

NPL Site Narrative for Callahan Mine

CALLAHAN MINE Brooksville, Maine

Conditions at Proposal (September 13, 2001): The Callahan Mine site is located approximately 1,000 feet east-southeast of Harborside Village in the Town of Brooksville, Hancock County, Maine. The site is the former location of a zinc/copper open-pit mine. The mining operations were conducted adjacent to and beneath Goose Pond, a tidal estuary. The Callahan Mine was reputedly the only intertidal heavy metal mine in the world at the time of its operation. The property comprises 150 acres and is located in a coastal, rural setting on the Cape Rosier peninsula. The property abuts Goose Pond to the east, and private properties to the west, south, and north. Facility features include large waste piles (waste rock piles), a tailings pond, and mine operations buildings and structures. The open pit mine ceased operations in 1972 and was flooded by opening a dam at Goose Falls. The mine is currently under water and is subject to daily tidal exchange in Goose Pond. Goose Pond is connected to Goose Cove to the north by a reversing falls known as Goose Falls. Goose Cove is located on the southern part of Penobscot Bay.

The zinc/copper sulfide deposit was discovered in 1880 at low tide by a clam digger. The main components of this deposit were sphalerite and chalcopyrite, accompanied by abundant pyrite and lesser amounts of pyrrhotite. The first mine operated until 1887. Ore was mined from three shafts. Efforts were made to mine the ore sporadically through 1964. Callahan Mining Corporation geologists became interested in the potential of the property in 1964 and subsequently open pit mining operations commenced in 1968. Two dams were constructed at the saltwater inlet and freshwater inlet of Goose Pond. Fresh water that normally flowed into Goose Pond was diverted south to Wier Cove via a drainage ditch. Goose Pond was subsequently drained to allow for the excavation of the mine.

The open-pit mine was approximately 600 to 1,000 feet in diameter and 320 feet deep. Approximately 5 million tons of non-ore-bearing waste rock and 798,000 to 800,000 tons of ore-bearing rock were removed from the mine. Waste rock was removed and piled throughout the property, but predominantly in an area south of Dyer Cove. This area has been referred to as "Callahan Mountain," due to the large volume of waste rock located in this area. In addition, a large amount of marine clay (200,000 to 225,000 tons) was dumped on the lower portions of "Callahan Mountain" after a mud slide occurred at the open-pit mine. Dyer Cove, currently a small part of the Goose Pond estuary, was a fully enclosed area used to temporarily store water pumped from the open pit mine. Particulates were allowed to settle out prior to pumping the water from this cove to Goose Cove. Sediment-laden water from the mine was also pumped through a 16-inch pipe line, discharging directly into Goose Cove, north of Goose Pond.

Ore was trucked from the mine to an ore storage area. From here, the ore was loaded into a series of crushers and mills that reduced the rock to the consistency of fine sand and silt. The small particles containing zinc and copper were then recovered by a process called "flotation". The ore was passed through flotation cells into which chemicals were introduced that caused the minerals to float on bubbles. Chemicals that were used in the flotation process included dithiophosphate salts, aryl phosphorodithioate, cyclohexanol, and cresol. The flotation process creates a "froth" which lifts (through surface tension) the mineral particles and depresses or allows the remaining rock to sink. The mineral rich froth was collected, washed, dried, and stockpiled in a portion of the mill where it awaited transportation to a smelter. The average ore grade was 1.30% copper, 4.91% zinc, 0.35% lead, and 0.50 ounces per ton of silver.

The remaining non-mineral particles and residues of the chemical reagents were discharged to the tailings pond. The approximately 11-acre tailings pond is located in the southern portion of the property, adjacent to Goose Pond. A series of dams were constructed as material was added to the tailings pond. The final height of the dam is 82 feet. Mining operations ceased in June 1972 due to the depletion of the mineral reserve. Milling ceased in July 1972.

A study completed by the Maine Department of Marine Resources in 1975 examined bioaccumulation of trace elements in selected marine organisms located in Goose Cove. Levels of cadmium, copper, lead, and zinc were detected at several times to several orders of magnitude higher, in Goose Cove biota and sediments than in samples collected from other Maine midcoastal and river locations. The most recent sampling event was conducted by the Maine Department of Environmental Protection in October 1999. Soil samples, tailings pond samples, tailings pile samples, waste rock pile samples, sediment samples, and surface water samples were collected. Soil samples were collected from the mine entrance and the mine operations areas. Sediment samples were collected from Goose Pond, Dyer Cove, and Horseshoe Cove. Samples were submitted to the State of Maine Health and Environmental Testing Laboratory for metals analysis. The analytical results for these samples are used to associate hazardous substances with the sources and attribute hazardous substances to the site. The sediment samples document actually contaminated sensitive environments and an actually contaminated fishery in Goose Pond.

Status (September 2002): EPA is considering various alternatives for this site.

For more information about the hazardous substances identified in this narrative summary, including general information regarding the effects of exposure to these substances on human health, please see the Agency for Toxic Substances and Disease Registry (ATSDR) ToxFAQs. ATSDR ToxFAQs can be found on the Internet at [ATSDR - ToxFAQs](http://www.atsdr.cdc.gov/toxfaqs/index.asp) (<http://www.atsdr.cdc.gov/toxfaqs/index.asp>) or by telephone at 1-888-42-ATSDR or 1-888-422-8737.