# Option Submittal Form

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

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Date Option Submitted: 1/27/2012

Option Name:

Irrigation Infrastructure Modernization Program to Improve Efficiency

Description of Option:

It is widely understood that irrigation for agriculture in the Colorado River Basin accounts for 85%-90% of water use. Modernization of antiquated irrigation delivery systems with technology can dramatically improve delivery efficiency of irrigated water by 20%. The improvement in efficiency results in water that is measured, managed and controlled. Water that would previously be lost in operational spills, overages to farmers beyond their water right & needs, and overtopping ditch banks can be controlled through improved infrastructure and new technology. Operational costs to irrigation districts can be reduced and farmers can realize improved service levels.

The Colorado River Basin Study mirrors a similar exercise done for the Goulburn- Murray River Basin in Australia. This basin covers an area of 26,200 square miles in an arid region similar to the American Southwest. The 2.4 million acre feet of water within this basin are distributed to more than 16,000 farmers over 4,100 miles of canals.

In 2007, in the midst of the worst drought on record, the Australian Federal Government explored options to reduce water use for irrigation through conservation, similar to the QSA agreement between Imperial ID and MWD in California. The Federal Government committed $1billion as the first stage of a complete implementation of technology across the irrigation delivery system infrastructure. Rubicon Water was selected to supply this unique and revolutionary technology throughout the Goulburn-Murray Basin.

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

Further analysis would be needed to identify the best irrigation districts where the technology could be used in the Colorado River Basin for the greatest value (return on investment) and benefit. However the technology would be effective and provide water conservation in most districts in the Basin. The technology has already been successfully implemented in pilot programs at two locations in California (Oakdale ID and RD108) with demonstrated benefits. The pilot programs have resulted in a 7-11 year return on investment with a $40-$75 cost per acre foot conserved (dependant on size of implementation).

Another potential area to consider would be a partnership with the water authority (Conagua) in Baja Mexico to pay for this technology to be implemented there in exchange for some of their water right to be put to use in the US side of the Basin

**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.

The Irrigation Infrastructure Modernization Program described above could result in an estimated water savings of 900k to 1.8m acre feet each year Basic assumptions are:

Upper Basin: 90% of 7.5m acre feet are used for irrigation or 6.75m af
Lower Basin: 85% of 7.5m acre feet are used for irrigation or 6.375m af

Typically the distribution efficiency of irrigation systems in the Western US (and globally) is about 70% which would give the Colorado River Basin a rough efficient water use of 9.18m acre feet (13.125m af * 70%).

# 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.

As mentioned before, this is a proven technology currently covering more than 4,000 miles of canals in Australia, controlled by 10,000 automated gates. The first automated control gates were installed in 2002 and full scale implementation began in 2007. The technology has also been successfully implemented in the US at Oakdale ID and RD108.

**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.

Since the technology relies on using the existing canal delivery system (as opposed to pipelines), the costs are very favorable with a Return on Investment of 7-11 years. Compared to pipelines, which have a similar level of efficiency the costs are dramatically less:

Automated Rubicon Network Control technology: ~$150k to $200k per mile (resulting in efficiency of ~85%)
Typical Pipelines: $800k to $1m+ per mile (resulting in efficiency ~85-90%)

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

All work is done in the canal right of way and not “in” the rivers. Therefore, it is estimated that no special permitting would be required.

**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.

No special considerations required; although, the government needs to actively partner with irrigation districts to gain their support for implementation of the technology.

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

From a technology perspective there is no risk. The challenge of implementing a new technology within irrigation districts is to gain the support and understanding of the people (operators and farmers) who will be using or be impacted by the technology. Their support in embracing the benefits of this technology makes for a very successful operation as witnessed at Oakdale ID in California.

**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.

The technology has been proven in harsh and arid environments around the world including Australia, China, Vietnam, Mexico and the Western US. The hardware and software are mature technologies and proven very reliable. As with any automation technology, there can occasionally be individual failures of components at some instance over a products lifetime. The technology has a robust alarm system, at every gate, to allow real time alerts to be conveyed to operators for immediate resolution.

The hardware is constructed in a modular design that allows it to be maintained in the field with minimal tools, training, and easily replaceable parts.

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

A great benefit of this technology is that only the water ordered by the farmer is brought onto the farmer's field. The remaining water is retained in the canal or river. This reduces unnecessary water from being applied to the field that often contains fertilizer, pesticide and other chemicals. Water quality downstream is improved without the impaired water recharging back into the 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 |
|---|---|
| None required – solar powered system | Solar Power. The proposed option is a solar powered system and thus does |
| | |

**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 |
|---|---|
| Not applicable | No impact |
| | |

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

| Locations | Anticipate Benefits or Impacts |
|---|---|
| | Conserved water can be left in reservoirs and rivers for boating, tubing, fish |
| | |

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

| Locations | Anticipated Benefits or Impacts |
|---|---|
| | Conserved water can be put back to best use which may include leaving wat |
| | |

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

Implementing this technology creates more efficient irrigation districts and farms that are better able to stay in business during droughts and keeping more people employed that are injecting spending and tax dollars in the local community.

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

The following material has been attached:

- A list of Relevant Experience
- NVIRP Case Study Presentation
- OID Case Study Brochure
- Three case studies written by existing customers

A video describing the Northern Victoria Irrigation Project and associated technology can be found at http://www.youtube.com/watch?