

cannot be explained by evaporation of the water as it flows across the field.

The average profile salinities of the heavy textured Imperial Valley soils were always considerably higher in the tail end portions of the fields compared to the upper sections, and the salinity levels were proportionally higher in the shallow soil depths in the tail end of the fields compared to the upper end. While absolute levels of salinity were always higher in the heavy textured soils compared to the light textured soils, accumulations of salt were not found within the beds of the former furrow-irrigated soils as they were in the analogous light textured ones. These data imply that, as the result of cracking, the salts that otherwise would be expected to accumulate in the beds have been removed as the irrigation has flowed through the beds via the network of fractures and cracks that form during the drying of such heavy textured soils between irrigation events. Whereas classical two-dimensional distributions of salinity were observed in the furrow/bed environment of the light textured soils, only one-dimensional patterns were observed for the heavy textured soils. The fact that salinity increased more rapidly in the upper part of the soil profile compared to the lower sections of the fields of heavy textured soils suggests that significant horizontal salt transport occurred from the head to the tail of such fields.

Thus prevalent concepts of salt movement and leaching described in typical textbooks do not apply to highly cracking soils—certainly not those that dominate the Imperial Valley of California. Similar heavy textured swelling/cracking soils are found in the many other irrigated lands of the world, such as the Nile Delta of Egypt. The leaching patterns of such soils are dictated by the dynamic flow of water in the network of cracks that exist within and throughout the beds. The water that "drops" into the cracks moves horizontally at the bottom of the cracks, gradually filling up to the surface. This process, over time, causes a horizontal and upward transport of salt across the field. The salinity assessment technology of Rhoades and colleagues used in this study is well suited to establishing the levels and patterns of soil salinity within soil profiles and fields and to the evaluation of the adequacy/suitability of irrigation/drainage management of fields with respect to salinity control and to the evaluation of irrigation uniformity. A complementary bromide tracer study undertaken along with

this study confirms these conclusions and is reported elsewhere (Shouse et al. 1997).

APPENDIX. REFERENCES

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Lieutenant Colonel Carl Andrew Lewke, U.S. Marine Corps
68490 Peladora Road
Cathedral City, California 92234

February 14, 2002

Resource Management and Planning Department
ATTN: Elston Grubaugh
Imperial Immigration District
P.O. Box 937
Imperial, California 92251

Dear Ms. Grubaugh:

C4-1

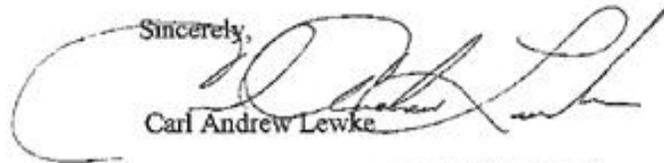
I am a Coachella Valley homeowner. I am forwarding this correspondence to your office to formally register my opposition to the Imperial Irrigation District's proposed plan to transfer water to San Diego and the Coachella Valley. The scientific evidence clearly indicates that such a transfer will trigger an ecological disaster in the Salton Sea; the area will no longer serve as a major fishery and bird habitat. Additionally, the shrinkage of the Sea will most likely create problems for the entire Coachella Valley in terms dust storms and odors.

C4-2

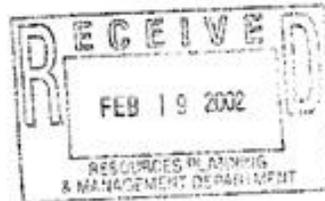
C4-3

I take my young daughters to the Salton Sea coastline at the Mecca State Park on a regular basis to observe the wildlife and pristine environment. In my opinion, it would be the height of irresponsibility to sacrifice the Salton Sea in an effort to obtain new water sources. I respectfully submit that other options must be considered.

Sincerely,



Carl Andrew Lewke



Letter - C4. Signatory - Carl Andrew Lewke.

Response to Comment C4-1

In the absence of the Proposed Project, the salinity of the Salton Sea is projected to continue to increase with consequent changes in the ecological dynamics of the sea. Water conservation and transfer under the Proposed Project would accelerate the occurrence of these changes but would not result in different effects than would ultimately occur in the absence of the Proposed Project. Implementation of the Habitat Conservation Plan component of the Proposed Project would avoid or mitigate the effects to biological resources of the Salton Sea that are attributable to water conservation and transfer. See Master Response for *Biology—Approach to Salton Sea Habitat Conservation Strategy* in Section 3 of this Final EIR/EIS.

Response to Comment C4-2

Dust: Please refer to the Master Response on *Air Quality-Salton Sea Air Quality Monitoring and Mitigation Plan* in Section 3 of this Final EIR/EIS.

Odors: As described in Section 3.11, Aesthetics, in the Draft EIR/EIS, the effect of the Proposed Project or Alternatives would be less than significant, because there will be ongoing objectionable odor episodes at the Salton Sea under Baseline conditions.

Response to Comment C4-3

Comment noted.

Letter - C5
Page 2

C5-1

Californians and Americans want to see in environmental protection.

C5-2

Has anyone considered that instead of transferring the water to San Diego, it should be transferred to the Salton Sea? Once the sea has reached a predetermined level, any excess could be used to meet other priorities in drought years. With the addition of fresh water in the lake, it seems that the problem of high salt levels in the lake would be solved.

2. Health of the Residents of this Region

C5-3

I am a resident of La Quinta and a diabetic. Diabetes is a chronic disease that requires continuous monitoring of one's health. Exercise is a very important part of my daily routine. When we have dust storms, I cannot exercise and the immediate impact on my health is reflected in higher unsafe sugar levels. The long-term effect to a diabetic with poor control is heart disease, blindness, kidney failure and an assortment of other problems. Exercise is not a cure, but postpones many of these problems.

C5-4

The highest risk groups for diabetes are American Indians, Hispanics and senior citizens. Obviously, I am describing the population of our region.

C5-5

We already have significant air quality problems, i.e. dust. (See the Desert Sun, Saturday, February 9, 2002.) I can't imagine that any action compounding this problem would even be considered. I don't know how anyone with young children, older parents, friends or family with any type of illness would be in favor of the water transfer with the increased potential of dust storms from the shrinking Salton Sea. It also appears to me that this action will not only affect our region but also areas in Arizona and Mexico.

C5-6

If San Diego does not receive the water transfer, it will not suffer from the air quality (i.e. dust) problems that the desert

Response to Comment C5-2

The concept of transferring Colorado River water to the Salton Sea to dilute salinity levels presents several legal obstacles. Primarily, the Salton Sea has no water rights which would allow water to be transferred to the Sea. In addition, the Salton Sea Reclamation Act (1998, Public Law 105-372) specifically forbids the use of excess Colorado River flows for restoration purposes. The Salton Sea Habitat Conservation Strategy in the HCP provides for the delivery of mitigation water to the Sea to offset reductions in inflow caused by the Project (as compared to projected Baseline inflows).

Response to Comment C5-3

Please refer to the Master Response on *Air Quality—Salton Sea Air Quality Monitoring and Mitigation Plan* and *Health Effects Associated with Dust Emissions* in Section 3 of this Final EIR/EIS.

Response to Comment C5-4

In response to comments, the text of Section 3.15 has been revised. The changes are indicated in subsection 3.15 in Section 4.2, Text Revisions in this Final EIR/EIS.

Response to Comment C5-5

Please refer to the Master Response on *Air Quality—Salton Sea Air Quality Monitoring and Mitigation Plan* in Section 3 of this Final EIR/EIS.

Response to Comment C5-6

Please refer to the Master Response on *Air Quality—Salton Sea Air Quality Monitoring and Mitigation Plan* in Section 3 of this Final EIR/EIS.

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Page 3

C5-6

communities are already suffering from. Why compound the air quality problems of the environment that we live in?

3. Water Conservation

I lived in El Dorado County, California, for nearly twenty years and lived through several severe droughts. Nowhere in Southern California do you find conservation that equals what I experienced during those drought years. In my opinion, San Diego has many options. For example, look at Santa Barbara. Desalination of ocean water, water efficient landscapes, restrictions on the hours that landscapes can be watered, water efficient appliances, strict control of industrial use of water and growth control until a certain level of conservation is met are many options that are available to San Diego.

C5-7

Note: We could all do a better job of conservation. We have developments in the desert that are designed around man-made lakes for boating. What's wrong with this picture?

4. Future Growth

Twenty years ago, I never thought that we would see the kind of growth that we are currently experiencing in the Coachella Valley. I do not want to see farming suffer. Farming is a bright spot in our local, state and the national economy. By transferring water, you effectively transfer the future unknown potential of one region to another.

C5-8

Final Comment

If this proposal is passed, both San Diego and the Coachella Valley will receive increased amounts of water. The experts seem to be split on *how bad* the impact will be on the Salton Sea and the surrounding regions. One thing is for sure. When water is diverted from a large body of water, an ugly scar on the land, dust, and poorer water quality result. The ecology and everyone in the surrounding areas suffer!

C5-9

Response to Comment C5-7

The Alternatives Analysis included as Appendix D of the Draft EIR/EIS included an alternative that would "Maximize Local Supplies in SDCWA Service Areas and Develop 200 KAFY Desalination Facility." This alternative also included maximizing conservation as considered in the SDCWA's Urban Water Management Plan. SDCWA projects being able to "create" 93,200 AFY by means of conservation methods by the year 2020. However, this level of conservation does not eliminate their need for more reliable supplies.

Please refer to the Master Responses on *Other—Desalination in SDCWA Service Area* and *Other—Comments Calling for Increased Conservation* in Section 3 of this Final EIR/EIS.

Response to Comment C5-8

As described in the Draft EIR/EIS, depending on the eventual implementation of the water conservation program, there could either be beneficial or adverse impacts to the regional economy. If water is conserved using on-farm and water delivery system improvements, it is anticipated that there would be beneficial effects to regional employment; therefore, there would not be any adverse effects to mitigate. If fallowing is used to conserve all or a portion of the water to be transferred, there would be adverse effects to the regional economy and farm workers as identified in the Draft EIR/EIS.

The IID Board will consider whether to implement socioeconomic mitigation measures when it considers whether to approve the Proposed Project or an alternative to the Proposed Project.

Response to Comment C5-9

The Draft EIR/EIS for the Proposed Project analyzes potential impacts as a result of the conservation and transfer of water from IID to SDCWA. Potential impacts to sensitive receptors, including biological resources and humans within the Project's region of influence, are examined and mitigation measures to reduce these impacts are proposed.

Apr. 1. 2002 2:18PM

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Letter - C5
Page 4

C5-10 [Where will the money come from to repair a problem in the making? The state and federal governments are already experiencing budget shortfalls. There is currently not enough money to meet all of our needs and creating a problem that diverts already limited financial resources should not be considered an acceptable option.

C5-11 [I'm not in favor of destroying this desert environment to fuel growth in other parts of California. We should be trying to protect and enhance this unique and special location.

Sincerely,



Craig Smith

78-740 Castle Pines Drive
La Quinta, California 92253

Response to Comment C5-10

As part of the environmental review process, IID is responsible for mitigating, to the extent feasible, any impacts resulting from the IID Water Conservation and Transfer Project and HCP. Therefore, IID is also financially responsible for any impacts resulting from the Project. The EIR/EIS identifies those impacts that can feasibly be mitigated. As far as mitigating for the Project Baseline condition of the Salton Sea, no state or federal agency has funded the Salton Sea Restoration Project.

Response to Comment C5-11

Please refer to the Master Response on *Other-Growth Inducement Analysis* in Section 3 of this Final EIR/EIS.

FW Water transfer.txt

>
> -----Original Message-----
> From: Bob Ransdell [mailto:BRansdell@ThermoKevevex.com]
> Sent: Thursday, March 28, 2002 10:05 AM
> To: 'info@iid.com'
> Subject: Water transfer

>
>
>
>
C6-1 > I am a citizen of the state of california and I am writing to express my
> opposition to the proposed water transfer to San Diego Water district of up
> to 300,000 AF of water from the Colorado river. I think this deal will not
> only destroy the Salton Sea causing huge negative environmental impacts
but
C6-2 > is also a rip-off of the public in that farmers in the IID will make
money
> from water that is supplied to them by the public. This water is supplied
to
> them at below market cost but they will get market prices for selling it.
>
> Bob
> Ransdell, Soquel CA.

Letter - C6. Signatory - Bob Ransdell.

Response to Comment C6-1

Comment noted.

Response to Comment C6-2

This comment does not address the adequacy of the EIR/EIS; therefore, no response is required.



California-American Water Company

880 Kuhn Drive • Chula Vista, California • 91914-3514 • (619) 656-2400 • FAX (619) 656-2408

April 15, 2002



Mr. Bruce D. Ellis
U.S. Bureau of Reclamation
Phoenix Area Office
PO Box 81169
Phoenix, AZ 85069-1169
FAX: 602-216-4006

Mr. Elston Grubaugh
Manager, Resources, Mgmt., & Planning
Imperial Irrigation District
PO Box 937
Imperial, CA 92251
FAX: 760-339-9009

Dear Mr. Ellis and Mr. Grubaugh,

Thank you for the opportunity to comment on the draft EIR/EIS for the IID-San Diego County Water Authority water transfer project.

California-American Water Company has been and remains a strong supporter of the IID-San Diego water transfer. We provide water service to more than 20,000 households in San Diego County and currently have almost 100 employees in San Diego County. We recognize the importance of a secure, stable water supply for continued economic growth and the stability of our region.

San Diego must avoid continued dependence on a sole water supplier. We need to diversify our water supplies through continued conservation and recycling, and through other innovative means such as the IID water transfer and seawater desalination. Our regional well-being depends on it.

Thank you again for the opportunity to comment on and support this important project. Please don't hesitate to contact me at (619) 656-2459 should you have any questions about our enthusiastic support of the water transfer project.

Sincerely,

Kevin Tilden

**Letter - C8. California-American Water Company.
Signatory - Kevin Tilden.**

Response to Comment C8-1

Comment noted.

C8-1



8355 Aero Drive
San Diego, CA 92123-1718
Tel: (858) 292-4900
Fax: (858) 292-4901

Stephen A. Zapoticzny
Director of Environmental, Safety & Health

Letter - C9. CP Kelco. Signatory - Stephen Zapoticzny.

Response to Comment C9-1

Comment noted.



April 15, 2002

Mr. Bruce D. Ellis
U.S. Bureau of Reclamation
Phoenix Area Office
PO Box 81169
Phoenix, AZ 85069-1169
FAX: 602-216-4006

Mr. Elston Grubaugh
Mgr., Resources, Mgmt., & Planning
Imperial Irrigation District
PO Box 937
Imperial, CA 92251
FAX: 760-339-9009

Dear Mr. Ellis and Mr. Grubaugh:

Thank you for the opportunity to comment on the draft EIR/EIS for the IID-San Diego County Water Authority water transfer project.

CP Kelco, a specialty chemicals manufacturer with over 400 employees in San Diego based at our manufacturing plant and Research & Development Laboratories, was an early supporter and remains a strong supporter of the IID-San Diego water transfer. Until now, we have been able to depend on our Colorado River water supply even during periods when drought has curtailed other sources of water. But California is under a mandate to reduce its dependence on Colorado River water that belongs to and is now being used by other states, and we must implement this transfer to ensure that the reliability of this core water supply is not diminished. A reliable and affordable supply of water is critical to the viability of our business. The significance of the IID transfer water is that it holds a senior priority of use that will not be curtailed even though other states use their full apportionment and surplus water is not available.

San Diego must avoid continued dependence on a sole water supplier. We need to diversify our water supplies through continued conservation and recycling, and through other innovative means such as the IID water transfer and seawater desalination. Our regional well-being depends on it.

Sincerely,

C9-1

DEAR BRUCE:

PLEASE CONSIDER DESALTING IN YOUR DEIS AS A WAY TO PROMOTE MORE COLORADO RIVER WATER SHARING. COASTAL DESALTING IN CALIFORNIA POTENTIALLY ALLOWS ALL 7 COLORADO RIVER STATES TO HAVE MORE WATER.

CORDIALLY,
MARK BIRD

Desalination: An infinite water supply

Several new desalting techniques offer California and the world a clean and inexhaustible water source. Perhaps the most auspicious of these techniques is Archimedeian Desalination, or AD, which would easily reduce costs by more than 90 percent compared to conventional seawater desalination. This technique would lead to the creation of streams of quality potable or drinking water from the ocean.

AD consists of four primary components: (1) filtration membranes, (2) an Archimedeian screw to elevate water, (3) a vertical shaft to purify water via the force of gravity and (4) brine recycling.

The first component consists of increasingly refined filtration membranes designed to minimize the entry of extraneous substances into the vertical shaft. Such filtration membranes would be designed to progressively eliminate large human and non-human debris, smaller debris, non-organic seawater contaminants, harmful biological agents, and microbiological contaminants.

The second component of AD is an angled cylinder. This cylinder would be a 21st century improvement of the second century B.C. principle. AD cylinders would be designed to have the characteristics of rotatability, lightweight material composition, an ideal angle positioning, and other features to maximize economic efficiency.

In the vertical shaft, water is flushed through multiple stages for purification. Near the bottom of the vertical shaft a brine recycling unit, situated to obtain economic benefits from the saline residue.

Why 90 percent less expensive:

Listed below in order of relative priority are seven construction factors which are estimated by AD to lead to seawater purification that would reduce costs by more than 90 percent compared to conventional techniques:

1. Land Use: Conventional desalting plants use much valuable coastal land. Conversely, AD uses far less land, as plants would be constructed vertically. In

particular, coastal land is very costly in California. It is estimated AD would use at least 76 percent less land than horizontally constructed conventional plants.

2. Energy Use: Energy cost reduction is viewed as the second most critical cost reduction factor. Middle Eastern and other desalting plants require a large amount of energy. Conversely, AD minimizes or potentially eliminates energy expenditures. Electricity is produced in dams by converting via gravity the stored water in reservoirs into useful electrical energy. The force of the descending water turns turbines producing electricity. AD provides the promise of producing both electricity to assist in elevating the water and electricity for sale. AD also has cost-saving potential to release purified water at a higher level than the surrounding land.

3. Renewable Energy Adaptations: The cylinder in AD has the additional advantage of being adapted to derive renewable energy benefits. These potential modifications include ocean tidal energy to propel water up the cylinder, solar panels on the cylinder to assist in elevating the water, and wind power to assist in cranking the cylinder. Recent advances in tidal, solar, and wind energy technology are auspicious for application to AD.

4. Multiple Filtration: It is envisioned AD would use a minimum of around a half dozen filtration screens and membranes prior to the entry of water through the cylinder. Greater particle sedimentation in AD would occur given the large area of the cylinder. Recent and certain further advances in filtration would reduce costs significantly, as water entering the vertical shaft would be cleaner. Cleaner water facilitates purification and corrosion and other damage to mechanical components.

6. Computer Monitoring: AD relies far more on computer monitoring of filtration accomplishment, cylinder operations, and shaft purification processes than conventional desalination.

6. Cylinder Angle: Engineering principles and computer modeling applications now have the ability to optimize the construction of the cylinder angle to the nearest one percent. Without this exactitude, the cylinder angle might deviate by 10 to 20 percent from the ideal angle. With the cylinder angle to the nearest one percent, costs to elevate a large volume of water to a high elevation would be reduced considerably.

7. Brine Recycling: Nearly all the 92 natural elements of the Periodic Table are found in seawater. Conversely, many elements and minerals are declining both nationally and globally. These two indisputable trends imply the monetary value of seawater byproduct recycling will soar.

Will and Ariel Durant, authors of the 11-volume *The Story of Civilization*, called Archimedes "the greatest of ancient scientists." However, perhaps it is more fitting to conclude with an Archimedeian expression: Eureka! Give me a lever and I will water the earth. Such a lever could also provide an infinite amount of clean water for California. ■

Mark Bird is currently an adjunct faculty member for Community College of Southern Nevada. He is a former federal water planner and the author of more than 30 water publications. You can contact Bird via e-mail at: bird.m@eeobcc.org

Letter - C10. Signatory - Mark Bird.

Response to Comment C10-1

Please refer to the Master Response on *Other—Desalination in SDWCA Service Area and Comments Calling for Increased Conservation* in Section 3 of this Final EIR/EIS.