

**SUBMIT OPTION SUBMITTAL FORM BY:**

1. EMAIL TO: [COLORADORIVERBASINSTUDY@USBR.GOV](mailto: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

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## Option Submittal Form

**Contact Information (optional):**

**Keep my contact information private.**

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

Date Option Submitted: February 17, 2012

**Option Name:**

Brackish water desalting in Yuma area
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**Description of Option:**

Irrigation using Colorado River water in the vicinity of Yuma has created a large mound of brackish groundwater. The mound holds approximately 600,000 to 800,000 acre-feet of brackish groundwater. The amount of water flowing from the groundwater mound that is excess of the needs for other purposes in the area and otherwise flows to Mexico through either surface or groundwater flow is available for use.
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**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 Yuma vicinity of Arizona, north of the international border with Mexico and east of the Colorado River. Water would presumably be desalted at the Yuma Desalting Plant.
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**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.

100,000 AFY would be reliably available. Current limitation is the capacity of the Yuma Desalting Plant, or about 80,000 AFY. Expansion of the plant to allow full utilization of the 100,000 AFY is likely to take ten years.
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## 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 Bureau's Yuma Area Office has been actively conducting research to understand the viability of treating groundwater rather than agricultural drainage water at the facility. Pilot plant evaluations indicate that this would be technically feasible with minor modifications to the plant. Recovery of the excess groundwater would be through expansion of the 242 wellfield on the north side of the international boundary. The current wells in the wellfield have large capacities, and expansion of the wellfield appears to be relatively straightforward.

**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.

The technical memorandum on brackish desalting prepared for the earlier augmentation study for the Colorado River system estimated costs at \$640 per acre foot in 2007 dollars

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

The recent pilot run of the Yuma Desalting Plant indicated that permitting issues are manageable. The major permitting concern is potential impacts to the downstream Cienega de Santa Clara in Mexico. However, since this options proposes the use of excess brackish groundwater rather than agricultural drainage water conveyed by the MODE, impacts to the Cienega should be minimal.

**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 major legal and public policy considerations relate to the availability of water under the Law of the River. The treated water would be exchanged for delivery to Mexico. This could result in significant accounting issues related to water compact allocations and may involve ongoing international negotiations on storage and use of ICS water by Mexico.

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

Primary implementation risks and uncertainty relate to the accounting for the water under compact allocations and legal arrangements made for exchange of the water with Mexico. The implementation risks in terms of the actual desalting at the Yuma Desalting Plant are relatively minimal and straightforward.

**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.

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Covered under Implementation Risk/Uncertainty. The volume of water should be reliably annually under current irrigation practices in the area. The reliability of the physical facilities at the Yuma Desalting Plant and the expanded 242 wellfield should be high.

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

The salinity of the brackish groundwater is well within the range that can be desalted by membrane processes. Total dissolved solids of the raw water would range from 1200 to 1900 mg/l and the total dissolved solids of the product water would be 500 if delivered to Mexico for potable supply and 750 if returned to the Colorado River for exchange.

**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
Desalting is an energy intensive process. Continuous power needs would be approximately 20 to 30 MW, and annual energy costs would be about \$9,000,000.	

**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
	Minimal impact.

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

Location(s)	Anticipate Benefits or Impacts
	Minimal impact.

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

Location(s)	Anticipated Benefits or Impacts
	Major considerations are increased emissions associated with power production for desalting energy. As described under Permitting, other environmental impacts are minimal.

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

No major effects.

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