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"The consideration is that hydrogen sulfide gas is corrosive to concrete," said Dick Cassidy, chief of the reservoir regulation and water quality section of the corps' Portland district. "So we began some preliminary investigations as to what the impact of the gas might be on the concrete."

Cassidy's section recommended that the corps install a \$150,000 mechanical aerator on the bottom of the reservoir, which would pump oxygen into the deep waters and theoretically prevent the production of toxic, corrosive chemicals. The recommendation was confirmed by experts at the corps' Waterways Experiment Station in Vicksburg, Miss., but it was ultimately rejected for lack of funds.

A second solution - to drain the water in the summer months when the lake produces algae - was also rejected because the reservoir is supposed to be used for recreation and irrigation.

The corps raised the water level in the reservoir this year to try to mitigate the problem, but it appeared to make matters worse.

While the corps considers its options, scientists under contract with the corps continue to study the intriguing forces, seen and unseen, that are affecting the dam.

Oregon State University oceanographers Robert Collier and Jack Dymond are studying the geochemical processes occurring in the dam and reservoir. They're trying to figure out how the water is interacting with the concrete and exactly how much of the concrete is washing downstream every year.

"The main problem is the dam leaks," Collier said. "Concrete is not designed to have water running through it. If you didn't have water running through the concrete, you wouldn't have a problem. In other

words, the leaks came first. The chemistry that follows is removing material from the dam."

Collier and Dymond have found evidence that the dam may be healing itself to some degree. Calcium carbonate leached through the concrete has deposited on some dam surfaces and plugged leaks. Although the surface precipitation of calcite may decrease the dam leakage, it will not enhance dam integrity, the scientists say.

The corps has also contracted with University of Washington oceanographer Marvin Lilley to examine a suspected methane presence within the dam. Corps officials are especially concerned about methane because it is highly explosive and potentially could result in a more immediate and catastrophic failure of the dam than the dissolution process.

Microbial ecologist Jim Staley is under contract to determine what's going on biologically within the dam matrix. Staley has discovered that water within the dam is providing a habitat for bacteria that can change hydrogen sulfide and nitrogen into concrete-corroding acid compounds.

"Acids corrode concrete," Staley said. "If you took concrete and added acid to it, it would eventually dissolve the concrete. There is the potential for corrosion (at Willow Creek) because these bacteria are there."

Like everybody else, Staley is having to develop new techniques to study Willow Creek Dam because the situation is so unusual.

"At Willow Creek, we have a unique combination of factors - a new dam in a very rich watershed with water seeping through," he said. "If you had a solid concrete structure impervious to water, those bacteria are not there. Where the water is, is where the life is and that's where the problem is."

Dam still controversial

by Lisa Strycker
The Eugene Register-Guard
Controversy has plagued Willow Creek Dam near Heppner since the day it was conceived.

The agricultural community's 1,500 residents argued for years about the necessity, the expense, the design and the location of the flood-control project that was completed at the town's city limits by the U.S. Army Corps of Engineers in 1983.

And now Heppner's citizens worry that the dam, with its leaks and toxic gas emissions, could fail and inundate the town they were told it would save from a flash flood.

"The issue has been on the burner since 1903 when we had the big flood through here," said former mayor Cliff Green. "Over the years, county commissioners and judges through different administrations went to D.C. to lobby for construction of a dam here for flood control. They basically got nowhere with it."

Then in 1971, a summer storm caused a flash flood down Shobe Canyon that destroyed several houses in Heppner, filled the swimming pool with mud and deposited mud on Main Street.

In the process of cleaning up the mess, the Federal Emergency Management Administration was contacted. The agency promptly designated a flood plain, required Heppner residents to obtain flood insurance and imposed regulations that effectively stopped any new construction downtown.

"At that point, the idea of the dam was revived and it was a very hot question," Green recalled. "Most of us on the council opposed it and tried to fight the regulations other ways. It finally reached the point that the dam seemed to be the only thing that would save the downtown core area. Basically, we built the dam to save Main Street from government regulations, not from water."

Green advised the town's residents to vote for the dam in a referendum election even though he thought it

wasn't necessary for flood control. In 1981, Heppner residents voted 297-272 to give the corps the go-ahead to build the dam. But most residents—even those who voted in favor of the project—felt the project had been shoved down their throats by the federal government.

With the help of Sen. Mark Hatfield, residents were able to get money appropriated for the project and it was built, as cheaply as possible with a revolutionary roller-compacted concrete construction method.

Without the political pressure, the corps probably would not have built the dam because it doesn't meet the usual corps criteria, said William Branch, chief of the hydraulics and hydrology branch within the corps' engineering division in Portland.

"It was something we were not pushing at all," Branch said. "The dam itself at Willow Creek had a benefit-cost ratio below 1, which going by our standards, we would not build the dam."

The dam is designed to protect the town from a flood down Willow and Balm Fork creeks, but in recent years most of Heppner's flooding has come from Shobe Canyon southwest of the town or Hinton Creek to the northwest. Town residents generally are satisfied with a flash flood warning system installed in those two watersheds.

With all the problems at Willow Creek Dam, many residents say they'd have been happier with a warning system on Willow Creek and Balm Forks than the looming, leaking concrete structure.

"I have always questioned the credibility of the project and the corps pertaining to the project," said Heppner resident Kit George, whose front-yard view is dominated by the dam.

"I don't think this dam was ever justified and I don't think they could ever justify building it. Now we have it, we're stuck with it and we have to make the best of it."

Willow Creek dam was first of its kind

by Lisa Strycker
The Eugene Register-Guard
The world's first roller-compacted concrete dam at Willow Creek near Heppner signaled the start of a revolution in gravity-dam construction.

Since Willow Creek was completed in 1983, more than 20 roller-compacted dams have been started throughout the world, including the highly controversial Elk Creek Dam on a Rogue River tributary in Southern Oregon and a county-built dam on a tributary of the South Umpqua River.

The U.S. Army Corps of Engineers decided to use the new roller-compacted construction method at Willow Creek instead of traditional concrete, rockfill or embankment dams to save time and money, although the corps has spent at least \$2.5 million beyond the original \$34.7 million construction cost for studies and work on the dam to reduce leakage and corrosion problems that threaten to destroy the structure.

Whether the problems documented at Willow Creek will arise at the other dams remains to be seen. Lessons learned at Willow Creek have been used to improve the methods for constructing roller-compacted dams elsewhere.

"The technology of that type of construction has progressed rapidly," said William Branch, chief of the hydraulics and hydrology branch within the engineering division of the corps' Portland district. "We learned a lot from constructing Heppner, which has gone to benefit the engineering community."

Willow Creek Dam is the corps' last completed project in the Northwest. The corps was in the process of building the \$119 million Elk Creek Dam when a federal judge halted construction last year because the corps hadn't fully considered how increased water temperatures and turbidity caused by the dam on Elk Creek would affect salmon and steelhead in the Rogue River.

Sources within the corps say the agency has not made public the problems developing at Willow Creek because of fears that such negative

publicity would jeopardize the already embattled dam at Elk Creek.

The U.S. Supreme Court has agreed to hear the federal government's appeal of the ruling that stopped construction on the Elk Creek Dam. Meanwhile, the dam sits half-finished at a height of 83 feet, a third of the completed height of 249 feet.

The Galesville Dam in Douglas County was completed in 1986 using the roller-compacted construction technique, said John Youngquist, water resources coordinator for the county. The 167-foot-high dam cost \$14 million, a savings from the \$17 million projected for an earth-filled dam.

Galesville Dam developed seven major cracks running through the dam body from upstream to downstream, though which water leaked. Dam experts say the cracking occurred because a delay in construction required some of the work to be done during the hot summer season. The roller-compacted concrete had a short time to mature and had cooled quickly during the first winter, resulting in the cracking.

"They were very easy to repair," Youngquist said. "Before the repair, the leakage was 1,000 gallons per minute. The leakage is now in the neighborhood of 120 gallons per minute. It is leaking. But it is not leaking beyond what is normal."

The roller-compacted concrete technique uses conventional earth moving equipment that allows the structure to be built very rapidly, making it much less expensive than conventional mass concrete.

The mixture looks and handles much like damp gravel fill, but hardens into concrete with strengths that should equal conventional mass concrete.

At Willow Creek and at Elk Creek, the concrete is made by quarrying rock from above the reservoir area, processing it into sand and gravel sizes and combining it with sand, cement, flyash and water. The roller-compacted concrete, which is much drier than conventional concrete, is transported to the site, spread in layers using large dozers and compacted using heavy vibratory rollers.

Shaw works towards Eagle Scout award

It is estimated that less than 1% of all boys who join the Boy Scouts of America as Cub Scouts ever reach the ultimate rank of Eagle Scout; the last one from Heppner was Perry Cooper, in 1978.

J.J. Shaw of Heppner is nearing completion of the goal he set when he joined in 1979. He has 4 of the required 21 merit badges remaining. He is in the middle of the major service project required of all Eagle Scout candidates.

J.J. has designed a service project to landscape a problem area at Hope Lutheran Church. He has also worked to obtain donations and volunteers. An Eagle Scout can-

didate must develop organizational and leadership skills; he cannot do the project alone.

Saturday, August 27, scouts from Troup 654 in Hermiston (the troupe J.J. joined and in which he has served as senior patrol leader and junior assistant scoutmaster when the local troupe disbanded) will be spreading gravel and digging out the area where railroad ties will go to establish beds of plants and flowers. J.J. has spent several hours preparing for this activity beginning last winter when he took measurements of the area with a foot of snow on the ground. A design has been on the bulletin board at the church since the project was approved by the council this spring.

At a later date, men from the church will be asked to assist with the placement of the 8'x8'x8' oak railroad ties to be used as retaining walls in the bank.

Chief Rathbun's Tips

FRAUD WATCH
It's a fraud if you're told you have won the Reader's Digest Sweepstakes and can pick up your prize by paying \$40 C.O.D. (the magazine says it doesn't operate this way).

It's a fraud if you are asked to pay \$10 for a Social Security Number or enter a Social Security Sweepstakes. The Social Security Administration says it's cards are free and it runs no sweepstakes.

School Lunch Menus

HEPPNER ELEMENTARY SCHOOL
Tentative Lunch Menus
Sept. 26-30

Monday - Chicken, potatoes/gravy, vegetable, dessert, milk.
Tuesday - Surprise Salad Bar.
Wednesday - Potato bar, vegetable, peanut butter cookie, fruit, salad bar.
Thursday - Casserole.
Friday - Grilled cheese sandwiches, pickles, vegetable, fruit, milk.

SAM BOARDMAN ELEMENTARY
Tentative Lunch Menus

Monday - Sloppy Joes, corn, fruit, cookie, milk.
Tuesday - Weiner wraps, chicken noodle soup, veggie stix, apples, cake, milk.
Wednesday - Haystacks, meat, cheese, lettuce, chips, green beans, fruit, grab'n' crackers, milk.
Thursday - Hot turkey sandwiches, potatoes/gravy, cranberries, mixed vegetables, Rice Krispie Treats, milk.
Friday - Hamburger cook-out, chips, veggie stix, apples, ice cream sandwiches, milk.

RIVERSIDE HIGH SCHOOL
Tentative Lunch Menus

Monday - Taco Munchskin, cottage cheese, veggie stix, blueberry muffins, milk, salad bar.
Tuesday - Tuna or peanut butter sandwiches, veggie soup, cheese stix, pudding/fruit, milk.
Wednesday - Chicken nuggets, tartar/sweet & sour sauce, potatoes, butter, corn, red Jello cake, salad bar.
Thursday - Breakfast croissants, hash browns, cheese stix, mixed fruit, strudel, milk, salad bar.
Friday - Hamburger cook-out, chips, veggie stix, scotcheroos, bananas, milk.

BOOK DROP

by Marie Struthers

by Marie Struthers

"A Brief History of Time" by Steven Hawking is still at the top of the non-fiction best seller list and deservedly so. This little book, written in everyday English, presents the history of man's understanding of the universe in clear and concise language sans yard long formulas and patronizing lectures.

Written for the layman, the only equation included is Einstein's E=MC² and Hawking doesn't even demand that you understand that. From flat earth theories through the "Big Bang" and beyond he takes you on a chronological trip through the merky relms of physics; where it all began and where it may (or may not) be going.

Steven Hawking is an eminently qualified guide for this journey. Handicapped with Lou Gehrig's Disease since early adulthood, Hawking has, nevertheless, been in the forefront of theoretical astrophysics for the last 20 years. Unable, now, even to speak unaided, he has produced some of the most lucid theories and clarifications of theories in the field.

"A Brief History of Time" is a condensation of all the progress made in the field of physics since Aristotle. Hawking brings phrases such as "sub-atomic particle", "string theory" and "black hole" into perspective for the non-physicist with a skillful pen.

Even if you were never able to pass Algebra II in high school, this book will fascinate you. It can be found, along with a couple of dozen other best sellers, at the Heppner Public Library. See you there!

SAVINGS

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Sunday by appt.

HEPPNER ELKS LODGE #358
COMING EVENTS

Friday, Sept 23rd - HUNTERS NITE
15** All You Can Eat Rib Feed at 6:00 p.m.
Prizes Galore!!!

Saturday, Sept 24th
Live Music 9:00-2:00 Country/Variety
sound by "CROSS TOWN"

Thursday, Sept. 29th
"Under The Big Top Circus" 7:00-8:30 p.m.
Presented by King Royal - Heppner Fairgrounds

Saturday Oct. 15th
Basque Barbeque 7:00-9:00 p.m.
Live Music 9:00-2:00 a.m.

Friday, Oct. 28th
High School Homecoming Dance 10:00-1:00 a.m.
Breakfast 1:00-2:00 a.m.

Saturday, Oct. 29th
Halloween Costume Contest and Dance
Live Music 9:00-2:00 a.m.

Heppner Elks 358
676-9181 "Where Friends Meet" 142 N. Main

★ **BIG BUCK CONTEST** ★
★ Deadline Sign-Up **Sept. 30** ★
★ 10/22 Ruger Western Knife Box of Ammo (Prizes) ★
★ **De Wilde Swap Shop, Inc.** ★
★ 567-2080 ★
★ Main Street, Hermiston ★
★ Red-White-Blue Bldg. ★
★ Open 7 Days A Week ★
★ ★

Art auction to be held in Hermiston Sept. 24

Hermiston's Perceptor chapter of Beta Sigma Phi will hold their 15th Annual Art Auction September 24 at Thompson Hall on the Umatilla County fairgrounds in Hermiston.

The doors will open at 6 p.m. for the preview and silent auction. The live auction begins at 8 p.m.

Admission at the door is \$3 per person.

There will be approximately 100 pieces of art entered with the proceeds going to the Hermiston High School band trip scheduled to Vienna, Self Reliance Group and the Pioneer Humane Society.

A no-host bar will be available with hors d'oeuvres furnished by the sorority.

The auction is open to the public. Come have a fun evening with us.

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