STATE OF COLORADO

Colorado Water Conservation Board

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TO:	Colorado Water Conservation Board Members	Bill Owens Governor			
FROM:	Randy Seaholm Chief, Water Supply Protection	Russell George Executive Director			
DATE:	January 16, 2006	Rod Kuharich CWCB Director			
SUBJECT:	Agenda Item 24, January 24-25, 2006 Board Meeting - Colorado River Basin Issues – Development of Operations for	Rick Brown Acting Deputy Direct			
	Lakes Powell and Mead under Low Reservoir Conditions, including the Development of Lower Basin Shortage Criteria				

or

Introduction

Representatives of the 7-Colorado River Basin States have been meeting over the last two years to discuss operations of Lakes Powell and Mead under low reservoir conditions. The last several years of drought resulted in particularly low reservoir levels in Lake Powell prompting the Upper Division States to request a reduction in Lake Powell releases. While the Secretary of Interior did not reduce Lake Powell releases, she did encourage the development of management strategies for Lakes Powell and Mead under low reservoir conditions, including the development of "Lower Basin Shortage Criteria." As a result, on June 15, 2005 the Bureau of Reclamation published a Federal Register Notice announcing its intent to solicit comments and hold public meetings on the development of management strategies for Lakes Powell and Mead under low reservoir conditions, which strategies would include the development of Lower Basin Shortage Guidelines. In response, the 7-Colorado River Basin States sent a letter to Reclamation on August 25, 2005 indicating the states were discussing ways to utilize water surface elevations or volumetric contents at both Lakes Powell and Mead to determine the beginning and end of Lower Basin Shortage Guidelines and operations under low reservoir conditions.

The 7-Basin States also noted that these operations and shortage guidelines were part of a much more comprehensive set of actions needed to address Colorado River water supply issues. Additional actions included "System Efficiency and Management Improvements" such as development of more regulatory storage and the Agenda Item 24 January 24-25, 2006 Board Meeting Page 2 of 3

possibility of tamarisk removal, and "Water Supply Augmentation Programs" such as precipitation management and desalination.

And 1 10

The purpose of this memorandum is to update the Board on the progress of discussions to date, which have been focused mainly on coordinated management of Lakes Powell and Mead under low reservoir conditions. Attached are two diagrams of the various operational strategies that have been analyzed by the "Technical Committee" and presented to representatives of the 7-basin states. Also attached are a basin map and reservoir teacup diagrams showing critical reservoir elevations and volumes, which will be discussed with Board Members during the January meeting.

The instruction to Reclamation is to complete the development of coordinated management strategies for the operations of Lakes Powell and Mead under low reservoir conditions and the development of Lower Basin Shortage Guidelines by December 2007. If this timeline is to be adhered too, the 7-basin states will need to develop the coordinated management strategy by the first week in February in order for Reclamation to complete the development of alternatives so that the DEIS will be available in December 2006 and the FEIS in October 2007.

Technical Workgroup Evaluations

The 7-Basin State representatives established a Technical Workgroup to analyze different options for the conduct of coordinated operations between Lakes Powell and Mead under low reservoir conditions. The Technical Workgroup has reduced the many possibilities to those shown on the attached tables. The Technical Workgroup will continue to analyze different target elevations in order to meet the stated goals of (1) minimizing the extent and duration of Lower Basin shortages and (2) maximizing the protection afforded to the Upper Basin by Lake Powell against possible calls upon the Upper Basin to curtail uses in order to meet the delivery requirement to the Lower Basin of 75 MAF over any 10-year period plus one-half of any deficiencies in deliveries of 1.5 MAF annually to Mexico. Further refinements to these suggested operations will be presented to the 7-Basin State representatives on January 30-31,2006.

I have attached some selected graphs showing the results of some of the latest model runs that Reclamation has made for the Technical Workgroup and which I believe best illustrate the Workgroups findings to this point in time. In short, the Upper Basin Workgroup members prefer "Hybrid rev2 for Powell operations in coordination with step shortages at Lake Mead under the "Step Shortage rev1" option. This scenario provides improved protection for the minimum power pool at Lake Powell over current operations and significant benefits to the Lower Basin. The Lower Basin prefers "Hybrid rev1 – Step Shortage rev1." While the Lower Basin preference comes closer to maximizing benefits for the Lower Basin it comes at the considerable expense of Lake Powell storage in slightly below average to slightly better than average years.

It should be noted that either scenario is preferable to the current operations which result in Lake Powell drawing down early going into a drought, while Lake Mead is sheltered from any drought impacts until Lake Powell releases are reduced to 8.23 MAF. Once Powell releases are at 8.23 MAF, Lake Mead losses approximately 1.3 MAF annually until Lake Powell returns to the 602(a) storage level, above which

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it then starts to equalize storage with Lake Mead. Neither Upper Basin water users nor Lower Basin water users have ever experienced a shortage under these operations, but the past several years of drought have shown that such is clearly possible. Lake Powell reached its low point in April 2004 with approximately 8.0 MAF of live storage (elevation 3555.9 feet). This was approximately 4.0 MAF above minimum power pool and considering Powell was losing between 2.0 and 3.5 MAF per year during the drought represented the possibility the Powell could go below minimum power in about 2-years if the drought had continued at that magnitude. Lake Mead is still subject to further drawdown, which is dependent on how fast Powell recovers. If average inflows to Powell occur over the next couple of years, Lake Mead should not drop below elevation 1126 as Powell would go above the 602(a) storage level and begin to equalize storage with Lake Mead.

Finally, there are obviously numerous modeling assumptions that should be considered and those are being discussed with a Colorado technical workgroup to assure that Colorado's constituents understand and are comfortable with those assumptions. It is hoped that through this process that they can help the negotiating team better identify and explain the pro's and con's of the suggested 7-basin state coordinated operations for Lakes Powell and Mead.

Negotiating Points

Attachment B hereto contains the Upper Division State negotiating points as presented to the Lower Division States on January 5, 2006. Attachment C contains the Lower Division States latest draft concept paper that outlines the Lower Division's proposed "Guidelines for the Interim Operation of Lake Mead and Deliveries of Colorado River Water to the Lower Division States." The Lower Division concept paper is still being negotiated among the Lower Division States and may still undergo some significant revisions as a result. We would emphasize that none of these items have been formally agreed too by anyone and are still subject to change through the negotiating process. While these documents have been shared with Colorado's major users of Colorado River water, they are not ready for full public distribution. The documents do represent the best indication of how the negotiations are proceeding. We would note that the negotiations are moving in a positive direction and hopefully they will result in a 7-state proposal for Reclamations consideration during the current NEPA process.

Recommendations

Staff has no recommendations to offer at this time. Staff would be interested in any comments or direction that Board Members would like to convey to Colorado's negotiating team.

Attachments

Colorado River Basin Hydrology

- 16.5 million acre-feet (maf) allocated annually
- 13 to 14.5 maf of consumptive use annually
- 60 maf of storage
- 15.1 maf average annual
 "natural" inflow into Lake Powell over past 100 years
- Inflows are highly variable year-to-year



RECLAMATION



Key Operating Principles

 Minimum 8.23 maf objective release from Lake Powell
 Storage equalization when storage in Lake Powell is greater than Lake Mead
 Meeting downstream demands from Lake Mead
 Flood control criteria for Lake Mead

RECLAMATION

2.1 Lower Basin Shortage

2.1.1 Step Shortage

The original Step Shortage strategy (Step Shortage Original) was developed as part of a collaborative instate process in Arizona to provide a recommendation for Colorado River shortage guidelines. The basic concept of Step Shortage is to specify the occurrence and magnitude of Lower Basin shortages based on Lake Mead's elevation at the beginning of each calendar year (similar to the Interim Surplus Guidelines currently in effect to determine surpluses). The shortage amount is the reduction in consumptive use and annual release from Lake Mead.

Three revisions to Step Shortage were also studied. These revisions and the Step Shortage Original strategy are illustrated in Figure 2-1. There is no absolute protection of specific elevations in Lake Mead under these strategies; therefore, the maximum shortage amount in any year is 600 thousand acre-feet (KAF) regardless of how low the water surface elevation of Lake Mead is projected to be. Results of modeling these strategies showed that Lake Mead does drop below elevation 1000 feet, but never reaches dead pool storage through 2025.

Mead					Mead
Elevation	Step Shortage Original	Step Shortage rev1	Step Shortage rev2	Step Shortage rev3	Elevation
1220					1220
1100					1100
1075		400	400	400	1075
1010	400	500	400	500	10/5
1050					1050
	500	600	500	500	
1025		-			1025
1000	600		600	600	1000
895					895

Figure 2-1

Lake Mead Step Shortage

Step Shortage rev1 incorporated an additional shortage step at Lake Mead elevation 1100 ft and modified the shortage pattern from the original. It was the most aggressive step shortage strategy studied. Step Shortage rev2 had an additional shortage step at Lake Mead elevation 1100 ft with the same shortage pattern as the original below 1075 feet. Step Shortage rev3 had an additional shortage step at Lake Mead elevation 1100 with a slightly more aggressive shortage pattern than the original below 1075 ft. A comparison of these shortage strategies is presented in Section 4.

Figure 4-1

Lake Powell Release Strategies - Hybrid Revisions

Powell					Powell
Elevation	Hybrid	Hybrid rev1	Hybrid rev2	Hybrid rev3	Lievation
3700	Equalize or 8.23	Equalize or 8.23	Equalize or 8.23	Equalize or 8.23	3700
602(a)					602(a)
	8.23; if Mead < 1050, balance contents with a max release of 9.5	8.23; if Mead < 1100, balance contents with a max release of 9.5	8.23; if Mead < 1050, balance contents with a max release of 9.5	8.23; if Mead < 1100, balance contents with a max release of 9.5	
3575					3575
			7.48	7.48	
3550					3550
	7.48	7.48			
3525					3525
	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	
3370					3370

(Elevation in feet; Volume in million acre-feet)

Hybrid rev1 raised the Lake Mead elevation for triggering balancing from 1050 to 1100. Hybrid rev2 raised the Lake Powell elevation for triggering a 7.48 MAF release from 3550 to 3575. Hybrid rev3 was a combination of Hybrid rev 1 and 2, incorporating both adjustments. Other parameters remained the same as Hybrid Originals.



Figure 4-15 Probability of Lake Mead Elevation Below 1000

Figure 4-15 shows the probability of Lake Mead dropping below 1000 ft. The probability of Lake Mead going below 1000 ft is first observed in 2016 under Step Shortage Original, one year earlier than under the Step Shortage revisions.

4.2.2 Summary of Findings

Based on the Step Shortage revisions that were tested, a key finding is that Lake Mead is more sensitive to the elevation at which a shortage starts rather than the pattern of shortage.

4.3 Hybrid with Step Shortage rev1

After studying the results of the two sensitivity analyses presented in this section, the Technical Committee determined that balancing releases should not be made from Lake Powell before a shortage had been triggered in the Lower Basin. With this in mind, a sensitivity analysis was performed that examined the Hybrid strategies combined with the Step Shortage rev1 strategy. Under Step Shortage rev1 a shortage is first triggered at a Lake Mead elevation of 1100 ft. This ensures that balancing releases occur 1) at the same time as a Lower Basin shortage as in Hybrid rev1 and rev3 or 2) after a Lower Basin shortage has been triggered as in Hybrid Original and rev2.





Figure 4-16 shows the 10th and 50th percentile elevations at Lake Powell. At the 10th percentile Hybrid rev2 is above all strategies for every year after 2009. Hybrid rev3, which includes an extended 7.48 band and increased Lake Mead balancing elevation also stays above the Normal for almost the entire run duration. At the 50th percentile, Hybrid Original and Hybrid rev2, both having a Lake Mead balancing elevation of 1050 ft are nearly the same, both approaching the Normal 50th percentile in 2025.

Calendar Year





Figure 4-17 displays the 10th and 50th percentile elevations at Lake Mead. The 10th percentile indicates that strategies that include an extended 7.48 band (Hybrid rev2 and rev3) tend to be lower than strategies with a 25-ft 7.48 band. At the 50th percentile all strategies are very similar, with a maximum difference of 5 ft.

4.3.2 Probability of Being Below Key Elevations

Figure 4-18

Probability of Lake Powell Elevation Below 3490



Figure 4-18 shows the probability of Lake Powell dropping below 3490 ft. Under the Hybrid strategies, the probability of Lake Powell going below 3490 ft. is reduced (maximum 2%) compared to the Normal.



Figure 4-19 Probability of Lake Mead Elevation Below 1050

Figure 4-19 shows the probability of Lake Mead dropping below 1050 ft. This probability is lowest under Hybrid rev1 which includes a Lake Mead balancing elevation of 1100 ft. After 2016 this probability is lower under all the Hybrid strategies compared to the Normal.

Figure 4-20

Probability of Lake Powell Elevation Below 3570



Figure 4-20 shows the probability of Lake Powell dropping below 3570 ft. This probability is lowest under Hybrid rev2. After 2014 this probability is highest under Hybrid rev1. The maximum difference between these two strategies is about 9%.

Figure 4-21

Probability of Lake Mead Elevation Below 1120



Figure 4-21 shows the probability of Lake Mead dropping below 1120 ft. The effect of the Hybrid strategies is almost indistinguishable. A small reduction (about 2%) is observed in 2009 with the Hybrid strategies compared to the Normal.



Figure 4-22 Probability of Lake Mead Elevation Below 1000

Figure 4-22 shows the probability of Lake Mead going below 1000 ft. Because Lake Powell releases 7.48 for an extended elevation range, Hybrid rev2 and rev3 introduce a chance of going below 1000 ft one year earlier than Hybrid Original and rev1. For this same reason, under Hybrid rev2 and rev3 the probability is higher compared to the Normal for all years after 2015.

4.3.3 Summary of Findings

The plots presented show that both Lakes Powell and Mead are more sensitive to increasing the elevation range at which Lake Powell releases 7.48 MAF than increasing the Lake Mead balancing elevation. This is the same finding that resulted from the Hybrid Step Shortage Original sensitivity analysis, presented in Section 4.1. Increasing the Lake Mead elevation to trigger a shortage so that balancing releases from Lake Powell do not occur before a Lower Basin shortage does not change the relative effects of the parameter adjustments made to form the Hybrid revisions. As shown in Section 4.2, the effect of increasing the shortage trigger elevation from 1075 ft to 1100 ft is higher 10th percentile elevations at Lakes Powell and Mead.

4.4 Extending the Interim Surplus Guidelines (ISG)

In addition to the sensitivity analyses for the Hybrid and Step Shortage strategies, two other sensitivity analyses were performed that revealed significant findings. The first analysis involved extending the Interim Surplus Guidelines from 2016 through 2025, with all other parameters remaining unchanged.

Lake Powell was operated according to the Hybrid Original strategy. Lake Mead's shortage strategy was Step Shortage Original.

Attachment R

DRAFT

Colorado River Basin States Outline of Areas of Agreement

NOTE – This document does not represent agreement by any of the Colorado River Basin States or the Federal Government on any matter outlined herein. This document is prepared for discussion purposes only, and is not for attribution. This document is prepared subject to the provisions of Rule 408 of the Federal Rules of Evidence, and any corresponding rule of evidence in any state. Neither this document nor any discussions, documents or other materials in relation hereto or in the furtherance hereof shall be admissible in any court of law for any purpose.

- Period of Agreement. All operations and agreements set forth herein will be for an "Interim Period" which shall run from the adoption of Shortage Criteria and Coordinated Operations until 2025. The states will request the Secretary to extend the Interim Surplus Guidelines and the Interim 602(a) Storage Guideline to remain in effect during the Interim Period. The Interim Period may be extended by the agreement of all seven basin states.
- 2. <u>Coordinated Operation of Lake Powell and Mead.</u> The basin states will work through the technical committee to refine and submit to the Secretary for adoption a proposal for the coordinated operation of Lakes Powell and Mead. The proposal will be based on the "Hybrid" scenario developed by the committee, and shall be refined for the benefit improved water management in the Colorado River Basin. Coordinated operations shall not adversely affect the yield for development available to the Upper Basin.
- Lower Basin Shortage Guidelines. The basin states will work through the technical committee to refine and submit to the Secretary for adoption a proposal for Shortage Guidelines for the release of water from Lake Mead. The proposal will be based on the "Step Shortage" scenarios developed by the committee. Mexico will receive a proportionate shortage under the guidelines.
- 4. All states will work toward the development of projects designed to augment the supply of water to the Colorado River. Specifically:
 - A. All states will work toward the development of a desalination project in Mexico that may make water available to Mexican cities and to the Colorado River for use by Nevada, California or Arizona, either directly or by exchange. Any water developed from desalination projects shall be the property of the developing entities, as those entities determine.

- B. All states will work toward the study, and if appropriate, the implementation of, weather modification projects in the Upper Basin. Any water developed from such projects shall be considered system water.
- 5. All states agree to support Upper Basin development projects.
- 6. All states recognize that Nevada needs a period of time to develop in-state non-tributary groundwater supplies for southern Nevada, and to develop augmentation of Colorado River supplies described in #4 above. The purpose of such projects will be to supplement Nevada's 300 KAF apportionment from the Colorado River. Pending the development of these additional supplies, the states will develop a specific list of proposals to provide additional water from the Colorado River for a limited time certain, predicated upon the development of additional in-state Nevada supplies and/or augmentation. Once this list is developed with reasonable confidence that the agreed alternatives can be implemented, Nevada will suspend the EIS process for the development of the Virgin River Pipeline.
- 7. During the Interim Period, for so long as the Interim Period may be extended, and for so long after the Interim Period as may be necessary for the water levels in both Lakes Powell and Mead to return to elevations at or above that which existed at the beginning of the Interim Period, no state shall assert against any other state or against the Secretary of the Interior or any agency of the Department of the Interior, any claim based on the Colorado River Compact, the Upper Colorado River Compact, or the 1968 Colorado River Basin Project Act or any regulation promulgated thereunder as of the date hereof. The states specifically agree that during the Interim Period, no state shall suffer injury, and as a result no such claim shall be ripe for judicial determination.

Attachmente

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Conceptual Paper

Guidelines for the Interim Operation of Lake Mead and Deliveries of Colorado River Water to the Lower Division States Working Draft

Prepared by the States of the Lower Division¹

Introduction

The States of Arizona, California and Nevada propose that revised and expanded guidelines for the implementation of the Long-Range Operating Criteria (LROC) for the operation of Lake Mead be adopted. The primary purpose of the revised and expanded guidelines is to protect and conserve the water supply of Lake Mead to meet the consumptive uses in the Lower Division States. A secondary purpose is to provide flexibility and more certainty in the water supply operations and water deliveries from Lake Mead. The existing Interim Surplus Guidelines would be revised and Interim Shortage Guidelines would be issued by the Secretary of the Interior (Secretary). Together, these guidelines would prescribe Lake Mead operations and water deliveries for the full range of water supply conditions in Lake Mead. These detailed guidelines for the determination of shortage, normal and surplus operations would avoid the potential for conflict between the Lower Division States and the Secretary over the annual determination of Lake Mead operations.

The Lower Division States have discussed the concept for revising and expanding the guidelines. Each state has particular concerns about the effect of the operation of Lake Mead on the long-term water supplies needed to meet the needs of its water users. Nevada desires new flexibility in the operation of Lake Mead to deliver imported non-system water to meet increasing demands, and to use

¹ The text that is bracketed is to be replaced once the appropriate language has been developed.

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conserved water during an interim period of time while it develops new long-term non-Colorado River water supplies for importation. California desires that the guidelines recognize the shortage priorities specified by the 1968 Colorado River Basin Project Act and water delivery contracts, that the operation of Lake Mead be flexible enough to allow surplus deliveries in order to avoid flood control releases and to minimize the excess water deliveries to Mexico, and that Lake Mead be managed to facilitate conjunctive use with other in-state water supplies in California and the accumulation of Intentionally Created Surplus (ICS) water in Lake Mead. Arizona desires that the Secretary operate Lake Mead consistent with the 1964 Supreme Court Decree, *Arizona v. California* (Decree) and that water users in Arizona be protected from shortages as much as possible. To that end, Arizona believes that any increased flexibility in operations to accommodate Nevada or California interests must be offset by increased water supplies in the Colorado River System Reservoirs as described in this conceptual paper.

Both Nevada and California interests want to conserve water in the Lower Basin and accumulate an equivalent amount of water in Lake Mead for use in future years. The Lower Division States propose that the Secretary adopt revised and expanded guidelines that provide for the states to develop credits for use as "Intentionally Created Surplus" (ICS) in future years. In addition, the guidelines would establish criteria for declaring a shortage condition with respect to the operation of Lake Mead. These guidelines would incorporate the Interim Surplus Guidelines (ISG), including any revisions to the ISG that may be appropriate. To be consistent with the Decree, water specifically created by a user as ICS water may be delivered to that user or another designated user within that user's state, in a subsequent year, in accordance with Articles II (B)(2) and II(B)(6).

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General Working Principles

Proposed revised and expanded guidelines are based on the following water management principles.

- Full Range of Operations. The proposed revised and expanded guidelines must be for the full range of Lake Mead operations, not just low reservoir levels. More specific guidelines should be adopted for the determination of surplus and shortage conditions, and thus the normal condition. As directed by Congress, the LROC would be reviewed every five years.
- 2. Consistency with the Decree. Operations must be consistent with the Decree. All water delivered from the Colorado River in the Lower Basin would be water controlled by the United States, as defined in the Decree. Therefore, the Secretary may only release water to the states under three conditions: normal, shortage, or surplus. Water within any state's apportionment under the Decree that is not requested by it can be released to another state pursuant to Article II (B)6 of the Decree.
- 3. <u>Priorities During Shortage</u>. Priorities for deliveries during a shortage condition in the Lower Basin, including Mexico, should be consistent with the 1968 Colorado River Basin Project Act, water delivery contracts, the 1944 Treaty with Mexico, and the Decree.
- 4. <u>Augmented Water Supplies</u>. The guidelines should accommodate the use of water supplies that have augmented the Colorado River water supply.

Unused Basic Apportionments

Before making a determination of a surplus condition under the revised and expanded guidelines, the Secretary would determine the quantity of apportioned but unused water from the basic apportionments under Article II (B)(6), and would allocate the water in accordance with Section 1.B. of the existing ISG.

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Surpluses

Water deliveries under surplus conditions would be made pursuant to four conditions listed in order of storage condition in Lake Mead (i.e., from highest storage to lowest):

- Flood Control Surplus (available to all states and Mexico). The Secretary has discretion to make deliveries above and beyond basic apportionments to holders of valid water delivery contracts within the constraints of the Decree and the 1944 Treaty with Mexico.
- 2. Quantified Surplus. To avoid flood control releases under certain conditions (e.g., 70R), a quantified surplus release may be calculated and delivered to holders of valid water delivery contracts, including agricultural users in accordance with the existing ISG. This surplus would be ordered in August prior to the calendar year it is made available. A Quantified Surplus condition would not represent a determination by the United States that surplus water is available for delivery to Mexico.
- 3. <u>Domestic Surplus</u>. A surplus would be calculated based on water needed to meet direct domestic use in the United States. The surplus delivery would only be made if the elevation of Lake Mead is above [an agreed upon elevation to be determined]. (Under the ISG, the elevation is 1,125 feet above mean sea level (fmsl) for a Partial Domestic Surplus and 1,145 fmsl for a Full Domestic Surplus). The amount of water that is calculated to be available would be determined annually based on water orders for direct domestic use. No recharge or other off-stream storage would be used to calculate the domestic surplus amounts, however such water may be re-regulated within a calendar year within the storage facilities of a recipient. A Domestic Surplus condition would not

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represent a determination by the United States that surplus water is available for delivery to Mexico.

4. ICS. Above the elevation that triggers a Shortage condition, any Section 5 contract user within a state may be permitted to use water that it has made available by augmenting the amount of water in Lake Mead. Such augmentation would result in the contractor being provided with credits. In order to ease the burden of accounting on the Bureau of Reclamation, the contractor with the lowest priority to each state's basic apportionment could choose to administer the use of ICS within that state. Availability of the augmented supply of water for delivery and use would require a determination consistent with Articles II (B)(2) and (6) of the Decree, would require a water delivery contract, and an agreement by the other states to forbear ordering the ICS. Forbearance agreements may have special conditions and requirements. The Secretary should abide by all forbearance agreements. The availability of ICS would not represent a determination by the United States that surplus water is available for delivery to Mexico.

Sources of ICS Water

Four sources of water have been identified that could be made available to augment the amount of water in Lake Mead for the purposes of creating ICS. The sources include water imported to the Colorado River system; water created by exchange/demand management; water conserved through improvement in system efficiencies (e.g. improved terminal storage to reduce over-deliveries to Mexico); and water conserved by extraordinary measures.

Principles Governing Use of ICS

Proposed guidelines for ICS, a revision to the ISG, are based on principles that protect and benefit Colorado River system supplies for all states.

- Provide System Benefit. The amount of the ICS should be less than the total quantity of water that is added to Lake Mead to ensure that there is increased security for the system water users by increasing system contents. The benefit to the system may be implemented in several ways, including a reduction of the recoverable amount from the credits received, and loss of water during spill.
- <u>Credit Losses</u>. Annual evaporation losses would be calculated and subtracted from the credits to protect the system and determine in part the overall recoverable amount of ICS. The method for determination of losses is [to be determined].
- 3. <u>Verify Supply Augmentation</u>. The quantity of water supply augmentation that would qualify as credits for recovery as ICS must be verifiable and approved in a manner supervised by the states. The criteria and process for verification and approval would be described in the forbearance agreements or in the revised and expanded guidelines. Secretary approval of the verification may be required. Some form of oversight by the Lower Division States and/or the Bureau of Reclamation (Reclamation) would need to be developed, similar to the committee consultation process used to verify the water use reductions for the Inadvertent Overrun and Payback Policy (IOPP).

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Conditions of Use of ICS by Type of Augmentation

Directly Imported Water to the Colorado River System

Description

The sources of water that have been currently identified as water augmentation through direct importation of water to the Colorado River system include groundwater from non-tributary basins in Nevada. The Coyote Spring Valley project would convey water through the Muddy River to Lake Mead. The Three Lakes and Tikaboo Valley Groundwater Project and the Northern Nevada Groundwater Development Project (White Pine and Lincoln Counties) would convey water directly to northeast Las Vegas, then enter Lake Mead via Las Vegas Wash return flow.

Conditions

- Recovery of imported water accumulated in Lake Mead would be subject to a reduction to benefit the system. The amount of the reduction would be equal to no more than 5% [or other amount to be determined later] of the augmented amount. Once recovered from Lake Mead, imported water becomes "mainstream water" for Decree accounting purposes, including the determination of return flow credits.
- Permission to use ICS would be suspended during shortage declarations; however, the Secretary would reduce the shortage in a state to account for the amount of water imported by that state during shortage conditions.

3. During a year in which a Flood Control Surplus or a Quantified Surplus has been declared, the permission to use ICS would be suspended for that year. Any water spilled from Lake Mead would first come from the credits available for each agency at the beginning of the calendar year as follows:

Credits no longer available to Agency A equals the amount of water spilled from Lake Mead multiplied by the quantity of credits available to Agency A at the beginning of the calendar year divided by sum of credits available to all agencies at the beginning of the calendar year. The credits that are no longer available to Agency A could not exceed the credits available to Agency A at the beginning of the calendar year.

- During Domestic Surplus conditions, the contractor would have the ability to choose to use either or both ICS and domestic surplus for that year.
- The amount of the imported water that reaches Lake Mead must be verified by measurement. [The methodology and reporting requirements need to be determined.]
- 6. Permission to use ICS would require a forbearance agreement between the states and should require action by the Secretary pursuant to Articles II (B)(2) and II (B)(6) of the Decree to release the ICS for use by the contractor in the state that created it. No other rights other than the permission to use the ICS pursuant to Articles II (B)(2) accrues. The forbearance agreements would include restrictions and limitations to enforce compliance with verification, the reduction to benefit the system and account for evaporation losses if the water was stored in a previous calendar year and other water accounting provisions.

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Water Created via Exchange/Demand Management

Description

Another system augmentation program identified is water created by exchange/demand management. Entities such as The Metropolitan Water District of Southern California (MWD) would take measures to reduce demand for Colorado River water (such as replacement of Colorado River water with other available non-Colorado River system sources or verified conservation of Colorado River water), thereby creating credits such that ICS can be used in a subsequent year.

Conditions

- The permission to use ICS would be limited to credits available after a reduction for evaporation losses in previous years, and a reduction to benefit the system.
- The ICS may be transferred to another entity in the same state at the discretion of the entity holding the ICS credits.
- 3. The permission to use ICS would be suspended during a declared shortage, but would be reinstated after the Lake Mead condition returns to normal as long as a recoverable quantity of ICS is still available. In the event of a shortage in the service area of the agency that accumulated the credits to be recovered as ICS, the Secretary would allow a portion of the credits to be recovered as ICS [with that amount to be determined].
- 4. If Flood Control Surplus or Quantified Surplus is available in any year, the permission to accumulate ICS credits would be suspended for that

year. However, ICS credits could be used during a Quantified Surplus. Any water spilled from Lake Mead would first come from credits available for each agency at the beginning of the calendar year in accordance with the formula described above.

5. Permission to use ICS from credits accumulated by exchange/demand management would require a forbearance agreement between the states and should require action by the Secretary pursuant to Articles II (B)(2) and II (B)(6) of the Decree to release the ICS for use by the entity that accumulated the credits. No other rights other than the permission to use the ICS pursuant to Article II (B)(2) accrues. The forbearance agreements may include restrictions and limitations to enforce compliance with verification, a defined reduction to benefit the system, a reduction for evaporation losses in previous years, and other water accounting provisions.

Water Conserved by Improving System Efficiency

Description

Some Colorado River water is delivered to Mexico in excess of its Treaty allocation because there is inadequate usable terminal storage at Senator Wash Dam and water is bypassed around the Yuma Desalting Plant (YDP). Reclamation is preparing design studies for improved terminal storage and studying alternatives for reducing the bypass flows, including operation of the YDP, but U.S. budgetary constraints are delaying implementation of actions to remedy the water losses at the international boundary. The states propose that improvements be funded by nonfederal entities and that water be made available to the funding entity for a period of years to offset the investments.

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> Several projects are proposed for non-federal funding: capital investments for terminal storage near Drop 2 of the All American Canal, dredging upstream of Laguna Dam, and/or storage at possibly other sites adjacent to the Gila Gravity Main Canal. Funding for YDP capital improvements and operating costs are also needed.

Conditions

- The volume of credits for future use of ICS is to be determined based on a negotiated determination among the states taking into account the investment and the amount of water that would be conserved.
- 2. Permission to use ICS would be only for an interim period of time to be determined at the discretion of the entity holding the ICS credits.
- Permission to use ICS would require a forbearance agreement among the states. The Agreement would include:
 - i. The total quantity of water that is available for use by the funding entity.
 - ii. The annual quantity of water that is available for use.
 - iii. Total capital cost to be funded by the funding entity. [A question has been raised about whether a state can receive credit for OM&R investments.]
 - iv. The conditions describing the timing for the permission to divert.
 [To be discussed is whether a state may divert both Domestic Surplus and ICS at the same time.]
 - v. An additional benefit to the system may not be appropriate when the system benefit due to continued conservation is substantially greater than the amount of ICS proposed to be used. [The standards and type of analysis that would be used to demonstrate the net benefit of the capital improvement needs to be determined.]

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Mainstream Water Conserved by Extraordinary Conservation Measures

Description

If a state provides for the temporary reduction of its basic apportionment under the Boulder Canyon Project Act by extraordinary measures (after deducting any payback of 2001 and 2002 overruns and inadvertent overruns associated with the IOPP), such as water system efficiency projects, on-farm conservation, and fallowing agricultural land previously irrigated, the reduction in consumptive use would be a credit applied toward future use of ICS. [The methods of extraordinary conservation in addition to fallowing are to be determined (e.g. canal lining and tailwater return systems).]

Conditions

- The permission to use ICS is limited to credits available after a reduction for the previous years' evaporation losses and the reduction to benefit the system. The benefit to the system should be no greater than 5% [still to be determined].
- 2. The total amount of ICS would be limited. [This limit is still to be determined.] The ICS may be transferred to another entity in the same state.
- 3. The permission to use ICS would be suspended during a shortage, but would be reinstated after the Lake Mead condition returns to normal as long as credits for use of ICS are still available.
- 4. If Flood Control or Quantified Surplus is available in any year, the permission to accumulate ICS credits would be suspended for that

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> year. However, ICS credits could be used during a Quantified Surplus. Any water spilled from Lake Mead would first come from the credits accumulated in accordance with the formula shown above.

Tributary Water Conserved by Retired System Agriculture

Nevada has requested that permission to obtain credits and use ICS as a result of the retirement of tributary agriculture previously irrigated (pre-compact Virgin and Muddy River water uses). [No resolution of this issue has been reached.]

Long-Term Augmentation of System Supply

If the Colorado River system is augmented by a joint basin-wide state effort and/or federal effort, credits would not be obtained by that effort for future use as ICS. Such water supply would be for the benefit of the entire system and used to reduce the likelihood of shortages and to meet the Mexican treaty obligations.

As a result of joint state and/or federal investigations, projects may be identified that might be funded by one or more states for the purpose of providing new supplies. In particular, Nevada may fund a particular augmentation project that would be used to replace short-term water conservation through system efficiencies, for example a new desalting plant. The mechanism for the exchange and diversion of the water could be similar to the current inter-state off-stream storage agreements, utilizing ICS apportionment. December 12, 2005 Page 14 of 15 Working Draft for Discussion

Shortage Guidelines for the Operation of Lake Mead

Shortage declarations made by the Secretary would be triggered at Lake Mead elevations so as to provide protection for future water deliveries to the Lower Division States. One shortage strategy that has been considered is: · · · ·

- 1. For Mead elevations between 1,075 fmsl and 1,050 fmsl, the shortage reduction should be 400,000 acre-feet (af).
- 2. For Mead elevations between 1,050 fmsl and 1,025 fmsl, the shortage reduction should be 500,000 af.
- 3. For Mead elevations beginning at elevation 1,025 fmsl and below, the shortage reduction should be 600,000 af.

The Lower Division States will also consider other trigger elevations and stepped shortage reductions, as well as, the use of a protection or absolute protection elevation level in Lake Mead in order to protect senior rights and for the secondary benefit of maintaining use of the SNWA intakes.

Declared shortages are to be shared proportionally with Mexico based on the reduction in water deliveries from a normal condition. The shortage to be borne by Mexico would be determined in accordance with the 1944 treaty between the United States and Mexico. Arizona and Nevada would proportionately share shortages based on the provisions of the 1968 Colorado River Basin Project Act, the terms of water delivery contracts, and the Nevada Interstate Banking Agreement with the Arizona Water Banking Authority. A shortage sharing agreement between Arizona and Nevada would determine the proportionate reductions for each state.

Hydrologic conditions could necessitate reductions in excess of the maximum reduction contained in the guidelines, for example 600,000 af. Such an event

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> must trigger a Secretarial consultation process to determine how to implement additional reductions in accordance with the Colorado River Basin Project Act of 1968 and the Decree in the least damaging and most equitable manner possible. Further, if hydrologic conditions indicate that Lake Powell elevations are rising and may reach equalization elevations in the coming year, the Secretary may have the discretion, after consultation with the Lower Division States, to forego a shortage declaration even if a Lake Mead trigger elevation has been reached.

Explanation of Model Run Scenarios -- Mead Operations

1/23/06 Technical Committee Conference Call

(Elevation in feet; Volume in thousand acre-feet)

Mead Elevation	Lower Basin Shortage Strategy				
	Step Shortage Original	Step Shortage rev1	Step Shortage rev2	Step Shortage rev3	Elevation
1220	no shortage	no shortage	no shortage	no shortage	1220
1100		400	400	400	1100
1075					1075
	400	500	400	500	_
1050	500				1050
1025				500	1025
	600	600	600	600	1020
1000					1000
					_
895					895

Figure 4-1

Lake Powell Release Strategies - Hybrid Revisions

Powell Elevation	Hybrid	Hybrid rev1	Hybrid rev2	Hybrid rev3	Powell Elevation
3700	Equalize or 8.23	Equalize or 8.23	Equalize or 8.23	Equalize or 8.23	3700
602(a)	8.23; if Mead < 1050, balance contents with	8.23; if Mead < 1100, balance contents with	8.23, if Mead < 1050, balance contents with	8.23; if Mead < 1100, balance contents with	602(a)
3575	a max release of 9.5	3575			
3550	7.48	7.48			3550
3525	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	
3370					3370

(Elevation in feet; Volume in million acre-feet)

Hybrid rev1 raised the Lake Mead elevation for triggering balancing from 1050 to 1100. Hybrid rev2 raised the Lake Powell elevation for triggering a 7.48 MAF release from 3550 to 3575. Hybrid rev3 was a combination of Hybrid rev 1 and 2, incorporating both adjustments. Other parameters remained the same as Hybrid Originals.

Figure 4-1

Lake Powell Release Strategies - Hybrid Revisions

(Elevation in feet; Volume in million acre-feet)					
Powell	laberid	Hybrid rev1	Hybrid rev2	Hybrid rev3	Powell Elevation
3700	Equalize or 8.23	Equalize or 8.23	Equalize or 8.23	Equalize or 8.23	3700
602(a)					602(a)
	8.23; if Mead < 1050, balance contents with a max release of 9.5	8.23; if Mead < 1100, balance contents with a max release of 9.5	8.23; if Mead < 1050, balance contents with a max release of 9.5	8.23; if Mead < 1100, balance contents with a max release of 9.5	
3575			7.48	7.48	3575
3550	7.48	7.48]		3525
3525	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	balance contents with a min/max release of 7 and 9.5	
3370					3370

Hybrid rev1 raised the Lake Mead elevation for triggering balancing from 1050 to 1100. Hybrid rev2 raised the Lake Powell elevation for triggering a 7.48 MAF release from 3550 to 3575. Hybrid rev3 was a combination of Hybrid rev 1 and 2, incorporating both adjustments. Other parameters remained the same as Hybrid Originals.