

Oklahoma

Water
News

MONTHLY NEWSLETTER OF THE OKLAHOMA WATER RESOURCES BOARD

Economical Geothermal Energy Will Heat and Cool Capitol

Thrifty heat pumps replace traditional systems

Experts say that perhaps the greatest source of untapped energy lies, literally, beneath our feet. Over the last three decades, the earth's seemingly inestimable supply of heat has been captured for use in homes, schools and industries, and, currently, it is being put to test at the State Capitol in Oklahoma City.

The project, appropriately named OASIS (Oklahoma Air Space Improvement System), consists of a

OWRB geologist Bob Fabian (left) and hydrologist Gary Glover examine cuttings excavated from one of the Capitol bore holes. A length of dual earth coil extends from the hole.



closed loop, geothermal heat pump system now being installed in the subsurface just west of the Capitol complex near the intersection of Lincoln Boulevard and N.E. 23rd Street.

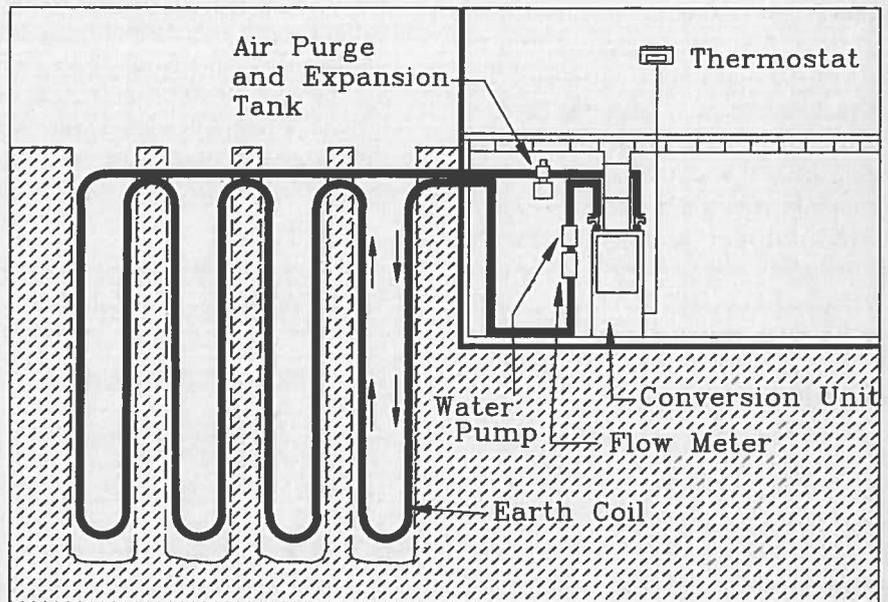
Because the temperature of the earth remains fairly constant (around 62 degrees Fahrenheit), the heat pump can pull heat from it and move it, via circulating water, to inside areas during winter. In summer, the

system reverses, removing heat from inside and exhausting it underground, thus providing cool air for Capitol staff. OASIS will employ rows of pipes transporting water to and from depths of hundreds of feet.

According to Don Price, Capitol administrator of building management, this new heating and cooling scheme should vastly reduce energy consumption over the current conventional system, saving up to \$200,000 a year on utility bills. OASIS will also cut maintenance costs and improve air quality. The 74-year-old seat of Oklahoma government currently uses 139 separate heating and cooling units added

Continued on page 2

Shown is one row of the closed loop geothermal heat pump system. The system circulates water through a flexible pipeline which extends to great depths to capture the earth's heat or exhaust heat underground.



Geothermal, continued from page 1

piece-by-piece over the years. The initial \$3.1 million project will control temperatures in the basement and first three floors of the building; a future appropriation would extend the system to the upper two floors. The undertaking has been approved by the U.S. Department of Energy to qualify for funding from oil over-charge monies.

At one time, it was assumed that soil temperatures were too low to be of use as a home heating source. It was necessity that piqued the interest of Swedish engineers who, more than 30 years ago, experimented with geothermal technology to relieve the wintry country's complete dependence on foreign oil and coal. Ever since, much of Scandinavia and Northern Europe has been reaping the benefits of geothermal energy, specifically earth-coupled heat pumps. Although the closed loop system has been available in the U.S. since the 1960s, it was not until about 1980 that the technology was widely accepted here. Research by the Technology Extension of Oklahoma State University has been a key to this growth.

The OWRB is currently guiding the construction of 376 bore holes, each 256 feet deep and five inches in diameter and spaced approximately 12 feet apart. Hydrologist Gary Glover, of the Board's Groundwater Division, maintains that inspection of the holes will ensure that they are properly grouted and sealed and located a safe distance from potential pollution sources—measures required by OWRB regulations. After the pipe is laid, bore holes are filled with bentonite to prevent infiltration of contaminants from the surface to groundwater. Glover and other Board hydrologists and geologists have also conducted sampling of the underlying Garber-Wellington Aquifer to monitor the project's effect on groundwater quality.

When completed late this year, the actual "energy field" will occupy approximately 1¼ acres. Boring of the holes is being accomplished by Van & Co. Drilling, Duncan.

The vertical closed loop heat

pumping system circulates water or an antifreeze solution via a network of flexible pipes—centrally connected by a manifold structure—which extend underground through a series of bore holes. Heat is transferred to and from the soil through walls of the pipeline, called earth coil, as the water travels down and back up the evenly spaced bore holes. The warmed liquid is then returned to the heat exchanger to warm freon gas. Like a refrigerator, heat pumps rely upon the expansion and compression characteristics of freon gas; all gases alter their properties under temperature or pressure changes.

Most experts believe the closed loop technique to be superior to an open loop system where water is pumped from a supply well, flows through the heat exchanger, then is discharged into a recharge well or in surface waters. The fully sealed closed loop is preferred because it is non-consumptive, has a longer life and avoids potential water quality problems (such as scaling of pipes or the heat exchanger by hard water) and quantity obstacles posed by the open process.

While heat pumps cost substantially more to install than traditional air-to-air heat and cooling systems, experts say they often pay for themselves within a few years and they are easily retrofitted on most buildings. As the U.S. seeks to decrease its dependence upon foreign oil and gas, this form of free, renewable energy will become increasingly important. In Oklahoma, many will be watching the Capitol's strategy with great interest. What happens there could dictate the future role of the earth's crust as a reliable and efficient energy source.



Floodplain Workshops Set

The OWRB and Federal Emergency Management Agency have scheduled eight workshops this spring to update various state and local officials involved in floodplain management activities. Morning sessions in four of

the March workshops will concentrate on general floodplain management information for realtors, lenders, insurance agents, emergency managers and community floodplain administrators. Concurrent afternoon sessions of all workshops will allow insurance agents, floodplain administrators and emergency managers to participate in group discussions on the National Flood Insurance Program's Community Rating System and related concerns. Each meeting will begin at 8:00 a.m. and adjourn at 4:00 p.m. Dates and locations are shown below. Call (405) 231-2531 for more information.

March 5

Texoma State Lodge

March 7

Western Hills State Lodge

March 12

Pioneer Area Vo-Tech, Ponca City

March 14

Quartz Mountain State Lodge

March 20

Roman Nose State Lodge

March 22

NE Oklahoma A&M, Miami

April 2

Metro Tech-Spring Lake, OKC
(insurance agents only)

April 4

Metro Tech-Spring Lake
(lenders only)

Board Offers T-O-T Program

The Wellhead Protection Program is a federal effort to assist the states in the protection of wells that supply public drinking water. Careful management of the wellfield and periphery has been demonstrated to be much more cost-effective than clean-up of a contaminated water supply.

Delineation of the Wellhead Protection Area (WHPA) is critical to the development of a protection strategy. Groundwater flow equations and time-of-travel calculations are used in the delineation of WHPAs by the T-O-T program developed by the Oklahoma Water Resources Board.

T-O-T is a menu-driven, user-friendly program requiring an IBM or compatible computer to operate. A math co-processor is not required.

The program uses EPA-recommended criteria and methods to delineate the wellhead protection area for a single pumping well. T-O-T is an easy, reliable method for delineation.

The program on 5½ or 3½-inch diskette costs \$50 and can be ordered from the Librarian, OWRB, P.O. Box 150, Oklahoma City, OK 73101-0150. For further information call Bob Fabian, (405) 231-2574.

Environment vs. Development

A nonprofit corporation has recently been formed with the stated goal of bringing together the often diverging interests of environmental management and economic development in Oklahoma.

The Environmental Federation of Oklahoma Industries and Agricultural Operations has stated two primary goals: 1) to promote the development of sound environmental regulations and policies that are congruent with economic development and environmental concerns, and 2) to inform its membership in all aspects of public and private concerns about the environment. Standing environmental committees will include air, water, hazardous waste, solid waste, hazardous materials, occupational hazard, land resource and legislative. The organization will be administered by a 25-member board of directors representing industry, agriculture, consultant and other interests.

"The formation of an organization such as this is long overdue," said OWRB Executive Director James R. Barnett. "Balancing interests of environmental protection and economic development is a difficult chore and an effort that will require considerable attention from the general citizenry, business and leaders in government."

Monitoring Well Test Ready

A written test to determine the competency of operators seeking state licenses to drill monitoring wells is available at any office of the Oklahoma Water Resources Board.

According to Duane Smith, OWRB Groundwater Division chief, monitoring well drillers may take the exam-

ination at the Board's headquarters, 600 N. Harvey in Oklahoma City, or at branch offices in Tulsa, McAlester, Woodward and Lawton. The test is administered Monday through Friday between 9 a.m. and 3 p.m.

Licensing is required for all who drill to sample groundwater quality or chemistry; monitor the unsaturated zone above the water table; or bore to obtain soil or geotechnical data.

The licensure of monitoring well drillers is a logical extension of the original water well drillers licensing law, in effect since 1973, Smith pointed out.

It mandated that wells be properly sealed for safety purposes and constructed to prevent contamination from sewage, agricultural chemicals and other pollutants. In addition to drillers of water wells and monitoring wells, a 1990 law requires examination and licensing of pump installers.

Monitoring well drillers fees for licensure are \$100 for a new firm, plus a \$50 fee deposited in the Well Drillers and Pump Installers Indemnity Fund; \$50 for each operator tested and \$20 for each additional operator from the same firm.

For further information on monitoring well driller testing and licensing, call the OWRB Groundwater Division at (405) 231-2516.



At the January 8 meeting of the Water Resources Board, Larry Hudgens of Elk City became the first pump installer to be licensed by the OWRB. Chairman Robert S. Kerr, Jr., presented the license to Hudgens, who operates F & H Water Well Drilling in Elk City.

Organization Selects Officers

The Oklahoma Floodplain Management Association (OFMA) has chosen three primary officers and five regional heads to represent the organization.

At its November organizational meeting, the Association elected Harold Springer, Oklahoma Water Resources Board Engineering Division chief, as chairman and Bart Hines, City of Norman, as vice-chairman. In December, Joe Remondini, with the Corps of Engineers, was chosen for the treasurer position and Carol Williams, City of Tulsa, was elected secretary.

Regional representatives are Doug Koscinski, City of Norman; Carol Williams, City of Tulsa; Donetta Blanlot, OWRB McAlester branch; Jack Hudman, Cotton County; and Greg Scheffe, OWRB Woodward branch, who is acting representative of the northwest region.

The Floodplain Management Association also adopted bylaws which will allow the group to more effectively promote the importance of floodplain management and flood insurance throughout the state. (Note: In the September edition of the *Oklahoma Water News*, the new group was erroneously named the State Association of Floodplain Managers.)

Five types of OFMA annual membership are offered: Student—\$10; Associate—\$15; Agency—\$20; Full—\$20; and Corporate Sponsor—\$100. For more information on membership, please call (405) 271-2531.

FINANCIAL ASSISTANCE PROGRAM UPDATE

Approved at January Board Meeting

Grants

Bluejacket PWA—\$65,000
Hall Park Municipal Authority—\$75,000
Town of Cole—\$17,442

Loans

(current rate—6.592%)
Hall Park Municipal Authority—\$205,000

Totals as of 1/8/91

	Loans	Grants
Approved	73	214
Amount	\$75,350,000	\$13,583,155
Funded	58	192
Amount	\$47,260,000	\$11,983,442

**STORAGE IN SELECTED OKLAHOMA LAKES & RESERVOIRS
AS OF JANUARY 30, 1991**

PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (acre-feet)	PRESENT STORAGE (acre-feet)	PERCENT OF STORAGE		PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (acre-feet)	PRESENT STORAGE (acre-feet)	PERCENT OF STORAGE	
			conservation	flood				conservation	flood
SOUTHEAST					EAST CENTRAL				
Atoka	124,100	123,475	99.5	N/A	Eufaula	2,314,600	2,314,600	100.0	0.4
Broken Bow	918,070	917,645	99.9	0.0	Tenkiller	654,100	654,100	100.0	0.9
Hugo ¹	187,603	186,214	99.3	0.0	Wister ¹	58,601	58,601	100.0	1.1
McGee Creek	113,930	113,930	100.0	0.1	NORTHEAST				
Pine Creek ¹	73,346	73,346	100.0	0.2	Birch	19,200	17,648	91.9	0.0
Sardis	274,330	274,330	100.0	0.9	Copan	43,400	40,109	92.4	0.0
CENTRAL					Eucha	80,000	79,600	99.5	N/A
Arcadia	27,520	27,520	100.0	0.5	Fort Gibson	365,200	364,826	99.9	0.0
Hefner	75,400	57,039	75.7	N/A	Grand	1,672,000	1,643,940	98.3	0.0
Overholser	15,900	9,861	62.0	N/A	Heyburn	7,105	7,105	100.0	0.3
Stanley Draper	100,000	75,583	75.6	N/A	Hudson	200,300	200,300	100.0	3.3
Thunderbird	119,600	119,600	100.0	0.6	Hulah	31,160	24,539	78.8	0.0
SOUTH CENTRAL					Oologah	553,400	553,400	100.0	7.6
Arbuckle	72,400	72,400	100.0	0.3	Skiatook	322,700	279,423	86.6	0.0
Texoma	2,643,300	2,630,325	99.5	0.0	Spavinaw	30,590	30,590	100.0	N/A
Waurika	203,100	199,668	98.3	0.0	NORTH CENTRAL				
SOUTHWEST					Kaw	428,600	428,600	100.0	0.3
Altus	132,830	88,706	66.8	0.0	Keystone	557,600	557,600	100.0	0.5
Ellsworth	72,490	59,470	82.0	N/A	NORTHWEST				
Fort Cobb	80,010	79,207	99.0	0.0	Canton	111,310	96,592	86.9	0.0
Foss ²	256,220	178,890	69.8	0.0	Fort Supply	13,900	13,900	100.0	0.1
Lawtonka	56,574	47,051	83.2	N/A	Great Salt Plains	31,420	31,420	100.0	1.4
Tom Steed	88,970	73,071	82.1	0.0	STATE TOTALS	13,130,879	12,804,224	97.5	0.6

¹ Seasonal pool operation

² Conservation pool lowered to enhance project operation

N/A—not applicable; no flood storage allocation.

Data courtesy of the U.S. Army Corps of Engineers, Bureau of Reclamation, Oklahoma City Water Resources Department, Central Oklahoma Master Conservancy District, City of Tulsa Water Superintendent's Office, City of Lawton, City of Altus, Altus Irrigation District, Foss Reservoir Master Conservancy District and Fort Cobb Master Conservancy District.

This monthly newsletter, printed by the Central Printing Division of the Office of Public Affairs, Oklahoma City, Oklahoma, is published by the Oklahoma Water Resources Board as authorized by James R. Barnett, executive director. Ten thousand copies are printed and distributed monthly at an approximate cost of 20 cents each.

MARY E. WHITLOW, Editor

BRIAN VANCE, Writer

BARRY FOGERTY, Photographer

BRAD NESOM, Layout Artist

OKLAHOMA WATER NEWS

Monthly Newsletter of the
Oklahoma Water Resources Board
600 N. Harvey, P.O. Box 150
Oklahoma City, OK 73101-0150

Robert S. Kerr, Jr., Chairman
Bill Secrest
R. G. Johnson
Gerald Borelli
Richard McDonald
Ervin Mitchell
Dick Seybolt
Frank H. Condon
Mike Henson

BULK RATE
U.S. POSTAGE
PAID

Oklahoma City, Okla.
Permit No. 310