divining rod

Vol. XII No. 2 New Mexico Water Resources Research Institute May 1983

Saline Research Funded by State

The 1983 State Legislature has awarded $500,000 to the New Mexico Water Resources Research Institute for a two-year saline water research program to be conducted in association with the Roswell Desalting Test Facility.

"The program will take advantage of the facility's unique capability of producing large quantities of saline water similar to the quality of New Mexico's saline ground water resources," said Dr. George O'Connor, WRRI acting director. "New Mexico, in investing $500,000 in the research program, has taken an important step toward making better use of its saline water resources."

He said the appropriation will be divided among three general areas of salinity research. About 40 percent will be allocated for irrigated agriculture research to demonstrate the feasibility of substituting saline water for fresh water in crop production. Research studies will focus on crops that demonstrate salt and drought tolerance. Nontraditional crops such as salt grass, guayule and jojoba also could be evaluated for their potential to expand the state's agricultural diversity.

The second research area, greenhouse and hydroponic applications, will receive about 20 percent of the funds. This research will examine the direct use of brackish water to grow high-value greenhouse crops and/or to maintain the temperature and humidity in greenhouse systems. The greenhouse research also could involve hydroponics where high-value crops such as tomatoes are grown in water only.

The remaining 40 percent is earmarked for aquaculture research. The general objective here is to test the suitability of using brackish water for growing fish, shellfish and algae. "Aquaculture is becoming an important industry for producing protein-rich algae for uses such as animal feed. We imagine that some projects would test algal species to determine those best suited to the Roswell brine," O'Connor said.

The institute is now ready to allocate the funding to projects that address one of the three research areas. Research proposals and letters of interest will be accepted until the June 20 deadline, according to O'Connor. Outstanding individual projects could be funded for the maximum allotted in each research area, but the institute is encouraging projects requiring less funding.

O'Connor explained that projects which promise immediate or rapid productivity will stand an improved chance of funding. "We also expect that at least part of the research will be done at the desalting facility or in the Roswell area," he said.

(For related stories, see inside pages.)

Annual Water Conference Draws 200

A spring snowstorm intruded on the NCAA basketball finals in Albuquerque and stayed over for the 28th Annual New Mexico Water Conference, April 5-6.

Despite the weather, the conference drew nearly 200 registrants including about 30 high school students from Albuquerque's science enrichment program. The conference was jointly sponsored by the WRRI, the New Mexico Environmental Improvement Division (EID) and the U.S. Geological Survey (USGS).

The EID session, through case examples, showed how a water pollution control agency works in investigating specific water quality problems in the state.

Brad Cates, intergovernmental liaison for the Environmental Protection Agency, was the luncheon speaker. Cates said the EPA recognized the state's primary role in ground water protection and urged states to develop protection strategies. Strategies should consider protection of both current and future water uses, according to the EPA.

The USGS session included a panel discussion of municipal water quality problems. Delfin Lovato, chairman of the All Indian Pueblo Council, spoke to the group about the need to coordinate water planning with the Pueblo communities.

The WRRI session focused on research projects aimed at solving water quality problems. The WRRI's role as research coordinator also was outlined for the participants.

Test Facility Open for Business

Roswell, New Mexico, is used to taking advantage of its misfortune. When nearby Walker Air Force Base closed down in 1967, Roswell turned the abandoned air base into a thriving industrial park. And last year when the federal government put the Roswell Desalting Test Facility on the block, the city was quick to put in its bid.

"We would like to see this facility develop into a successful research center because when it succeeds, the community benefits," said James B. Whitford, Jr., Roswell city manager. The city is promoting its latest venture on the merit that the facilities are already in place. Whitford said the same concept was used to sell the idea of the industrial park to private industry.

Whitford said the city's industrial improvement board is not interested solely in direct profits from the desalting facility. He said Roswell could prosper from the initial economic growth and employment, but the city also would benefit from the business and academic research attracted to the area. He believes this economic spin-off will be just as valuable to the community. "The plant will bring in business people who will stay in Roswell's motels and research scientists who will make Roswell their home," he said.

The city, which took over the plant March 1, has just one year to prove it can attract private industry. Whitford and members of the industrial improvement board have the same high hopes for the research facility as they had for the industrial park.

Two midwestern-based firms already have contracted to use the facility's reverse osmosis equipment. There also are probable contracts with an electro dialysis firm and with a laboratory that tests water heaters.

Whitford, with an entrepreneur's eye on eastern New Mexico's oil industry, would like to see the facility's laboratory used for detecting metals in oil. "There isn't another laboratory capable of that outside Albuquerque," he said.

This enterprising optimism was just as strong in 1963 when Stuart Udall spoke at the facility's dedication. The then secretary of the Interior Department lauded desalting as "a new bold program in water research."

Lead operator Kenneth Irvin and NMSU agricultural engineer Ted Sammis discuss the facility's blending capabilities.

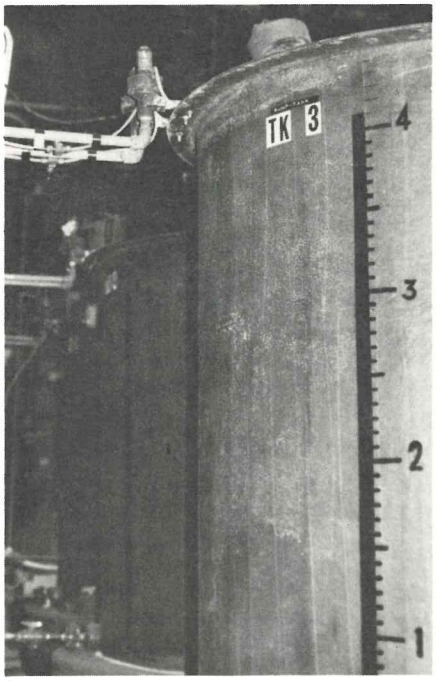
But in September 1982, the Roswell facility was shut down; not because it failed to live up to its promise, but because it outlived its purpose—testing desalting techniques. The federal government believed it was time for private industry to take desalting technology into commercial production.

The facility, located five miles east of Roswell just this side of the Pecos River, is spotless and ready for its new tenants. It comes complete with two 25,000 sq. ft. test buildings, a fully equipped laboratory, offices, and three huge storage tanks.

The facility originally desalted water by a steam process, but converted to a less expensive reverse osmosis method in the 1970s. In reverse osmosis, saline water is forced under pressure through tightly wound layers of a paper-like filter. The purified water then passes through the filter's hollow core leaving the salt behind.

According to Charlie Sparnon, water utilities manager for the city of Roswell, the facility can release 250,000 gallons of high quality water each day during peak production. Because the desalting process may be too expensive for public use, the real demand for the purified water will more likely come from the commercial sector. One of the city's primary goals is to provide high quality water for electronics and chemical industries whose production depends on a supply of high quality water.

However, the facility also hopes to attract customers interested in its poor quality product—saline water. The New Mexico Legislature has just made that possible by awarding $500,000 to the New Mexico Water Resources Research Institute for a two-year saline water research program. WRRI researchers will be using waters similar to the facility's saline by-product for several research projects.



Four blending tanks can mix saline water to specific concentrations for research projects.

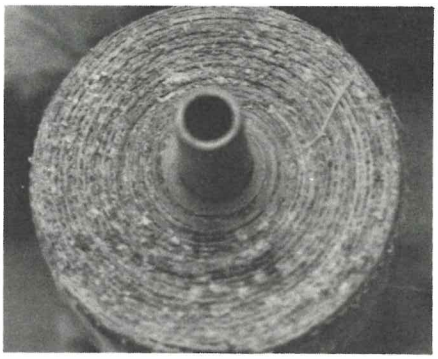
Although it seems unreasonable to grow crops using saline water, many New Mexico producers have no other choice. Researchers,

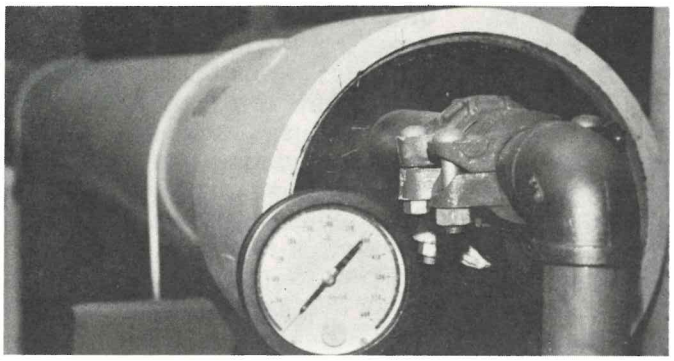
knowing they are unlikely to change the water quality, are looking for ways to change the plant. Using saline irrigation, they are trying to improve production of both native and imported salt-tolerant crops.

Other research projects will test greenhouse and hydroponic production techniques using saline water. The researchers will even investigate the feasibility of producing shrimp and algae in brine ponds.

Because research requires controlled conditions and exacting measures, the saline water for these projects will be specially blended in four huge tanks at the facility. The tanks can blend up to a combined 600 gallons of water per minute.

The WRRI is nearly as enthusiastic as the city fathers about the prospects for the desalting test facility. "The next two years will provide an excellent opportunity for real progress in saline water research. The facility couldn't have been better suited to this type of research," said George O'Connor, WRRI acting director.





Cross section of a small reverse osmosis filter (above) used in desalting water. Actual reverse osmosis operates under pressure (left) to force separation of saline particles from water.

"Problem" Resource Abundant

In New Mexico, the word salinity is often followed by "problem." And no wonder — of the state's 20 billion acre-feet of ground water, 15 billion is saline and considered unsuitable for public use.

Salinity depends on many factors, but in New Mexico salinity occurs from four basic causes. In one case, saline water is simply the residue of past seas and alkaline lakes. In another, salinity is the result of ground water that has been circulating underground, sometimes for millions of years. Over time, the water becomes "enriched" by its soluble mineral surroundings. The more enriched the water, the saltier it is.

Shallow water tables also can cause salinity. Plants whose roots reach a shallow water table release water through evapotranspiration. The evapotranspiration removes the water but continues to concentrate the salts in solution. Another case associated with salinity and shallow water tables results when the water from the shallow water table evaporates up through the soil.

Saline water, true to its name, is salty. Sometimes as salty as sea water. However, not all saline water is the same strength. Slightly saline water, for example, contains from 1,000 to 3,000 parts per million total dissolved solids (ppm TDS). These waters, which amount only to about 1.4 billion acre-feet of the underground supply, are typical of shallow wells in the Mesilla Valley and irrigation return flow.

Moderately saline water contains 3,000 to 10,000 ppm TDS and is typical of the ground waters in New Mexico. Saline waters, which ranges from 10,000 to 35,000 ppm TDS, also are found in the state's ground water supply. At the high range, these waters compare to the salinity of the Pacific Ocean. Brine waters contain more than 35,000 ppm TDS and are similiar to those in the eastern Mediterranean Sea.

Although 95 percent of the irrigation water in the United States contains less than 1,500 ppm TDS, New Mexico irrigation often depends on water with salinity levels as high as 3,500 ppm TDS.

With this in mind, several areas in New Mexico have vast underground supplies of saline water that seem suited to saline water development. The Pecos River Basin, for example, has large amounts of slightly to moderately saline water, with massive aquifers at greater depths containing moderately saline to brine ground water.

The Tularosa and San Juan basins also have saline aquifers ranging from 5,000 to 7,000 feet thick. The Rio Grande Valley from Albuquerque to Las Cruces has large amounts of slightly to moderately saline water. The Ogallala aquifer in eastern New Mexico as well as the aquifers in southwestern New Mexico also contain saline water.

These saline waters, in a substitute or supplemental role, could prove beneficial for both agricultural and public uses. For example, 1 percent of the available saline water supply would provide the state with water for all uses for 50 years.

Areas that would benefit most from saline water development are those with abundant supplies of recoverable slightly to moderately saline water. Development also would depend on the quality and quantity of the area's fresh water supply and on the amount of land suitable for irrigation.

NM Enacts Export Control Law

New Mexico's reaction to the federal court decision which overturned the state's ground water export ban includes a new ground water export control law and a five-point appeal of the court's ruling.

The new law, passed during the recent New Mexico legislative session, allows ground water export only with proof that the transfer "is not contrary to the conservation of water within the state and is not otherwise detrimental to the public welfare" of New Mexicans. Under the new law, the state engineer considers export requests based on six factors, including water availability and demand in New Mexico.

El Paso's lawyers have filed a motion in Federal District Court to have the new law declared unconstitutional. They contend the new law's "clear intent and affect is to circumvent" U.S. District Judge Howard Bratton's Jan. 17 decision overturning New Mexico's ban on ground water export. The new law "constitutes the same economic protectionism that has already been ruled unconstitutional," the brief states.

El Paso's brief also disputes the law's requirement that the state engineer consider six factors for granting an export request. The lawyers contend that because the same requirement does not apply to New Mexicans, the law violates constitutional protections for interstate commerce. The court has yet to rule on El Paso's challenge to the new law.

New Mexico has leaned heavily on the new law in appealing the January decision. The appeal notes that the first question facing the court is whether the existence of the new law "moots" the appeal because the old law banning export is no longer in force. New Mexico Assistant Attorney General Jeff Fornaciari acknowledged that the state's appeal is aimed partially at defending its new law rather than putting the export ban back into effect.

The five arguments outlined in the appeal include a contention that Bratton's human survival standard is too narrow and fails to take into account New Mexico's legitimate interest in saving its water for broader needs.

New Mexico also argued that Bratton overemphasized the national interest in placing few restrictions on interstate commerce. The appeal also reaffirms the earlier argument that the Rio Grande Compact automatically prohibits El Paso from pumping ground water out of southern New Mexico. The state's final two appeals argue that Bratton should have dismissed the suit because of jurisdictional problems. New Mexico's appeal is now before the 10th U.S. Circuit Court of Appeals in Denver.

New Publications

High Plains-Ogallala Aquifer Study series - R. R. Lansford - June 1982 (#146, Lea Co., NM; #147, Curry Co., NM; #148, Roosevelt Co., NM; #149, Quay Co., NM; #150, Regional Report)

#158 *Proceedings of the New Mexico Water Resources Research Institute Symposium,* "Coping with Federal Water Policy Changes" (Copy charge: $5.) - February 1983

Texas Spot Open

The Texas Water Resources Institute is seeking a director. Apply to Edward A. Hiller, chairman, TWRI Director Search Committee; Agricultural Engineering Dept., Texas A&M University; College Station, TX 77843.

George A. O'Connor, acting director, New Mexico Water Resources Research Institute
Linda G. Harris, editor

the divining rod
New Mexico Water Resources Research Institute
Box 3167, NMSU
Las Cruces, NM 88003
(Address correction requested)

Non-Profit Org.
U.S. Postage
PAID
Las Cruces, N.M. 88003
Permit No. 162