

Oklahoma

Water  
News

MONTHLY NEWSLETTER OF THE OKLAHOMA WATER RESOURCES BOARD

## Promise of Artificial Recharge Examined in Nationwide Study

Water planners in Oklahoma have envisioned various methods of augmenting state water supplies. Unfortunately, few of the schemes have shown adequate return of water for the often stiff price involved. But now one such ambitious procedure—called artificial groundwater recharge—is getting a chance to prove its worth in southwestern Oklahoma's Blaine Gypsum Aquifer.

In the late 60's, irrigators near Hollis became concerned over well declines as great as 125 feet in some areas of the Blaine Gypsum Aquifer. To replenish that water source which

pours lifeblood into cotton and grain crops and herds of livestock, the local Southwest Soil Conservation District sponsored construction of recharge wells, impoundments and diversion structures.

Beginning in 1968 and funded by local taxes, four impoundments and 70 recharge wells were installed to catch and channel runoff into the groundwater formation. One impoundment was constructed around a natural sinkhole area which appeared to be an ideal access point for recharge water to reach the aquifer. Although irrigators, District workers

and other participating groups received virtually no outside guidance from state or federal agencies, the process did indeed seem to enhance the Blaine's yield. Unfortunately, installers made no provisions for monitoring, so little data were available to measure the project's effectiveness.

Declining groundwater levels in other High Plains states prompted the Bureau of Reclamation to seek Congressional funding for study of artificial recharge. In June, Congress approved a \$27 million appropriation for the five-year High Plains States Groundwater Demonstration Program. Following expected presidential endorsement of the bill, 21 sites in 12 states—including Oklahoma's Blaine Gypsum Aquifer in Jackson, Harmon and Greer Counties—will test various artificial means of supplementing groundwater supplies west of the Mississippi River.

"Artificial recharge stores underground excess surface water that would normally flow away," said OWRB Groundwater Division Chief Duane Smith. "We hope that the project will not only provide more water for irrigators in the region, but will also evaluate the potential of artificial recharge nationwide.

The Bureau will be federal sponsor with the OWRB supervising overall development and operation of the \$358,000 Blaine Gypsum project. Also lending support will be the U.S.



Robert Fabian, coordinator of the Blaine Gypsum Aquifer groundwater demonstration project, and OWRB Geologist Bob Thomas examine a schematic drawing of artificial recharge wells prepared for the Hollis region.

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*Recharge, continued from page 1*

Geological Survey, Oklahoma Geological Survey, Environmental Protection Agency and the Southwest Water and Soil Conservation District. Project coordinator is Robert Fabian, OWRB Lawton Branch manager.

According to Commissioner of Reclamation C. Dale Duvall, the program represents a substantial departure from traditional Bureau projects.

"First, we are concentrating on groundwater resources rather than surface water supplies. Second—and this is part of a new trend for us—the financing of the program is a joint federal-state venture. Almost one third of the money will come from non-federal sources," he said.

***New BuRec-State survey of artificial recharge centers on the Blaine Gypsum of the Southwest***

The Blaine Gypsum Aquifer provides irrigation water to a 1500-square mile area in southwest Oklahoma and adjacent parts of Texas. The formation is primarily made up of the Dog Creek Shale and Blaine Gypsum interspersed with beds of gypsum, limestone and dolomite. Percolating waters have dissolved the highly soluble gypsum and limestone deposits forming numerous subsurface cavities, or karsts, in the aquifer, Smith said.

"We're very excited that the Blaine was chosen for the study. Although various techniques of artificial recharge have been practiced for more than 200 years, this is the first attempt, to my knowledge, to artificially recharge a karst aquifer in the U.S.," Smith pointed out.

Drillers will place 10 recharge wells in the channels of intermittent streams, along with 10 monitoring wells. Two diversion structures, or dams, will be constructed to direct runoff from precipitation and irrigation tailwater to inlet pipes intersecting the recharge wells several feet below the surface. One diversion will direct and impound water around a sinkhole area south of Hollis; a diver-

sion north of Hollis will consist of an 1800-foot long dam and two recharge wells.

One of the most difficult tasks facing researchers is determining how well their project works. They will seek to separate quantities of artificially recharged water from that which naturally enters the aquifer through deep percolation of precipitation, seepage of water through stream banks and pond bottoms, and groundwater underflow from adjacent areas. Existing irrigation wells in the area will be included in the Board's annual well measurement and groundwater quality sampling programs. Many observation wells will be equipped with water level recorders to track aquifer fluctuations. Using subsequent data, geologists and hydrologists will attempt to ascertain the effectiveness and feasibility of groundwater recharge.

"The study will also focus on water quality in the Blaine," according to Board Geologist Bob Thomas. "Although high levels of sulfates, dissolved solids and salt preclude the aquifer's use by humans, project results should help us evaluate water quality concerns of artificial recharge

in aquifers used primarily for public water supply."

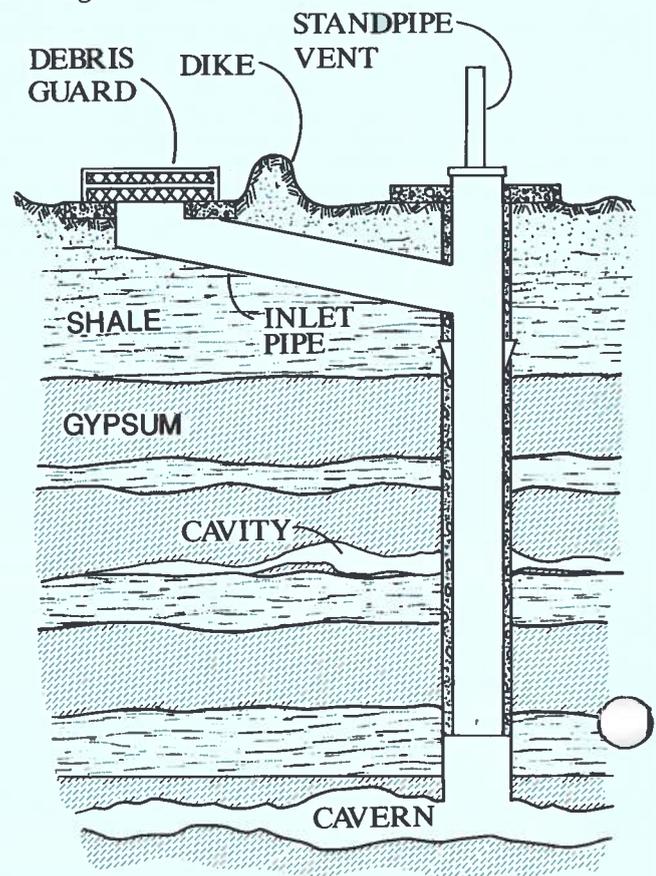
Of concern to researchers are harmful pesticides and herbicides present in agricultural runoff. Such contaminants are normally filtered out in sand and gravel aquifers, but may bypass that process via limestone arteries leading directly to the cavernous Blaine Formation. Despite this, Thomas and others suspect that the recharge water may be of better quality than the aquifer normally supplies. Extensive water quality sampling will either prove or disprove this theory. And sampling will also answer concerns about streams receiving discharge from the aquifer.

Computer models will also be formulated to simulate the movement of groundwater, Thomas said.

"Computer modeling should show us how well artificial groundwater recharge works and how it affects the aquifer over the long term."

In addition, he said, a tracer dye will be injected into observation wells to look at various aquifer characteristics, such as groundwater movement and velocity. Planned start-up of the project is scheduled for October.

An earthen embankment around each inlet will hold water as it flows to the well and infiltrates isolated cavities in the subsurface gypsum beds of the Blaine Aquifer. Debris guards will prevent large objects from entering the inlet pipes. Ten recharge wells will be constructed in the channels of intermittent streams around Hollis. Impoundments and wells used in the earlier recharge effort will again be utilized in the new project but, according to OWRB Groundwater Division Chief Duane Smith, the exact number of these structures is unknown at this time.





## Compact Meets September 22

Members of the Arkansas-Oklahoma Arkansas River Compact Commission will hold their annual meeting on September 22 at the Robert S. Kerr Conference Center near Poteau.

Representatives from Oklahoma and Arkansas will discuss water supply and quality issues in the Arkansas River Basin. Oklahoma commissioners are James R. Barnett, OWRB executive director; Dr. Lloyd Church, Wilburton; and John Moffitt, Ft. Gibson. Baren "Skip" Healey, of Davis, Oklahoma, is the acting federal commissioner to the compact.

## Tips for a Rainy Day

The OWRB Engineering Division administers the National Flood Insurance Program and reminds Oklahomans that the flood season again approaches. For information on the NFIP, call (405) 271-2531.

During the Fall flood season:

- ★ Keep flood insurance policy and list of personal property in a safe deposit box. Photograph home and valuables; store in a safe place.
- ★ Learn the safest, shortest route from your home to high ground.
- ★ If you live in a frequently flooded area, store sandbags, plywood, plastic sheeting and lumber.
- ★ Keep a battery powered radio and flashlight in working order.
- ★ If caught indoors, turn off all utilities, move yourself and valuables to upper floors. If necessary, move to the roof to wait for rescue team.
- ★ Avoid walking through floodwaters more than knee-deep and don't at-

tempt to drive where water is over the road.

★ In a flood watch, be alert and prepared; in a flood warning, move to safe ground immediately.

## Brush Gulps Texas Water

According to the U.S. Water News and figures released by the U.S. Soil Conservation Service, as much as 10 million acre feet of Texas water (about 57 percent of all the water used in Texas by municipal, industrial and agricultural sectors in 1980) could be made available annually through a comprehensive brush management program.

The density of major Texas brush species—juniper, live oak and especially, mesquite—is on the rise in Texas. SCS estimates that 105 million acres are now infested with the hardy range plants which use up nearly 40 percent of the rain that falls on the Lone Star State each year. That figure represents more water than is consumed annually by all of Texas' towns, industries and agricultural crops.

It's no surprise that Texas water officials view brush management as a key to increasing the state's water supply.

## Court Fines Waste Disposer

A recent lawsuit against a commercial hazardous waste facility in Louisiana levied the largest penalty ever obtained in such a court case—\$2 million, according to Robert E. Layton, Jr., administrator of Environmental Protection Agency Region 6.

The suit alleged 1,700 violations of the federal Resource Conservation and Recovery Act by the commercial hazardous waste treatment, storage and disposal facility near Baton Rouge. The two defendants named in the suit are subsidiaries of Browning-Ferris Industries in Houston.

EPA inspections in 1985 and 1986 revealed landfilling of ignitable waste and hazardous liquids, failure to properly analyze hazardous waste, unauthorized waste piles, inadequate facility closure plan and record-keeping, and failure to conduct inspections and personnel training.

"This settlement says that we will not tolerate the illegal, careless or

irresponsible handling of hazardous wastes," Layton vowed.

He pointed out that requirements of the suit could involve the expenditure of another \$1 million to install groundwater monitoring wells, verify proper closure of landfill cells, implement a computerized waste tracking system and conduct an independent environmental audit of the cleanup.

## Memorial Funds Sought

Funds for erection of a memorial to North Canadian River developers are being solicited by the North Canadian River Historical and Memorial Committee. Frank Raab, chairman of the committee, announced that \$1,600 has already been received toward the monument's estimated \$7,663 cost.

The memorial will honor the people who worked to promote the three reservoir system (Optima, Fort Supply and Canton Reservoirs) of flood control and water development on the Oklahoma segment of the Canadian River. Raab, who has worked tirelessly for flood control since the 1930s, is highly responsible for completion of the \$64 million system constructed by the Corps of Engineers. He is a former director of the Water Board and, for two decades, served as Oklahoma representative to the National Water Resources Association.

According to Raab, any individual, business or group that contributes \$100 or more will have his/her name inscribed on the reverse side of the 4' x 9' granite slab which will overlook Canton Reservoir. He urges that donations be sent to:

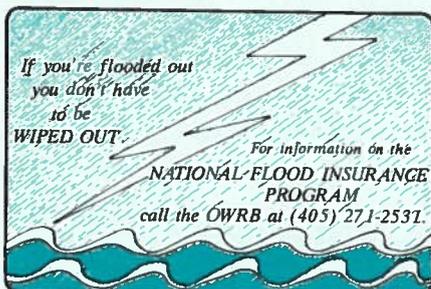
Canadian River Memorial Committee  
% Community State Bank  
Harold Day, Treasurer  
P.O. Box 549  
Canton, OK 73724

For details on the monument, call Raab at (405) 274-3425.

## Feds Appoint Commissioner

U.S. Army Major General Thomas A. Sands has been appointed by President Reagan as the first federal com-

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*Mainstream, continued from page 3*

missioner to the Red River Compact. Sands serves as division engineer with the Corps of Engineers' Lower Mississippi Valley Division in Vicksburg, Mississippi.

In addition to a federal commis-

sioner, each of the four member states in the Red River Compact—Texas, Arkansas, Louisiana and Oklahoma—is represented by two state commissioners. Red River Compact Commissioners for Oklahoma are OWRB Executive Director James R. Barnett and

L. L. "Red" Males of Cheyenne.

Oklahoma is involved in four interstate stream compacts which equitably apportion the water in each river basin. The Red River Compact, approved in 1978, is the youngest of these agreements.

**ACTIVE CONSERVATION STORAGE IN SELECTED OKLAHOMA LAKES AND RESERVOIRS  
AS OF AUGUST 23, 1988**

PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY	PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY
SOUTHEAST			Wister	46,847	74.1 <sup>4</sup>
Atoka	90,677	73.4	Sardis	292,324	96.6
Broken Bow	880,422	95.9	NORTHEAST		
Pine Creek	77,700	100.0	Eucha	71,300	89.6
Hugo	157,600	100.0	Grand	1,346,050	90.2
McGee Creek	102,526	93.4	Oologah	461,555	84.8
CENTRAL			Hulah	27,039	88.4
Thunderbird	105,925	100.0	Fort Gibson	365,200	100.0
Hefner	71,918	95.4	Heyburn	6,434	97.5
Overholser	15,551	97.6	Birch	18,413	95.9
Draper	80,990	81.0	Hudson	200,300	100.0
Arcadia	27,390	100.0	Spavinaw	27,000	90.0
SOUTH CENTRAL			Copan	38,301	88.3
Arbuckle	58,427	93.4	Skiatook	292,945	91.7
Texoma	2,292,481	86.9	NORTH CENTRAL		
Waurika	190,621	93.9	Kaw	428,600	100.0
SOUTHWEST			Keystone	541,708	87.9
Altus	69,208	52.1	NORTHWEST		
Fort Cobb	74,637	95.2	Canton	67,120	68.8
Foss	164,118	67.3 <sup>2</sup>	Optima	3,000	— <sup>1</sup>
Tom Steed	73,581	82.7	Fort Supply	13,900	100.0
EAST CENTRAL			Great Salt Plains	29,284	93.3
Eufaula	2,196,892	94.3			
Tenkiller	599,271	95.5	<b>STATE TOTALS</b>	<b>11,604,255</b>	<b>90.7<sup>3</sup></b>

1. In initial filling stage
2. Temporarily lowered for maintenance
3. Conservation storage for Lake Optima not included in state total
4. Seasonal pool operation

Data courtesy of U.S. Army Corps of Engineers, Bureau of Reclamation, Oklahoma City Water Resources Department, and City of Tulsa Water Superintendent's Office.

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