

Overview of the Intentionally Created Surplus and Intentionally Created Mexican Allocation Programs for the Lower Basin States and Mexico and Preliminary Evaluation of the Value the Cadiz Project Could Bring to the Metropolitan Water District

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This paper was prepared at the request of Cadiz Inc. to provide an initial, high level, evaluation of the benefits the Cadiz storage project could bring to the Metropolitan Water District if the project were approved to receive Intentionally Created Surplus credits for which it is eligible under guidelines adopted by the United States Bureau of Reclamation. It also provides an overview of the recent agreement between Mexico and the United States for storage of water in Lake Mead, and other Lake Mead storage programs that the Metropolitan Water District has recently funded or approved for funding.

Executive Summary

The Colorado River is a vital component of California's water supply, providing at least 4.4 million acre-feet of water to the State every year. Since 2002, the River has faced a lingering drought that has drastically reduced the amount of water stored in the system's two principal reservoirs, Lake Powell and Lake Mead, and created the possibility that deliveries of Colorado River water to its users could be severely limited over the long term. In 2007, as the drought continued, the US Department of the Interior adopted the "Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead" (Interim Guidelines), to establish new criteria for management of the two reservoirs based on their respective water surface elevations. It was the aim of the Interim Guidelines to avoid significant economic, power and water supply impacts throughout the Colorado River system associated with any potential reduction in deliveries.

The Interim Guidelines also created the Intentionally Created Surplus (ICS) program, which allows Lower Basin Colorado River states (California, Nevada and Arizona) to store water in Lake Mead if they create a like amount of water within their state that could be used instead. By holding wet water in the two reservoirs, the ICS program seeks to control the potential of a shortage declaration. Under the program, one way ICS can be created is through system efficiency improvements or extraordinary conservation measures, such as land fallowing, seawater desalination or lining irrigation canals. For example, if a California Colorado River contractor implements an eligible program that creates 40,000 acre-feet (AF) of new water supply per year, then, under the ICS program, the Contractor could leave 40,000 AF of water stored in Lake Mead for future use through a credit from USBR. USBR will hold the water in a storage account until an "ICS Surplus" is declared on the River and stored water could be delivered in addition to annual river allocations.

Since 2007, the Metropolitan Water District (MWD), a California Colorado River contractor, has participated in or considered three ICS eligible programs. These programs have a weighted average valuation of \$330.38 per AF based on their development costs and ICS credits created.

The Cadiz Project is designed to provide 50,000 AF of water per year to MWD member agencies or water users in the MWD service area for 50 years. Cadiz water would be transported in MWD's transportation facilities, including the Colorado River Aqueduct, and would create new water within the MWD service area similar to seawater desalination, system efficiency improvements, or other programs. The Cadiz Project appears to meet the criteria established in the Interim Guidelines for projects eligible to create ICS, and if it were to be approved as an ICS program for MWD, then it would add significant value in the MWD service area.

Based on the average value of other ICS programs, the Cadiz project would have an approximate value of \$648.2 million over the 50 year life of the project, or nearly \$13 million per year. Cadiz water would also be subject to MWD wheeling charges to cover transportation costs and would potentially create other benefits in the service area when ICS held in Lake Mead is released; these benefits have not been calculated but are expected to be significant.

ICS is an important program for Colorado River stability and reliability in the Lower Basin states. Water policy makers at both the state and federal level have identified supply-demand gaps that will need to be met by storing water in wetter years to augment supplies in dry or average years. Any new augmentation that can be provided to MWD's storage accounts is of great value to the agency. These benefits are even more pronounced in the Cadiz instance since direct investment in the success and implementation of the Project by MWD is not required.

Overview of Intentionally Created Surplus

Operation of Lake Powell and Lake Mead is governed by the Secretary of Interior's December 2007 "Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead" agreement and Record of Decision (ROD). The ROD contains a complicated set of operational tiers and reservoir release criteria for management of the River.

Under the Intentionally Created Surplus (ICS) feature of the Interim Guidelines, Lower Basin (California, Nevada, and Arizona) Contractors may "store" (through a storage credit) water in Lake Mead that would otherwise have been delivered and used. The ICS storage is created in lieu of using Colorado River entitlement by producing and using water through specifically approved extraordinary conservation projects and programs. These projects and programs include land fallowing, canal lining, seawater desalination and other measures. For the MWD and others, ICS can also be created by participating in projects designed to realize Colorado River system efficiencies, such as the Drop 2 storage reservoir near the All-American canal. MWD can call upon this water when the Secretary declares that ICS surplus water is available. ICS can only be made available to Lower Basin States when Lake Mead is above elevation 1,075 (i.e. not in a shortage condition). ICS storage is limited for each

lower division state; California's total storage limit is 1.5 million acre-feet (MAF) with up to 400,000 AF per year created or delivered. The bulk of California's potential ICS storage (385,000 AF) and use goes to MWD by agreement of the California parties. The ICS storage in Lake Mead is also subject to losses and spill, and must be withdrawn before 2037, ten years after expiration of the Interim Guidelines. It is possible, and even likely that the ICS and other portions of the Interim Guidelines could be extended beyond this point. In fact, USBR regularly runs various modeling assumptions, including extension of the ICS until 2060.

ICS Benefits of the Cadiz Project

The Cadiz storage project is proposed to provide 50,000 AF per year (AFY) of water supply to MWD member agencies or agencies within its service area. The project meets the Interim Guidelines criteria for projects eligible to create ICS. A preliminary evaluation of the value that the Cadiz project could bring to MWD in terms of ICS credits is about \$648 million. This assumes the project produces 50,000 AFY for 50 years, is approved for ICS credits, but only stores water when Lake Mead is not in a full Municipal & Industrial (M&I) surplus or flood control condition. The evaluation is based on the comparable cost of the three recent projects and ICS value MWD received, or could have received, from the projects. In the case of Cadiz water, MWD would receive wheeling and other revenues associated with moving Cadiz water, therefore all projects represent an "apples to apples" comparison in terms of potential revenues to MWD, evaporation losses, and one-time "system assessment" losses.¹

In 2008 MWD entered into a funding agreement with the USBR, Southern Nevada Water Authority and Central Arizona Water Conservation District for the construction of the Drop 2 Reservoir adjacent to the All-American Canal (AAC). The reservoir helps control AAC flows and conserve water that otherwise might be lost or spilled. In return for its share of funding the project (428.7 million), MWD would receive 100,000 AF of conserved Colorado River water and have an opportunity to receive an ICS credit in this amount. The unit cost of this conserved water is \$287 per AF.² Similarly, in 2009 MWD participated in the pilot operation of the Yuma Desalting Plant with the same group of agencies. Again, the water produced from the plant is considered conserved Colorado River water and eligible for ICS credits. The project was anticipated to yield 23,200 AF at a cost of up to \$490 per AF.³ Finally, in 2009 also, MWD authorized an emergency short-term fallowing program within the Palo Verde Irrigation District, and an expenditure of up to \$23 million to fund the program, costing approximately \$340 per AF.⁴ Whether this program is fully implemented or not, it still represents a comparable cost to MWD for ICS eligible water supplies.

¹ The 2007 Interim Guidelines specify that when water is placed into ICS storage, a one-time 5% loss is charged to the quantity which becomes system water. ICS water in storage is also subject to a 3% loss per year.

² Data from MWD Memo 8-4, April 8, 2008

³ MWD presentation to its Water Planning and Stewardship Committee, September 14, 2009

⁴ MWD Memo 8-6, March 10, 2009

The preliminary valuation recognizes that Cadiz water might not be needed for ICS in certain years. While the 2007 Interim Guidelines allow (or do not prohibit) water from being placed in storage during surplus conditions, MWD would not likely want to always do so. According to 2011 modeling runs by the USBR⁵, the average probability between 2020 and 2060 for a full M&I surplus, which includes both Flood Control and some Quantified Surpluses, is 21.5 percent. To determine a comparable value between the three projects and Cadiz water, a reduction in the potential Cadiz volume by this percentage was applied:

Preliminary Valuation of ICS Credits for Cadiz Storage			
<u>Comparable MWD Project</u>	<u>Total AF</u>	<u>Unit Cost, \$/AF</u>	
Yuma Desalter	23,200	\$	490
Emergency Land Fallowing, PVID	66,000	\$	340
AAC Drop 2	100,000	\$	287
Weighted Average of all 3 Projects=		\$	330.38 \$/AF
ICS Value of Cadiz, assuming 1.962 MAF potential storage (1)		\$	648,206,638
(1) 2.5 MAF is reduced by 21.5 percent, the estimated time that Lake Mead would be in full M&I surplus or flood control releases			

At 50,000 AFY, the Cadiz water represents about 13 percent of the annual amount of ICS water available to be placed into or extracted from storage by MWD. If this annual amount is extrapolated over a 50 year period (to 2.5 MAF) the amount of ICS created would exceed the amount eligible to be stored at one time as ICS (1.5 MAF). For more than 1.5 MAF to be stored, water would have to be cycled through MWD's ICS storage account. To determine how much cycling might be possible, one can look at a similar MWD storage facility, Diamond Valley Reservoir (DVR). DVR is an 800,000 AF surface storage reservoir located within the MWD service area. Since its initial fill, the reservoir has cycled through a significant portion of its capacity (up to 400,000 AF) three times in the 12 years it has been in service.⁶ This cycling will continue because future demands and supplies projected in MWD's 2010 Regional Urban Water Urban Management Plan show that MWD will need at least 61 percent of its State Water Project (SWP) supplies in an average year (and more in dry years) in order to meet demands without drawing upon storage reserves. The SWP cannot reliably deliver this amount, and in fact can only delivery this amount about 60 percent of the time.⁷ This supply-demand gap will need to be met by storing water in wetter years and withdrawing these supplies in average or dry years. MWD's storage accounts will continue to be cycled in the future and it is expected that ICS will play an increasingly important component helping MWD manage its supply-demand gaps and variances.

⁵ Correspondence and analysis from CRB staff, 11/17/11

⁶ Source: Colorado River Board of California, June 2013 packet

⁷ Draft State Water Project Delivery Reliability Report, 2009, Figure 1, Page 3

Recent ICS Programs for Mexico

Over the past three years Mexico and the United States have executed a series of three "Minutes" that provide, in part, for ways to assist Mexico after an earthquake struck the Mexicali Valley in April 2010. The earthquake caused significant damage to Mexico's regional water conveyance infrastructure, thus limiting its ability to deliver water. The latest, Minute 319, was executed on November 20, 2012, and will be implemented over a five-year period. A major provision of Minute 319 deals with Colorado River operations, including the potential to create what is termed Intentionally Created Mexican Allocation (ICMA). The Minute also contains provisions for deliveries to Mexico under high U.S. storage scenarios, and deliveries to Mexico under low U.S. storage scenarios. Other pilot environmental water development programs and investigations of bi-national projects were included in the Minute including a pilot exchange program where up to 124,000 AF of ICMA would be made available for exchange use in the United States. Of that amount it is anticipated that 47,500 AF would be made available to MWD for its \$5,000,000 share of a funding agreement for the exchange program. The ICMS would be converted to a Binational ICS credit in Lake Mead.

The unit cost of the ICMA water that MWD would receive as part of its \$5,000,000 funding share of the pilot exchange program is estimated to be \$105 per AF, much lower than what MWD has paid or was willing to pay for participation in other recent projects that create ICS. On the other hand, Mexico will receive substantial benefits from the ICMA and other projects that will be initiated under Minute 319, so the cost to MWD of this storage is not necessarily comparable to the other three projects.

Similar to ICS, ICMA would allow Mexico to create water supply eligible for storage in Lake Mead from water conservation projects or development of new water sources, or it could create ICMA by deferring some of its normal 1.5 MAF apportionment deliveries. Mexico can create up to 250,000 AFY year of ICMA through the interim period ending December 2017, and up to 200,000 AF of ICMA could be returned and delivered to Mexico in a single year during this time, as long as deliveries do not exceed 1.7 MAF in a single year. Under the Minute, a maximum amount of 1.5 MAF of storage may accumulate in Mexico's account and the storage is subject to annual evaporation, similar to ICS water for the Lower Basin States. Unlike the Interim Guidelines for the Lower Basin where ICS deliveries cannot be made when Lake Mead is below elevation 1075, the ICMA program uses Lake Mead elevation 1,025 as the minimum for ICMA deliveries. Between Lake Mead elevations 1,025 and 1,075 feet, shortages occur and Arizona and Nevada's overall apportionment deliveries are reduced by up to 417,000 AF collectively. Mexico is subject to a 50,000 AF reduction from its overall 1.5 MAF apportionment when Lake Mead is between elevations 1,050 and 1,075, and a shortage of 70,000 AF if Lake Mead is between elevations 1,025 and 1,050. These reductions to Mexico can be more than made up by the ICMA. However below elevation 1,025, Mexico is subject to a 125,000 AF reduction from its 1.5 MAF apportionment and may not use ICMA. If Lake Mead is projected to be below elevation 1,000 Minute 319 requires that further consultation with Mexico be made.

The USBR recently released its August 2013 24-month study of Colorado River operations. This study sets criteria to be used in preparation of the 2014 Annual Operating Plan for Colorado River Reservoirs. The results of the study have been publicized in several recent news reports and show that under the "Most Probable Inflow" conditions, Lake Mead could fall from its current elevation of 1,106 feet above sea level to below the 1,075 foot elevation level, or 35 percent of capacity by April 2015. The "Most Probable Inflow" scenario represents a 50 percent chance that the elevation will be either above or below that level. Further, the study shows that the lake level could reach elevation 1,060, or 31 percent capacity, by July 2015. In simple terms, the August 2013 study results dictate that Lake Powell releases to Lake Mead will be reduced in 2014 to 7.48 MAF from the 8.23 MAF scheduled to be released in 2013. This reduction brings to focus the important role of Intentionally Created Surplus to the Lower Basin States and Mexico in times of reduced deliveries into Lake Mead. Lower water levels not only affect downstream deliveries to the Lower Basin States and Mexico but also impact power production and recreational and environmental values. For Mexico, Minute 319 provides time for the US and Mexico to monitor and study the impacts of its provisions. It envisions that a similar, longer term agreement will be developed that will address the same water management issues that are contained within Minute 319. The Interim Guideline for Lower Basin operations are in effect through December 2025. Extension of Minute 319 would also help to align the Mexican and Lower Basin operating provisions.

About Gordon Hess and GHA Water

Gordon Hess is a water resources and policy consultant with over 30 years of public and private sector experience in integrated water resource planning, design and construction of water infrastructure, and formulating local, regional and federal water policies. He is a former executive level manager with a major southern California wholesale water agency.

Gordon Hess and Associates Inc. (GHA Water) provides clients with consulting services related to policy, cost, and water rate impacts of infrastructure and water supply development. Drought management, water transfers, water pricing and rate structures, financial and economic analysis, preparing and administering grant funding, and other related matters are the firm's principal focus areas. Clients include public agencies, private companies, and organizations throughout California.

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