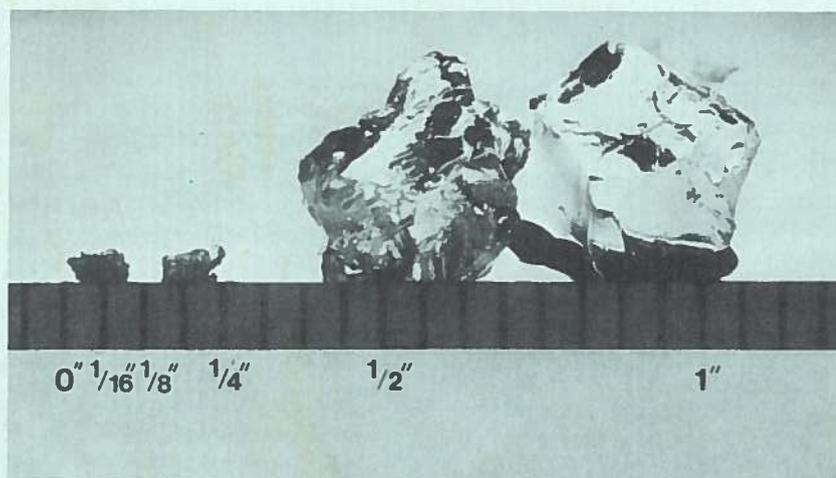


OK Water NEWS

A little water goes a long way. Long-lived granules absorb water, store it for slow release to roots.

Polymers



MONTHLY NEWSLETTER
OF THE OKLAHOMA
WATER RESOURCES BOARD

Gerald E. Borelli, Chairman

Earl Walker

Ervin Mitchell

Bill Secrest

Ralph G. McPherson

Gary W. Smith

Ernest R. Tucker

Robert S. Kerr, Jr.

R. G. Johnson

Larger chunks of gel on the right began like the particles on the left. Within 30 minutes of hydration, the granules absorb 50% of their potential; in 60 to 90 minutes, they swell to 100% of their water-holding capacity.

Sprinkled in water, granules no bigger than coarse salt grow before your eyes, taking on the chunky appearance of cracked ice and the texture of gelatin dessert.

A miracle?

Not a miracle, but anionic polyacrylamide, an agricultural polymer introduced in an earlier form to Oklahoma's oil patch before it was adapted to state garden patches. Relatives of "garden variety" polymers were developed to seal off the pervious zones encountered in drilling operations, and allow drilling liquids to flow past

them down the hole.

Agricultural varieties, sprinkled sparingly four inches down in garden soil or greenhouse pots, soak up the available moisture and store it for gradual release in the root zone, where plants can use it most efficiently. By gelling the moisture, the polymer lets the plant draw out the water as transpiration demands. So stored, the water can neither "pool" to drown roots nor run off or evaporate from the surface. Further, say its developers, it improves the structure of sandy soils and, used in its hydrated form, opens up tough clay soils.

The polymer grains repeat the cycle of absorbing and releasing 95 percent of their moisture throughout their three-to-five-year lifetime. Developers of the product, marketed in Oklahoma under the brand name Broadleaf P-4, claim it speeds germination, establishes strong seedlings and increases the water-using efficiency of growing plants.

Less water, less often

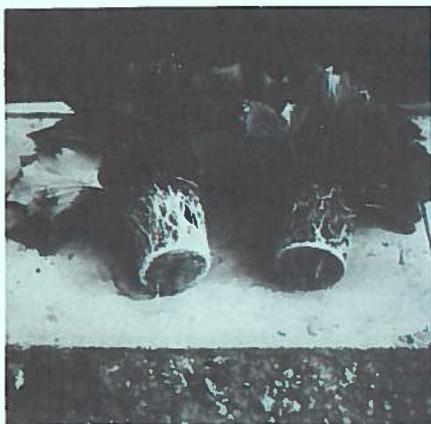
By capturing the moisture in the soil and feeding it to the plant gradually, the polymer allows longer intervals between waterings. Houseplants in six-inch pots of ordinary potting soil may require weekly watering, while those grown with one-fourth teaspoon of the polymer granules in the mix need only monthly watering. In about two weeks, the roots will have attached themselves to the small gel reservoirs for a

Continued on page 2

Polymers, from page 1
water supply.

Since water is confined in the structure of the polymer, soil on the surface may feel dry. Developers of Broadleaf P-4 caution that it's important to watch houseplants closely for early signs of stress until a watering schedule is determined. Lawns or turf areas planted with the polymer product may require twice-a-week watering to withstand August's severe heat and drought, while untreated lawns require daily watering to remain green.

It's in horticulture where the poly-



The *Cinneraria* plant on the left is from a batch grown with polymers in the compost and the other, from a group grown in equivalent soil without the polymers. The treated plant shows roots more fibrous, evenly developed and whiter in color. The treated pots were watered once for every three waterings of the untreated pots.



These roots, washed free of soil, show how roots grow through the hydrated granules to absorb the stored water.

mers have received the widest acceptance. In a finer grind, it works well as a root dip to prevent shock and prolong the moisture supply available to nursery shrubs and trees during transplanting. Potted plants removed from the greenhouse to the warm, dry climate of supermarkets, florists and garden centers have a better chance of survival, if the soil is laced with polymers. Proponents of the polymers claim the gel produces plants with a stronger, better developed root system, sturdier stalk and brighter foliage. All this, they claim, happens faster than in greenhouse stock watered in the conventional mode.

Declared safe by British equivalent of Food and Drug Administration

British chemists, developers of the second-generation polyacrylamide marketed under the brand name "Broadleaf P-4," claim the product is non-toxic, will not contaminate soil, water or living organisms and is neutral in pH. In Britain and Europe it is accepted as non-hazardous by the Intergovernmental Maritime Organization. No statement has been issued to date by the Federal Food and Drug Administration, but the product is under study for use in growing commercial food crops.

Perhaps the factor that will prove an obstacle to its wide use in growing field crops is its cost. Although farmers could expect the polymer to reduce irrigation costs for up to five years, the expense would have to be charged against first-year profits. Therefore, it is unlikely that western Oklahoma farmers, already strapped with high pumping costs and lower crop values, could justify its costs.

However, polymers have been used widely by the conservation-conscious Israelis to produce bumper crops of food and to make their desert country bloom.

Marketed by the pound at about \$20, horticulturists may find it a bargain in watering 200 6-inch pots, and the home gardener could find it a reasonable alternative in watering a flower bed or a small backyard vegetable

patch. Outdoors, the product is applied at the rate of four ounces per 10 square feet. The \$395 price tag on a 55-pound bag would seem to limit its use to the cultivation of high-dollar grasses such as golf course greens and turf areas or nursery-grown shrubs and trees.

Agricultural polymers are interesting products, in any case, and the gels prove that water can take on a form additional to vapor, liquid and solid (ice).

Zoo Dam Complete

Safe new dam and bridge span OKC Northeast Lake

After carrying countless carloads of visitors around Northeast Lake to Lincoln Park zoo and picnic grounds, the old concrete bridge and roadway were closed in 1982, victims of time and crushing spring rains. The road and bridge on Grand Boulevard formed the dam at the north end of the lake, and the dam had been under scrutiny by the Board's engineers since a safety inspection in 1978.

Engineers of the OWRB, U.S. Army Corps of Engineers and a consulting firm performing routine inspections had warned the city concerning the safety of the outdated structure. The dam, they assessed, could carry only 26 percent of the probable maximum flood, and heavy rains could cause floodwaters to overtop the dam one foot.

Climatologists estimate the probable maximum flood (PMF) on the basis of the most critical hydrologic and meteorologic conditions. One factor considered is the probable maximum precipitation (PMP)—theoretically the heaviest rain that is physically possible over a certain area, over a certain duration.

It could've happened here.

Oklahoma has four points at which actual observed rainfall equalled or exceeded 50 percent of the PMP over 24 hours, ranging from 18.8 inches to 23.6 inches. Only brief historic data

are available, so it is not unreasonable to expect storms of greater magnitude.

Inspectors at Zoo Lake dam recommended repairs to the spillway, removal of trees on the dam and planting grass cover to control erosion on the slopes. The warnings to city officials and zoo administrators passed unheeded.

Torrential rains in May 1982 caused the aged bridge structure to crack, dislodged and overturned a wing wall, caused a higher wall to fail, caved in a 36-foot stretch of roadway and further damaged the spillway.

That stretch of Grand Boulevard between Northeast 50th and Interstate 35 was closed while cracks in the bridge and outlet works were grouted and the road repaired. Zoo Lake was refilled without renovation to the crumbling spillway. Although the temporary repairs enabled reopening of the road in 1984, OWRB engineers continued to insist that the dam was dangerously inadequate and failed to meet state and federal dam safety criteria.

Old concrete in the 1908 bridge, weakened joints and collapsed road and spillway needed major renovation.

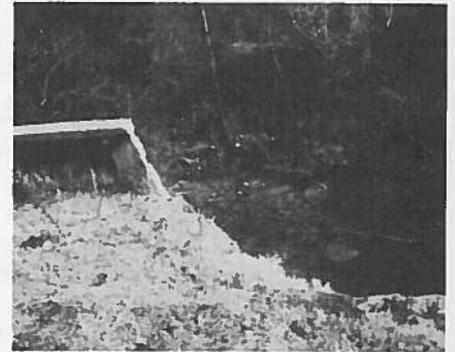
Just months after the temporary repairs were completed, the roadway again began to sink. Again the road was closed and the lake drained. This time, with the support of Oklahoma County Commissioner Shirley Darrell, and contributions of county funds and federal money from the Economic Development Administration, reconstruction of the dam began. The safety requirements long recommended by Board engineers were implemented. Early on, Engineering Division Chief Harold Springer and other Board staff reviewed plans and specifications for the new construction. They inspected the site regularly and continued to remind city and county officials about the state's dam safety regulations.

They persisted in requiring the removal of trees and heavy vegetation that could weaken the earthen dam and in requiring the planting of grass

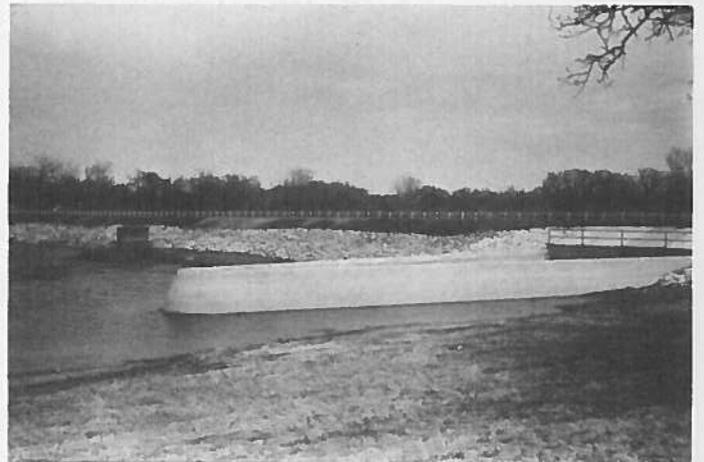
cover to hold the new slopes against erosion.

Ribbon-cutting ceremony marks end of 8-year effort.

After eight years of acting the gadfly to encourage the city and county officials to rebuild the dam, Board engineers are breathing easier. Springer and his staff of the Engineering Division are confident that the new dam can withstand the heaviest rains. They are assured that the road atop the dam will safely carry countless more generations of visitors and picnickers to Lincoln Park Zoo and recreation complex.



Heavy rains, age and the rupture of a water transmission line buried in the earthen dam contributed to the cave-in of the ancient spillway, bridge and dam.



A new road and bridge are part of the dam recently completed at Northeast (Zoo) Lake in Oklahoma City's Lincoln Park. The concrete structure in the foreground is the new spillway. The new dam is cleared of trees and its slopes are protected against erosion by grass cover.



At the ribbon-cutting officially opening the bridge and dam at Northeast Lake are Contractor Jack Tway of R. R. Tway, Inc.; Steve Wylie, Zoo director; Ron Rosser, chairman of the Zoological Society; Shirley Darrell, Oklahoma County Commissioner; Cecil Bearden, OWRB engineer and Buck Buchanan, Oklahoma County Commissioner.

Division Reviews Permits

According to Stream Water Division Chief J. A. Wood, staff continues to review permits for compliance and finalize enforcement action in the Upper Washita River area of the Red River

Basin. Such periodic review is required by Oklahoma Stream Water law and the Rules and Regulations of the Oklahoma Water Resources Board.

When this review is complete, OWRB staff will check for compliance

permits for stream water use in the entire Arkansas River Basin from the Panhandle to the Oklahoma-Arkansas line. Due for review are 954 permits in Stream Systems 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9-1, 2-9-2, 2-9-3, 2-9-4, 2-10 and 2-11.

ACTIVE CONSERVATION STORAGE IN SELECTED OKLAHOMA LAKES AND RESERVOIRS AS OF MARCH 19, 1986

PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY	PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY
SOUTHEAST			NORTHEAST		
Atoka	114,300	92.1	Eucha	79,567	100.0
Broken Bow	908,060	98.9	Grand	1,326,270	89.0
Pine Creek	77,700	100.0	Oologah	544,240	100.0
Hugo	157,600	100.0	Hulah	30,594	100.0
CENTRAL			Fort Gibson	365,200	100.0
Thunderbird	105,925	100.0	Heyburn	6,600	100.0
Hefner	68,000	90.2	Birch	19,200	100.0
Overholser	14,900	93.7	Hudson	200,300	100.0
Draper	78,200	78.2	Spavinaw	30,000	100.0
SOUTH CENTRAL			Copan	43,400	100.0
Arbuckle	62,571	100.0	Skiatook		1
Texoma	2,589,260	98.0	NORTH CENTRAL		
Waurika	203,100	100.0	Kaw	398,618	93.0
SOUTHWEST			Keystone	605,807	98.0
Altus	37,651	28.0	NORTHWEST		
Fort Cobb	67,907	86.6	Canton	97,421	99.9
Foss	132,048	54.0 ²	Optima	3,000	1
Tom Steed	68,504	77.0	Fort Supply	13,557	97.5
EAST CENTRAL			Great Salt Plains	31,400	100.0
Eufaula	2,205,896	95.8			
Tenkiller	627,500	100.0			
Wister	27,100	100.0			
Sardis	302,500	100.0			
STATE TOTALS				11,587,361	91.8³

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.

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

MARIE WELTZHEIMER, Design

OKLAHOMA WATER NEWS
Oklahoma Water Resources Board
1000 N.E. Tenth, P.O. Box 53585
Oklahoma City, Okla. 73152

BULK RATE
U.S. POSTAGE
PAID
Oklahoma City, Okla.
Permit No. 310