



In a continuing effort to monitor state aquifers, hydrologists from the Oklahoma Water Resources Board and the U.S. Geological Survey will travel across the state in the annual cooperative well measurement program.

The 1987 effort, which began January 5 in the Panhandle, will measure

## Oklahoma Groundwater Due Scrutiny in Measuring Program

*OWRB Crews Schedule Trips to the Field to Record Static Water Levels in 1,018 Wells*

depth to water in 1,018 wells. The effort will end by March 31.

According to Duane Smith, Groundwater Division chief, the objective of the well measuring program is to gather historical records of water level fluctuations, and from them, predict water use trends and future

availability of groundwater supplies. The program also provides data for research, he added.

Data gathering begins each January when irrigation has ceased and water levels are restored to normal.

"Although most in the measuring network are irrigation wells, those supplying municipal, industrial and domestic water and those constructed solely for observation are also included," Smith said.

Oklahoma's well measuring program was initiated in 1937 by the U.S. Geological Survey. Since 1950, the effort has been conducted jointly by the OWRB and the USGS.

Because a large portion of the state's irrigation water is pumped in the Panhandle's Texas County, work-

ers will measure 135 wells there — more than in any other county. Also in the Panhandle, hydrologists will record depth to water in 91 and 77 wells in Cimarron and Beaver Counties, respectively.

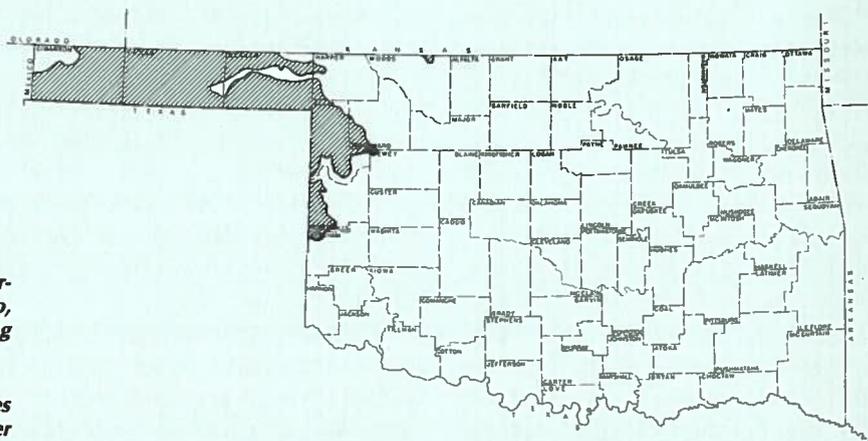
The Panhandle — historically referred to as 'No Man's Land' — appropriately contains only about one percent of the state's hardest citizens. The coarse land slopes sharply from the plateaus and canyons of Black Mesa in northwest Cimarron County across the dune and cover sands of Texas County to the rolling rangeland of northeastern Beaver County. This harsh terrain, sculpted by the region's extreme climate, receives a mere 10 to 20 inches of annual rainfall. Little vegetation exists except for the phreatophytes (deep-rooted plants and trees that tap water at or very near the water table) growing near a few rivers and their tributaries.

*Continued on page 2*



**ABOVE:** The Ogallala, or High Plains Aquifer underlies portions of eight states: Texas, New Mexico, Oklahoma, Kansas, Colorado, Nebraska, Wyoming and South Dakota.

**RIGHT:** The Oklahoma region of the Ogallala includes the Panhandle counties of Cimarron, Texas and Beaver as well as parts of Harper, Ellis, Woodward, Dewey, Roger Mills and Beckham Counties.



*Measuring, continued from page 1*

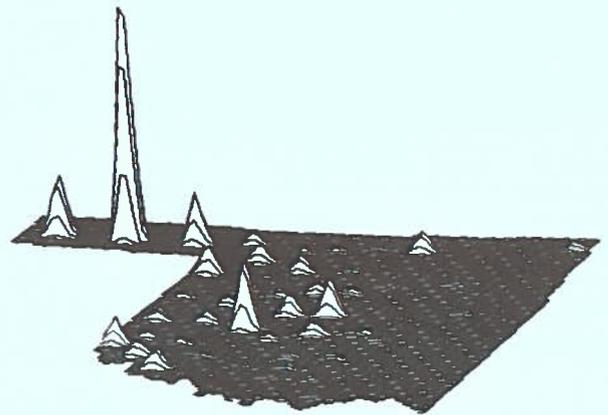
***When it does rain, high winds and hot summer temperatures pilfer precious moisture.***

Those rare instances when it does rain in the Panhandle, it pours. Unfortunately, high winds and extremely hot temperatures soon pilfer this precious moisture; in fact, annual evaporation far exceeds precipitation in the region. Some eight years after completion, the Panhandle's sole reservoir, Lake Optima in Texas County, has yet to achieve the conservation storage designed for it. Switches of vegetation often are visible growing from the lake bottom.

One has to wonder why the Board's well measurement program focuses on such an isolated region. But the rugged Panhandle terrain conceals the tremendous resource which lies beneath it. Clues to the buried treasure are revealed by the vast and fertile croplands. Viewed from the air, they dot the arid landscape like giant poker chips, greened by sweeps of center-pivot sprinklers. Virtually all of this precious water is withdrawn from the largest and most productive single water resource in the country — the Ogallala, or High Plains, Aquifer. In better times, its presence under nearly all of the Oklahoma Panhandle had made agricultural products one of the state's most lucrative ventures. Nationally, it supplies 30 percent of all groundwater pumped for use by the country's farms and ranches.

The Ogallala Aquifer is an extensive formation approximately the size of California. It stretches through eight states — from west central Texas to southern South Dakota. The Ogallala consists of loosely cemented layers of fine- to medium-grained sand, silt, clay and gravel in the Panhandle and in several western Oklahoma counties. In the Panhandle, the formation's thickness varies from 100 to 700 feet. In 1980, storage in the Panhandle section of the Ogallala was estimated to be 51.8 million acre-feet — about three times the combined water storage in all other Oklahoma reservoirs and lakes of 1000 acre feet or more.

***This computer graph shows levels of groundwater use in Oklahoma.***



In northwestern Oklahoma, where dryland farming elicits disappointing returns, farmers and ranchers rely almost solely on the Ogallala to water millions of acres of wheat, corn and cotton, as well as grain sorghum for the Panhandle's prolific cattle feeding industry. Wise use of the Ogallala Aquifer for agricultural development and heightened awareness of soil and water conservation in the years since the Dust Bowl have done much to prevent nightmarish recurrences. But many have come to realize that even the Ogallala is not bottomless — heavy pumping since the early 60's has threatened the aquifer's enormous supply of water.

***Texas County draws enormous amounts of water for irrigation — some 250 million gallons a day.***

According to Smith, the well measurement program has served as an invaluable tool in monitoring the condition of the Ogallala Aquifer.

"We have many valuable groundwater supplies in the state but, because of its unique importance, we concentrate more on the Panhandle portion of the Ogallala than any area," Smith said.

Some reports have predicted depletion of the Ogallala as soon as the middle of the twenty-first century, he pointed out.

"Overdevelopment and the high density of wells — especially south of Guymon — have caused a lot of concern," Smith said. "Fortunately, the Ogallala Formation is relatively thick in most of Texas County."

***High energy costs, low farm prices and a fragile economy have somewhat stoppered the enormous drain of water.***

Despite heavy irrigation in the Panhandle, Smith believes that the future of the aquifer is not as bleak as some may have predicted.

"By monitoring Ogallala water level fluctuations over the past twenty years or so, we think that levels in the aquifer may be stabilizing somewhat after a period of fairly heavy water use. This could be attributed to many factors: the current plight of the farmer, rising costs of natural gas and electricity for pumping and, in general, the fragile condition of the state's economy," he said.

"But, really, there is a lot of speculation in regard to the present condition of the Panhandle's water supply. The jury is still out until we can update our studies on the Ogallala's storage in Oklahoma," Smith was quick to add.

Experts and laymen agree as to the extreme importance of groundwater, not only for economic reasons, but for basic human needs. The Board's well measurement program has also displayed its worth as an effective groundwater management tool — especially to the hardy ranchers and farmers of the Panhandle who can rest a little easier knowing that the OWRB is keeping a watchful eye on their precious jewel — the Ogallala Aquifer.



## Board Announces New Reports

New hydrologic investigations exploring the availability of water in three river basins, a technical report on irrigation water requirements and a survey of domestic water supply are available at the Oklahoma Water Resources Board. Although quantities are limited, most are available without charge, said OWRB Librarian Susan Lutz.

New hydrologic studies are available on the Deep Fork River (from central to eastern Oklahoma), the Salt Fork of the Red River (in the southwest) and the Kiamichi River (in the southeast). The Deep Fork study was completed by Terry Lyhane and Tesfai Ghermazien, PhD, and the Salt Fork of the Red River investigation was conducted by Robert S. Fabian of the Board's Lawton branch office.

The hydrologic study of the Kiamichi River Basin was prepared by the Bureau of Reclamation in cooperation with the OWRB under the Bureau's Technical Assistance to the States program.

J. A. Wood, OWRB Stream Water Division chief, pointed out that Oklahoma Statutes require the Board to determine that water is available before approving new stream water

permits. Hydrologic investigations provide accurate estimates of surface water available.

Wood pointed out that another such study is finished and nearing publication. In January, the Board will make available the "Hydrologic Investigation of the Canadian River and Little River" by Hydrologist Michael L. McCaugh.

The new Bureau of Reclamation publication available in limited numbers through the OWRB is the "Technical Report on Irrigation Requirements, State of Oklahoma." It maps irrigation requirements of 11 crops in normal and dry years. The crops are alfalfa, pasture grass, corn grain, spring wheat, peanuts, cotton, grain sorghum, vegetables, corn silage, soybeans and winter wheat.

Also available from the OWRB is a recent report entitled "Introduction to Water Resources and Domestic Water Supply in Oklahoma" by Wayne A. Pettyjohn, PhD, and Hal White of Oklahoma State University. The manual discusses the chemical, biological and physical constituents of water; chlorination, filtration and softening; and construction of a domestic water supply source.

## Thirsty? Look to Nebraska

According to the University of Nebraska's new "Groundwater Atlas," that state could be proclaimed the

"groundwater state" of the U.S. The Atlas claims two billion acre-feet of good quality groundwater underlies the state at recoverable levels. Further, the resource is available under nearly all of the land surface.

The amount of groundwater in storage is equivalent to 25 times the state's annual precipitation, is 250 times larger than its average annual streamflow, and is 700 times greater than the amount of water stored in Nebraska's surface reservoirs.

## Water Use Forms Due Mail-Out

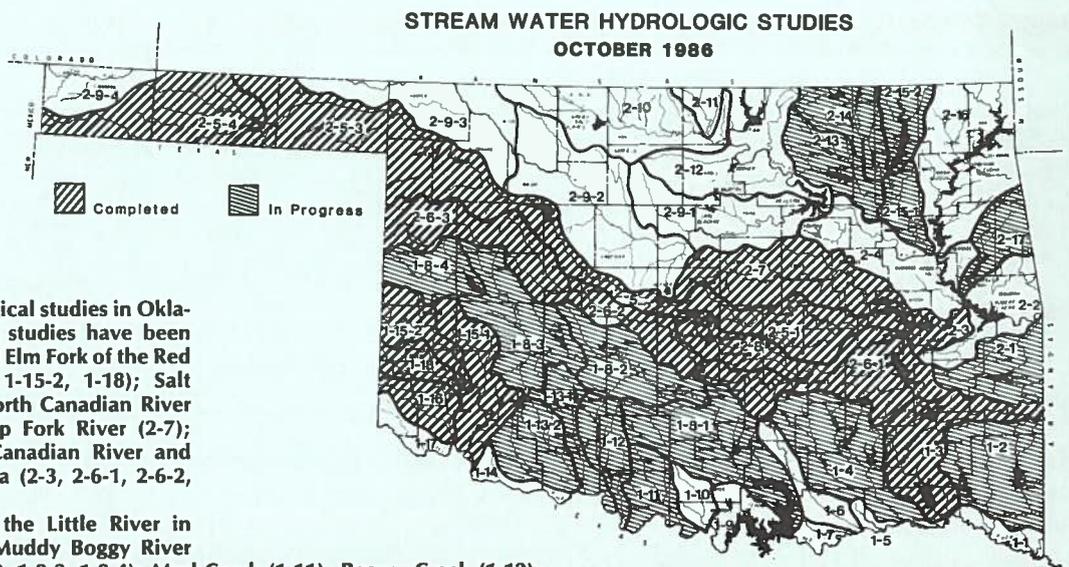
State irrigators, municipalities, industries and rural water districts are now receiving annual water use report forms from the Oklahoma Water Resources Board.

According to Jann Hook, OWRB Programmer Analyst, mailing began the last week in December.

"We ask water users to complete use forms promptly and return them to us within 30 days," she said. "The majority of forms — 9,543 — will be mailed to irrigators who account for the greatest water use."

Hook said that 1,367 forms will be mailed to water users in other categories. A typical report requests information on the amount of water used, the type of system and the energy source. This data will assure proper allocations of water for the future, she added.

*Continued on page 4*



Map shows status of hydrological studies in Oklahoma's river basins. Hydrologic studies have been completed for the North Fork and Elm Fork of the Red River (Stream Systems 1-15-1, 1-15-2, 1-18); Salt Fork of the Red River (1-16); North Canadian River (2-5-1, 2-5-2, 2-5-3, 2-5-4); Deep Fork River (2-7); Kiamichi River (1-3) and the Canadian River and Little River in Central Oklahoma (2-3, 2-6-1, 2-6-2, 2-6-3, 2-8).

Studies are in progress for the Little River in Southeastern Oklahoma (1-2); Muddy Boggy River (1-4); Washita River (1-8-1, 1-8-2, 1-8-3, 1-8-4); Mud Creek (1-11); Beaver Creek (1-12); Cache Creek (1-13-1, 1-13-2); Poteau River (2-1); Verdigris River, Bird Creek and Caney River (2-15-1, 2-15-2, 2-13, 2-14) and the Illinois River (2-17).

Continued from page 3

It is extremely important to fill out the forms completely, Hook said. For those requiring help, she recommended calling OWRB branch offices. In Oklahoma City, call 271-2555; in Lawton, 248-7762; in McAlester, 426-5435; and in Tulsa, 581-2925.

### EPA Names New Regional Head

Robert Layton, Jr. has been appointed new Environmental Protection Agency Administrator for Region 6. He succeeds Dick Whittington who retired in September.

Layton will direct environmental programs for the five-state area of

Arkansas, Louisiana, New Mexico, Oklahoma and Texas. He will assume his duties in January at the Regional Office in Dallas, Texas.

A professional engineer and graduate of Texas A&M University, Layton served as mayor of Tyler, Texas from 1975 to 1976.

#### ACTIVE CONSERVATION STORAGE IN SELECTED OKLAHOMA LAKES AND RESERVOIRS AS OF DECEMBER 15, 1986

PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY	PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY
<b>SOUTHEAST</b>			<b>NORTHEAST</b>		
Atoka	95,132	76.6	Eucha	63,750	80.1
Broken Bow	918,100	100.0	Grand	1,453,620	97.4
Pine Creek	77,700	100.0	Oologah	544,240	100.0
Hugo	157,600	100.0	Hulah	30,594	100.0
<b>CENTRAL</b>			Fort Gibson	365,200	100.0
Thunderbird	105,925	100.0	Heyburn	6,600	100.0
Hefner	75,878	100.0	Birch	19,200	100.0
Overholser	16,088	100.0	Hudson	200,300	100.0
Draper	88,200	88.2	Spavinaw	30,000	100.0
<b>SOUTH CENTRAL</b>			Copan	43,400	100.0
Arbuckle	62,571	100.0	Skiatook	295,900	100.0
Texoma	2,637,700	100.0	<b>NORTH CENTRAL</b>		
Waurika	203,100	100.0	Kaw	428,600	100.0
<b>SOUTHWEST</b>			Keystone	616,000	100.0
Altus	132,886	100.0	<b>NORTHWEST</b>		
Fort Cobb	78,423	100.0	Canton	97,500	100.0
Foss	177,923	73.1 <sup>2</sup>	Optima	3,000	— <sup>1</sup>
Tom Steed	88,971	100.0	Fort Supply	13,882	99.8
<b>EAST CENTRAL</b>			Great Salt Plains	31,400	100.0
Eufaula	2,329,700	100.0	<b>STATE TOTALS</b>		
Tenkiller	627,500	100.0		<b>12,434,132</b>	<b>96.2<sup>3</sup></b>
Wister	27,100	100.0			
Sardis	290,449	96.0			

1. In initial filling stage.

2. Temporarily lowered for maintenance.

3. Conservation storage for Lake Optima not included in state total.

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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### OKLAHOMA WATER NEWS

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