SUBMIT OPTION SUBMITTAL FORM BY:

1. EMAIL TO: COLORADORIVERBASINSTUDY@USBR.GOV
2. U.S. MAIL TO: BUREAU OF RECLAMATION, ATTENTION MS. PAM ADAMS, LC-2721, P.O. BOX 61470, BOULDER CITY, NV 89006-1470
3. FACSIMILE TO: 702-293-8418

Option Submittal Form

Contact Information (optional): ☐ **Keep my contact information private.**

Contact Name:	Title:
Affiliation:	
Address:	
Telephone:	E-mail Address:

Date Option Submitted: 2/14/2012

Option Name:

Reservoir Evaporation Control- Preferential Storage in Lake Powell

Description of Option:

The evaluation of this option addresses methods for evaporation control at the two largest Colorado River reservoirs: Lake Mead, located in southern Nevada, and Lake Powell, located in southern Utah and northern Arizona. The former covers 250 square miles behind Hoover Dam, and the latter covers 260 square miles behind Glen Canyon Dam. Both lakes are located in arid climates, with evaporation rates estimated to be 80 inches per year and 50 inches per year, respectively (United States Bureau of Reclamation [USBR] 2006b). This comes to an approximate loss of 1.7 million acre-feet per year (AFY) through evaporation for both reservoirs when Lake Powell is at elevation 3,700 feet (24.3 million AF) and Lake Mead is at elevation 1,221.4 feet (26.2 million AF).

The method considered to control evaporation is the use of preferential storage in Lake Powell.

Evaporation control could be achieved by managing changes between Lake Mead and Lake Powell. When the stored water in these reservoirs is significantly low, evaporation can be reduced by allowing all reductions in stored volume to be taken from Lake Mead. While maintaining a full Lake Powell, the lowering of Lake Mead would reduce the surface area and would reduce the water lost to evaporation for that stretch of the Colorado River.

Location: Describe location(s) where option could be implemented and other areas that the option would affect, if applicable. Attach a map, if applicable.

The location of supply for this study is Lake Mead and Lake Powell.

Quantity and Timing: Roughly quantify the range of the potential amount of water that the option could provide over the next 50 years and in what timeframe that amount could be available. If option could be implemented in phases, include quantity estimates associated with each phase. If known, specify any important seasonal (e.g., more water could be available in winter) and/or frequency (e.g., more water could likely be available during above-average hydrologic years) considerations. If known, describe any key assumptions made in order to quantify the potential amount.

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The amount of water available depends on the surface area and the evaporation rate of each reservoir. The surface area of Lake Powell is 252 square miles (mi2) at elevation 3,700 feet and has an estimated evaporation rate of 50 inches per year. This totals to a potential loss of approximately 672,000 AFY. The surface area of Lake Mead is 246 mi2 at elevation 1,221 feet and has an estimated evaporation rate of 80 inches per year. This totals to a potential loss of approximately 1.1 million AFY. The combined evaporation from both reservoirs is estimated at 1.7 million AFY.

Water recovery was estimated for various Lake Mead/Lake Powell operational scenarios. The Lake Powell option estimates the evaporation if Lake Powell were operated as full as possible while allowing the storage in Lake Mead to vary with water availability. The Lake Mead option estimates evaporation if Lake Mead were operated as full as possible while allowing Lake Powell to vary with water availability. The Combined Storage option estimates the evaporation if both Lake Powell and Lake Mead were operated to maintain similar storage volumes based on water availability. It is estimated that 0 to 290,000 AFY of Water is potentially available.

Additional Information

Technical Feasibility: Describe the maturity and feasibility of the concept/technology being proposed, and what research and/or technological development might first be needed.

The storage of water in the Colorado River system reservoirs is managed by the U.S. Bureau of Reclamation (Bureau) based on the annual Operating Plan transmitted by the Secretary of the Interior to the Governors of the Seven States.

Costs: Provide cost and funding information, if available, including capital, operations, maintenance, repair, replacement, and any other costs and sources of funds (e.g., public, private, or both public and private). Identify what is and is not included in the provided cost numbers and provide references used for cost justification. Methodologies for calculating unit costs (e.g., $/acre-foot or $/million gallons) vary widely; therefore, do not provide unit costs without also providing the assumed capital and annual costs for the option, and the methodology used to calculate unit costs.

Uncertain

Permitting: List the permits and/or approvals required and status of any permits and/or approvals received.

Preferential storage in Powell may require an EIS due to changes in river flows.

Legal / Public Policy Considerations: Describe legal/public policy considerations associated with the option. Describe any agreements necessary for implementation and any potential water rights issues, if known.

The operational policy would be different than current policy and would require negotiations between impacted parties.

Implementation Risk / Uncertainty: Describe any aspects of the option that involves risk or uncertainty related to implementing the option.

There may not be consensus among interested/impacted parties.

Reliability: Describe the anticipated reliability of the option and any known risks to supply or demand, such as: drought risk, water contamination risk, risk of infrastructure failure, etc.

Preferential Storage in Lake Powell - Preferential storage in Lake Powell would provide predictable and reliable water supplies but only under specific conditions and only by reducing loss. Minimal additional water would be available when the two reservoirs are full. When the combined storage of the two reservoirs is near one half of capacity, the greatest water savings can be achieved. These water savings are expected to be repeated each year, but they will vary based on the water stored in each reservoir.

Water Quality: Identify key water quality implications (salinity and other constituents) associated with the option in all of the locations the option may affect.

Preferential storage in Lake Powell, could be expected to impact water temperature and slightly decrease the TDS in the downstream river.

Energy Needs: Describe, and quantify if known, the energy needs associated with the option. Include any energy required to obtain, treat, and deliver the water to the defined location at the defined quality.

Energy Required	Source(s) of Energy
Those pumping directly from Lake Powell would require less energy due to higher lake levels. However, the opposite is true for those that pump from Mead.	Hydropower

Hydroelectric Energy Generation: Describe, and quantify if known, any anticipated increases or decreases in hydroelectric energy generation as a result of the option.

Location of Generation	Impact to Generation
	The administrative cost of managing preferential storage in Lake Powell is expected to be minimal when compared to current operation. The major cost is elimination of power generation capacity. Hoover Dam (Lake Mead) has a total generating capacity of 2,079 megawatts (MW), and generated 3.2 billion kilowatt-hours (kWh) in 2005. Glen Canyon Dam (Lake Powell) has a total generating capacity of 1,296 MW kilowatts and generated 3.2

	billion kWh in 2005. While preferential storage in Lake Powell would reduce the available revenue at Lake Mead, there would be an increase in the output of the power plant at Lake Powell.

Recreation: Describe any anticipated positive or negative effects on recreation.

Location(s)	Anticipate Benefits or Impacts
	Recreational use of the empty reservoir would be substantially affected. Lake Mead is a popular recreational spot and attracts 6 to 8 million visitors per year (House of Representatives, April, 2006). Testimony at the House of Representatives suggested that the annual economic impact from Lake Mead exceeds $500 million. Although the lowering of Lake Mead would limit many of the current recreational uses such as house boating and water skiing. it might increase other recreational uses, such as rafting. Wildlife including fish and waterfowl would be impacted by this operation. It is expected that a significant National Environmental Policy Act (NEPA) process will be required to review preferential storage in Lake Powell.

Environment: Describe any anticipated positive or negative effects on ecosystems within or outside of the Colorado River Basin.

Location(s)	Anticipated Benefits or Impacts
	Preferential storage in Lake Powell is likely to have some environmental impact. Recreational use of the empty reservoir would be substantially affected. Wildlife including fish and waterfowl would be impacted by this operation. It is expected that a significant National Environmental Policy Act (NEPA) process will be required to review preferential storage in Lake Powell.

Socioeconomics: Describe anticipated positive or negative socioeconomic (social and economic factors) effects.

The impacts on recreation are likely to also have impacts on regional socioeconomics.

Other Information: Provide other information as appropriate, including potential secondary benefits or considerations. Attach supporting documentation or references, if applicable.

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