Top job: Cleaning up Montana's acid lake

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ABSTRACT (ABSTRACT)

Atlantic-Richfield Co (ARCO) is trying to come up with a way to purify the water in Berkeley Pit in Butte MT before it endangers other areas. The water is polluted with sulfuric acid from the mines.

FULL TEXT

Headnote

Don't even think of swimming in the Berkley Pit, one of the most polluted spots in the United States.

A flock of snow geese swoops down from the sky and lands on a lake in Butte, Mont. The geese are making a quick stop before continuing their migration south. After drinking the lake's maroon-colored water, however, the geese never take off again.

The geese hadn't landed in an ordinary lake. They'd landed in the Berkeley Pit, an abandoned open pit mine that holds billions of liters of polluted water-or, as some of the locals say, "not-water."

The Berkeley Pit is the most toxic of a group of highly polluted water sources in southwestern Montana. Those bodies of water, all in and around the city of Butte, are part of the largest Superfund operation in the nation. Superfund is a popular name for a fund of money to be used by the U.S. government for the cleanup of extremely hazardous waste sites.

Environmental groups in Butte have been using rockets, spotlights, and flares to shoo birds away from the Berkeley Pit. At the same time, scientists have been experimenting with new ways to clean up the pit's polluted water. Butte-named for the butte. or flattopped hill that the city is built on emerged as a copper mining center nearly 100 years ago. Copper was in high demand then because the United States was becoming electrified and power lines were being strung across the country.

Butte's rich supply of copper once earned it the nickname of "the richest hill on Earth." Now that the copper is gone and the butte is scarred from decades of mining, many residents call the area an eyesore.

When the Berkeley Pit, which is located in the heart of Butte, was an active copper mine, huge pumps extracted groundwater from the mine. Groundwater is water that exists naturally below the ground. When the mine was shut down in the early 1980s, the pumps were turned off. Since then, groundwater has been draining into the pit through the butte's many kilometers of mining tunnels. Roughly 11,000,000 liters (3 million gallons) of polluted water pour into the pit each day.

The pit water has a high concentration of sulfuric acid, which was used in the mining process and remains in the ground. Sulfuric acid is an extremely strong acid-strong enough to kill geese and dissolve heavy metals. A heavy metal is one with a high atomic weight.

Some heavy metals, such as iron, zinc, and manganese, are normally found in humans and other living organisms. Indeed, small quantities of some heavy metals are necessary for many life processes. Other heavy metals, such as lead, mercury, and cadmium, can be poisonous when they get into the air and the water, however.

At its current level, the toxic brew of sulfuric acid and heavy metals in the Berkeley Pit is not an immediate threat to the surrounding area. However, scientists predict that the brew will eventually reach a level at which it w111 start flowing out of the pit.

The Montana Department of Environmental Quality has ruled that the Atlantic-Richfield Company (ARCO), which owns the plant, must develop a plan to purify the polluted water before it endangers other areas. If ARCO fails to

come up with a plan, it could face fines of $25,000 a day. With that threat as a motivator, ARCO has been challenging inventors to come up with ways to clean the water.

TREATING THE WATER

Already, ARCO plans to build two treatment plants where lime is added to water drawn from the pit. Lime is a white, powdery material derived by heating limestone rock. Lime is also a base, a compound that neutralizes an acid. When a base and an acid react, they form water. Scientists say adding lime to the water drawn from the pit will also cause the dissolved heavy metals to precipitate, or drop out of a solution.

The downside of lime treatment is that it will create a ton of heavy-metal sludge each day. So ARCO, with the help of a waste-disposal company, MSE Technology Applications, is looking at other ways to treat the bad water. One alternative studied by MSE calls for cow manure!

Bacteria that feed on cow manure produce hydrogen sulfide, a compound with the smell of rotten eggs. Hydrogen sulfide makes heavy metals precipitate out of water.

Fortunately, there is no shortage of cow manure in the region. Already, cow manure is being used to treat polluted mine water in the nearby city of Elliston. "We have a lot of cows in Montana," said Marietta Canty, an environmental engineer with MSE.

DETAILS

ERIC Subject:	Water; Hazardous Materials; Scientists
Subject:	Environmental cleanup; Water pollution; Mining industry; Manures; Mining; Groundwater; Heavy metals; Sulfuric acid; Copper
Business indexing term:	Subject: Mining industry; Industry: 32531 : Fertilizer Manufacturing 21223 : Copper, Nickel, Lead, and Zinc Mining
Location:	Butte Montana; United States--US
Company / organization:	Name: Atlantic Richfield Co--ARCO; NAICS: 211120, 457110
Classification:	32531: Fertilizer Manufacturing; 21223: Copper, Nickel, Lead, and Zinc Mining
Publication title:	Current Science; New York
Volume:	84
Issue:	10
Pages:	10-11
Publication year:	1999
Publication date:	Jan 22, 1999
Publisher:	Scholastic Inc.
Place of publication:	New York
Country of publication:	United States, New York

Publication subject:	Literature, Education, Children And Youth - For, Sciences: Comprehensive Works
ISSN:	00113905
CODEN:	CURSBW
Source type:	Magazine
Language of publication:	English
Document type:	Feature
Accession number:	04087961
ProQuest document ID:	195944529
Document URL:	https://www.proquest.com/magazines/top-job-cleaning-up-montanas-acid-lake/docview/195944529/se-2?accountid=173502
Copyright:	Copyright Weekly Reader Corporation Jan 22, 1999
Last updated:	2024-03-15
Database:	Research Library

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