

SUPPLEMENTAL REPORT ON COLORADO RIVER STORAGE PROJECT
AND PARTICIPATING PROJECTS

UPPER COLORADO RIVER BASIN, OCTOBER 1953

1. This supplemental report on the Colorado River Storage Project and Participating Projects in the States of Arizona, Colorado, New Mexico, Utah, and Wyoming is based on the accompanying report of the Regional Director, Bureau of Reclamation, Salt Lake City, Utah, dated December 15, 1950, and is a Department wide report recommending authorization of programs of all the agencies of the Department. The report supersedes and replaces, with modifications, the previous reports of the Commissioner of the Bureau of Reclamation and the Secretary of the Department of the Interior on this project, and modifies and brings the report of the Regional Director up to date. Comments of the affected States and of interested Federal agencies on our proposed report, obtained in accordance with the provisions of the Flood Control Act of December 22, 1944 (58 Stat. 887), the Act of August 14, 1946 (60 Stat. 1080), and applicable Inter-Agency agreements, are enclosed and made a part of this report.

2. The report of the Department of the Interior on the inventory of potential developments in the Colorado River Basin, House Document 419, Eightieth Congress, pointed out that, in view of the fact that there is not enough water available in the Colorado River system to permit construction of all of the potential projects and have full expansion of existing and authorized projects, the States of the Colorado River Basin should determine their respective rights to deplete the flow of the Colorado River consistent with the Colorado River Compact. Following issuance of that document, the States of the Upper Colorado River Basin negotiated and formalized a compact called the Upper Colorado River Basin Compact to which the Congress granted its consent in the Act of April 6, 1949 (63 Stat. 31). Completion of that compact has permitted formulation of at least an initial stage of further development of the Upper Colorado River Basin. The plan proposed and presented in the Regional Director's report was worked out in close cooperation with representatives of the States of the Upper Colorado River Basin, and their favorable comments are enclosed.

3. A plan of ultimate development in terms of storage is presented in this supplemental report but recommendation is made for authorization at this time of only a partial development in terms both of storage and of water utilization. Selection of the plan for ultimate storage is based in general upon securing the needed reservoir capacity for all purposes, while attaining the minimum in evaporation losses, water being prerequisite to the livelihood of the area. The initial units have been selected as being those best adapted to meeting the most pressing needs of the area. As indicated in the recommendations included herein, the proposal is such as to permit additions to the plan as other units and

Participating Projects are investigated and weighed in the light of the criteria expressed herein. The total storage capacity contemplated ultimately is designed to assure that the flow of the river at Lee Ferry will not be depleted below 75,000,000 acre-feet in any ten consecutive years while permitting continued development of the Upper Basin as contemplated when the Colorado River Compact was drawn up. Thus, upon the authorization of the units recommended, the Upper Basin may continue and increase its utilization of its waters and the Lower Basin may be assured that its rights under the compact are protected.

4. It is not contemplated that all units of the ultimate storage plan should be constructed or even authorized at this time. The project is planned to ultimately provide about 48 million acre-feet of total capacity which it now appears can best be accomplished by a series of nine storage reservoirs. Recommendations for the authorization of other than the initially recommended units will be based on continued hydrologic investigations. Revenues from the sale of power generated at or made possible by these reservoirs should be used to assist in the repayment of reimbursable costs of worthy irrigation projects which might not otherwise be feasible under the Federal Reclamation Law. Additional storage project units should be constructed as required to meet the needs for consumptive use of water and for generation of electric energy.

5. In addition to permitting the Upper Basin to move forward with utilization of its waters, the Colorado River Storage Project and Participating Projects will provide electrical energy to a large area where it is urgently needed. Flood protection, sediment retention, fish and wildlife conservation, and recreational opportunities will also be provided. Detailed recommendations and plans to accomplish these purposes will be prepared as a part of the detailed planning for the individual units and projects.

6. The underlying report of the Regional Director recommended approval of a system of ten major dams and reservoirs as units of the Storage Project, with initial authorization of the Glen Canyon, Echo Park, Flaming Gorge, Navajo, and Whitewater Units. Authorization of twelve initial participating projects was recommended, with provision for including one additional project, which is already authorized and under construction, as a participating project.

7. As mentioned hereinbefore, copies of the report of the Regional Director were submitted as a part of the proposed report of the Department of the Interior to the Secretary of the Army and to the States signatory to the Colorado River Compact for their views and recommendations in accordance with the provisions of Section 1 of the Flood Control Act of

December 22, 1944, to the heads of the agencies of the States of Arizona, Colorado, New Mexico, Utah, and Wyoming exercising administration over the wildlife resources of the States for their report and recommendations in accordance with the provisions of the Act of August 14, 1946, and to other interested Federal agencies for their views and comments. Copies of all the comments which have been received are enclosed with this supplemental report.

8. The reviewing officials of the States directly affected, namely the upper division States of Colorado, New Mexico, Utah, and Wyoming, approved the proposed report, and commended the Department for the coordination between the States and the Department during the course of investigations and preparation of the report. They noted that there has been full compliance with the spirit and purpose of the Flood Control act of 1944. They endorsed the recommendations in the proposed report and called attention to and made recommendations on matters beyond the scope of the proposed report.

9. Three of the upper division States recommended that the hydroelectric plants of the project be operated in conjunction with other Federal powerplants on the Colorado River in such manner as to produce the greatest practicable amount of power and energy that can be disposed of at firm power and energy rates. The States of the Upper division appeared also to desire that ultimately some provision be made that would give power users in those States or in the Upper Basin a permanent priority over users elsewhere to the energy generated by the project units. They appeared to be concerned over the possibility that highly developed areas outside their confines will be in a position to contract for the power output of the projects before potential users in the Upper division States or in the Upper Basin are in a position to do so. It is noted that bills introduced in the Congress by Senators and Representatives from the Upper Basin States include a provision relating to this matter. The Congress will no doubt consider this problem in the course of hearings on the bills.

10. The State of Arizona also concurred in the report, and expressed a desire to be included in the power marketing area of the project on the same basis as the other Upper Basin States. The power marketing studies in the report were made as examples only, and the method of preparing those studies does not evidence any intention to exclude Arizona from the use of power from the project.

11. The States of Colorado, New Mexico, and Utah recommended that the Shiprock Indian reclamation project be authorized as one of the initial participating projects but not constructed until a detailed project report is completed, made available to the States for review, and approved by the Congress. The State of New Mexico also recommended

that the South San Juan and the San Juan-Chama Projects be included for authorization as initial participating projects on the same basis as the Shiprock Project.

12. At the time the Colorado River Storage Project report was being prepared, the Commissioner, Bureau of Indian Affairs, anticipated that a detailed report on the Shiprock Project would soon be available. The difficulty of reaching an agreement among the various parties who are interested in the development of the waters of the San Juan River in New Mexico has prevented the completion of such a report up to this time. For this reason it is now recommended, and the report is revised, in partial accord with the views of the States and at the request of the Commissioner of the Bureau of Indian Affairs, to provide for authorization of the Shiprock Project now as one of the initial participating projects with, however, initiation of actual construction deferred until there has been made available to the affected States and approved by the Congress a report on the project establishing the acreage to be served by the project and its feasibility.

13. With respect to the San Juan Projects, a great quantity of data is being collected and analyzed. The need for the San Juan-Chama Project in particular is acute to relieve pressing and impending water shortages both for irrigation and for municipal and industrial purposes in New Mexico and to provide an important block of hydroelectric power in a power-short area. The South San Juan Project is closely associated with the Shiprock Indian Project, and the two should be developed as divisions of one project. The Congress may give consideration to the authorization of the San Juan-Chama and South San Juan Projects as initial participating projects, as they are included in the bills which have been introduced in the Congress.

14. Prospects are good for an early agreement among the parties concerned as to the use of the waters of the San Juan River on Indian and non-Indian lands in New Mexico. When the underlying report was prepared, agreement to this division of water had not been anticipated quite so soon and, accordingly, the Navajo Dam and Reservoir had been considered as one of the units of the storage project for initial authorization rather than as a participating project reservoir. It had been expected that during its early life the principal purpose of this control structure, which will also assist in preventing sediment encroachment in Glen Canyon Reservoir, would be that of aiding in meeting water deliveries at Lee Ferry. It was recognized, however, that ultimately it would be needed to assure continuous water supply for the Shiprock Indian irrigation project and South San Juan Development, and as replacement storage for the San Juan-Chama Diversion Project, and that its use would be restricted to supplying the participating projects when its full capacity was needed for consumptive use purposes. With the

present hopeful outlook toward full agreement being reached within the next few years, full conservation use of the Navajo Reservoir will be needed at an earlier date than heretofore assumed. For this reason it is recommended that the Navajo Dam and Reservoir be eliminated as a unit of the Storage Project, and that it become a part of the Shiprock Indian Irrigation Project, with portions of its cost, along with portions of the costs of other joint facilities, to be charged later against the potential South San Juan and San Juan-Chama Projects. It should be the first unit of the Shiprock Project to be constructed. In view of the close relationship between the South San Juan and Shiprock Developments, it is believed to be appropriate to incorporate them as one project, to be called the Navajo Project, consisting of two divisions, the Shiprock (Indian) Division and the South San Juan Division. The Navajo Reservoir is recommended herein initially as a part of the Shiprock Division as it is an essential integral part of the Indian Development without which the program to make the Navajo Indian self-sufficient cannot be fully carried out.

15. After reviewing the proposed report the State of Colorado recommended that the Whitewater Unit on the Gunnison River not be included as an initial unit of the Colorado River Storage Project. Although desiring one of the initial units to be located on the Gunnison River, the State at that time had not decided which of the several possible units should be selected, and recommended that certain further studies be made of the Gunnison River Units before final selection is made. Further study was given by the Bureau of Reclamation to the location of storage units on the Gunnison River, in accordance with this recommendation, and information was made available to the State. The Director of the Colorado Water Conservation Board has recently advised us that the Board has approved a reservoir at the Curecanti site with a storage capacity of 940,000 acre-feet, and has urged that this project be included as a part of the initial authorization of the Colorado River Storage Project. Analyses of the Colorado River Storage Project with both the large Curecanti (2,500,000 acre-feet) and the small Curecanti (940,000 acre-feet) are included as attachments to this report. These analyses indicate that power from either unit would be more expensive, under present day estimated costs, than power from alternative sources. We believe that power needs of the Western slope area can be taken care of, for the time being at least, by use of energy from the recommended units. Colorado will need more power as well as storage capacity in the immediate future. Every effort should be made to assure means of meeting that need and to that end the Congress may wish to consider authorization of the Curecanti or some other Storage Unit in Western Colorado.

16. The States of the upper division of the Colorado River Basin recommended that provision be made for additional funds for investigations in the Upper Colorado River Basin prior to the time the investigations

fund recommended in the proposed report comes into operation. Their recommendation for establishment of an Upper Colorado River Development Fund, which is not covered in the Regional Director's report, is incorporated herein pursuant to recommendations previously received from the States of the Upper Basin. In addition, the need for additional funds during the interim period prior to the time the fund is effectuated is recognized. The recommendations of the States for additional investigations funds will undoubtedly be given consideration by the Congress.

17. Colorado recommended that the La Plata Project be included as a participating project. The plan for the project as presently contemplated does not appear to be economically justified at this time. The La Plata Project area is, however, being reanalyzed and, in addition, further consideration can always be given to the present plan of development under changed economic conditions. If the results are favorable, the La Plata Project can be recommended as a participating project at an appropriate time.

18. New Mexico recommended that the project construction schedule be revised so that the Navajo Unit could be constructed at the same time as the other initial units. Although the Navajo Dam and Reservoir is no longer recommended as one of the initial Storage Project units, its inclusion as a part of the Navajo Project will permit its construction to be initiated as soon as it is needed and concurrently with the schedule of construction for the initial storage units if necessary requirements can be met.

19. The reviewing official of the State of Nevada stated that Nevada had no objection to the report. Subsequently the Bureau of Reclamation was requested to include the detailed comments made by the State on an earlier draft of the report as a part of Nevada's official comments. This has been done, although some of the matters discussed are not applicable to the report which was under review.

20. The views of the Fish and Game Departments of the States of Arizona, Colorado, New Mexico, and Utah, commenting on the 6-year program of the Fish and Wildlife Service, are favorable. Copies of these comments are included as a part of this report and the Fish and Wildlife program has been incorporated in the substantiating materials to the report of the Regional Director.

21. Numerous other comments have been made which are summarized in the attached digest of comments and recommendations by States and Federal agencies on the Colorado River Storage Project report. As is the case on any project of this magnitude there will be many details, such as exchanges of water rights, the use of existing facilities, and

similar items, to be worked out by negotiations with water users and others prior to construction of the affected parts of the project.

22. Subsequent to the review of the proposed report by the States and agencies, further careful consideration has been given to a selection of the units of the Storage Project which should be recommended for initial authorization. Immediate needs of the Basin are for storage space to permit holdover of water for release to the Lower Basin as required by the Colorado River Compact while allowing substantial growth in consumptive use in the Upper Basin, and for power-generating facilities to assist in meeting power load growth in and adjacent to the Colorado River Basin. The reservoirs must be completed and filling started at the earliest practicable date, because as consumptive uses in the Upper Basin increase there will be less and less water available for filling the reservoirs. Under the terms of the Colorado River Compact, requiring delivery of water at Lee Ferry, the Glen Canyon Reservoir, located just above this point, occupies a key position for regulating water deliveries to the Lower Basin. Likewise, the Echo Park Reservoir, centrally located in the Upper Basin and controlling the Upper Green and Yampa Rivers, occupies a strategic position. In particular, as the increased use of Green River water increases its salinity, the Echo Park Reservoir will permit mixing it with the relatively pure waters of the Yampa, so that the quality of water releases from the reservoir will be improved. The powerplants of the two reservoirs likewise are strategically located to permit economically serving the major loads expected to grow in the area. For these reasons, it has been concluded that the Glen Canyon and Echo Park Units should be recommended for authorization at this time with transmission facilities necessary to interconnect these and other Federal hydroelectric plants and to market the power, and with recreational and associated facilities as recommended by the Director of the National Park Service which are incidental to the construction of dams and reservoirs in the Dinosaur National Monument. Every effort has been made to find suitable alternatives for the Echo Park and Split Mountain Units because of their encroachment on the Dinosaur National Monument, but no adequate substitute for the Echo Park Unit has been found because of the increased evaporation which will take place from the greater surface areas, at lower elevations, of the alternative reservoirs. Reasons for the elimination of the initial recommendations of the Whitewater Unit and of the Navajo Unit as two of the initial storage project units have been covered earlier in this report. After review of the purposes to be served by the Flaming Gorge Unit, which was formerly recommended for initial authorization, it is believed that it might well be deferred for future development. The Echo Park Unit will probably meet immediate needs in this area and Flaming Gorge can be recommended at a later date when it is required.

23. The necessary coordination of the storage project units and the participating projects for financial assistance can be accomplished without the establishment of the Upper Colorado River Account recommended in the underlying report and without applying the interest component of the power revenues to irrigation repayment. In order that all reimbursable costs of the project can be repaid to the Treasury without applying the interest

component of the power revenues and without the establishment of the Basin Account, it is our recommendation that repayment of the costs which are allocated to irrigation and assigned to be repaid from power revenues be made from net power revenues after completion of the return of the commercial power investment, including interest during construction, with interest on the unamortized balance at a rate equal to the average rate paid by the United States on its long term loans outstanding at the date of authorization of the project,

24. The estimated cost of the recommended units of the Colorado River Storage Project and the initial Participating Projects as recommended for authorization herein is \$1,134,643,000 at January 1953 price levels, itemized as follows:

Echo Park Unit	\$ 176,400,000
Glen Canyon Unit	421,300,000
Central Utah (Initial phase), Utah	231,044,000
Emery County, Utah	9,865,500
Florida, Colorado	6,941,500
Hammond, New Mexico	2,302,000
LaBarge, Wyoming	1,673,000
Lyman, Wyoming	10,564,000
Pine River Extension	
Colorado-New Mexico	5,027,000
Seedskaadee, Wyoming	23,272,000
Silt, Colorado	3,356,000
Smith Fork, Colorado	3,367,000
Paonia, Colorado	6,944,000
Eden, Wyoming	7,287,000
Shiprock (Indian) Division of Navajo Project, including Navajo Reservoir and canal capacity for South San Juan Division	225,300,000
	<u>\$1,134,643,000</u>

Construction of the Shiprock Division would not be initiated until a report thereon has been submitted to the States and approved by the Congress. The cost of the Eden Project, Wyoming, \$7,287,000, which would be one of the initial Participating Projects under the recommendation contained herein, is included in the above tabulation although it is already authorized by the Congress and no further authority is required to complete construction. The full cost of the Paonia Project is also included, although a portion of this project has been authorized, is already constructed, and the water users have contracted to repay the construction costs. The proposed reauthorization would increase the scope of the project, and incorporate it into the Storage Project for repayment of that part of the costs which exceeds the water users' repayment ability.

25. In addition to the aforementioned costs, the recreational planning and construction program and the archeological, wildlife, and geological programs, to be accomplished by the National Park Service in connection with the work in Dinosaur National Monument, are estimated to cost \$21,000,000. This work is of national significance, and the cost thereof should be nonreimbursable, and the funds should be appropriated as part of the National Park Service program.

26. Of the cost of the two initial units of the Storage Project, \$98,300,000 would be allocated to irrigation and other water consuming uses, and \$499,400,000 would be allocated to power, under the alternative-justifiable expenditure theory of cost allocation. Allocation of costs of the participating projects will be the subject of further study in connection with preparation of detailed plans.

27. The Colorado River Storage Project and the initial participating projects, as recommended herein, have engineering feasibility, are economically justified, and, as a whole, would have financial feasibility, if authorized by the Congress substantially in accordance with the recommendations contained herein. The project units and the participating projects recommended for initial authorization and development are sorely needed to permit meeting the requirements of the Compacts and the international commitments with respect to the Colorado River and to provide for economic stability and development of the Upper Colorado River Basin. Benefits from irrigation and other beneficial water consuming uses would be realized through construction of the dependent participating projects. The evaluated annual power benefits from the initially recommended units of the Storage Project exceed their annual costs in the ratio of 1.64 to 1. The benefit cost ratios for the initial Participating projects computed in accordance with present Bureau of Reclamation practice, all exceed unity under present conditions. Irrigation revenues from the participating projects will pay the operation, maintenance, and replacement costs of those projects allocated to irrigation, and, in addition, for each project recommended, will repay a part of the capital cost of the participating project. Repayment of the power allocation of each of the recommended Storage Project Units and the power allocation of Central Utah Project, including interest during construction and including interest on the unamortized balance at a rate equal to the average cost to the government of long term money, now estimated at $2\frac{1}{2}$ percent, can be accomplished by power revenues based on an average rate of 6 mills per kilowatt hour within a 50-year period from the date each power unit is placed in operation. The 6 mill rate is used for illustrative purposes only. The actual selling price of the power will be established at rates consistent with sound business principles and taking into account the irrigation costs which are to be assigned for repayment from power revenues. Repayment of the irrigation alloca-

tion of the initial Storage Project Units and the portion of the costs of the twelve non-Indian participating projects allocated to irrigation and other water-consuming uses that exceeds the repayment ability of the water users, a total of \$268,842,000, and the portion of the costs of the Shiprock Indian Division of the Navajo Project which is expected to be assigned for repayment from power revenues will be accomplished by the application of the net power revenues after the power costs are repaid. With annual net power revenues at the 6 mill average rate of about \$15,000,000 from only the two initial units, as indicated on the attached financial operations study, repayment of the known irrigation costs could be accomplished within approximately 18 years after the close of the 49-year period of full operations required for repayment of the power allocations of the first two units. Repayment of the costs of the Shiprock Indian Division would require an estimated additional 10 or 12 years. If all of the units were started and completed simultaneously, the period required for repayment of all reimbursable costs would be in excess of the 50-year period recommended in Budget Circular A-47. Differences in complexities of construction and magnitude of the various units, lengths of development periods, and practicalities of appropriations will all dictate a staggered starting and completion schedule. Since it is our recommendation that two of the best revenue-producing units be initiated first and we do anticipate that completion of the other units will be staggered, it is quite probable that the reimbursable cost of each single unit will have been paid out within the time limit recommended in Circular A-47. A reasonably close determination of this can only be made as the various units are initiated. In the event the various units are initiated at an accelerated rate, the cost of power can be increased to a certain extent to provide more revenue and accelerate payment. For example, at a 7 mill average rate power costs can be repaid in 35 years from the time the last power unit comes into production, and full repayment of the known irrigation costs could be made in 13 additional years, a total of 48 years. In addition, as other units of the storage project are authorized and come into production, additional revenues will be available to shorten the repayment period or to aid additional projects.

28. The units of the Storage Project would be operated as a system in order to produce by integration the maximum benefits from the sale of hydroelectric energy. Analyses of the power production of the nine units of the Storage Project on an incremental basis are contained on the attached summary sheets in order to show how each unit will fit into the system. One analysis is of the system including the 2,500,000 acre-foot Curecanti Reservoir as originally planned by the Bureau of Reclamation. The other analysis includes the 940,000 acre-foot Curecanti desired by Colorado. Recommendation for authorization of other than the initial units will be supported by further additional studies.

29. The recommendations of the Bureau of Reclamation follow. They incorporate all the modifications to the recommendations of the Regional Director discussed above and thereby supersede all previous recommendations:

It is recommended that the following be approved: (a) That the physical plan of development of the water resources of the Upper Colorado River Basin as described in the underlying report of the Regional Director and as modified by this supplement report be approved;

(b) That authority be sought for the Secretary of the Interior, acting pursuant to the Federal Reclamation Laws (Act of June 17, 1902) (32 Stat. 388) and acts amendatory thereof or supplementary thereto, to construct, operate, and maintain (i) the following units of the Colorado River Storage Project: Echo Park, Glen Canyon, including transmission facilities to interconnect them and other Federal plants and to market the power produced; and (ii) the following initial participating projects subject to the other appropriate portions of these recommendations:

Central Utah (Initial phase), Utah
Emery County, Utah
Florida, Colorado
Hammond, New Mexico
LaBarge, Wyoming
Lyman, Wyoming
Pine River Extension, Colorado-New Mexico
Seedskae, Wyoming
Silt, Colorado
Smith Fork, Colorado
Paonia, Colorado
(including Minnesota Unit)

all as described in the report of the Regional Director but with such modification of, omissions from, or additions to the works as the Commissioner of Reclamation, with the approval of the Secretary, may find proper;

(c) That, as contemplated in its authorizing legislation, the Eden Project, Wyoming, which has previously been authorized and is partially constructed, be included in the plan of development and that the Storage Project be charged with that portion of the reimbursable construction costs of the Eden Project which is in excess of the amount specified to be repaid by the water users in the Act of June 28, 1949 (63 Stat. 277); and that the Paonia Project, Colorado, as described in the Regional Director's report, which is also partially constructed, be included in the plan of development and that the Storage Project be charged with that portion of the reimbursable costs of the Paonia Project which is in excess of the amount which will be repaid within the period specified in the Act of June 25, 1947 (61 Stat. 181);

(d) That, pursuant to the recommendation of the Commissioner of Indian Affairs, and in order to consolidate the recommendations of the Secretary for dependent projects in the Upper Colorado River Basin, the Shiprock (Indian) Division of the Navajo Project, including the Navajo Dam and Reservoir, be authorized for construction, operation, and maintenance in accordance with laws applicable to the development of irrigation projects on Indian reservations, including the provisions of the Act of July 1, 1932 (47 Stat. 564, 25 U.S.C., 1946 ed., 368a), the benefits of which Act should be extended also to the Indian lands to be served by the Florida and the Pine River Extension Projects, provided, however, that the Shiprock Division shall receive assistance from the project power revenues in the same manner and to the same degree as other participating projects and that initiation of actual construction shall be deferred until there has been made available to the affected States and approved by the Congress a report on the Division establishing the acreage to be served and the feasibility of the development;

(e) That authority be sought for the Secretary, acting pursuant to the laws applicable to the development of National parks, monuments, or recreational areas, to the extent to which those laws are not inconsistent with operation of the Colorado River Storage Project units for their primary purposes, to construct, operate, and maintain the recreational facilities proposed in this report;

(f) That irrigation repayment contracts entered into provide, except in the case of the Eden and Paonia Projects, for repayment of the obligation assumed thereunder over a period of not more than fifty years exclusive of any development period authorized by law;

(g) That authority be sought such that repayment of that part of the construction cost of the project (including the participating projects) which is allocated to irrigation and assigned to be repaid without interest from net power revenues will be accomplished from such revenues after completion of the return of the commercial power investment with interest on the unamortized balance at a rate not less than the average rate paid by the United States on its long-term loans outstanding at the time the project is authorized. Revenues and costs in connection with other undertakings hereafter authorized to be constructed should be included as a part of the Colorado River Storage Project upon specific authorization by Act of Congress;

(h) That the Secretary from time to time recommend to Congress for authorization additional units of the Colorado River Storage Project and additional participating projects;

(i) That there shall be available to aid each participating project, or group of participating projects, an appropriate district, preferably of the water conservancy type, which shall be satisfactory to the Secretary of the Interior, one purpose of which shall be to provide revenues for the project, over and above those paid by irrigators, to assist in repayment of construction costs allocated to irrigation;

(j) That the investigations and programs proposed to be undertaken by certain agencies of the Department of the Interior, as summarized in paragraphs 33 through 39 of the Regional Director's report and presented in detail in the appended substantiating materials, be authorized; and that appropriations therefore be nonreimbursable, and that in the case of investigations conducted by the Bureau of Reclamation, except those financed under (l) below, the provisions of the Act of April 19, 1945, should govern;

(k) That there be set up and maintained in the Treasury from the receipts of the Colorado River Storage Project a continuing fund of \$1,000,000 to the credit of and subject to expenditure by the Secretary to defray emergency expenses and to insure continuous operation of the project;

(l) That there be set up and maintained in the Treasury from the receipts of the Colorado River Storage Project a special fund, to be known as the Upper Colorado River Development Fund, to which shall be transferred at the end of each fiscal year, beginning

with the initial year of commercial power production by the Colorado River Storage Project and the participating projects, 7½ percent of the net power revenues for that year after such net revenues exceed 5 million dollars annually, but not to exceed one million dollars in any one fiscal year, which should be available, upon appropriation (such appropriation to remain available until expended), for expenditure by the Secretary, without prejudice to the use by him for the same purposes of other appropriated moneys, for studies and investigations relating to the development, conservation and utilization of the waters of the Upper Colorado River Basin, all expenditures from said fund to be non-reimbursable and nonreturnable under the Federal Reclamation Laws.

Attachments: 22

List of Attachments to Supplemental Report
on Colorado River Storage Project and Participating Projects,
October 1953

1. Financial Operations Study
2. Incremental Power Analysis Table (2,500,000 acre-foot Curecanti Unit)
3. Incremental Power Analysis Table (940,000 acre-foot Curecanti Unit)
4. Digest of Comments and Recommendations of States and Federal Agencies
5. Report of the Regional Director, Bureau of Reclamation, Project Planning Report No. 4-8a.81-2, December 1950, with Substantiating Materials and Report of other Agencies
6. Comments, Governor of Arizona, June 19, 1951
7. Comments, Director, Arizona Game and Fish Commission, February 23, 1951
8. Comments, California Division of Public Works, June 14, 1951
9. Comments, Colorado Water Conservation Board, June 12, 1951
10. Comments, Colorado Game and Fish Commission, February 23, 1951
11. Comments, Nevada State Engineer, February 14, 1951.
12. Comments, Nevada State Engineer on earlier draft of report, October 24, 1950
13. Comments, New Mexico State Engineer, June 12, 1951
14. Comments, New Mexico State Game Warden, March 22, 1951
15. Comments, Utah State Engineer, June 12, 1951
16. Comments, Utah Fish and Game Commission, March 5, 1951
17. Comments, Wyoming State Engineer, March 30, 1951
18. Comments, Department of the Army, July 3, 1951
19. Comments, Department of Agriculture, May 28, 1951
20. Comments, Department of Commerce, April 10, 1951
21. Comments, Federal Power Commission, May 21, 1951
22. Comments, Federal Security Agency, March 27, 1951

COLORADO RIVER STORAGE PROJECT & PARTICIPATING PROJECTS

October 9, 1953

FINANCIAL OPERATION STUDY FOR EXAMINATION OF INVESTMENT REPAYMENT FROM POWER REVENUES

(Colorado River Storage Project Consisting of Glen Canyon, Echo Park,
and the Power Features of Initial Phase, Central Utah Project)

Units: Columns 3-6 Million KWH
Columns 7-21 Thousand Dollars
52912

Year of Study	Fiscal Year	Sales of Electric Energy				Power Revenues Sales of Electric Energy				Revenue Deductions		Total (Columns 11+12)	Net Power Revenue (Columns 10-13)	Transferred to Upper Colorado River Development Fund	Power Investment During Year	Accumu- lated Interest During Construc- tion	Amortization of Power Investment		Irrigation Assistance from Net Power Revenues	Assistance Needed for Irrigation
		Pumping	Firm	Firm Excess	Total (Columns 3+4+5)	Pumping at (3.0 Mills)	Firm at (6.0 Mills)	Firm Excess at (3.5 Mills)	Total (Columns 7+8+9)	Provi- sions for Emergency Expense	Operation, Maintenance, Overhead and Replacement						2-1/2% Interest on Unpaid Balance	Unpaid Balance 1/		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
0	1960																			
1	61	0	1,270	395	1,665	0	7,620	1,382	9,002	125	1,969	2,094	6,908	518	336,933	28,060	364,993			
2	62		1,780	946	2,726		10,680	3,311	13,991	125	3,189	3,314	10,677	801	50,664	31,226	421,558			
3	63		2,280	1,007	3,287		13,680	3,525	17,205	125	3,860	3,985	13,220	992	28,580	33,012	452,587			
4	64		3,310	521	3,831		19,860	1,824	21,684	125	4,531	4,656	17,028	1,000	28,580	34,798	482,040			
5	65		3,810	559	4,369		22,860	1,956	24,816	125	5,202	5,327	19,489		29,548	36,584	508,429			
6	66		4,220	679	4,899		25,320	2,376	27,696	125	5,900	6,025	21,671		24,244	38,419	534,034			
7	67		4,589	382	4,971		27,534	1,337	28,871	125	6,118	6,243	22,628		18,927	39,631	552,170			
8	68		5,188	0	5,188		31,128	0	31,128	125	6,278	6,403	24,725		0	40,577	564,219			
9	69		5,159		5,159		30,954		30,954	0	6,403	6,403	24,551			13,804	544,913			
10	1970		5,129		5,129		30,774		30,774				24,371			13,865	535,165			
11	71	0	5,100		5,100	0	30,600		30,600				24,197			13,623	525,347			
12	72	1.3	5,070		5,071	4	30,420		30,424				24,021			13,379	515,460			
13	73	2.2	5,040		5,042	7	30,240		30,247				23,844			13,134	505,503			
14	74		5,009		5,012		30,054		30,061				23,658			12,887	495,483			
15	75		4,981		4,983		29,886		29,893				23,490			12,638	485,380			
16	76		4,951		4,953		29,706		29,713				23,310			12,387	475,205			
17	77		4,923		4,925		29,538		29,545				23,142			11,880	464,943			
18	78		4,893		4,895		29,358		29,365				22,962			11,624	454,605			
19	79		4,863		4,866		29,178		29,185				22,782			11,365	444,188			
20	1980		4,834		4,836		29,004		29,011				22,608			11,105	433,685			
21	81		4,803		4,805		28,818		28,825				22,422			10,842	423,105			
22	82		4,771		4,773		28,626		28,633				22,230			10,578	412,453			
23	83		4,740		4,742		28,440		28,447				22,044			10,311	401,720			
24	84		4,708		4,711		28,248		28,255				21,852			10,043	390,911			
25	85		4,677		4,679		28,062		28,069				21,666			9,773	380,018			
26	86		4,645		4,647		27,870		27,877				21,474			9,500	369,044			
27	87		4,614		4,616		27,684		27,691				21,288			9,226	357,982			
28	88		4,583		4,585		27,498		27,505				21,102			8,950	346,830			
29	89		4,551		4,554		27,306		27,313				20,910			8,671	335,591			
30	1990		4,520		4,522		27,120		27,127				20,724			8,390	324,257			
31	91		4,488		4,490		26,928		26,935				20,532			8,106	312,831			
32	92		4,457		4,459		26,742		26,749				20,346			7,821	301,306			
33	93		4,426		4,428		26,556		26,563				20,160			7,533	289,679			
34	94		4,393		4,396		26,358		26,365				19,962			7,242	277,959			
35	95		4,363		4,365		26,178		26,185				19,782			6,949	266,126			
36	96		4,331		4,333		25,986		25,993				19,590			6,653	254,189			
37	97		4,299		4,301		25,794		25,801				19,398			6,355	242,146			
38	98		4,269		4,271		25,614		25,621				19,218			6,054	229,982			
39	99		4,236		4,239		25,416		25,423				19,020			5,750	217,712			
40	2000		4,206		4,208		25,236		25,243				18,840			5,443	205,315			
41	01		4,174		4,176		25,044		25,051				18,648			5,133	192,800			
42	02		4,142		4,144		24,852		24,859				18,456			4,820	180,164			
43	03		4,112		4,114		24,672		24,679				18,276			4,504	167,392			
44	04		4,079		4,082		24,474		24,481				18,078			4,185	154,499			
45	05		4,048		4,050		24,288		24,295				17,892			3,862	141,469			
46	06		4,017		4,019		24,102		24,109				17,706			3,537	128,300			
47	07		3,986		3,988		23,916		23,923				17,520			3,208	114,988			
48	08		3,954		3,956		23,724		23,731				17,328			2,875	101,535			
49	09		3,922		3,925		23,532		23,539				17,136			2,538	87,937			
50	2010		3,891		3,893		23,346		23,353				16,950			2,198	74,185			
51	11		3,875		3,877		23,250		23,257				16,854			1,855	60,186			
52	12		3,860		3,862		23,160		23,167				16,764			1,505	45,927			
53	13		3,845		3,847		23,070		23,077				16,674			1,148	31,401			
54	14		3,828		3,831		22,968		22,975				16,572			785	16,614			
55	15		3,813		3,815		22,878		22,885				16,482			415	1,547			
56	16	2.2	3,797	0	3,799	7	22,782	0	22,789	0	6,403	6,403	16,386	1,000	0	39	0			
Totals		98	238,822	4,489	244,409	312	1,438,942	15,711	1,454,955	1,000	344,391	345,391	1,109,564	55,311	546,056	40,577	453,820	---	2/	2/

274,680 268,829

Notes:

- 1/ Includes accrued interest during construction.
- 2/ Net power revenues during an 18-year period beyond the repayment period of the power investment would be required to provide the assistance needed by irrigation in the repayment of the irrigation allocation of Glen Canyon and Echo Park costs plus the irrigation costs of 12 initial participating projects beyond the abilities of the irrigators to repay over a repayment period as specified in the proposed legislation.

PRELIMINARY INCREMENTAL ANALYSIS
COLORADO RIVER STORAGE PROJECT UNITS

10-8-53

Project Unit (In assumed order of construction)	Allocation of joint costs		Specific power costs	Total	Cost	Power costs	Annual operation, maintenance, and replacement			Average annual salable energy	Cost of power delivered to	Cost of steam power to meet	Benefit Cost Ratios
	To irrigation	To power	including transmission	power cost	reassign-ments	assigned to unit	At site costs	assigned costs	net costs	(million kwh)	to market	to same market	
	Million Dollars						(thousand dollars)			(million kwh)	(Mills per kwh)	(Mills per kwh)	
	1	2	3	4	5	6	7	8	9	10	11	12	
INITIAL UNITS													
Glen Canyon	50.3	141.7	229.3	371.0	-16.9	382.0	4802	-336	4466	3813	4.7	7.3	1.71
Echo Park	48.0	76.8	51.6	128.4	-.5	137.5	1155	-10	1145	1017	5.9	7.3	1.42
DATA ON UNITS IN ULTIMATE PLAN													
Cross Mountain	13.9	19.4	16.9	36.3	3.7	42.7	296	75	371	376	5.0	7.3	1.65
Split Mountain	—	—	84.4	84.4	7.2	96.9	644	144	788	643	6.5	7.3	1.26
Gray Canyon	9.2	127.4	54.3	181.7	6.0	201.3	1212	121	1333	1186	7.1	7.3	1.15
Flaming Gorge	28.9	39.8	14.3	54.1	.9	59.1	364	17	381	388	6.4	7.3	1.36
Gurecanti*	30.3	40.9	14.8	55.7	1.7	61.6	376	35	411	308	8.4	7.3	1.04
Crystal	—	—	40.9	40.9	-1.2	42.3	325	-26	299	227	7.9	7.3	1.00
Whitewater	5.0	20.4	18.9	39.3	-.9	40.9	360	-20	340	232	7.7	7.3	1.05
TOTAL	185.6	466.4	525.4	991.8	0	1064.3	9534	0	9534	8190	—	—	—

NOTES:

- Col. 6 Incremental power plant and transmission line costs reassigned among the project units in accordance with the energy credited to each site.
- Col. 7 Total power costs assigned to each unit including allocated joint costs, powerplant, transmission, and interest during construction.
- Col. 10 The estimated annual cost of operation, maintenance, and replacement assigned to each unit.
- Col. 11 Average annual salable generation credited to each unit during 50 years of full operation.
- Col. 12 Mill rate required to repay all costs allocated to power at each unit, including interest during construction, in 50 years of full operation with 2½% interest charged on the unpaid balance.
- Col. 14 The benefit-cost ratios shown are based on primary power benefits only but give consideration to the expected useful life of facilities extending beyond 50 years by the present value of the estimated salvage after 50 years.

* Capacity 2,500,000 acre-feet.

PRELIMINARY INCREMENTAL ANALYSIS, COLORADO RIVER STORAGE PROJECT UNITS
(Curecanti Reservoir at 940,000 af)

11-9-53

Project unit (In assumed order of construction)	Allocation of joint costs		Specific power costs including trans-mission	Total power cost	Cost re-assign-ments	Power costs assigned to unit	Annual operation, maintenance and replacement			Average annual salable energy (million kwh)	Cost of power delivered to market (mills/kwh)	Benefit-cost ratios
	To irri-gation	To power					At site costs	assigned costs	net costs			
	Million dollars											
1	2	3	4	5	6	7	8	9	10	11	12	13
Glen Canyon	55.7	136.3	229.3	365.6	-16.9	376.6	4802	-336	4466	3813	4.7	1.74
Echo Park	43.7	81.1	51.6	132.7	-.5	141.8	1155	-10	1145	1017	6.0	1.40
Cross Mountain	14.0	19.3	16.9	36.2	3.7	42.6	296	75	371	376	5.0	1.67
Split Mountain			84.4	7.2	7.2	96.9	644	144	788	643	6.5	1.22
Gray Canyon	9.5	127.1	54.3	181.4	6.0	201.0	1212	121	1333	1186	7.1	1.15
Flaming Gorge	30.9	37.8	14.3	52.1	.9	57.1	364	17	381	388	6.2	1.42
Curecanti (940,000 af)	8.1	29.8	11.4	41.2	0	44.9	280	0	280	195	9.6	.86
Crystal	-	-	40.9	40.9	0	43.5	325	0	325	210	8.8	.92
Whitewater	4.9	20.5	18.9	39.4	-.4	41.5	360	-11	349	220	7.9	.98
Total	166.8	451.9	522.0	973.9	0	1045.9	9538	0	9538	8048		

NOTES:

- Col. 6. Incremental powerplant and transmission line costs reassigned among the project units in accordance with the energy credited to each site.
- Col. 7. Total power costs assigned to each unit including allocated joint costs, powerplant, transmission and interest during construction totaling \$72,000,000.
- Col. 10. The estimated annual cost of operation, maintenance, and replacement assigned to each unit.
- Col. 11. Average annual salable generation credited to each unit during 50 years of full operation.
- Col. 13. The benefit-cost ratios shown are based on primary power benefits only but give consideration to the expected useful life of facilities extending beyond 50 years by the present value of the estimated salvage after 50 years. An average basin steam power rate of 7.3 mills per kilowatthour was used to compute direct power benefits.

COPY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Washington 25, D. C.

November 13, 1953

The Secretary
of the Interior

Sir:

At your request and pursuant to the request of the Director of the Bureau of the Budget contained in his letter to you of January 27, 1953, the report of the previous administration on the Colorado River Storage Project and Participating Projects has been reviewed. The attached Supplemental Report on the Project dated October 1953, has been prepared to supersede the previous reports of the Commissioner of Reclamation and Secretary of the Interior and to bring up to date the December 15, 1950 report.

The new report is based on the December 15, 1950 report of Reclamation's Regional Director and it includes the comments of the affected States and agencies on that previous report.

I find that the elements recommended for initial authorization in the attached report have economic and engineering feasibility and that they will soon be needed to meet the requirements of the Compacts and the International commitments with respect to the waters of the Colorado River and to provide for economic stability and development of the Upper Colorado River Basin. I, therefore, submit this report, incorporating with modifications the report of the Regional Director of the Bureau of Reclamation and superseding all other previous reports, as my report on the Upper Colorado River Storage Project and Participating Projects.

I recommend that you approve and adopt the report and that you submit it to the President for advice concerning its relationship to his program.

Respectfully submitted,

/s/ W. A. Dexheimer

Commissioner

Dec. 10, 1953
Approved and adopted

/s/ Douglas McKay

Secretary of the Interior

Attachment

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
Washington 25, D. C.

November 18, 1953

Memorandum

To: The Secretary

From: Under Secretary

Subject: Construction of Dams in the Dinosaur National Monument

In accordance with your verbal instructions, I have made a study concerning the proposal to build the Echo Park Dam and the Split Mountain Dam as a part of the Upper Colorado River Basin development. These two dams, if built, will be located within the Dinosaur National Monument. They were originally proposed to be included in the plan of development of the basin which was prepared by the Bureau of Reclamation and recommended for approval by the Secretary of the Interior in January 1951. Opposition developed to the construction of these two dams in the Dinosaur National Monument, and on December 4, 1952, the then Secretary of the Interior revised his recommendation and proposed that further consideration be given to studies of alternate sites. It was under these circumstances that you directed me to investigate the matter with particular reference to the suggested alternate sites.

In connection with this investigation I have reviewed the reports, sought and been furnished data and information from both the National Park Service and the Bureau of Reclamation, conferred with various interested parties and organizations, and have, in company with the Director of the National Park Service and the Commissioner of the Bureau of Reclamation, personally visited the two dam sites in question and inspected a considerable portion of the Dinosaur National Monument. I also inspected on the ground and from the air other portions of the Upper Colorado River area.

The opposition to the two dams in question arises from persons and organizations interested in the national parks and their desire to preserve the Dinosaur National Monument in its present natural state. The Echo Park Dam, in particular, will create a large reservoir within this Monument and will certainly alter its appearance and the existing conditions. It is a matter of personal opinion as to the extent of the harm that may be created by this reservoir. My own feeling is that the alteration will be substantial and if conflicting interests did not exist, I would prefer to see the Monument remain in its natural state. However, I do feel that if the dam is built, the beauty of the park will by no means be destroyed and it will remain an area of great attraction to many people.

It should be noted that neither of these proposed reservoirs will inundate any portion of the quarry where the dinosaur skeletons have been found.

I have examined the proposals for various alternate reservoirs. To be effective these alternates must provide approximately the same storage of water and must waste as little water as possible. The latter is extremely important for the available water for consumptive uses in the Upper Colorado River Basin is far less than will be needed for the full economy of this region.

I have been furnished with information on the New Moab, Dewey, Desolation dam sites, and have considered the possibility of increasing the height of the proposed Glen Canyon Dam. I am particularly impressed with the showing that any of these alternate dam and reservoir sites would result in a net loss of water from evaporation from approximately 100,000 to 200,000 acre feet per year. Even the lower figure is enough to provide all of the domestic, commercial and industrial water for a city the size of Denver. In an area where water is so precious this is a matter of very serious consequence. Such lost water cannot be replaced at any cost and the ultimate regional economy would have to be reduced accordingly.

There has been some question as to the accuracy of the estimates of evaporation and the application of the formulas used to compute losses. I have reviewed this matter and, while there may be some error due to a shortage of experimental data, I am convinced that the calculations are reasonable and any error that exists is equally applicable to the calculations for all reservoirs. Therefore, the error in net differences in calculated losses between any two reservoirs must be small.

There would be substantial loss in electric generating capacity if any one of the alternate sites were selected. While this is a matter of economic importance, I do not attach as much weight to it as to the loss of water. The power loss could be replaced by steam power at some increased cost.

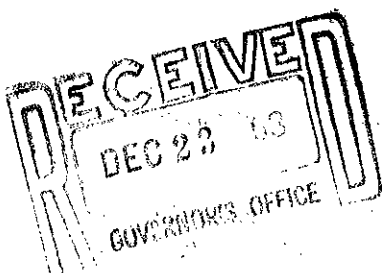
I share the concern of those who would preserve the beauties of the Dinosaur National Monument in their present natural state, but as between a choice of altering this scenery without destroying it in a basin which is and will remain rich in scenery, or the irreplaceable loss of enough water to supply all the needs of a city the size of Denver, I believe the conservation of the water in the interest of the nation is of greatest importance.

In view of the foregoing, I recommend that the plan for the development of the Upper Colorado River Basin include the Echo Park and Split Mountain Dams and reservoirs within the Dinosaur National Monument. This is in keeping with the original recommendation made by the former Secretary of the Interior.

/s/ Ralph A. Tudor
Under Secretary

APPROVED:

/s/ Douglas McKay



UNITED STATES
DEPARTMENT OF THE INTERIOR
Office of the Secretary
Washington 25, D. C.

December 10, 1953

Through: Bureau of the Budget

My dear Mr. President:

On December 4, 1952, my predecessor in office submitted a report on a proposed plan for the development and utilization of a portion of the water resources of the Upper Colorado River Basin by construction of the Colorado River Storage Project and Participating Projects. By letter of January 27, 1953, Budget Director Dodge asked that I review this report to determine whether it conforms to my program in terms of present policies and whether any modification or revision should be made.

After review of the report and re-analysis of the recommended units and projects by the Commissioner of Reclamation at my request, I submit herewith my revised report on the Colorado River Storage Project and Participating Projects, which supersedes the previous report of December 4, 1952.

A proposed report on this project was transmitted to the affected States and to the Secretary of the Army as required by the Flood Control Act of December 22, 1944 (58 Stat. 887), and to other Federal Agencies in accordance with Inter-Agency agreements, and copies of all the comments are included with the report. The comments of the heads of the Agencies exercising administration over the wildlife resources of the States in which project works would be located are also included.

It should be noted that my revised report approves the Echo Park Dam and the Split Mountain Dam, both of which would be constructed within the Dinosaur National Monument. Because of the conflicting interests which have arisen in connection with these dams, I requested the Under Secretary to undertake a personal investigation of these proposed dam sites, the extent to which Dinosaur National Monument would be modified by their construction, and the possibility of alternative dam sites. I am attaching a copy of his memorandum on this subject.

The Department of the Interior in submitting this report anticipates modification of its opinion on any individual projects

or units, at the time appropriations are sought, if necessary in the light of any additional information and economic studies that might then be available.

We shall appreciate having advice concerning the relationship of this proposed project to your program before I transmit the report to the Congress for its consideration and appropriate action.

Sincerely yours,

/s/ DOUGLAS MCKAY
Secretary of the Interior

The President

The White House

Enclosures 23

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DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
Washington 25, D. C.

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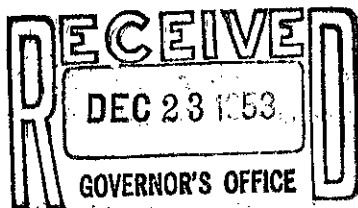
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/s/ Ralph A. Tudor
Under Secretary

APPROVED:

/s/ Douglas McKay



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DEPARTMENT OF THE INTERIOR
Office of the Secretary
Washington 25, D. C.

December 10, 1953

Through: Bureau of the Budget

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/s/ DOUGLAS MCKAY
Secretary of the Interior

The President.

The White House

Enclosures 23

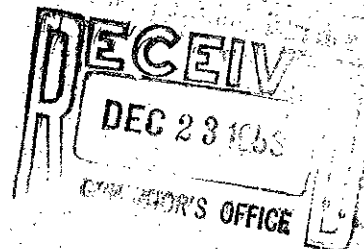


UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
WASHINGTON 25, D. C.

IN REPLY REFER TO:

DEC 15 1953

The Honorable
Dan Thornton
Governor of Colorado
Denver, Colorado



My dear Governor Thornton:

In 1951 copies of the proposed report of the Secretary of the Interior on the Colorado River Storage Project and Participating Projects were furnished to the State of Colorado for the views and recommendations of the State in accordance with the requirements of the Flood Control Act of 1944. The comments of your State were furnished by letter dated June 12, 1951.

After consideration of all the comments received, the proposed report has been put in final form and copies have been sent to the President through the Bureau of the Budget for advice as to the relationship of the proposed project to the program of the President.

In behalf of the Secretary of the Interior, I am enclosing two copies of the revised report for your information. Should you wish to make any further comments, we would appreciate having them at your early convenience, in order that they may be forwarded to the Bureau of the Budget for its consideration.

Sincerely yours,

Acting Commissioner

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