INDIAN WELLS VALLEY
COOPERATIVE WATER MANAGEMENT GROUP

INDIAN WELLS VALLEY
COOPERATIVE WATER MANAGEMENT GROUP

Post Office Box 1329
Ridgecrest, California 93556-1329

March 6, 2013

California Department of Water Resources
Division of Integrated Regional Water Management
Financial Assistance Branch
Post Office Box 942836
Sacramento, CA 94236-0001
Attn: Mr. Zaffar Eusuff

RE: Indian Wells Valley Water District's Proposition 84 Grant Application

Dear Mr. Eusuff:

The Indian Wells Valley (IVW) is located in the northern part of the Mojave Desert, east of the Sierra Nevada and south of the Owens Valley. There is a single source of potable water supply; the local groundwater aquifer underlying the IWV. This aquifer is recharged from precipitation in the Sierra Nevada Mountains. Groundwater is pumped to supply the Indian Wells Valley Water District, Naval Air Weapons Station-China Lake (NAWS), Inyokern Community Services District, and numerous private wells. Additionally, groundwater is used for agricultural purposes, mostly in the northern portion of the basin, and Searles Valley Minerals exports water from the aquifer for the community potable water system and mining operations in Trona/Searles Valley located about 25 miles east of the IWV.

In 1995, ten local stakeholders agreed upon a Cooperative Groundwater Management Plan resulting in formation of the Indian Wells Valley Cooperative Groundwater Management Group (IWVCGMG). The group was comprised of representatives of the ten signatories including the Bureau of Land Management, the City of Ridgecrest, Eastern Kern County Resources Conservation District, Searles Valley Minerals, Indian Wells Airport District, Indian Wells Valley Water District, Inyokern Community Services District, Kern County Water Agency, Naval Air Weapons Station and Quist Farms. The County of Kern - Board of Supervisors 1st District became the eleventh signatory in 2003. This Management Group was established to accomplish the following objectives:

1. Limit additional large scale pumping in areas that appear to be adversely impacted.

2. Distribute new groundwater extraction within the Valley in a manner that will minimize adverse effects to existing groundwater conditions (levels and quality), and maximize the long-term supply within the Valley.

3. Aggressively pursue the development and implementation of water conservation policy and education programs.

4. Encourage the use of treated water, reclaimed water, recycled, gray and lower quality water where appropriate and economically feasible.

5. Explore the potential for other types of water management programs that are beneficial to the Valley.

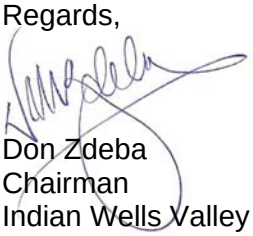
6. Continue cooperative efforts to develop information and data which contributes to further defining and better understanding the groundwater resource in the Indian Wells Valley.

7. Develop an interagency management framework to implement and enforce the objectives of this Plan.

Previous groundwater studies in the basin indicate that the groundwater budget in the IWV is not only in a deficit, but that the water of highest quality is being extracted now. Recognizing this, IWV users have been encouraged to implement water conservation measures to reduce the pumping deficit. Nevertheless, the IWVCGMG recognizes the IWV will eventually need to treat brackish water in order to extend the life of the groundwater resource. The Indian Wells Valley Water District conducted a study from 2007-2010 that proved local brackish water can be treated effectively with zero liquid discharge. The next step is to identify brackish water resources that can be treated and introduced to the potable water supply.

For the benefit of all users of the Indian Wells Valley aquifer, the signatories of the IWVCGMG strongly support the Indian Wells Valley Water District's grant application to fund a brackish water resource study.

Regards,



Don Zdeba
Chairman
Indian Wells Valley Cooperative Groundwater Management Group
www.iwvgroundwater.org

Cooperative Groundwater Management Plan for the Indian Wells Valley

Preamble:

The groundwater aquifer system in the Indian Wells Valley (as shown in Figure #1) is complex and the supply is finite. Substantial data is available regarding groundwater production in the Valley but only limited data exist pertaining to the aquifer characteristics. While considerable data has been collected through individual and cooperative technical studies, there is still a need for additional information to further characterize the watershed and to support the management of the aquifer system in the Valley.

Large scale cooperative groundwater technical studies have been completed and are continuing in the Indian Wells Valley. The results of this effort contributed valuable insights to the nature of the Valley's groundwater resources. Based on these studies, the major participants in the study (the Indian Wells Valley Water District, Naval Air Weapons Station/China Lake, Searles Valley Minerals) and other Parties have concluded that it is in their best interest to participate in the development of this Cooperative Groundwater Management Plan (the "Plan") to extend the useful life of the groundwater resources to meet current and foreseeable user needs in the Valley.

Purpose:

The purpose of this Plan is to:

1) set forth guidelines and management principles for the production, distribution, and use of groundwater within the purview of the participants;
2) further develop (cooperatively or individually) the technical data and analytical capabilities to better understand the nature and characteristics of the watershed and aquifer system;
3) apply these guidelines toward sound conservation and management practices to extend the useful life of the groundwater resource to meet current and foreseeable future demands;
4) coordinate interested local agencies and water producers into a cooperative planning effort to develop objectives and share information and management practices to maintain the life of the resource.
5) develop and refine criteria for the selection, collection, sampling, and monitoring protocol of groundwater and groundwater production and/or monitoring wells within the Indian Wells Valley.

The Parties agree that, within the framework established by this Plan, the Parties themselves are best able to determine how to meet their respective future water supply needs and assure the availability of a long-term, high quality water supply.

The Parties recognize the varied beneficial uses within the Valley, including residential, agricultural, industrial, municipal, commercial, and public. In addition, Searles Valley Minerals currently exports water from the Valley. Groundwater planning for the Valley must take these existing uses into account.

This Plan is not intended to alter or affect any existing water rights, and no Party, by executing this Plan, waives any of its rights.

This Plan is intended to be a flexible document. As more groundwater information becomes available through technical studies, data collection and analysis, and experience in interpreting the effects of pumping pattern changes it is expected, and agreed, that this Plan will be modified accordingly.

Planning Concerns:

The following concerns have provided the incentive to the Parties for participating in a cooperative planning effort in the Indian Wells Valley.

1) Water levels have declined in areas within the Valley.
2) As depth to groundwater increases, production and distribution costs will increase.
3) As depth to groundwater increases, the potential exists for poorer quality water to mix with and degrade higher quality water.
4) Some portion of the recharge to the Valley from the Sierra Nevada may be lost to evaporation in the China Lake playa.
5) Our understanding of the complex geohydrology of the Valley is based on groundwater quantity and quality data collected from available production and monitoring wells located throughout much of the Valley. The recharge and discharge characteristics of the aquifer are not fully understood. Adequacy of the known groundwater reserves to meet future demands shall be determined.

Planning Objectives / Groundwater Management Guidelines:

In an effort to successfully address the aforementioned concerns, the Parties' actions will be directed toward the following groundwater management objectives:

Planning Objective #1: Limit additional large scale pumping in areas that appear to be adversely impacted.

No Party will increase it's annual production of water from the groundwater depression identified in Figure #2 (applies to extractions greater than 5 AF/yr.). The water producing Signatories' long-term goal is to limit new and reduce existing production in this area to the fullest extent possible over an economically reasonable time frame.

Planning Objective #2: Distribute new groundwater extraction within the Valley in a manner that will minimize adverse effects to existing groundwater conditions (levels and quality), and maximize the long-term supply within the Valley.

Future groundwater development by the Parties will be distributed within the Valley in a manner that is designed in accordance with aquifer characteristics. The Parties will consider developing, to the fullest extent possible, individually or as a cooperating group, wells in the outlying areas of the Valley. Areas such as Indian Wells Valley Water District's southwest field should be considered as should wells designed to capture recharge from all areas of the watershed. As a general guideline, the location and capacity of new production wells (excluding domestic wells) should not unreasonably interfere with existing wells.

Planning Objective #3: Aggressively pursue the development and implementation of water conservation and education programs.

The Parties have collectively developed a written policy regarding water conservation (Water Conservation Public Policy-Attachment A) and will continue to develop and refine, to the extent possible, water conservation guidelines and education programs.

Planning Objective #4: Encourage the use of treated water, reclaimed water, recycled, gray and lower quality water where appropriate and economically feasible.

The Parties will consider, individually or collectively, use of non-potable water, such as treated sewage effluent or poorer quality sources, for appropriate re-use applications. The Parties will consider constructing, individually or collectively, recharge facilities including spreading basins and other types of facilities to capture and conserve storm water flows to augment efforts to replenish groundwater reserves. Water treatment and blending of different quality waters should be pursued to extend the life of the groundwater resource.

Planning Objective #5: Explore the potential for other types of water management programs that are beneficial to the Valley.

The Parties will consider, individually or collectively, projects such as water transfers, water banking, water importation, groundwater replenishment, and other programs that will enhance or prolong the groundwater reserves in the Valley. The Parties may consider joint acquisition, use, and operation of such projects and/or programs.

The Parties will coordinate with, and provide input to, land use planning authorities regarding water-intensive development activities within the Valley.

The Parties will review any new proposed export of water from the Valley with respect to its effect on groundwater resources, and make appropriate response,

including but not limited to participation in the environmental review and planning process.

Planning Objective #6: Continue cooperative efforts to develop information and data which contributes to further defining and better understanding the groundwater resource in the Indian Wells Valley.

The Parties will continue to cooperate, to the fullest extent possible, in data gathering and analysis projects focusing on groundwater recharge, discharge, storage, quality, quantity, transmissivity and storativity as it pertains to the groundwater resources of the Indian Wells Valley. In conjunction with this objective, the Parties have collectively developed a Selection Protocol for wells Used for Water Level and Water Quality Monitoring (Attachment B), a Groundwater Sampling Protocol (Attachment C), a Groundwater Sampling Plan (Attachment D), and a Water Level Monitoring Protocol (Attachment E).

Planning Objective #7: Develop an interagency management framework to implement objectives of this Plan.

The following entities are signatories on this Plan: Eastern Kern County, Resource Conservation District, Indian Wells Valley Airport District, Indian Wells Valley Water District, Inyokern Community Services District, Kern County Water Agency, Naval Air Weapons Station/China Lake, Searles Valley Minerals, the City of Ridgecrest, Quist Farms, the Bureau of Land Management, and Kern County.

The Parties may develop a cooperative agreement which defines the roles, responsibilities, rights, and obligations of all participants, affords opportunities to enlist new members and provides the administrative framework for implementing applicable elements of this Plan. A Steering Committee with representatives from each signing entity has been established to assist with coordinating each signing entity's groundwater management actions in conformity to the Plan. In conjunction with this objective, as well as Planning Objectives 1 through 6, the Parties have collectively developed a Working Group Objectives Action Plan (Attachment F).

Signing this Plan does not create any financial obligations. Future financial obligations will be determined in the agreement developed to implement this plan.

Signatory Accomplishments

Since cooperating as a groundwater resources management group, the Signatories have accomplished many water resource projects in an effort to further understand the aquifer system and to extend the useful life of the aquifer. The accomplishments are listed in Attachment G and may be revised and updated from time to time without amending the Plan or without obtaining the mutual written consent of the Parties.

Severability:
If any part of this Plan is declared invalid by a court of law, the remaining provisions of the Plan shall continue in full force and effect.

Changes:
It is understood and agreed that this Plan contains all the provisions agreed upon by the Parties thereto. This Plan may be amended at any time by mutual written consent of the Parties. Notice of proposed changes must be submitted to the other Parties at least thirty (30) days in advance of the proposed change.

Effective Date, Termination, and Withdraw:
This Plan is effective when signed and will remain in effect until amended or terminated by mutual written agreement. Any Party may withdraw from this Plan by giving the other Parties six months' written notice. This agreement will remain in effect for six years from the signing date and will be reviewed triennially.

Originally executed the 21st day of September, 1995, at Ridgecrest, California.

Revised and accepted this 16th day of March, 2006 at Ridgecrest, California

Revised and accepted this____ day of___, 2012 at Ridgecrest, California.

4/23/12

COMMANDER, NAVY REGION SOUTHWEST

KERN COUNTY WATER AGENCY

CITY OF RIDGECREST

INYOKERN COMMUNITY SERVICES DISTRICT

INDIAN WELLS VALLEY WATER DISTRICT

SEARLES VALLEY MINERALS

EASTERN KERN COUNTY RESOURCES CONSERVATION DISTRICT

INDIAN WELLS VALLEY AIRPORT DISTRICT

BUREAU OF LAND MANAGEMENT QUIST FARMS

KERN COUNTY

Effective Date, Termination, and Withdraw:
This Plan is effective when signed, and will remain in effect until amended or terminated by mutual written agreement. Any Party may withdraw from this Plan by giving the other Parties six months' written notice.

Originally executed the 21st day of September, 1995, at Ridgecrest, California.

Revised and accepted this 16th day of March, 2006 at Ridgecrest, California.

Revised and accepted this 15th day of March, 2012 at Ridgecrest, California.

NAVAL AIR WEAPONS STATION
CHINA LAKE

By_____

KERN COUNTY WATER AGENCY

By_____

CITY OF RIDGECREST

By_____

INYOKERN COMMUNITY SERVICES DISTRICT

By_____

INDIAN WELLS VALLEY WATER DISTRICT

By_____

SEARLES VALLEY MINERALS

By_____

EASTERN KERN COUNTY RESOURCES CONSERVATION DISTRICT

By_____

INDIAN WELLS VALLEY AIRPORT DISTRICT

By_____

BUREAU OF LAND MANAGEMENT

By_____

QUIST FARMS

By_____

KERN COUNTY

By_____

Indian Wells Valley Water District

Pilot Testing of Zero Liquid Discharge Technologies Using Brackish Groundwater for Inland Desert Communities

Pilot Testing

May 2010

FINAL

carollo

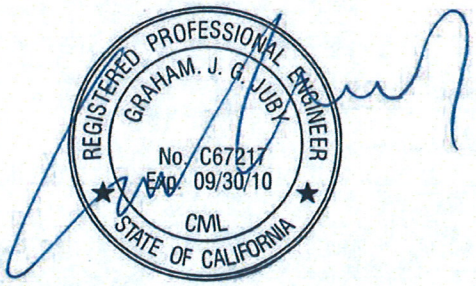
Engineers...Working Wonders With Water™

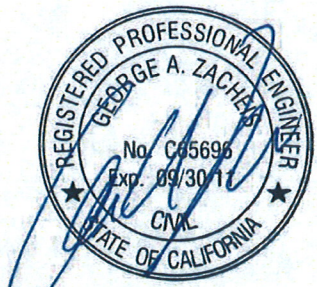
Indian Wells Valley Water District

PILOT TESTING OF ZERO LIQUID DISCHARGE TECHNOLOGIES USING BRACKISH GROUNDWATER FOR INLAND DESERT COMMUNITIES

FINAL

May 2010





carollo
Engineers...Working Wonders With Water™

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Chapter ES
EXECUTIVE SUMMARY

ES.1 INTRODUCTION AND BACKGROUND

In response to the greater demands for potable water in the Indian Wells Valley Water District (IWVWD) service area, the IWVWD identified brackish groundwater desalination from the Northwest Well Field (NWWF) as a potential new source of potable water. The groundwater from the NWWF was originally used for irrigation and cannot be used for drinking water without treatment. The treatment of brackish groundwater will allow the IWVWD to increase capacity while using the existing resources in the Indian Wells Valley.

After completing a detailed preliminary design in February 2006, IWVWD submitted a proposal to the Department of Water Resources (DWR) requesting financial assistance as part of the 2006 Water Desalination Grant Program (Chapter 6(a) of Proposition 50) to conduct a brackish groundwater desalination pilot study. IWVWD's proposal was accepted for funding by the DWR, and IWVWD hired Carollo Engineers, P.C. (Carollo) to conduct a turnkey piloting project focused on minimizing the brine volume produced from brackish groundwater desalination.

The minimization of brine volume is an important aspect of this project. Due to the IWVWD's geographical location, traditional brine disposal options such as ocean discharge are not feasible. Ultimately, a zero liquid discharge (ZLD) treatment system, incorporating a brine concentrator (BC) followed by evaporation ponds, will be required, and decreasing the brine volume to the BC can lead to significant capital and operational cost savings.

This report summarizes results from the pilot testing conducted during June 2008 through June 2009. The work focused on establishing reasonable conditions under which the treatment system could operate. This information enabled brackish groundwater desalination to be evaluated as a potential future source of potable water in the IWVWD.

ES.2 GOALS AND OBJECTIVES

The overall goal of the pilot project was to determine the feasibility of brackish groundwater desalination to supply potable water for the IWVWD using the treatment train combination identified in the 2006 Preliminary Design Report (PDR) as the most appropriate treatment approach to achieve a ZLD system. Results from this testing are intended for use as a basis to determine the economic viability of constructing a 3,000 acre-feet per year (AFY) ZLD treatment process that would increase potable water production in the region.

The major objectives of this work were to:

1. Demonstrate the technical feasibility of the primary and secondary desalting technologies at pilot scale using reverse osmosis (RO) and electrodialysis-reversal (EDR), respectively.

2. Demonstrate that the primary RO process is able to treat NWWF groundwater with minimal membrane fouling after pretreatment to remove iron (Fe) and manganese (Mn). In addition, verify that the secondary desalting process can operate at its projected water recovery level. A combined water recovery level of 90 percent was predicted via a desktop analysis conducted in 2006.
3. Evaluate the effectiveness of reversible RO operation to reduce membrane fouling tendencies and to permit higher recoveries.
4. At bench scale, evaluate the removal of selenium (Se), arsenic (As), and uranium (U) from the concentrate stream produced by the secondary desalting step.
5. Investigate potential users for high-quality distillate that would be generated by a thermal brine concentration step.
6. Evaluate the cost of using solar power for a full-scale plant.

ES.3 MATERIALS AND METHODS

The pilot facility was housed in a temporary building constructed adjacent to Well No. 1 in the NWWF. The pilot plant consisted of Fe and Mn pretreatment filtration pilot, a primary RO pilot, and a secondary EDR pilot operating on the primary RO concentrate stream. Well water was pumped to the pretreatment system where Fe and Mn were removed for subsequent treatment using RO; the concentrate stream was then fed from the RO unit to the EDR unit for further treatment. The RO and EDR permeate, EDR concentrate, and Fe/Mn filter backwash were all combined and returned to a pilot process sump where the combined water could be pumped out onto the surrounding farmland for disposal.

As part of the original pilot testing plan, the RO unit was to be operated for 3 months in conventional mode (Phase I) and 3 months in reversible mode (Phase II). Likewise, the EDR was to be operated for a total of 3 months with a goal of 1,000 hours of operation. During operation, each process stream was to be sampled and a detailed water quality analysis was to be performed. Bench-scale testing was also included in the test plan to initially determine the free chlorine dose required for adequate Fe and Mn removal and testing of As, Se, and U coagulation/sedimentation jar test. Coagulation bench-scale testing was to be undertaken on the final EDR concentrate sample to determine if these constituents could be removed and sequestered from the final concentrate prior to BC treatment. High levels of As, Se, and U in the brine pond salts could result in solids that require disposal to costly hazardous waste landfills.

ES.4 RESULTS AND DISCUSSION

The pilot facility was operated for a 7-month period and during this time, the RO unit was operated for a total of 4,400 hours (2,100 hours in conventional mode and 2,300 hours in reversible mode). Despite delays in the preparation and shipment of the EDR unit, 1,600 hours of operation were achieved, which exceeded the initial goal of 1,000 hours.

Long runtime and stable performance enabled a significant amount of data collection during the pilot study. This data allowed performance trends to be established and conclusions on system performance to be drawn.

The membrane processes (RO plus EDR) achieved an overall recovery of 92 percent and both produced a high-quality product removing 90 percent of the influent total dissolved solids (TDS). This removal resulted in a combined product TDS of 140 milligrams per liter (mg/L). All treated water goals were met (with the exception of boron) and the removal of more than 90 percent of many of the contaminants of concern (including As, Se, U, Fe, and Mn) was achieved. The boron treatment goal of 0.8 mg/L was not met by the membrane processes. Boron is not regulated and there is no maximum contaminate limit (MCL), however, the California Department of Public Health (CDPH) has set a notification level of 1 mg/L for boron. The boron concentration in the combined product was 1.4 mg/L; thus, the IWVWD would either need to notify the governing body that this limit has been exceeded, provide additional treatment to remove boron, or blend the effluent with water from the IWVWD's potable wells to reduce the boron concentration.

ES.5 COST ESTIMATE

A preliminary construction cost estimate (order-of-magnitude) was developed for a greenfield brackish groundwater treatment facility to produce 3,000 AFY. Using cost assumptions and vendor quotes, an overall project cost was developed, which includes engineering, legal and administration, and a 15-percent contingency. The project cost estimate is $46.0 million. This estimate includes chemical systems, treatment equipment, storage tanks, pumps, and other ancillaries required for treatment. It does not include the cost of distribution piping downstream of the finished water high-lift pump station. The total annual operation and maintenance (O&M) cost is estimated as $3.0 million, which includes electrical costs, chemical costs, membrane and filter media replacement costs, sludge disposal costs, and labor costs. The annual capital and O&M costs are summarized in Table ES.1.

Table ES.1 Annual Cost of Treatment
Pilot Testing of Zero Liquid Discharge Technologies Using Brackish Groundwater for Inland Desert Communities
Indian Wells Valley Water District

Item	Cost
Amortized Capital Cost[(1)(2)(3)]	$4,009,000
Annual Operating Cost	$3,041,000
Total Estimated Annual Cost	**$7,050,000**

Notes:
(1) Assuming a 20-year term and an annual fixed interest rate of 6 percent.
(2) Land costs not included as IWVWD has available land for the treatment facility.
(3) Costs for drilling and equipping wells, distribution piping from wells to plant, and distribution piping downstream of finished water high-lift pump station are not included.

The annual cost equates to $7.21 per 1,000 gallons ($2,350 per acre-foot (AF)). However, if this cost is split between the cost of the primary desalting process and brine disposal, then it can be seen that brine disposal comprises 65 percent of the overall cost . A comparison of primary desalting and brine disposal costs are shown in Table ES.2.

Table ES.2 Comparison of Primary Desalting and Brine Treatment Costs Pilot Testing of Zero Liquid Discharge Technologies Using Brackish Groundwater for Inland Desert Communities Indian Wells Valley Water District

Item	Primary Desalting $/AF[1]	Brine Treatment $/AF[1]
Capital Cost[2]	454	882
O&M Cost	360	654
Total Cost	**$814**	**$1,536**

Notes:
(1) $/AF values were determined using the cost per year for both capital and O&M divided by the amount of water produced per year (3,000 AF).
(2) Assuming a 20-year term and an annual fixed interest rate of 6 percent.

If the IWVWD had the option of disposing to an ocean brine line, instead of on-site treatment, overall treatment costs would be less. For example, there would still be a cost associated with ocean disposal - approximately $500 per AF. The total costs of the optimal case, primary desalting with ocean disposal, would be approximately $1,314 per AF.

With the additional treatment to achieve a ZLD system, the IWVWD benefits from the extra drinking water recovered, however, the value of this additional water does not compare to the cost of brine treatment. Thus, due to the IWVWDs inland location, a premium of about $1,036 per AF is added to the cost of brackish groundwater treatment.

ES.6 CONCLUSIONS

1. Pretreatment that includes sodium hypochlorite addition and granular media filtration can effectively remove Fe and Mn from the influent well water. During pilot testing, both Fe and Mn were consistently removed to below detection limits.
2. The RO unit can produce a high-quality, low-TDS product. During pilot testing, the RO product TDS was consistently less than 20 mg/L.
3. During pilot testing, the RO unit operated at recoveries ranging from 60 percent to 75 percent. Stable performance was achieved at all recoveries.
4. Biofouling caused a majority of the performance decline in the RO unit. The first stage of the RO unit experienced significant biofouling due to the biological content of the influent well water. The biofouling allowed for approximately 50 days of operation between chemical cleans. At full-scale, the feed water to the RO unit would be dosed with a disinfectant (such as monochloramine), to control biological growth in the RO unit, which should increase the interval between clean-in-places (CIP) operations.

5. The RO unit can be cleaned using a standard cleaning cycle with an extended soak time.

6. The reversible RO configuration has the potential to improve RO performance. During pilot testing, the reversible operation demonstrated the potential to reverse membrane fouling and improve overall performance.

7. The EDR unit can produce a high-quality, low TDS product when operating on the RO concentrate stream (3,040 mg/L TDS). During pilot testing the EDR product TDS was consistently less than 600 mg/L.

8. During pilot testing, the EDR unit was operated at recoveries from 75 to 80 percent; stable performance was achieved at all recoveries. The EDR experienced little to no scaling or fouling during operation.

9. The combined RO and EDR product water was able to meet all treatment goals set in the preliminary design except for the boron concentration. The average boron concentration was 1.4 mg/L, compared with the treated water goal of 0.8 mg/L. The combined product TDS averaged 140 mg/L and will need to be stabilized using lime stabilization at full-scale unless blending with other IWVWD wells is possible.

10. Pilot testing was able to achieve stable performance at an overall recovery of 92 percent, which is in line with the predicted values identified in the 2006 PDR.

11. The combined EDR/slurry precipitation and recycle RO (SPARRO) system (patent pending) was able to improve EDR performance and increase the EDR recovery. Further testing of this process combination is needed.

12. The bench-scale testing showed little to no removal of arsenic, selenium, and uranium due to competition with other ions present in the EDR concentration at much higher concentrations. However, it was determined that the background levels of these constituents were not high enough to cause ZLD residuals in brine ponds to be classified as hazardous or naturally occurring radioactive material (NORM).

13. Final brine treatment using a brine concentrator could achieve a recovery of 95 percent, increasing the overall plant recovery to 99.6 percent. The final 0.4 percent of flow would be disposed of in a lined evaporation pond.

14. A 1-megawatt (MW) solar facility would produce approximately 20-percent of the treatment facilities energy demand and cost the IWVWD approximately 5.0 million in additional capitol cost if the solar facility is purchased by the IWVWD.

15. The total project cost estimate for a treatment system to produce 3,000 AF per year is $46.0 million. The O&M costs for such a facility would be about $3.0 million per year. The capital and O&M costs equate to unit cost of water of $2,350 per AF.

DEPARTMENT OF THE NAVY
NAVAL AIR WEAPONS STATION
1 ADMINISTRATION CIRCLE
CHINA LAKE CA 93555-6100

IN REPLY REFER TO:

5090
Ser PR241/212
March 25, 2013

Mr. Zaffar Eusuff
CA Department of Water Resources
Division of Integrated Regional Water Management
Financial Assistance Branch
PO Box 942836
Sacramento, CA 94236-0001

Dear Mr. Eusuff:

SUBJECT: INDIAN WELLS VALLEY WATER DISTRICT'S PROPOSITION 84 GRANT APPLICATION

The Naval Air Weapons Station (NAWS) is one of the premier Research, Development, Test, and Evaluation centers in the nation. NAWS manages 1.1 million acres of withdrawn public lands in our North and South Ranges including large areas of land containing brackish water resources within the central and eastern portions of the Indian Wells Valley (IWV). The Navy also supports prudent groundwater management and stewardship of all of our groundwater resources within and adjacent to the IWV groundwater basin.

The IWV is located in the southwestern portion of the Basin and Range Geophysical Province, east of the Sierra Nevada and south of the Owens Valley. There is a single source of potable water supply; the local groundwater aquifer underlying the IWV. Groundwater is pumped to supply NAWS, IWV District, Inyokern Community Services District, and numerous private wells. Additionally, groundwater is used for agricultural purposes, mostly in the northwestern portion of the basin, and Searles Valley Minerals exports water from the aquifer for the community potable water system and mining operations in Trona/Searles Valley located about 25 miles east of the IWV. The aquifer is recharged from precipitation in the Sierra Nevada Mountains and by regional groundwater flow. Our aquifer has experienced overdraft conditions since the 1960s and the characterization of the brackish groundwater resources in the basin will be beneficial to all the water users in the future.

5090
Ser PR241/212
March 25, 2013

On behalf of the NAWS China Lake, I would like to confirm our support of the IWV Water District grant application for the characterization of the extent and feasibility of utilizing brackish water to extend the useful life of the local aquifer. Direct Navy support for the grant will include providing access to areas within Station boundaries for potential drilling sites, sampling, and monitoring of wells within the shallow aquifer system and by providing technical input/review during the grant project. The Navy looks forward to working with the project partners in completing this grant as part of a collaborative effort for the watershed and look forward to utilizing data collected to refine our existing Geographic Information System database and updating the group's website (www.iwvgroundwater.org).

Wise groundwater management is critical to our collective future of the IWV, and its inhabitants including the NAWS China Lake. While the IWV Cooperative Groundwater Management Group has made a noteworthy start on gathering valuable information, much is left to accomplish. I thank you for your consideration.

Sincerely,

D. A. LAZAR
Captain, U.S. Navy
Commanding Officer