



OKLAHOMA

water news

MONTHLY NEWSLETTER OF THE OKLAHOMA
WATER RESOURCES BOARD

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Young Tulsa Scientist Finalist in International Science Fair



STAFF PHOTO BY LINDLEY

Nancy Mills, May graduate of Washington High School in Tulsa, describes to OWRB Planning Specialist Art Cotton the experiments with water and pollutants that won her fourth place in competition in the "environmental" category of the 34th Annual International Science and Engineering Fair in Albuquerque recently.

The nation's waterways are rapidly becoming polluted with substances most Americans consider harmless, a situation that could eventually have serious effects on our ecosystem, says a young Tulsa scientist. Nancy Mills, an 18-year old May graduate of Booker T. Washington High School, makes her claims on the basis of seven years of personal research on automobile-related pollution; claims that are substantiated by prizes awarded by some of the top scientists in the nation and the world.

Mills returned to Oklahoma in mid-May from Albuquerque, where she was a finalist in the 34th Annual International Science and Engineering Fair. The fair is a magnet for the scientifically inclined high school student, this year drawing 560 contestants from 44 states, the District of Columbia, Puerto Rico and nine foreign countries. Mills competed directly against 50 others in the "environmental" category, and was rewarded with the fourth place honor. The U.S. Department of Energy also singled her out for a special award, designating her

an alternate for the "Energy Research Orientation Week" at a department national laboratory.

The prestigious awards capped a successful year for Mills, who earlier became the first student ever to win Tulsa's science fair four consecutive years. Approximately 20 other awards were taken home by Mills this year, including prizes by the Army, Navy, Air Force, Society of Microbiologists, Carolina Biological Supply and state competition.

In each case, Mills was presenting Phase III of an ongoing project, the "Ecological Effects of Automobile Related Pollutants on Specific Freshwater Aquatic Organisms." The latest stage of study looked at the effects of crankcase oil and asphalt on three types of green algae, two types of invertebrates and three types of plants. The first two phases also considered effects on algae of auto exhaust and tire rubber.

"No one thinks anything of going out to change his or her oil on a Saturday afternoon and dumping the old oil in a

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100 or More Drillers Remain Unlicensed, Out of Compliance

A segment of the state's water well drilling industry has drawn the wrath of fellow well drillers and a promise of stepped-up state enforcement, says OWRB Acting Ground Water Division Chief Duane Smith.

Smith says "quite a number" of calls have been received from licensed water well drillers complaining about the activities of unlicensed drillers operating in violation of state law. A new law effective last October requires that all drillers who are paid for their work—commercial well drillers—be licensed by the state. The law exempts only non-commercial drillers, such as an individual drilling his or her own well.

Formerly, well drilling companies that installed wells for domestic use were exempted from licensing requirements. The number of licensed drillers jumped from 130 before the new law's effective date to the 178 currently permitted. Still, it's estimated there are as

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storm sewer. They don't realize that the oil will wash out into the water system," Mills says.

Asphalt is worn off roads and washed into streams, and also finds its way to water as waste from road repair efforts. Mills found samples of asphalt to use in her project in a creek near her home, scraped off the road and dumped in the water when an attempt to install speed bumps apparently didn't succeed.

"We think of asphalt as another rock, but it's a blend of several materials. Heat, wind and water break it down, allowing components like petroleum to seep into the creek or soil," she explains.

What happens when the pollutants get in our water? "It doesn't necessarily kill them. It can stimulate or depress their growth, creating an imbalance in the ecological system. Organisms dependent upon the affected organisms are also then stimulated or depressed, increasing the imbalance. It's a chain reaction which could eventually be very damaging," Mills says.

The conclusions come from finely controlled scientific experiments. Mills converted the family dining room into a lab, installing three 10-gallon tanks and six five-gallon tanks. The amount of water in the tanks and the concentrations of pollutants introduced into them was carefully calculated so as to be consistent with levels of pollutants that might be released into a small pond.

For nearly three months the tanks dominated the dining room, their only source of light a fluorescent shop light controlled by a timer. Air and water temperature was also tightly controlled. Visual and microscopic data was gathered daily by Mills and recorded in the form of charts, graphs and notes.

The routine kept her busy, but not too busy to pursue other activities. Somewhere, Mills found time to serve as varsity cheerleading captain, a student council representative and vice-president of the Ecology Club. As an artist, she was a member of the National Art Honor Society and entered several watercolors in art competition. Away from school, she was active in her Methodist youth group and took up a new hobby, bodybuilding.

Her high school years are now behind her, but Mills will not soon forget the excitement that science and the study of water brought.

"Just getting to the International Science Fair was a thrill, although I'd been there before. When they called my name for fourth place, I walked up there like it was something I did every day. Inside, though, I was jumping up and down and going crazy. It was electrifying."

Mills is now looking to college at Oklahoma State University, where she plans a double major in zoology and botany. In ten years she sees herself in the water resources field working on pollution control.

It's likely she'll be telling people than what she tells them now— don't take water for granted.

"We have such beautiful rivers and waterways, and yet we throw trash in them. We don't respect our water enough," she says.

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many as 100 more drillers in the state who are operating without a license.

"We pushed for this law for a number of years as a way to upgrade the industry. It's the only way the state can really know who's doing what so that our ground water can be protected. You can bet we'll turn in any unlicensed drillers we come across," says Elk City driller Roy Burson, president of the Oklahoma Water Well Association.

Smith agrees with Burson's assertion that licensing protects Oklahoma's ground water quality, pointing to a number of checks set up in the law. One example he cites are OWRB rules and regulations that set minimum standards for construction of water wells, plugging of abandoned wells and water well test holes, and capping of water wells not in use.

Studies on well construction and water quality show that improperly constructed wells often serve as uncontrolled ground water recharge points. Surface runoff into well structures carry dissolved solids from livestock waste, agricultural chemicals, fecal organisms and other contaminants. Without the standards for construction that accompany licensing, the wells often are built without pollution-preventing safeguards.

Abandonment of wells can pose further problems, since the contamination present during the operational life of the well will continue. The wells also are used for disposal of wastes.

The problem isn't caused only by unlicensed drillers, Smith notes. Spot checks by OWRB of wells bored by licensed drillers have uncovered instances of improper construction, often the lack of a concrete seal that would prevent contaminants from trickling down the outside of the well casing into the aquifer below.

MAY CROP AND WEATHER SUMMARY

Continued cool weather and heavy rains hampered field work and slowed crop development across the state at month's end. Rains that left Oklahoma's subsoil moisture supplies in good shape and topsoil moisture supplies surplus in many areas also brought wheat and alfalfa haying operations to a standstill.

Row crop activity moved ahead between rains but at a very slow rate, and virtually no progress was made in alfalfa harvest. Planting of sorghum, peanuts and cotton slackened, and at month's end only 65 percent of the corn had been planted.

Pastures and ranges grew rapidly in the extreme south and are in good condition statewide. Warm, dry weather is needed for good growth in other areas.

Average temperatures ranged from 10 degrees below normal in north central areas to seven degrees below normal in the southeast.

Oklahoma Crop and Livestock Reporting Service

Smith plans to increase the number of spot checks, sending staff out in the field on a constant basis to look over well construction.

"We're also planning more personal meetings with well drillers and additional drilling seminars like the one we sponsored last year. Drillers will see a lot more of us," Smith says.

Licensed or unlicensed drillers who don't comply with rules will be risking penalty. Neglect or refusal to meet any provision of rules and regulations could ultimately result in fines of \$25 to \$250 a day, suspension or revocation of the drilling license and forfeiture of the \$5,000 bond drillers must maintain in order to be licensed.

"We'll do whatever we have to in order to insure our ground water is protected. Pollution of our aquifers has long-term and sometimes irreversible effects. With 61 percent of Oklahoma's total water used being drawn from ground water sources, we've got to be vigilant," Smith says.

Fill, Cover and Seal Old Wells

Hydrologists, geologists, water well contractors and other water professionals are all aware of the effects that abandoned wells can have on ground water quality. The wells are direct conduits to ground water below, serving as unrestricted, open channels for contaminants to reach water supplies.

Abandoned wells also present another danger, one more immediate and potentially tragic. Although no statistics are available to demonstrate the extent of the problem, each year across the nation people are killed or injured in accidents involving improperly abandoned wells.

Most of the problems from abandoned wells are associated with urban growth. As rural areas have urbanized, individual water supplies from wells often have been replaced by a public water system. More development and changing land ownership have contributed fur-



As urbanization turns country into city and water supply systems replace the family water well of yesteryear, abandoned wells attract pollutants and pose a hazard to walkers, children and animals.

ACTIVE CONSERVATION STORAGE IN SELECTED OKLAHOMA LAKES AND RESERVOIRS AS OF MAY 23, 1983

PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY
SOUTHEAST		
Atoka	124,100	100.0
Broken Bow	918,100	100.0
Pine Creek	77,700	100.0
Hugo	157,600	100.0
CENTRAL		
Thunderbird	119,758	100.0
Hefner	75,400	100.0
Overholser	15,935	100.0
Draper	75,300	75.3
SOUTH CENTRAL		
Arbuckle	62,571	100.0
Texoma	2,637,700	100.0
Waurika	203,100	100.0
SOUTHWEST		
Altus	100,256	75.5
Fort Cobb	77,487	98.8
Foss	149,000	61.1 ²
Tom Steed	73,922	83.1
EAST CENTRAL		
Eufaula	2,329,700	100.0
Tenkiller	627,500	100.0
Wister	27,100	100.0
Sardis	286,368	94.7 ¹
NORTHEAST		
Eucha	80,000	100.0
Grand	1,491,800	100.0
Oologah	544,240	100.0
Hulah	30,594	100.0
Fort Gibson	365,200	100.0
Heyburn	6,600	100.0
Birch	19,200	100.0
Hudson	200,300	100.0
Spavinaw	31,000	100.0
Copan	43,400	100.0
NORTH CENTRAL		
Kaw	428,600	100.0
Keystone	616,000	100.0
NORTHWEST		
Canton	97,500	100.0
Optima	1,920	... ¹
Fort Supply	13,900	100.0
Great Salt Plains	31,400	100.0

STATE TOTALS 12,140,251³ 98.6³

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.

ther to muddled records of well locations. Open or poorly covered, the wells sometimes are rediscovered only by heart-wrenching accident.

The Oklahoma Water Resources Board requires that wells temporarily removed from service be sealed at the top of the well casing with caps that cannot be easily

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removed. Permanent abandonment calls for a well driller, contractor or owner to fill the hole with drill cuttings or uncontaminated clay to within eight feet of the land surface. A minimum of five feet of concrete must be piled on top of the clay, effectively sealing the hole against runoff water or unwary walkers.

In the case of a polluted well, law requires that the contamination be isolated by cementing the well from top to bottom.

Duane Smith, acting Ground Water Division Chief, advises anyone who comes across an improperly abandoned well to report the find immediately to the OWRB.

"An abandoned well that isn't properly sealed is just an invitation to an accident. We'd like to see them all plugged," Smith says.



Statewide Program to Sample 500 Wells

A program of sampling the quality of well water begun in the Panhandle May 23 will continue across the state, and by June 30, provide data on approximately 500 wells representing all 21 of the state's major ground water basins.

Duane Smith, acting chief of the OWRB Ground Water Division, said water will be tested for a full range of parameters including pH, taste, temperature and odor and the presence of chlorides, chromium, nitrogen, metals and nutrients. By virtue of a cooperative arrangement, samples gathered by OWRB will be analyzed by the State Health Department laboratory.

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Data collected in the study will aid in the development of quality standards for ground water, a project already underway by the OWRB.

Bureau Offers Draft of New Regulations

The Bureau of Reclamation's proposed rules and regulations governing the implementation of the Reclamation Reform Act of 1982 are available for public inspection and comment through early July, Commissioner of Reclamation Robert N. Broadbent says.

Copies of the proposed regulations "covering every aspect of the act" are available from the Bureau's regional office in Amarillo, Texas, plus the six other regional offices and the main office in Washington, D.C.

The Reform Act is the first comprehensive revision of Reclamation law in more than half a century and will significantly affect water uses on Reclamation projects in the nation's 17 western states, Broadbent says.

Board Hosts Western State Engineers

The Western State Engineers spring workshop hosted by the Oklahoma Water Resources Board June 1-2 in Oklahoma City attracted a record 63 participants from 17 states, says Harold Springer, OWRB Engineering Division chief.

Springer served as workshop chairman, overseeing sessions on dam safety, floodplain management, hydrologic studies, water resources management and western water law.

The technically-oriented workshop was a good opportunity for professional engineers to share experiences and exchange ideas helpful in state water management, Springer said. The engineers return to Oklahoma City in the fall of 1984 for their 57th annual convention.

