimpairment of the riparian rights (under the State system) of the Government as an actual owner of the lands, and noninterference with the maintenance and improvement of the navigation of streams, has been too repeatedly and too strongly confirmed by the Supreme Court to be now questioned, and this reserved and valuable right would be seriously impaired—sometimes, perhaps, entirely destroyed—if the National Government, under the guise of aiding navigation, could exercise a precisely similar, but paramount, right at will. Here, too, there should be "no divided empire." The National Government has the undoubted power to see to it that the navigability of streams is maintained when they are in fact navigable, and that right is granted to it by the Consti-

tution of the United States. The State has the undoubted right to control the disposition of the waters within its limits, subject only to the limitations stated, and that right has been repeatedly confirmed by the Supreme Court. Neither should seek to invade the province of the other. In Kansas *v.* Colorado (206 U. S. 88) Mr. Justice Brewer said:

"Yet, while so construed (that is, broadly), it still is true that no independent and unmentioned power passes to the National Government or can rightfully be exercised by the Congress."

The power to seize upon and dispose of the flowing waters of a State would be both independent and unmentioned. Assertion of the existence of such power under the second paragraph of section 3, of Article IV of the Constitution, providing "The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States," etc., was made by counsel for the United States Government intervening, apparently, upon the theory that the National Government, being a large owner of arid lands in the Western States, might enter into a general scheme of reclamation, and, consequently, had an interest in the controversy between the States as to the disposal of the waters of the Arkansas River, the boundary between them. The contention of the Government met with no favor, the court stating emphatically that no such power had been granted and none could be exercised. Conceding, however, that so far as its own lands were concerned, the National Government had power to make all needful rules and regulations, the court materially qualified this decision by adding:

"We do not mean that its legislation can override State laws in respect to the general subject of reclamation. (Ib. p. 92.)"

VIEWS OF MR. O'GORMAN

The title, ownership, and dominion over navigable waters are vested in the several States abutting thereon, subject to the rights delegated by the States to the Federal Government.

The power conferred by the Constitution of the United States upon Congress "to regulate commerce" comprehends control of the rivers for that purpose only. Before the Revolution the right of dominion and ownership in the rivers, bays, and arms of the sea and the soils under them resided in the Crown, and, as stated by Chief Justice Taney in the leading case of Martin *v.* Waddell (16 Peters, 367), "when the Revolution took place the people of each State became themselves sovereign; and in that character hold the absolute right to all their navigable waters and the soils under them for their own common use, subject only to the rights since surrendered by the Constitution to the General Government."

To the same effect Shively *v.* Bowlby (152 U. S. 1) and Knight *v.* U. S. Land Association (142 U. S. 161).

In Illinois *v.* People (146 U. S. 387) the court said:

"It is the settled rule of this country that the ownership of, and dominion and sovereignty over, lands covered by tidewaters within the limits of the several States belong to the respective States within which they are found, and with the consequent right to use or dispose of any portion thereof, when that can be done without substantial impairment of the interest of the public in the waters, and subject always to the paramount right of Congress to control their navigation, so far as may be necessary for the regulation of commerce with foreign nations and among the States. This doctrine has often been announced by this court and is not questioned by counsel of any of the parties."

In Kansas *v.* Colorado (206 U. S. 46) it was said:

"The Government of the United States is one of enumerated powers; that it has no inherent powers of sovereignty; that the enumeration of the powers granted is to be found in the Constitution of the United States, and in that alone; that the manifest purpose of the tenth amendment to the Constitution is to put beyond dispute the proposition that all powers not granted are reserved to the people, and that if in the changes of the years further powers ought to be possessed by Congress they must be obtained by a new grant from the people. While Congress has general legislative jurisdiction over the Territories and may control the flow of waters in their streams, it has no power to control a like flow within the limits of a State, except to preserve or improve the navi-

gability of the stream; that the full control over those waters is, subject to the exception named, vested in the State."

In United States *v.* Rio Grande (174 U. S. 709) Mr. Justice Brewer, alluding to the limited and restricted function of the National Government in relation to navigation, said:

"The Hudson River runs within the limits of the State of New York. It is a navigable stream and a part of the navigable waters of the United States, so far at least as from Albany southward. One of the streams which flows into it and contributes to the volume of its waters is the Croton River, a non-navigable stream. Its waters are taken by the State of New York for domestic uses in the city of New York. Unquestionably the State of New York has a right to appropriate its waters and the United States may not question such appropriation, unless thereby the navigability of the Hudson be disturbed."

These authorities establish the proposition that the ownership of the waters and soil of navigable streams is in the State, and that the Federal Government has no right or power to interfere with the State's property except for the purpose of preserving or improving the navigability of a river. The surplus water or power produced as an incident to the public improvement made by the Government in aid of navigation belongs to the State. Under the commerce clause the Government acquires no title or property interest whatever in the river or bed thereof. The Constitution confers a naked power to regulate commerce; nothing more. The title of the State remains unimpaired, both as to the water and as to the soil. There is no power expressed or implied in the Constitution justifying the claim that the Federal Government may appropriate such surplus water or power. The assertion of such a right would constitute an interference with and confiscation of the property of the State by the Federal Government. The State is the owner of its natural resources, and, within its properly reserved power, has an absolute right to make use of its property, including the water power of its rivers, subject only to the limitation that it can not impede commerce and navigation.

The right of the Government to sell or lease its own property does not justify this attempted appropriation of the property of a State. Section 3, article 4, of the Constitution is a grant of power to the United States of control over its own property, but what belongs to the State can not be the property of the Federal Government.

The United States is not authorized by any of the enumerated powers to engage in the business of manufacturing, transmitting, or selling electrical power, whether at cost or for a profit; and the commerce clause was never designed to permit the Federal Government to secure revenue or profit as an incident to the promotion of the facilities of navigation.

Federal expenditures must be reimbursed exclusively through taxation. The function of taxation is to secure sufficient money to perform the delegated governmental functions. This power was limited by section 8, article 1, as follows:

"The Congress shall have the power to lay and collect taxes, duties, imposts and excises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States."

The Constitution merely permits regulation in the interest of navigation and commerce by the Federal Government. Regulation does not mean appropriation or confiscation of the rights of a State in its natural resources.

The contention in favor of the right of the Federal Government to lease the excess water power is without authority or reason to sustain it. Kaukana Co. *v.* Green Bay (142 U. S., 254) and Green Bay Co. *v.* Patten (172 U. S., 58) are not in point and do not support the proposition. The commerce clause was not involved in either case. In the former case the controversy arose between a State and a riparian owner, and in the latter case the right of the Federal Government grew out of a grant and was not based upon the commerce clause.

The claim is made that the Government's improvement creates the excess power, but the fact is that the water that produces the power concededly belongs to the State, and the only effect of the improvement by the Government is to enlarge the potentiality of the State's water at the point of improvement.

The Government has no more right to claim ownership of the increase of the water than the State or a riparian owner would have to require the

Government to make compensation for impairment of the stream at other points resulting from the improvement. Where depreciation is necessarily caused by the improvement for navigation the State must bear the loss; where appreciation results from the improvement the State is entitled to the gain. In either case the property affected belongs to the State. As we have seen, the title of the State includes the water as well as the bed of the rivers. The right of the State, under its title, to appropriate the water, subject only to the power of the Government under the commerce clause, is recognized by the cases cited, and the State's title necessarily excludes dominion over its waters by the Goverment except for the single purpose above indicated. The Government may improve navigation; it can not confiscate the property of the State.

BOULDER CANYON, LOWER COLORADO RIVER, POWER AND WATER SET-UP, JANUARY 1, 1928—PRESENTING THE FACTS

[This report presented to the Seventieth Congress, first session, House Committee on Reclamation and Irrigation, January 13, 1928; Senate Committee on Reclamation and Irrigation January 20, 1928]

FOREWORD

The Colorado River and Boulder Dam, due to political activities, voluminous advertising and congressional difficulties, has become a byword in the western country.

There have been tons of printed matter distributed on various phases of the subject, purporting to prove certain conditions, and in the main colored to fit the particular district or organization financing the propaganda.

Therefore, we have engaged a board of engineers, consisting of H. W. Crozier, of San Francisco, one of the foremost power experts on the Pacific coast; Thomas R. King, of the engineering firm of King & Malone, Reno, Nev., who has had both engineering and construction experience; and Stanley Palmer, professor of electrical engineering, University of Nevada, as a board to pass on any engineering conclusions pertinent to our State.

In this paper we have made an earnest effort to analyze and present the power set-up that has been included to carry the cost of the development.

It is not practicable in this short space to include all of the data leading up to the conclusions here presented, but we are ready at any time to take these matters up and discuss them fully whenever necessary.

The Nevada Colorado River Commission, Gov. F. B. Balzar, chairman; George W. Malone, State engineer and secretary of the commission; Charles P. Squires, Roy W. Martin, E. W. Clark, and Charles B. Henderson, are a unit in deciding to employ these methods to arrive at the facts, regardless of what they may show, so that Nevada may not take a position that might jeopardize the original object of the development.

We have consistently maintained that our State should benefit from the proposed development, at least to the amount that she would receive if developed by private capital, during the amortization period, and after the Government is fully repaid the benefit to the States should materially increase.

During the three-State conference held in San Francisco from December 1 to 18, inclusive, the three lower basin States were represented by five outstanding power experts: For California, E. S. Scattergood, of the Los Angeles Light & Power Co., and L. S. Ready, of San Francisco; for Arizona, Charles Cragin, chief engineer of Salt River project, and B. F. Jacobsen, of Los Angeles; for Nevada, H. W. Crozier, of San Francisco.

These men agreed substantially in their computations on similar set-ups, except on the question of steam stand-by service required in connection with Boulder Canyon power, the Nevada and Arizona engineers holding with the Government that no steam stand-by plants were necessary, because of reasons noted elsewhere in this report, and that if any stand-by service should be necessary only a very nominal amount would be chargeable direct to the Boulder Canyon power.

Charles Cragin, chief engineer for the Salt River project, agreed with the Nevada engineers; California agreed except in the matter of necessary steam stand-by service in connection with Boulder Canyon power; while Thomas Maddox and B. F. Jacobsen, also representing Arizona, Mr. Maddox being one of the Colorado River Commission, showed a slightly larger "spread" between Boulder power delivered in the power market and steam electric power developed at that point, due to certain changes made in the estimates of cost of the project.

The writer acted as chairman of the three-State conference held in San Francisco during November and December, 1927, where Arizona, California, and Nevada engineers made an earnest attempt to arrive at a correct set-up for the Boulder Canyon power, and the following data is in line with the results obtained at that time based on investigations set down in Weymouth report.

It is not anticipated that all of the benefits mentioned in this report will obtain immediately upon completion of the project, but any legislation or agreement should be so written that, as the silt is controlled and the irrigation and domestic water is used, they can be taken into account and a proper distribution be made.

POWER DEVELOPED BLACK OR BOULDER CANYON

With a dam 550 feet high and a reservoir capacity of 26,500,000 acre-feet there would be 22,000 second-feet of continuous flow at this time which would develop approximately 850,000 firm horsepower on an average head of approximately 475 feet and would provide 13,000 second-feet flow and 550,000 firm horsepower after full irrigation development upstream.

Long before Bullshead Reservoir is needed for reregulation, it will be developed for power purposes.

Bullshead Reservoir when completed will allow 550,000 firm horsepower to be developed at Boulder Canyon after full irrigation development above and below, which is predicted as 75 years or longer and will in addition develop 100,000 firm horsepower.

With either Bullshead or Parker Reservoir constructed, the water supply in the lower river can be entirely controlled without interfering with the proposed firm power output.

BIBLIOGRAPHY

Weymouth Report, 9 vols., a Government report made up at a cost, including field investigations, of nearly $400,000, and is the last word in Government reports on the Colorado River. The writer has a copy of this report.
Water Supply Paper No. 556, by E. C. Larue.
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68th Cong., 2d sess., S. 727.
69th Cong., 1st sess., S. Res. 320 (6 parts).
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69th Cong., 2d sess., Boulder Canyon reclamation project (5 parts).

THE WEYMOUTH REPORT

The detail investigations made by the Department of the Interior, which resulted in the so-called "Weymouth" report, were made while Mr. Weymouth held the office of Commissioner of Reclamation.

The report was finished in 1924 and consisted of eight volumes of typewritten matter; there was another volume gotten out later when certain United States Geological Survey information became available, making nine volumes in all. Volume No. 9 was a summation of the data on the Colorado River development, including data from former reports.

This report contains the latest and most complete investigations that have ever been made on the Colorado River; there was a very substantial appropriation made for this work and $391,000 was expended, but no funds were ever made available for printing it.

Any reports made subsequent to 1924 are simply compiled from this work, since any superficial examination will not reveal further information.

In this report the Department of the Interior concludes that the Boulder or Black Canyon site is the only one available that is below all principal tributaries, not otherwise being controlled, with sufficient capacity for flood, irrigation, and silt control, and that will develop enough power within reach of the available markets to repay the cost of construction, and any subsequent report must decide likewise, for it is the only detail data available.

This work goes very thoroughly into the matter of foundations, capacities, and detail estimates of all of the available sites on the Colorado River, in-

cluding detail geology, and, in the case of Black and Boulder Canyons and others, contains detail results of drilling foundations; also very complete detail estimates on power-plant installations and transmission lines.

The construction estimates were thoroughly checked by both Mr. Hill and Mr. Wiley, two of the most widely known engineers on the Pacific coast, and there is no doubt of their ability and experience.

Through the courtesy of the Department of the Interior the writer has had a copy of this report available.

ABSORPTION PERIOD

There has been some questions asked as to a possible deficit during the amortization period.

Fifty years are allowed for the return of the original investment, this in addition to the 10-year construction period, for which time the interest is included in the original appropriation, making a total of 60 years from the beginning of construction until advancement is repaid.

The 50 years are utilized by allowing 9 years for absorption of the power by the power markets, during which time interest, operation, maintenance, and depreciation are charged, then in the remaining 41 years the original advancement is repaid in 41 equal installments.

We estimate on past records that the entire amount will be taken up within six years, and under this condition there will be no deficit. Other engineers familiar with conditions in southern California, with the increasing tendency of large manufacturers to establish there, estimate three years, which would create an extra fund during the allowed absorption period.

It should be borne in mind that the plant is to be constructed in several units and investments would not be made until justified.

BOULDER OR BLACK CANYON

The project here considered in detail is the Boulder or Black Canyon set-up; this site is located about 55 miles above the State line between Nevada and California, where the Colorado River forms the boundary between Nevada and Arizona, which site is the subject of proposed legislation at this time.

It is proposed to construct a dam 550 feet high to impound 26,500,000 acre-feet of water for flood and silt control and irrigation purposes, and to generate power to pay the cost; this contemplates 1,000,000 installed horse power or 550,000 firm horsepower at 55 per cent load factor and equals 3,600,000,000 kilowatt hours per year.

Set-up according to Department of the Interior estimates

	Cost estimate	Interest included
Dam	$41,500,000	$55,000,000
Power plant	31,500,000	35,000,000
All-American canal	31,000,000	35,000,000
Interest during construction	21,000,000	
Total	125,000,000	125,000,000

The plan as outlined in the Swing-Johnson bill provides that the dam, power plant, and all-American canal shall be financed by advances from the United States Treasury, bearing 4 per cent interest, and provided that the total amount must be repaid within 50 years after the completion of the project.

Interest has been included in the original proposed advancement, during the construction period. We have, therefore, considered a nine-year absorption period, following completion of the works, during which time the power would be completely utilized.

Records for past years show that the rate of increase of firm horsepower in the southwestern power markets has been at the rate of about 75,000 horsepower per year; the installed horsepower is always at least twice the amount of the firm; Boulder Dam, as estimated, will be 550,000 firm or 1,000,000 installed horsepower on the contemplated 55 per cent load factor. Therefore, it is estimated that, at the rate of 150,000 horsepower per year, installed,

the 1,000,000 horsepower will be absorbed in about six years—some engineers predict even a shorter time, due to the increased consumption after the cost is stabilized by a large block of hydroelectric power. These records are taken from volume 8, Weymouth report, and on this basis there should be no loss over the nine-year absorption period (see p. 18).

Fifty years is the length of time assumed after the project is constructed, for the Government investment to be returned. The 50 years include a 9-year absorption period, during which time the entire power output is assumed to be absorbed by the market, and interest, operation, maintenance, and depreciation charges only will be carried, then in the last 41 years the original investment will be returned in 41 equal installments, in addition to the above-mentioned charges.

Cost of annual operation during amortization period—41 years exclusive of 9-year absorption period

4 per cent interest and annual payments	$6,250,000
Operation and maintenance, dam and plant	700,000
Operation and maintenance, all-American canal	500,000
Depreciation on total cost power plant, ¾ per cent	262,000
Total yearly charges	7,712,000

It is said by some, that our depreciation item is low, but the total amount allowed conforms to that allowed for private projects in California (see p. 18).

Three billion six hundred million kilowatt-hours, corresponding to 550,000 firm horsepower, equals 2.14 mills per kilowatt-hour at switchboard, including the all-American canal complete, carried by the power, on basis of $7,712,000 annual expense.

If the lands under the all-American canal would, as was suggested in the secretary's letter to Congress in 1927, pay the cost of amortization and operation and maintenance, the cost per kilowatt-hour would be reduced 0.376 mill, leaving 1.76 mills per kilowatt-hour to provide for the total payments on dam, power plant, and interest on all-American canal, and if the set-up was, as originally provided in the proposed legislation last year, that the all-American canal be constructed under the reclamation act, thereby no interest being charged and contracts with the lands benefited providing for original cost return and operation and maintenance before construction should be started, then the cost per kilowatt-hour would reduce further by the amount of the average interest, or 0.249, making the power bear only the cost of the dam and power plant, which would be 1.511 mills per kilowatt-hour at the switchboard on basis of 3,600,000,000 kilowatt-hours, or 550,000 firm horsepower.

Cost of power at switchboard in mills per kilowatt-hour

	Mills
Including dam and power plant	1.511
Including dam, power plant and interest all-American canal	1.76
Including dam, power plant and all-American canal	2.14

The above figures represent the cost of the power at the switchboard under the outlined conditions, based on 550,000 firm horsepower.

TRANSMISSION LINES

Six 220,000-volt, 3-phase circuits are proposed to carry the Boulder Canyon power to the power markets; the length of this line has been variously estimated, but the 300 miles which follow closely the line of the Union Pacific Railroad seems to be a conservative estimate. The cost of this line, including step-down substations, transformers, condensers, and intermediate condenser substations, is believed to be conservatively estimated at $50,000,000, including interest during construction.

Some comment has been made on the amount of depreciation allowed on the transmission lines in this set-up; the amount used here is comparable with similar projects under private management in California; then again the sum of $50,000,000, including interest, has been assumed as the cost, where the Department of the Interior estimates five lines costing $45,000,000, including interest, to be ample (see p. 18).

According to engineers and such internationally recognized transmission experts as Frank G. Baum, of San Francisco, transmission costs may be materially reduced within 10 years, on account of higher voltage lines, etc., so that a smaller number of lines would be required (six circuits are now contemplated) to be constructed as needed.

Cost annual operation during amortization period of 35 years

	Per cent	Cost	Mills
Interest	5	$2,500,000	0.695
Annual payments	1.107	553,500	.1538
Depreciation (see p. 18)	1.25	625,000	.1933
Operation and maintenance	1	500,000	.1388
Total	8.35	4,178,000	1.1609

Three billion six hundred million kilowatt-hours corresponding to 550,000 firm horsepower annual charges of $4,178,000 is equal to 1.16 mills at the switchboard.

	Cost at switchboard	Cost at power market assumed 12 per cent line losses
Dam and power plant	1.511	1.72
Transmission line	1.160	1.32
Total	2.671	3.04

The power delivered into the power markets, without any reference to the all-American canal, is 3.04 mills.

All-American canal—41 years amortization exclusive of 9-year absorption period

	Amount	Mills per kilowatt-hour at switchboard	Mills per kilowatt-hour in power market
Average annual interest	$896,000	0.249	0.283
Average annual payments	854,000	.237	.270
Operation and maintenance	500,000	.139	.158
Total	2,250,000	.625	.711

Cost of Boulder Dam power in power market on basis of 12 per cent loss from Boulder Canyon

	Mills
Cost, excluding all-American canal	3.04
Cost, including all-American canal interest only	3.323
Cost, including all-American canal interest and amortization	3.593
Cost, including all costs of all-American canal	3.751

DEPRECIATION

Relative to the depreciation item which is thought to be low by some, as assumed in this report, it is probably not understood.

If the "straight line" sinking fund method of depreciation is adopted, it means that for any given life in years of a piece of property of known value, a certain sum is set aside each year so that at the end of that life the total amount will replace the property.

The sinking fund method of providing for depreciation consists of setting aside a lesser sum, which, invested at compound interest, would when set aside annually plus the compound interest in the aggregate amount to the life of the property. This method is adopted here and is approved by utility commissions.

Item	Amount	Life	Equivalent straight line
	Per cent	*Years*	*Per cent*
Hydroelectric plants	0.75	28	3.57
Transmission line	1.25	30	3.34
Stem-electric plants	2.25	22½	4.45

Steam power costs at the power market

	Annual charge (per cent)	Mills per kilowatt-hour
Return on investment	7.50	
Depreciation	2.25	
Operating expense	1.80	0.00019
Stand-by fuel (1.1 barrel/kilowatt):		
$1 per barrel	1.00	
$1.25 per barrel	1.25	
Operating fuel		.00200
$1 per barrel		.00200
$1.25 per barrel		.00250
General expense	.25	
	12.80	.00219 and .00269

Steam electric power in mills per kilowatt-hour, at particular load factor

25-YEAR AMORTIZATION PERIOD

FUEL OIL

	55 per cent	60 per cent	67 per cent
$1 per barrel	5.12	4.89	4.58
$1.25 per barrel	5.68	5.43	5.15

35-YEAR AMORTIZATION PERIOD

FUEL OIL

	55 per cent	60 per cent	67 per cent
$1 per barrel	4.86	4.66	4.37
$1.25 per barrel	5.42	5.20	4.94

NOTE.—Twenty-five year amortization period and Government interest rate is comparable to no amortization payments and 7½ per cent interest.

The foregoing estimates are made for comparative purposes and based on plant cost of $100 per kilowatt, with an added cost of $10 for transmission purposes, making a total cost of $110 per kilowatt of installed horsepower.

To new power plants constructed in the power market, under conditions that now obtain, a performance of 13,270 British thermal units, equivalent to 480 kilowatt-hours per barrel of oil may be expected. This item will range from

somewhat under 13,000 British thermal units to about 14,000 British thermal units at present.

If power plants can be financed on the basis of a total rate of 7½ per cent annually, such as is obtained by the public utility corporations now operating steam power plants, and which is equivalent to public financing on a 5 per cent basis with 25 years partial payments, the above estimate of costs will apply.

It has been suggested that a decrease in steam costs might come about through the use of mercury vapor or the use of higher pressures, but it is the opinion of engineers that the increased cost of the mercury vapor in the first case, and the increased cost of construction in the second, will preclude any material reduction.

DIFFERENCE IN COST OF ROULDER CANYON POWER DELIVERED TO THE POWER MARKET AND STEAM POWER GENERATED AT THAT POINT

Steam power assumed 60 per cent load factor, 25-year amortization period, and $1 oil—4.89 mills per kilowatt-hour

	Steam power mills, per kilowatt-hour	Boulder Canyon power mills, per kilowatt-hour	Difference mills, per kilowatt-hour
Steam, including transmission line	4.89		
Cost, excluding all-American canal		3.040	1.850
Cost, including all-American canal interest only		3.323	1.567
Cost, including all-American canal interest and amortization		3.593	1.297
Cost, including all costs of all-American canal		3.751	1.139

Engineers for California, on a basis of the inclusion of the all-American canal interest only, arrived at a difference of 0.92 mill after deducting 0.51 mill for steam stand-by service; this would make 1.43 mills difference, as against 1,567 as noted above, which is comparable.

NOTE.—$500,000 equal 0.14 mill in the Boulder Canyon set-up. 550,000 firm HP=3,600,000,000 KWP per year, and 1 mill per KHW=3,600,000 per year on the Boulder Dam set-up.

1 HP=750 KWH.

1 KW=1,000 KWH.

STAND-BY STEAM POWER FOR USE IN CONNECTION WITH BOULDER POWER

Conclusions of engineers appear to vary somewhat as to the necessity for steam stand-by service in connection with Boulder Canyon power delivered into the power market, meaning idle plants to take up the load in case of failure of regular service; engineers in the employ of the California-Colorado commission, including Dr. Durand, member of the secretary's fact-finding commission, who has been employed by Los Angeles for some time, hold that idle steam stand-by service is necessary to the extent of approximately 0.4 mill, but our engineers favored the conclusion of the Government in this matter, as shown in the Weymounth report, that very little if any stand-by service was directly chargeable to Boulder Canyon power, for the following reasons:

1. Due to the all-western hook up that will no doubt obtain at that time, and, in fact, does now to a certain extent.

2. Transmission lines on a six-line basis of 200,000 horsepower capacity each, means one extra line when running full capacity, and with a possible overload to 240,000 horsepower each, would mean that four lines will carry 960,000 horsepower, which would practically mean the peak load, leaving two extra lines available, and no difficulty is anticipated in switching from one line to another in case of trouble.

3. It will require approximately 240,000 horsepower to pump 1,500 second-feet, or 1,000,000 acre-feet per year of domestic water over the divide, a total lift of approximately 1,600 feet. This will mean a substantial decrease in the distance that over one-half of the 550,000 firm horsepower developed at Boulder Dam must be transmitted, and in addition by the aid of small storage reser-

voirs which are already largely constructed near Los Angeles, it can be so arranged that an interruption of this service will not be serious, thus entirely obviating need for stand-by service on more than one-half of the total supply.

4. With 550,000 firm horsepower it is not anticipated that the load will be above 700,000 horsepower over 35 per cent of the time, and not over 800,000 horsepower over 10 per cent of the time; therefore, except during short periods of peak loading, three extra lines would be available in case of trouble.

5. The increase in the use of power in the available markets is at the rate of approximately 150,000 installed horsepower per year; therefore, only at the end of the absorption period would be the balance of hydroelectric and steam-electric power be top-heavy in favor of hydroelectric. It is contemplated that approximately 1,000,000 horsepower of steam-electric power will be constructed during the period of construction of Boulder Dam, so the balance will be in favor of steam power until practically the end of the absorption period. Then, when all of the boulder power is in use, more steam electric will be generated and again gaining the economic balance of approximately 20 per cent steam and 80 per cent hydro, making more steam power available, which, with possible overload, will in part act as stand-by in addition to extra transmission lines; and after the absorption period the balance will swing back to steam, until further hydroelectric power is brought in.

NOTE.—A report submitted by Mr. Van Norman, assistant city engineer of Los Angles, stated that it would require 390,000 horsepower to pump the domestic water over the divide for the southern California cities.

LOAD FACTOR

At the beginning of operation plant will develop 1,600,000 horsepower at 55 per cent load factor, and probably 70 per cent will be the peak, and will develop 1,000,000 horsepower at 88 per cent load factor; then, as irrigation develops, will drop back to probably 60 per cent load factor in 50 years.

The extra power developed, called dump power, can be sold for something, probably 1 mill per kilowatt-hour, which will materially boost the revenues during the earlier years, besides making up for the slightly under 100 per cent sale of the firm power.

Load factor for the Boulder Canyon is assumed 55 per cent as set-up in Weymouth report.

SOURCE OF ADDITIONAL REVENUE

1. Flood control.
2. Silt control.
3. Water for irrigation.
4. Water for domestic use.

Five hundred thousand dollars is reported to be the amount expended annually upon levee construction and repairs. Of this amount, the greater part could be diverted toward the construction cost of the proposed dam with no greater assessment. Flood control would also remove a menace, which at this time makes land values in the Imperial Valley extremely unstable, interest rates are high, and there is no demand for the lands.

Five hundred thousand dollars is expended annually in removing silt from the ditches and canals. This problem will not be entirely eliminated at once, but after the proposed construction is completed it will immediately decrease, and, as the silt already deposited is worked over, will gradually adjust itself. A considerable portion of this amount could be applied to the silt-control storage, with no further assessment on the lands.

Irrigation storage will stabilize the water supply on the lands now under cultivation and bring in approximately 300,000 acres additional. This will eliminate pumping on some of these lands and furnish a gravity system. If this land alone could stand $40 per acre, it would mean an additional sum of over $500,000 annually from this source, including interest.

Domestic storage will furnish 1,000,000 acre-feet of water for southern California cities at an estimated cost of $19.50 per acre-foot. This is where a considerable amount of the Boulder Canyon power will be used to pump it over the Divide. Water for irrigation is now costing from two to nearly three times the estimated cost, so that an additional charge of $2 per acre-foot should not be unduly burdensome, and that considering the per capita use in southern California cities of 150 gallons per day, and that there are nearly 326,000

gallons in 1 acre-foot, that $2 per acre-foot which would be added to the water account of 72 people per month would be hardly noticeable; $2,000,000 would be added to the revenue from this source alone.

This would make a total of $3,500,000 from the four sources mentioned above, entirely aside from returns on the power, which is not unreasonable when the savings are effected as outlined above.

Mr. Lester S. Ready, former chief engineer of the California Railroad Commission, and now in the employ of the California-Colorado River Commission, in a report to some of his California constituents in August, 1927, recommended that the service rendered in storing the irrigation silt and domestic water by the proposed construction may be worth up to $2,800,000. Even this amount would mean that the all-American canal, costing a total of $2,250,000 per year, would be carried, and $550,000 additional, or about $0.50 per acre-foot on domestic water, considering the all-American canal of $2,250,000 carried by the benefits from flood control, silt, and storage for irrigation, and would mean a delivery of the Boulder Canyon power into the power market at well under 3 mills—as against 4.89 mills for steam electric power.

Quoting Mr. Ready further, from his August, 1927, report, he finds that the annual operating cost of the dam, power plant, and all-American canal, including interest and amortization payments, is $7,515,000, which is slightly under our own conclusions, and that a 2.5-mill charge at the switchboard will probably be justified, and at that rate the return would be $9,000,000 and, with $2,000,000 from all other sources, instead of $2,800,000, would make $11,000,000 annual income, as against $7,515,000 annual outlay, leaving $3,466,000 annual surplus, and that a 2-mill charge at the switchboard on the same basis would leave $1,685,000 annual surplus—this on a basis of a 40-year amortization period.

This surplus, he concludes, could be used to retire the investment under the 40-year period, or lower the rate for power to the consumers, and finds further that the cost of the dam could be doubled and the project still be feasible.

METHODS BY WHICH AN AGREEMENT MAY BE HAD TO ASSURE NEVADA AND ARIZONA OF BENEFITS FROM THE CONSTRUCTION

1. Fix at the switchboard a price of 3 mills per kilowatt-hour and split all above the cost to the Government, on a 41-year amortization period, between Arizona and Nevada, power can then be delivered into the power markets at less than 4.5 mills, which is 0.4 mill under anticipated cost, if plants constructed at this time, and 1.5 mills under present cost, according to testimony before the California Railroad Commission.

2. A board of control to be appointed, consisting of three members, one to be appointed by the Governor of each of the lower States, to assist the secretary in the sale of the power and to secure adequate revenue from other sources, the Government to be paid first, then the three States of Arizona, California, and Nevada, to split the remainder between them, California's one-third to apply on the all-American canal until paid for, then to go to reduce the price of power to the purchaser, with suitable readjustment periods.

3. That a board of control be created and the power sold the same as above outlined and reasonable charges made for flood and silt control and irrigation and domestic water, but all the money received to be used to retire the amount expended by the Government at the earliest possible date; then the Government to retain control, and to deduct for operation, maintenance, and depreciation, the remainder to be divided between Arizona and Nevada.

NOTE.—Whatever agreement is had, to assure Arizona and Nevada of reasonable return through the proposed development of their natural resources, that they be allowed in addition to withdraw, upon reasonable notice, certain blocks of power for use in their own States.

CONCLUSIONS

1. That the States of Arizona and Nevada should receive an amount from the proposed development at least equal to the benefits that they would receive if this natural resource were developed by private capital, and upon reasonable notice be allowed to withdraw certain amounts of power for use in their own State.

2. That the power developed can be delivered into the available power markets, meeting competitive power costs, guarantee the Government investment and still meet the conditions outlined above, with a margin to spare, considering the set-up from the data gathered from the Weymouth report.

3. That the power can be delivered into the power markets for 4.5 mills, which is 1.5 mills under present plant cost, according to testimony before the California Railroad Commission, and 0.40 mill below anticipated cost, if plants were to be constructed at this time, and amortize the Government investment within from 15 to 18 years, proper charges being made for other benefits, irrigation, domestic water, flood and silt control.

4. That overwhelming opinion of engineers and men who have studied the fuel situation is that steam electric power will never be produced in the southwestern power markets cheaper than is possible at this time; that the increased cost of fuel and construction costs will offset any decrease from other causes.

5. That it was the opinion of Arizona, California, and Nevada engineers, who attended the three-State conference in San Francisco, that the Government estimates for the construction of the project were liberal, if proper methods were employed in prosecuting the work, based on the Weymouth report set-up.

RECOMMENDATIONS

1. That provision be made in any legislation for the States of Arizona and Nevada to benefit from the proposed development and that provision be made for withdrawal of power upon proper notice for use in their own States, or that provision be made in any legislation to accept the provisions of an agreement between any of the lower States relative to distribution of benefits.

2. That whatever method is used to provide for or recognize an agreement between the lower basin States relative to water and power a board be created as suggested to assist the secretary in determining proper charges to be made for power, flood and silt control, and irrigation and domestic water storage.

3. That the charges for power be not made as low as the repayment of Government charges will permit, but that the charges be comparable to, and on a competitive basis with, available power elsewhere for these markets.

FUEL COSTS AND RELATION TO STEAM-ELECTRIC POWER

Fuel costs are very uncertain, and are the most important variable factor in the steam-electric power set-up.

The Southwestern market is at this time controlled by the oil supply, the legitimate price of which is approximately $1 per barrel. and in the judgment of men who have studied the fuel situation coal will begin gradually taking the place of oil in a comparatively short time, and that the change will come rapidly when the cost of oil reaches $1.30 to $1.40 per barrel. Utah is probably the most favored coal supply.

COAL SUPPLY

Location	B.T.U. per lb.
Colorado	12,800 to 13,000
Utah	11,300 to 13,000
Alaska	13,176 to 14,800
Vancouver Island	11,100 to 13,400

To utilize coal in these markets will require large storage facilities, pulverizing machinery, etc.

Due to the limited oil fields near these power markets, the fuel cost will stabilize near the turning point from oil to coal, which is apparently about $1.30 per barrel of oil.

It will be noted from the tables given on page 19 that $0.25 difference per barrel of oil makes approximately 0.5 mill difference in cost per kilowatt-hour, so that it is concluded that the increase in fuel prices will at least offset any reduction in costs that it is possible to make within the next few years.

The ratio of barrels of oil to tons of coal is approximately 4 to 1.

EQUIVALENTS

WATER

One acre-foot of water is that quantity that will cover an area of 1 acre 1 foot deep.

One second-foot flowing continuously 24 hours equals 1.98 or approximately 2 acre-feet.

One second-foot of water equals 1 cubic foot of water passing a given point every second, equals 7.48 gallons per second equals 448.83 gallons per minute.

One acre-foot equals 325,850 gallons, or 43,560 cubic feet.

POWER

One second-foot falling 8.81 feet equals 1 horsepower, 100 per cent efficiency.

One second-foot falling 11 feet equals 1 horsepower, 80 per cent efficiency (commonly used for estimating purposes.)

Load-factor is the ratio of the average power to the peak power.

One horsepower equals 750 kilowatt-hours.

One kilowatt equals 1,000 kilowatt-hours.

Firm horsepower equals installed horsepower multiplied by the load factor.

Three billion six hundred million kilowatt-hours equals 1,000,000 installed horsepower or 550,000 firm horsepower on 55 per cent load factor.

SUMMARY

Arizona, most feasible project, 229,800 acres	acre-feet	806,400
Arizona, total irrigable, 891,000 acres	do	2,673,000
California, most feasible projects, 851,000 acres	do	3,620,750
California, total irrigable, 1,123,000 acres (this item includes 1,000,000 acre-feet for Los Angeles)	acre-feet	5,613,000
Duty, consumptive use, above Laguna	do	4.35
Duty, consumptive use, below Laguna	do	3.00
Duty, pumping, head gate diversion	do	4.00
Duty, pumping, net duty on land	do	3.25
Evaporation annually exposed surface Bounder Canyon, approximate	depth	5.00
Los Angeles, to get 1,000,000 acre-feet and is included in California's irrigable projects.		
Mexico, 200,000 acres	acre-feet	850,000
Nevada, most feasible projects, 15,000 acres	do	63,730
Nevada, total irrigable, 80,000 acres	do	340,000
Power, firm horsepower available present time from 550-foot dam of 26,000,000 acre-feet capacity, approximately	horsepower	800,000
Power, firm horsepower available with full irrigation development from 550-foot dam and 26,000,000 acre-feet storage	horsepower	550,000
Water available for irrigation and domestic use in United States in the lower basin	acre-feet	8,250,000
Water available for power, on basis of 26,000,000 acre-feet capacity reservoir	second-feet	21,500
Water available for power on basis of full upstream irrigation, development, approximate	second-feet	13,000
Water available for power on basis of full irrigation development of river with Bullshead or Parker for reregulating purposes, approximate	second-feet	13,000
Water, short, for complete lower basin development (this includes the 1,000,000 acre-feet item for Los Angeles)	acre-feet	375,980

FOREWORD

Due to the widely divergent statements relative to the acreages available for irrigation development in the three lower basin States, the writer has considered it important that all the information available be compiled and collected in such a manner that a perspective of the lower basin irrigation development can be gained without wading through all of the voluminous reports on this subject, and the data is especially pertinent at this time, since the subject of water division will be a vital factor in any agreement reached.

In this brief résumé of the data on the Colorado River, an attempt has been made to collect from the various reports, Document 142, Water Supply Paper 556, the Arizona engineering commission report, the Weymouth report, and various other reports, certain pertinent data pertaining to acreages, duty of water, consumptive duty, etc.

There are certain projects on which detail surveys are not complete, notably the Gila project in Arizona, and others on which opinions differ widely as to the correct gross and net acreages. Therefore it has been necessary to insert these acreages according to the best information available, with explanatory footnotes.

The writer has been assisted in this work by the following engineers:

E. B. Debler, hydraulic engineer, bureau of reclamation, Denver, Colo.

R. I. Meeker, special deputy State engineer, interstate rivers, Denver, Colo.

George M. Bacon, State engineer, Salt Lake City, Utah.

William Herbert W. Yoe, State engineer, Santa Fe, N. Mex.

John Whiting, State engineer, Cheyenne, Wyo.

Thomas Maddox, member Colorado River Commission, former State engineer, Phoenix, Ariz.

M. J. Dowd, chief engineer, imperial irrigation district, Imperial, Calif.

It is not understood that each of the engineers mentioned agree in every detail with this report, but from data furnished by each of them an attempt has been made to arrive at a fair setup for the lower basin.

DUTY OF WATER

Gross duty equal total amount diverted from the stream per acre.

Net duty equal total amount delivered to the land per acre.

Consumptive duty equals the amount actually consumed, meaning the difference between the gross amount diverted and the return flow to the stream.

SUMMARY OF WATER-SUPPLY DATA ON COLORADO RIVER

(From pages 101 to 123, United States Geological Survey Water-Supply Paper No. 556, water power and flood control of Colorado River below Green River, Utah.)

Values in acre-feet per year

Colorado River at Lee Ferry: Average recorded flow 1911–1923, computed from records of Green, Grand, and San Juan Rivers (Table 2, col. 6, pp. 104–106)	16,100,000
Colorado River at Lee Ferry: 1911–1923 records extended back to 1895 to include dry cycle 95–96 (Table 3, col. 6, p. 108)	15,200,000
Reconstructed river at Lee Ferry: This item is variously estimated at from sixteen to seventeen million acre-feet, and taking into account prior dry periods, it is estimated at even less than 16,000,000 (deducted from Table 6, cols. 4 and 5, p. 110)	16,600,000
Colorado River at Lee Ferry: Corrected for depletion by irrigation, period 1895 to 1922, one complete cycle (Table 8, col. 3, p. 112)	14,350,000
Estimated present consumption upper Colorado Basin above Lee Ferry (Table 6, col. 4, p. 110)	2,365,000
Estimated future consumption in river flow upper Colorado Basin above Lee Ferry (Table 8, col. 4, p. 112)	5,470,000
Estimated total present and future consumption in upper Colorado River Basin above Lee Ferry (Table 8, col. 4, p. 112)	7,835,000
Future average yearly river flow at Lee Ferry after deduction of combined present and future water consumption by irrigation in upper Colorado River Basin (Table 8, col. 5, p. 112)	8,880,000
Lower Colorado Basin Co.'s obligation at Lee Ferry (see Colorado River compact)	7,500,000

COLORADO RIVER BASIN WATER SUPPLY

(Based on long-time mean covering wet and dry cycles. Recorded flow corrected for depletion by irrigation.)

These figures represent approximately the total yearly flow of the Colorado River Basin, unreduced by irrigation consumption; in other words, the run-

off of the reconstructed river. Upper and lower basin terms fit definitions of same in Colorado River compact, as drafted at Sante Fe, N. Mex., November, 1922.

TABLE 1.—*Total basin water supply, reconstructed river*

[Values in acre-feet]

	Acre-feet	Per cent
Upper Colorado River Basin	16,600,000	84
Lower Colorado River Basin, less evaporation from the Gila River and Colorado River below Black Canyon, 1,500,000	3,100,000	16
	19,700,000	100

TABLE 2.—*Colorado River compact allocations, compact November, 1922*

[Values in acre-feet]

	Acre-feet	Per cent
Upper Colorado River Basin	7,500,000	38
Lower Colorado River Basin	8,500,000	43
Unallocated surplus	3,700,000	19
	19,700,000	100

NOTE.—The problem of a reconstructed river is a controversial matter and is included here as a fair average of the various opinions. The unallocated surplus is variously estimated between two and five million acre-feet.

TABLE 3.—*Water supply data values in acre-feet*

Reconstructed Colorado River at Lees Ferry		16,000,000
Inflow to Colorado River between Lees Ferry and above mouth Gila River:		
Utah (Kanab, virgin rivers)	225,000	
Nevada (virgin)	75,000	
Arizona (other tributaries)	1,180,000	
	1,480,000	
Evaporation approximately 1,000,000, Black Canyon to Yuma	1,000,000	480,000
Reconstructed Gila River:		
New Mexico supply	443,000	
Arizona supply	2,677,000	
	3,120,000	
Evaporation approximately 500,000 on Gila River	500,000	2,620,000
Total water resources, Colorado River Basin		19,700,000

TABLE 4.—*Lower Colorado Basin water resources*

[Values in acre-feet]

Average yearly water supply:		
Utah (virgin)		225,000
Nevada (virgin)		75,000
New Mexico (Gila)		443,000
		743,000
Arizona		3,857,000
Total		4,600,000
Evaporation from Black Canyon to Yuma, including Gila River, approximately 1,500,000		3,100,000

NOTE.—Figures for evaporation estimated for normal flow of both Colorado and Gila Rivers.

TABLE 5.—*Arizona water production, Colorado River Basin*

GILA RIVER SYSTEM

[Values in acre-feet]

Average yearly water supply:		
Gila River at Kelvin		787,000
Salt River at McDowell		1,470,000
Verde River at McDowell		609,000
Aqua Fria at Glendale		181,000
Hassayampa		23,000
Consumption above gauging stations		50,000
		3,120,000
New Mexico production:		
Gila at Guthrie, Ariz	244,000	
San Francisco at Clifton	199,000	
		443,000
Gila system production in Arizona		2,677,000

TABLE 6.—*Summary—Arizona water contribution*

[Average yearly values in acre-feet]

Gila system production		2,677,000
Main Colorado River:		
Little Colorado River	200,000	
Williams River	75,000	
Other tributaries	900,000	
		1,175,000
Total water production in Arizona		3,852,000

NOTE.—No allowance for evaporation in these figures.

TABLE 7.—*Showing flow of Colorado River*

LOWER COLORADO RIVER FLOW—RECORDS OF UNITED STATES GEOLOGICAL SURVEY

Climatic year	Lees Ferry	Grand Canyon	Topok	Yuma[1]
1921			21,543,000	19,427,000
1922	16,372,000		18,999,000	17,554,000
1923	16,135,000	[2] 16,965,000	18,175,000	17,056,000
1924	12,462,000	13,012,000	13,839,000	12,819,000
1925	11,300,000	11,800,000	11,700,000	11,827,000
1926	14,000,000	14,400,000	14,300,000	13,835,000

[1] U. S. R. S. station.
[2] Oct. 1 to Nov. 11 estimated from Lees Ferry record.

NOTE.—There is some question of the reliability of the Topok measurements, and the fact that it is a new station is to be considered.

TABLE 8.—*Evaporation amounts in acre-feet annually*

With adequate storage on lower Colorado River, such as Boulder Canyon with 26,000,000 storage, supplemented by small reservoir at Bullshead or Parker, water supply available from Colorado River would be fully conserved. The first draft on this supply will be reservoir evaporation, the following list indicating the most likely arrangement and losses therefrom, giving elevated water surface:

	Acres
Lees Ferry (Glen Canyon) Dam, 3,127–5,513; average reservoir area	50,000
Power dams, Glen Canyon-Havase, average reservoir area	20,000
Bridge Canyon, 1,207–1,773, Havase, average reservoir area	15,000
Boulder (black), 645–1,197, Havase, average reservoir area	95,000
Bullshead, 502–645, Havase, average reservoir area	21,000
Parker, 358–457, Havase, average reservoir area	39,000
Total area	240,000

Average loss, in addition to losses occurring under present conditions, 3.5 feet depth.

MEXICAN USES

The above supply contemplates upstream development which will very closely correspond to anticipated flow at Lees Ferry under compact in critical period, but average flow remains sufficient so that Mexican allotment would entirely have to be supplied from this equaled flow. In the absence of Mexican treaty, it is being assumed Mexico will be awarded sufficient water for 200,000 acres, requiring, at 4.25 acre-feet per year, 850,000 acres.

Total supply after full development of upper basin

Mean flow at Lees Ferry		8,888,888
Average gain to Boulder Canyon		1,460,000
River losses below Boulder Canyon	400,000	
Evaporation on developed river below Lees Ferry, 240,000 acres at 3.5 depth	840,000	
Mexico, 200,000 acres duty, 4.25	850,000	
		2,090,000
Total available supply for use in the United States below Lees Ferry		8,250,000

Evaporation over exposed surface at Boulder approximately 5 feet depth annually.

TABLE 9.—*Consumptive use and duty of water, Arizona and California projects, Colorado River*

[Values in acre-feet]

	Gravity		Pumping	
	Above lagoons, consumptive use	Below lagoons, consumptive use H. G. Diversion	H. G. Diversion	Net duty on land
Senate Document 142, Problem of Imperial Valley and Vicinity p. 38	3.00	4.4	3.5	3.3
Weymouth Report, U. S. Reclamation Service on Colorado River, vol. 3, p. 160, including Chucawalla	----------	4.0	4.5	3.0
All-American Canal, Mead, Schlecht & Grunsky, p. 35	----------	4.44	----------	3.33
Bulletin 6, Irrigation Requirements of California, p., 184	----------	4.0	4.44	3.0
Report of Arizona Engineering Committee on Arizona land irrigable from the Colorado River	----------	[1] 4.0	----------	3.0
Water Power and Flood Control, Water Supply, 556	3.00	4.5	4.5	3.38
Average	3.00	4.35	4.00	3.25

[1] 4.0 acre-feet duty, on basis of lined canal and tunnel which would require a somewhat lower duty with unlined canals.

Average as noted is assumed for calculations in this report.

NOTE.—The average duty is obtained as noted for the reason that practically every investigation has developed somewhat different amounts and it is desirable to arrive at some figure to be used, comparable with the various results.

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TABLE 10.—*Most feasible projects in California and Arizona*

[Net for United States irrigation use. Required for projects under way and projects not under way, but of most feasible character]

Project	Area		Water		Acre-feet total
	Arizona	California	Arizona	California	
Bullshead	500		1,500		1,500
Hardyville	2,300		6,900		6,900
Mohave Valley	24,000		72,000		72,000
Parker Valley [1]	110,000		330,000		330,000
Palo Verde		79,000		237,000	237,000
Yuma	93,000	15,000	396,000	63,750	459,750
Imperial Valley [2]		685,000		3,014,000	3,014,000
Coachella Valley [3]		72,000		306,000	306,000
Total	229,800	851,000	806,400	3,620,750	4,427,150

[1] Indian project.
[2] All American with Coachella Valley pumping area and West Side Mesa omitted.
[3] Coachella Valley 72,000 acres includes only gravity lands according to later surveys information furnished by Imperial irrigation district.

NOTE.—Nevada's gravity lands, 11,000 acres—46,750 acre-feet.
NOTE.—Nevada feasible acreage, 15,000 acres—63,730 acre-feet.

TABLE 11.—*Future water supply supply conditions in Lower Colorado River*

UPSTREAM DEVELOPMENT

Extent of development in upper basin assumed as in Weymouth report of February, 1924, which was also used as basis for water supply computations by LaRue in Water Supply Paper No. 556, except that there has been added power development in Colorado River in Dark Canyon (a short distance below mouth of Green River) as indicated on page 796 (vol. 6) of the hearings on Senate Resolution 320, Sixty-ninth Congress, first session.

LOWER BASIN DEVELOPMENT

Development on tributaries below Lee's Ferry has been assumed as indicated in the Weymouth report of February, 1924. The plan for river regulation below the mouth of Green River has been assumed as indicated on page 796 of the hearings on Senate Resolution 320, Sixty-ninth Congress, first session. At and above Bridge Canyon, Ariz., the arrangement of dams would correspond to that on Plate 3, Water-Supply Paper No. 556.

Below Bridge Canyon, the following dams would be built:

Dam	Present river surface	Maximum water surface behind dam
Boulder	645	1,197
Bullshead	502	645
Parker	358	457

TABLE 12.—*Gains and losses in acre-feet*

Year	Lees Ferry to Topok	Topok to Laguna	Lees Ferry to Laguna
1922	+2,627,000	−1,445,000	+1,182,000
1923	+2,040,000	−1,119,000	+921,000
1924	+1,377,000	−1,020,000	+357,000
1925	+400,000	+127,000	+527,000
1926	+300,000	−465,000	−165,000
Average	+1,349,000	−784,000	+565,000

Present loss from Boulder Canyon to Topok estimated at 300,000 acre-feet annually, making flow at Boulder Canyon 1,650,000 acre-feet greater than at Lee's Ferry. This gain will be reduced to 1,460,000 acre-feet with future developments on Little Colorado, Virgin River, etc. (See p. 18, vol. 3, Weymounth Report of February, 1924.) This estimate of depletion compares with estimate of 260 second-feet (188,080 acre-feet) by La Rue (see bottom p. 119, Water-Supply Paper No. 556).

The present average annual loss from Boulder Canyon to Leguna Dam is 865,000 acre-feet. Future losses through the Mohave, Parker, and Palo Verde Valleys are accounted for under consumptive irrigation uses, thus making present losses in these localities available for beneficial use. These losses are estimates at 2.5 acre-feet per acre for 200,000 acres, or 500,000 acre-feet annually, leaving a future loss from seepage, undeveloped areas, and undeveloped river channel of, roughly, 400,000 acre-feet.

TABLE 13.—*Water supply*

	Acre-feet	Acre-feet
Mean flow at Lee's Ferry		8,880,000
Average gain to Boulder Canyon		1,460,000
Total available from Colorado River		10,340,000
Reservoir and river losses: Reservoir evapor ation, average mfwy area of reservoirs from Glen Canyon to Parker, inclusive, 240 Canyon to Parker, inclusive, 240,000 acres.		
Average rate of loss in excess of present losses, 3. 5 feet.		
Average annual loss	840,000	
River losses below Boulder Canyon	400,000	
Total nonbeneficial uses		1,240,000
Balance for beneficial uses		9,100,000
Mexico estimated 200,000, Ac. duty, 4.25		850,000
Total for use in United States		8,250,000

TABLE 14.—*Source of Colorado River waters available for lower basin under future conditions*

	Acre-feet	Acre-feet
Gain, Lee's Ferry to Boulder Canyon		1,460,000
Less loss, Boulder Canyon to Laguna Dam		400,000
Net gain, Lee's Ferry to Laguna Dam		1,060,000
Contributed by New Mexico (Little Colorado system)	50,000	
Contributed by Utah (Virgin River, Kanab Creek, etc.)	100,000	
Contributed by Nevada	20,000	
		170,000
Net inflow creditable to Arizona		890,000

SUMMARY

	Acre-feet
Contributed by Upper Basin	8,880,000
Contributed by Utah	100,000
Contributed by Nevada	20,000
Contributed by New Mexico	50,000
Contributed by Arizona	890,000
Net supply (for reservoir evaporation and beneficial uses)	9,940,000
Reservoir losses (largely in Arizona)	840,000
Mexico,[1] estimated 200,000 ac. duty, 4.25	850,000
Net supply for beneficial use in United States	8,250,000

[1] There is some question whether or not the water finally allotted Mexico should all come from the main stream or should be furnished by the entire lower stream system. If the latter should be the case, it would have more water to be allotted the States from the main stream.

TABLE 15.—*Colorado River projects below Boulder Canyon Reservoir*

Project and tract	Average pump lift	Irrigated area	Acre-foot acre	Total acre-feet	Arizona		California	
					Irrigated area	Consumptive use	Irrigated area	Consumptive use
	Feet							
Bullshead to Mohave Valley	80	9,000	3	27,000	9,000	27,000		
Mohave Valley	None.	25,000	3	75,000	24,000	72,000	1,000	3,000
Parker Reservation	None.	104,000	3	312,000	104,000	312,000		
Parker-Gila Valley project:								
Parker Valley	None.	12,000	3	36,000	12,000	36,000		
Blythe area	None.	50,000	3	150,000			50,000	150,000
Palo Verde Mesa	None.	12,000	3	36,000			12,000	36,000
Palo Verde Mesa	90	43,000	3	129,000			43,000	129,000
Chucawall Valley	90	136,000	4.35	592,000			136,000	592,000
Gila Valley	235	632,000	3	1,896,000	632,000	1,896,000		
Palo Verde Valley	None.	79,000	3	237,000			79,000	237,000
Cibola Valley	None.	16,000	3	48,000	16,000	48,000		
Miscellaneous tracts	25	3,000	3	9,000	2,000	6,000	1,000	3,000
Yuma project (Valley)	None.	64,000	3	192,000	48,000	144,000	16,000	48,000
Yuma project (Mesa)	72	44,000	3	132,000	44,000	132,000		
Imperial irrigation district [1]	None.	515,000	4.35	2,240,000			515,000	2,240,000
All-American canal	None.	211,000	4.35	918,000			211,000	918,000
Do	80	59,000	4.35	257,000			59,000	257,000
City of Los Angeles				1,000,000				1,000,000
Total		2,014,000		8,286,000	891,000	2,673,000	1,123,000	5,613,000

[1] According to later surveys, by Imperial Valley, additional California lands: West side, 10,000 acres; West Mesa, 23,000 acres.

NOTE.—Nevada lands available for irrigation:	Acres	Acre-feet
Gravity	11,000	46,750
Pump	69,000	293,250
Total	80,000	340,000

TABLE 16.—*Most feasible acreage*

State	Acres	Acre-feet
California	851,000	3,620,750
Arizona	229,800	806,400
Nevada	15,000	63,730
Total	1,095,800	4,490,880

TABLE 17.—*Total irrigable acreage*

State	Acres	Acre-feet
California	1,123,000	[1] 5,613,000
Arizona	891,000	2,673,000
Nevada	80,000	340,000
Total	2,094,000	8,626,000

[1] Includes 1,000,000 acre-feet domestic water.

TABLE 18.—*Average discharges of principal tributaries (Senate Document 142)*

	Per cent of total discharge	Discharge in acre-feet	Square miles	Per cent of total area	Acre-feet per square mile
Green River	32	5,510,000	44,000	18	125
Upper Colorado (Grand River)	40	6,940,000	26,000	10	267
San Juan River	14	2,700,000	26,000	10	104
Other areas except Gila	8	1,560,000	91,000	39	16
Gila	6	1,070,000	57,000	23	19
Total	100	17,780,000	244,000	100	70

TABLE 19.—*Drainage-basin area, by States*

[Senate Document 142]

	Square miles
Wyoming	19,000
Colorado	39,000
New Mexico	23,000
Arizona	103,000
Utah	40,000
Nevada	12,000
California	6,000
Area in United States	242,000
Area in Mexico	2,000
Total	244,000

TABLE 20.—*Drainage-basin area, by basins*

[Senate Document 142]

	Square miles
Green River	44,000
Upper Colorado (or Grand River)	26,000
San Juan River	26,000
Fremont River	4,600
Paria	1,400
Escalante	1,800
Kanab	2,200
Little Colorado	26,000
Virgin	11,000
Miscellaneous	44,000
Gila	57,000
Total	244,000
Area including San Juan and all above	108,000
Above Boulder Canyon and below mouth of San Juan	53,000
Below Boulder Canyon and above Gila	24,000
Gila River Basin	57,000
Total	242,000

CONCLUSIONS

1. That with the contemplated storage at Boulder Canyon of 26,500,000 acre-feet, there is water available for more than the acreage feasible of irrigation at this time, including 1,000,000 acre-feet for domestic use.

2. That with the contemplated storage at Boulder Canyon, there will be a shortage of water in the lower basin for full irrigation development, after full development above Lee's Ferry; this shortage estimated will amount to 376,000 acre-feet, or 86,400 acres, after supplying 1,000,000 acre-feet for domestic use.

GEORGE W. MALONE,

State Engineer, Nevada.
(Sec. Colo. R. Comm.)

ARIZONA HAS NOT SURRENDERED HER RIGHT IN THE COLORADO RIVER BY ACCEPTING THE PROVISIONS OF THE ENABLING ACT OF NEW MEXICO AND ARIZONA

We have seen an opinion written by Arizona attorneys which asserts that Arizona has practically no rights in the Colorado River because of certain provisions in her enabling act. In our opinion such is not the case. Section 28 of the enabling act of Arizona reads as follows:

"There is hereby reserved to the United States and excepted from the operation of any and all grants made or confirmed by this act to said proposed State, all land actually or prospectively valuable for the development of water power or power for hydroelectric use or transmission, and which shall be ascertained and designated by the Secretary of the Interior within five years after the proclamation of the President declaring the admission of the State, and no land so reserved and excepted shall be subject to any disposition whatsoever of said State, and any conveyance or transfer of such land by said State or any officer thereof shall be absolutely null and void within the period above named; and in lieu of the land so reserved to the United States and excepted from the operation of any said grants, there be, and is hereby, granted to the proposed State an equal quantity of land to be selected from land of the character named and in the manner prescribed in section 24 of this act."

In our opinion said provision does not effect the legal status of the Colorado River. It makes no reference to the Colorado River nor to any river. It refers only to grants made or confirmed by said enabling act. A grant is a transfer of real property. (1 Bouvier Law Dictionary, p. 900.)

Referring to said enabling act it appears that the only transfers of real property mentioned in that portion of the act relating to Arizona are the grants of public land made by the United States to the State of Arizona in sections 24 and 25 of the enabling act, viz, sections 2, 16, 32, and 36, granted or confirmed to the State for common-school purposes, and the right granted to the State to select certain acreages for institutional and other purposes. The grants referred to do not include the beds of navigable streams. In Shively v. Bowlby (132 U. S. 1, 58), the Supreme Court of the United States, after a thorough review of the subject, reached the conclusion that "Grants by Congress of portions of the public lands within a Territory to settlers thereon, though bordering on or bounded by navigable waters, convey of their own force no title or right below high-water mark and do not impair the title and dominion of the future State when created." Undoubtedly, the same rule applies to grants by Congress of portions of the public lands to a State for school, institutional, or other purposes.

Since the grants referred to in the above extract from the enabling act do not include the beds of navigable rivers, it follows that the exception from such grants can not include the beds of such rivers because by its very nature an exception from a grant must be carved out of the grant and can not extend beyond the limits of the grant. Neither can the reservation to the United States include any lands not included within the terms of the grants referred to because the lands reserved are the lands excepted. There is nothing whatever in such provision to indicate that the reservation to the United States was intended to be broader than the exception from the grants. That said reservation is not broader than the grants is made conclusive by the words "And in lieu of the land so reserved to the United States and excepted from the operation of any of said grants, there be and is hereby granted to the proposed State an equal quantity of land to be selected from land of the character named and in the manner prescribed in section 24 of this act."

In connection with this subject, the disclaimer by the inhabitants of the State of all right and title to the public lands within the State, contained in section 20 of the enabling act, must also be considered. Said disclaimer reads as follows:

"That the people inhabiting said proposed State do agree and declare that they forever disclaim all right and title to the unappropriated and ungranted public lands lying within the boundaries thereof."

This disclaimer, unlike the reservation from section 28 above set forth, did not make its first appearance in the Arizona enabling act. In a slightly different form it originated in a resolution of the Continental Congress adopted September 6, 1780. It was inserted in the enabling act of Alabama when that State was admitted into the Union, and construed by the Supreme Court of the United States in the year 1844 as not including land in the bed of a navigable river in Pollards, Lessee, *v.* Hagan, 3 Howard 219, 224.

The enabling act of the State of Oregon, adopted February 14, 1859, required that the people of Oregon should provide by ordinance irrevocable without the consent of the United States that said State shall never interfere with the primary disposal of the soil within the same by the United States or with any regulation Congress may find necessary for securing title in said soil to bona fide purchasers. The legislative assembly of Oregon accepted this condition by act of June 3, 1859. Notwithstanding this condition and the acceptance thereof, the title of the State of Oregon to tidewater lands is unquestioned (Shively *v.* Bowlby, 152 U. S. 1, 58), and the title of said State to the beds of navigable rivers rests upon the same basis. (Johnson *v.* Knott, 10 Pac. 418 (Oreg.); Brewer Elliott Oil Co. *v.* U. S., 260 U. S. 77.)

The disclaimer above quoted from section 20 of the Arizona enabling act is evidently taken almost verbatim from the enabling acts of North Dakota, South Dakota, Montana, and Washington, approved February 22, 1889. Article XVIII of the constitution of Washington adopted in pursuance of said enabling act expressly asserted the title of the State to the beds and shores of all navigable waters in the State up to and including the line of ordinary high waters, and the title of the State so asserted has never been questioned. (Eisenback *v.* Hatfield, 26 Pac. 539; Yesler *v.* Commissioners, 146 U. S. 646; Port of Seattle *v.* Railroad Company, 255 U. S. 56.)

The same disclaimer is found in the enabling act of Oklahoma, and Chief Justice Taft has recently declared that Oklahoma has title to the beds of navigable rivers within its boundaries. (Brewer Elliott Oil & Gas Co. *v.* United States, 67 Law Ed. 140.)

The above decisions conclusively establish that the disclaimer of title to the public lands contained in section 20 of the Arizona enabling act does not apply to lands in the beds of navigable streams. It is impossible to reasonably argue that the reservation in section 28 of the enabling act has any broader application. It follows that the said reservation does not affect the titles to the beds of navigable streams. But if there were any doubt upon the question, that doubt would have to be resolved in favor of sustaining the title of the State to the beds of such streams for the reason stated by the Supreme Court of the United States in the following language:

"The United States early adopted and constantly has adhered to the policy of regarding lands under navigable waters in acquired territory while under its sole dominion as held for the ultimate benefit of future States, and so has refrained from making any disposal thereof save in exceptional instances when impelled to particular disposals by some international duty or public exigency. It follows from this that disposals by the United States during the Territorial period are not lightly to be inferred and should not be regarded as intended unless the intention was definitely declared or otherwise made very plain." (United States *v.* Holt State Bank, 70 Law Ed. 213.)

In an earlier case this rule of a construction in favor of equality among the States was asserted by the Supreme Court of the United States, as follows:

"It is impossible to suppose that by such indefinite language as was used in the enabling act Congress intended to differentiate Nebraska from her sister States, even if it had the power to do so, and attempt to impose more onerous conditions upon her than upon them." (Bolln *v.* Nebraska, 176 U. S. 83.)

It has been suggested that if said reservation does not include the beds of navigable streams, it was a vain and useless act. Such is not the fact. The unneccessary prohibition upon the State's power of disposal found in the provision indicates that the main purpose of Congress in inserting the provision in the enabling act was to prevent valuable power sites from being acquired by private individuals through purchase from the State. This purpose has been fully achieved. With the ownership and control of the lands bordering on the Colorado River vested in the United States, neither the State of Arizona nor private individuals are in a position to develop or exploit the river without the approval of the United States.

We are of the opinion that the said reservation would be unconstitutional if it were construed so as to reserve to the United States the beds of the

navigable waters within the State. In general, new States when admitted into the Union are admitted with all of the powers of sovereignty and jurisdiction which pertain to the original States, and such powers may not be "constitutionally diminished, impaired or shorn away by any conditions, compacts or stipulations embraced in the act under which the new State came into the Union which would not be valid and effectual if the subject of congressional legislation after admission." (Coyle *v.* Oklahoma, 221 U. S. 559, 573.) Construed as merely a reservation of the public lands subject to the disposition of the United States, the said reservation is undoubtedly with in the powers of Congress. Construed as an attempt to deprive the new State of the right to control the beds of navigable streams for the public benefit of the State, it clearly deprives the new State of that "Equality of constitutional right and power" which is "the condition of all States of the Union, old and new." (Coyle *v.* Oklahoma, 221 U. S. 575.)

In the case of Pollard *v.* Hagan (3 Howard 219), it was intimated that the United States had no power to dispose of lands under navigable waters but must hold them in trust for the future state. This was later modified in Goodtitle *v.* Kibbe (9 Howard 471), and in Shively *v.* Bowlby (152 U. S. 1), the rule was declared that "Congress has the power to make grants of lands below high water mark of navigable waters in any territory of the United States whenever it becomes necessary to do so in order to perform international obligations or to effect the improvement of such lands for the promotion and convenience of commerce with foreign nations and among the several states or to carry out public purposes appropriate to the objects for which the United States hold the Territory."

This rule was again considered by the Supreme Court of the United States in a case arising in Oklahoma involving a conflict between a grant by the United States of the bed of a portion of the Arkansas River to the Osage Indians before the admission of Oklahoma as a State, and certain oil leases made by the State of Oklahoma under the claim that the Arkansas River was a navigable river and the State the owner of the bed thereof. Chief Justice Taft after stating the rule laid down in Shively *v.* Bowlby, supra, says:

"If the Arkansas River were navigable in fact at the locus in quo, the unrestricted power of the United States when exclusive sovereign to part with the bed of such a stream for any purpose asserted by the Circuit Court of Appeals would be before us for consideration. If that could not be sustained, a second question would arise whether vesting ownership of the river bed in the Osages was for 'a public purpose appropriate to the objects for which the United States hold territory.'" (Brewer Elliot Co. *v.* U. S. 67 Law Ed. 145.)

It seems clear that even if the question thus left open by Chief Justice Taft were decided in favor of the unrestricted power of the United States to dispose of such lands before the admission of the State, under the rule laid down in Coyle *v.* Oklahoma, supra, the power of the United States to reserve to itself the title to lands under navigable water by a provision in an enabling act, could be exercised only for a purpose which would be a proper subject of congressional legislation after admission. Thus, Congress might perhaps, have reserved the lands within the bed of the Colorado River for the purpose of maintaining the navigability of the river, for the purpose of building bridges, for post roads over the same, or even for purposes of flood control or the reclamation of arid lands, but the reservation in question is plainly for the purpose of producing and transmitting power. The production and transmission of power is not a function vested in the Federal Government by the Constitution. The Federal water power act, and other similar acts, recognize this fact by being so drawn as to bring the same within some of the recognized powers of the Federal Government, with the production of power as an incident.

It is therefore clear that the State of Arizona has the same rights in the Colorado River, including the land under it, as have the other States through which it flows, and the same rights in the Colorado River, including the land under it, as have other States in similar rivers which flow through them. If this proposition is accepted, it follows: (*a*) That the State of Arizona may negotiate with the other States with reference to the Colorado River on an equality, and (*b*) that the State of Arizona may properly urge Senators and Representatives of other States to oppose the Swing-Johnson bill or any other bill that disregards the rights of Arizona in the Colorado River, upon the ground that the passage of such act will establish a precedent extremely dangerous to other States.

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