

EPA Completes First Part of Study to Define Contaminants at Formosa Mine Superfund Site

Operable Unit #1

Douglas County, Oregon

February 2012

This fact sheet gives information about a recent study to define contamination at the Formosa Mine Superfund Site. The site is on Silver Butte, one of the headwaters of Middle Creek, about 10 miles south of Riddle, Oregon in Douglas County.

In September 2007, the site was added to the Environmental Protection Agency's (EPA) National Priorities List, because heavy metals and acid rock drainage at the site pose a risk to people and the environment.

EPA recently completed a study, called the "Remedial Investigation" (RI), at the site. EPA worked closely with several partners to complete this effort, including the Bureau of Land Management (BLM), the Oregon Department of Environmental Quality (ODEQ), U.S. Fish and Wildlife, and the U.S. Geological Survey. The study focused on all surface mine materials deposited outside of the underground mine workings at the site. Other materials on the surface, including contaminated soils, were also studied. This part of the site is called "Operable Unit 1 (OU1)." Sampling defined the amount of mine materials and potentially affected soils at the site, and the levels of contaminants they contain. Some tests were also done of seeps, springs, surface water, and groundwater.



Formosa Mine site: looking south from Silver Butte over the former processing area and waste encapsulation pond. Acid-generating waste prevents vegetation from growing.

These water features are part of "Operable Unit (OU2)." OU2 includes surface water, stream sediment, groundwater, underground mine workings, and mine adit discharges.

While the study focused on the mine materials, the data collected helps EPA better understand how contaminants from these materials have affected and continue to get into surface water and groundwater. Background soils were also tested.

Key Study Findings

The sampling effort identified about 317,000 cubic yards of mine materials located on the surface of the site. These need to be addressed to protect people's health and the environment. The materials are spread over about 25 acres at depths ranging from 1 foot to about 40 feet. They contain sulfide minerals and high levels of contaminants like arsenic, cadmium, copper, and zinc. These metals leach out of mine materials and contaminate surface water and groundwater, generating acidic water called acid rock drainage.

It is estimated that mine materials in "OU1" generate

between 4 and 13 million gallons of acid rock drainage during an average year.

Potentially affected soils down-slope from steep piles of mine materials were sampled, to compare metals concentrations to background levels. The metals levels in the down-slope soils were higher than those found in background areas. However, it is unclear whether the high levels in down-slope soils are caused by mining, as the soils are next to massive sulfide outcrops that were present before mining began.

The soils are next to sulfide outcrops that were present before mining began

(Continued from first page)

These outcrops contain high levels of naturally occurring metals.

The study also found that soils are being contaminated by mining-influenced water discharges seeping slowly from beneath the surface, and from the adit water diversion system. The adit water diversion system was installed in 1994 to route mining influenced water draining from the adits to an overland drainfield. Although the system has reduced the amount of metals loading directly to Upper Middle Creek, it has contaminated soils in the drainfield area. This is likely affecting groundwater in the area and possibly downstream surface water.

Surface Water Test Results

The study found surface water in Upper Middle Creek and South Fork Middle Creek is strongly affected by the mining influenced water. Russell and West Fork Canyon Creeks, north and west of the site respectively, are not affected by the mine. Noticeable contamination from mining influenced water extends 13 miles downstream from the mine to where Middle and Cow Creeks meet. The site is not impacting drinking water quality at private

and municipal intakes downstream of the mine on Cow Creek. During the Operable Unit 2 Remedial Investigation, more sampling will be done on downstream surface water and stream sediments to more fully characterize them.

About Acid Rock Drainage

At the site, acid rock drainage poses a serious problem. Reducing and controlling it is one of the main challenges. It is toxic to fish and other aquatic life, and exposure to untreated acid rock drainage can be hazardous to people and wildlife.

Acid rock drainage is caused by chemical reactions between water, oxygen, bacteria, and sulfide minerals. At the site, there is water and air movement underground that didn't exist before mining began. Mine materials stored at the surface are exposed to oxygen and weathering. This created ideal conditions for acid rock drainage to form, both in the underground mine and within the surface mine materials.

Protecting the Ecosystem, Animals and People

The main concern at the site is ecological. The forested areas within the site are habitat for black bear, deer, a variety of birds, and the northern spotted owl, a federally threatened species. Creeks near the site are home to Chinook salmon, endangered salmon, and other species.

The remedial investigation found mine materials are getting into the surface water and posing a significant risk to fish, frogs, insects, and other aquatic life. Mine-related contaminants also threaten land animals.

It is important for people to stay away from the acidic water coming from the old mines.

EPA evaluated risk to several types of users who could access the site: workers, hikers, hunters, and campers. The risk level for these users was found to fall within the acceptable risk range, as they are temporarily passing through the site. However, it is important people stay away from the acidic water coming from the old mines.

In the future, EPA is considering working with partner agencies to post signs warning people to avoid drinking the water or coming into close contact with it.

If you need materials in an alternative format, please contact Debra Sherbina at 206-553-0247.

TTY users please call the Federal Relay Service: 800-877-8339.

Next Steps

Information gathered during the remedial investigation will help EPA determine the best and most efficient ways to address the surface mine materials.

EPA will carefully evaluate several cleanup options, including capping over contaminants, hauling contaminants away, and others.

These cleanup options will be detailed in a document called a “Feasibility Study” for OU1, which will be available to the public in 2013.

A second Feasibility Study will be done for OU2. The investigation and cleanup is being funded through EPA’s Superfund program, although EPA continues to search for Potentially Responsible Parties.

Background

The Formosa Mine Superfund Site covers an impacted area of 25 acres. It is a mix of private lands as well as federal lands managed by BLM. The abandoned Formosa and Silver Butte mines are on the site, as well as parts of Upper Middle Creek and South Fork Middle Creek. The site was originally mined for copper and zinc from about 1910-1937. The mine was reopened in 1990 by Formosa Exploration, Inc. and its parent company Formosa Resources Corporation.

When mining operations ended in 1993, the mine was filled with mill tailings, crushed ore, concentrates, and other mine materials. Acidic water, called acid rock drainage, was directed into the adit water diversion system and discharged into a drainfield area. Tailings and low grade ore from the mine were placed in a lined cell and capped. After some additional reclamation work, the mining company left the area in 1996. The original adit water diversion system began to fail in 1995.

Since then, the system has needed maintenance to keep it working. Investigations of water quality and aquatic life were done by the mining company in 1988-89, and in the 1990s by BLM and ODEQ. Between 1999 and 2002, BLM and ODEQ performed a baseline remedial investigation of the site.

These studies have documented 18 miles of fish habitat in Middle Creek and South Fork Middle Creek that have been severely degraded. The fishery that had thrived before this time was destroyed.

ODEQ installed a new adit water diversion system in 2000. It has operated since, but requires ongoing maintenance. In 2005, citizens petitioned EPA to consider adding the site to the National Priorities List (NPL) of the most contaminated sites in the nation. The site was added to the NPL in 2007. Remedial investigation activities for Operable Unit 1 and parts of Operable Unit 2 began in 2008 and were completed in 2011.

For More Information

Chris Cora, EPA Project Manager

☎ 206-553-1478

✉ cora.christopher@epa.gov

Debra Sherbina, EPA

Community Involvement

☎ 206-553-0247

✉ sherbina.debra@epa.gov

Visit the Formosa Mine Superfund Site on the web:

✉ <http://go.usa.gov/UaB>

View the OU1 Remedial Investigation Report, technical information, community involvement documents, photos, and more.

Information repositories:

Riddle Library

637 First Avenue
Riddle, OR 97469

Roseburg Library

1409 NE Diamond Lake Blvd.
Roseburg, OR 97470

1200 Sixth Avenue, Suite 900, ETPA-081
Seattle, Washington 98101-3140

February 2012



***EPA Completes First Part of Study
to Define Contaminants at
Formosa Mine Superfund Site***

Look Inside for

- ***Key Study Findings***
- ***About Acid Rock Drainage***
- ***Protecting the Ecosystem, Animals and People***