

2001

SITE: Elizabeth Mine

BREAK: 135

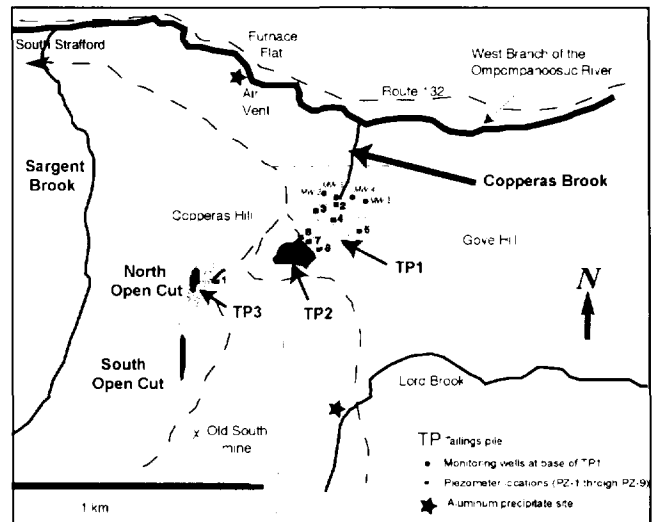
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### Introduction

The Elizabeth Mine is an abandoned copper and copperas mine located in the towns of Strafford and Thetford, Vermont. Surface water from the site drains into the West Branch of the Ompompanoosuc River (WBOR), which in turn flows into the Connecticut River.

The Elizabeth Mine operated from ca. 1809 to 1958. When the mine closed in 1958, it left behind 47 acres of tailings (crushed and processed rock), heap leach piles, waste rock, two large open cuts, several ore processing buildings, and almost a mile of underground workings extending from the top of Copperas Hill northward under the West Branch of the Ompompanoosuc River.

The Elizabeth Mine was designated a Superfund Site in June 2001. This Fact Sheet summarizes the cleanup action that EPA is proposing. A more detailed description of the site and the proposed cleanup can be found in the Proposed Plan and the Engineering Evaluation and Cost Analysis (EE/CA).



See inset on following page

Photos in color

# Elizabeth Mine: EPA's Proposed Cleanup Fact Sheet

March 2002

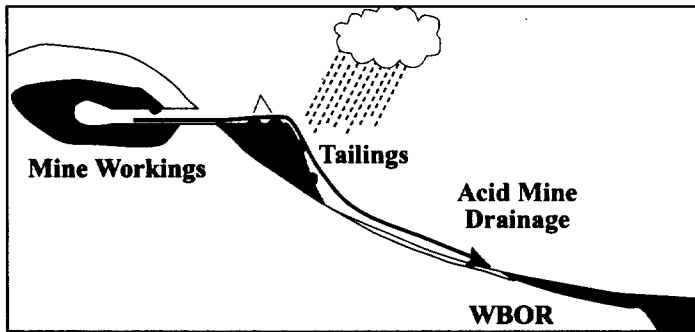


TP-3 looking southwest

## The Problem

### AMD Formation

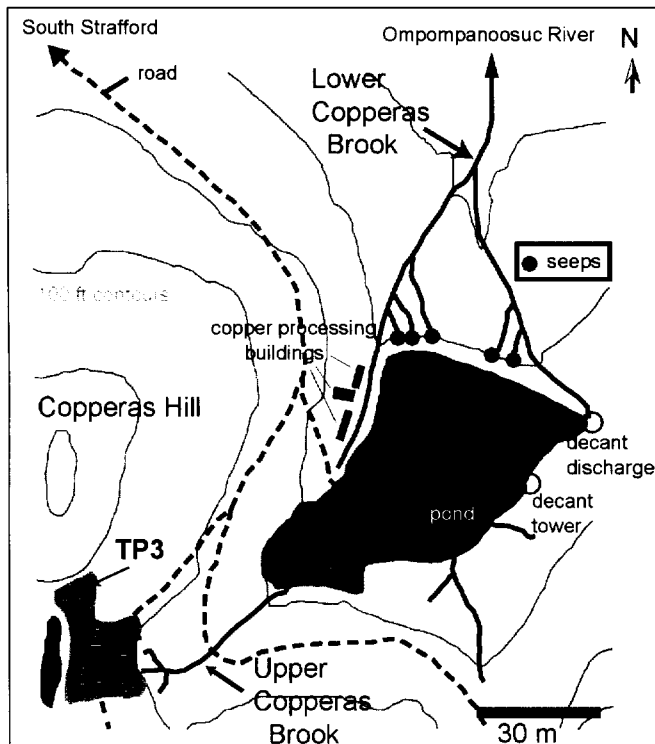
Acid Mine Drainage (AMD) forms when sulfur-bearing waste rock and tailings are exposed to air and water, forming sulfuric acid. The acidic runoff dissolves metals including aluminum, copper, cobalt, manganese, and zinc into ground or surface water. Iron sometimes precipitates to form red, orange, or yellow sediments in the bottom of streams containing acid mine drainage.



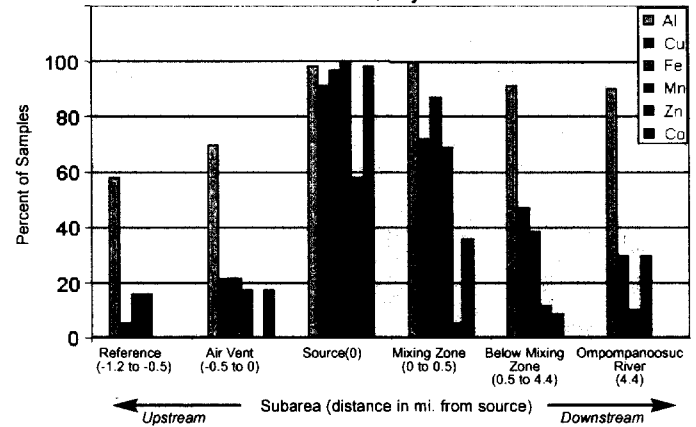
AMD from the Elizabeth Mine is polluting the WBOR. Concentrations of metals in the WBOR below the mine exceed Vermont Water Quality Standards and EPA criteria by a factor of 201 for aluminum, 9 for cobalt, 63 for copper, 50 for iron, and 17 for manganese.

### Ecological Impacts of the Mine

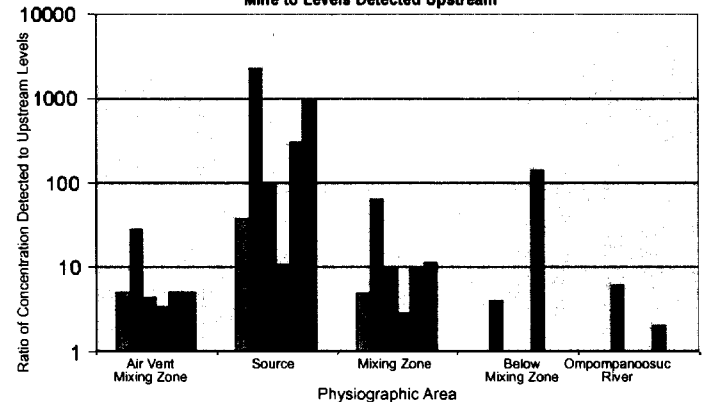
Water from the mine site and from the Air Vent is highly toxic to aquatic organisms. In laboratory tests, almost all of the organisms exposed to this water died. A number of fish studies indicate that fish density and species diversity in the WBOR decreases significantly below the mine site.



Percent of Samples Exceeding Chronic Water Quality Criteria



Comparison of Contaminant Levels Below the Mine to Levels Detected Upstream



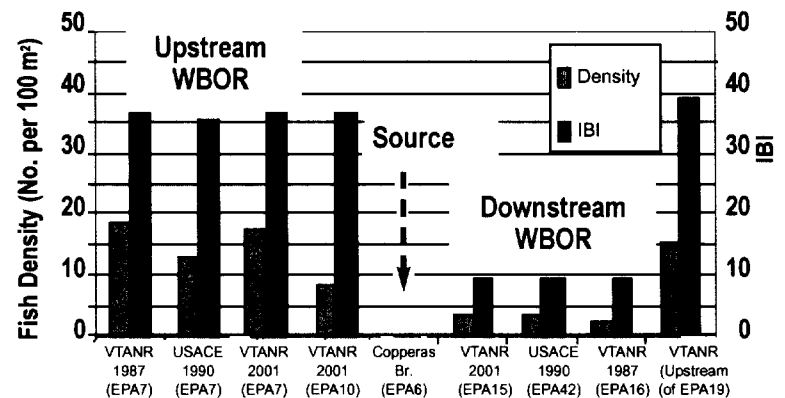
The first figure shows how often pollutants were detected at levels higher than the Vermont Water Quality Standards (VT WQS). Samples that exceed VT WQS increase dramatically at and below the confluence of Copperas Brook and the WBOR.

The second figure shows the ratio of contaminants levels upstream to contaminant levels below the mine. When viewed together, the two figures provide a picture of water quality in the WBOR. For example, while the top figure shows that aluminum is often detected upstream of the mine, the second figure shows that below the mine aluminum is detected at levels significantly higher than those found upstream.

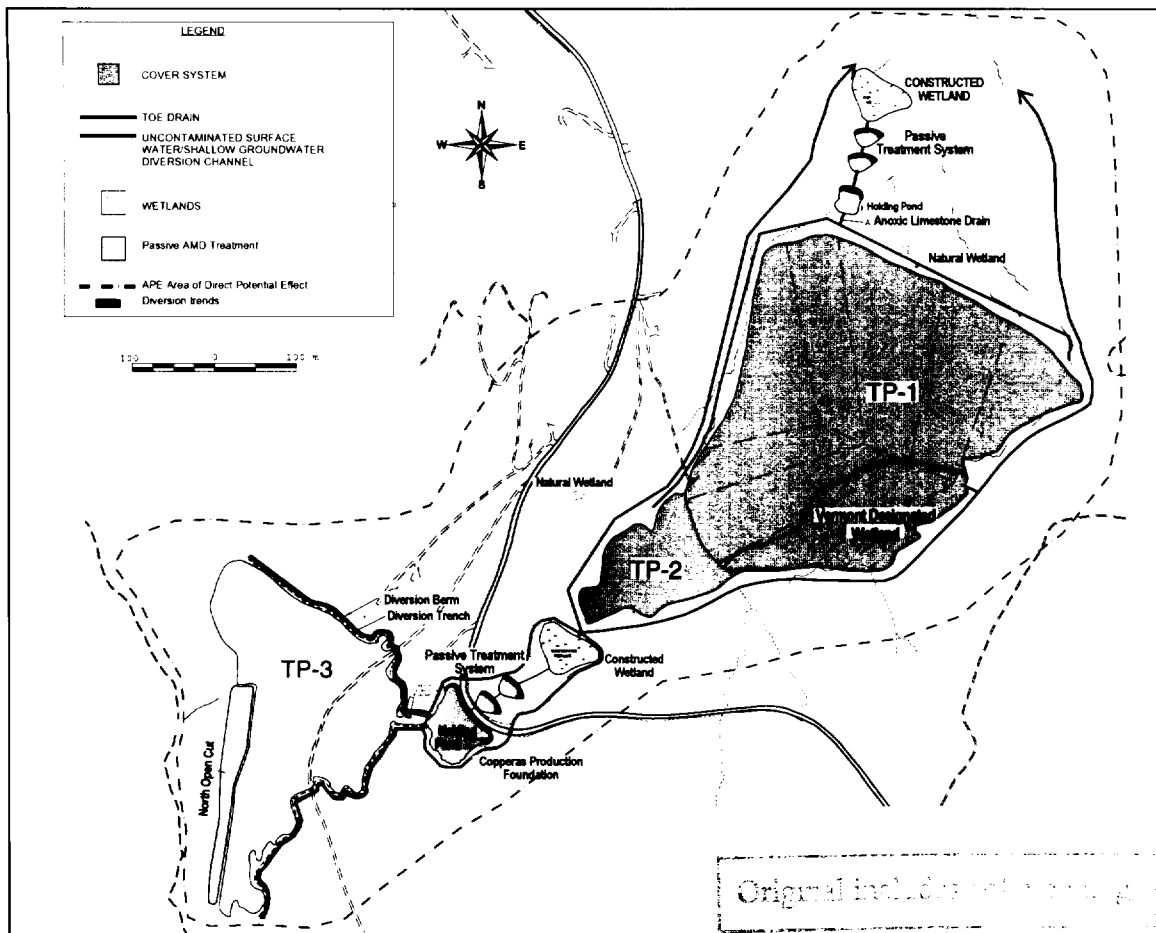
The two figures also show that cobalt, copper, iron, manganese and zinc are seldom detected above VT WQS upstream of the mine, while they are detected much more frequently above VT WQS below the mine.

### Fish Density and Species Diversity in the WBOR

The IBI index describes the ecological health of an aquatic system. The lower the IBI of an ecosystem, the lower the species diversity and density.



Originals in color.



### Cleanup Proposal

The EE/CA reflects the culmination of almost two years of dialogue between EPA, the Vermont Agency of Natural Resources (VTANR) and the Elizabeth Mine Community Advisory Group (EMCAG). The EMCAG has been very active in shaping the five cleanup alternatives described in the Proposed Plan and the EE/CA. All of the alternatives evaluated by EPA in the EE/CA involve:

- diverting surface water and shallow groundwater away from the tailings;
- treating the run-off from TP-3 and the seeps of TP-1;
- stabilizing the slopes of TP-1 and TP-2, as necessary; and
- placing a cover over TP-1 and TP-2.

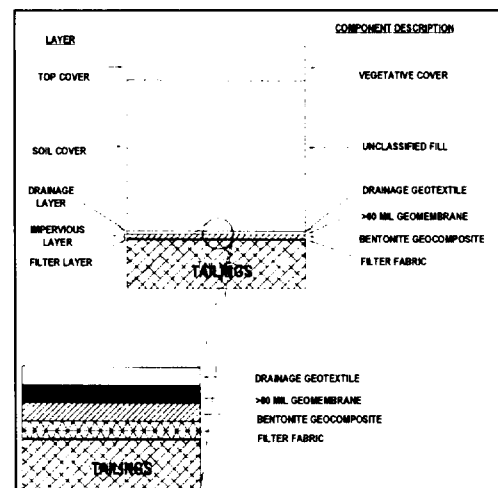
The primary difference between the alternatives is the type of cover system over TP-1 and TP-2.

EPA's preferred alternative, which is described in more detail in the Proposed Plan and EE/CA, is Alternative 2C. EPA proposes to:

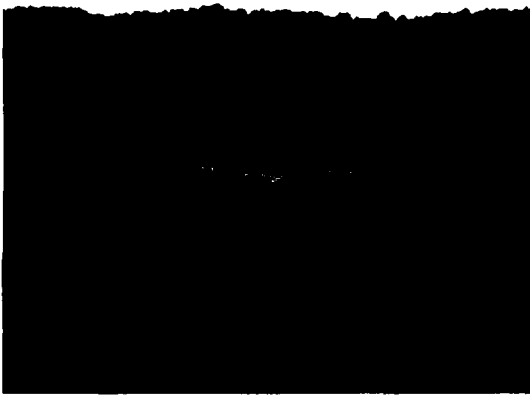
- construct diversion ditches to prevent shallow groundwater and surface water from flowing into the tailings,
- cover TP-1 and TP-2 with a multi-layer cover system to prevent rainwater and snow melt from flowing through the tailings,
- stabilize the slopes of TP-1 and TP-2 as necessary to achieve long-term stability of the tailings and cover system,
- preserve all, or a portion of, TP-3, and
- construct holding ponds, alkalinity dosing systems, sludge settling basins, anaerobic treatment cells, and aerobic wetlands to treat contaminated water from seeps along the base of TP-1 and the run-off from TP-3.

EPA is seeking comment on:

- the proposed cleanup action described in this fact sheet, the Proposed Plan and EE/CA,
- the determination by EPA that the cleanup will have unavoidable impacts on wetlands and floodplains within the Copperas Brook drainage,
- the cleanup's effect on historic resources at the site, and
- findings with respect to alternative measures to the specific criteria listed in the Vermont Solid Waste Management Rules that would allow for the preservation of the historic resources in TP-3. These alternative measures provide greater flexibility in the design of the cover system for TP-1 and TP-2.



Cross section of proposed multi-layer cover system. The cover system may be modified during the design phase.



TP-1 and TP-2 looking northeast

### Community Impacts

Cleanup construction of this magnitude involves short-term impacts to local communities. EPA is working with area selectboards and the EMCAG to reduce traffic and other construction-related impacts as much as possible.

EPA has provided the local communities with technical assistance through the Technical Outreach Services to Communities and Technical Assistance Grant programs. Through these programs the community has been able to access academic and private sector expertise to evaluate technical documents issued by EPA. EPA also awarded the towns of Thetford and Strafford a Redevelopment Initiative Grant to consider future use options for the site.

### Historic Preservation

The Elizabeth Mine is eligible for listing on the National Register of Historic Places. The colorful heap leach piles known as TP-3 located above the Mine Road are a particularly significant part of the historic mining landscape. EPA is working with the State Historic Preservation Office and the Vermont Agency

of Natural Resources to preserve as much of TP-3 as possible. Preservation of the historic, but AMD-generating, materials of TP-3 would lead to increased Operation and Maintenance (O&M) costs. Because O&M costs will be paid by the State of Vermont, the state will make the ultimate decision regarding preservation. The current position of the VTANR is that all of TP-3 will be preserved, if funding can be found to support the maintenance costs. The VTANR will revisit this position upon completion of the design phase, when O&M costs have been better defined.

### For More Information

This fact sheet provides an overview of the Elizabeth Mine Site and EPA's cleanup proposal. For more information about the proposed cleanup please review the Proposed Plan and the Engineering Evaluation and Cost Analysis (EE/CA).

You can view a PDF version of the Proposed Plan and the EE/CA by going to: <http://www.epa.gov/region1/superfund/index2.htm>, and clicking on the Find New England Sites box, typing Elizabeth Mine, clicking on Go, and then clicking on Elizabeth Mine.

You may contact the following people to get a copy of the Proposed Plan:

- Edward Hathaway 1-888-372-7341, ext. 81372,
- William Lovely 1-888-372-7341, ext. 81240, or
- Sarah White 1-888-372-7341, ext. 81026.

The EMCAG website includes a meeting schedule and documents related to the cleanup: <http://www.dartmouth.edu/~cehs/CAGsite>

All of the EPA publications about the Elizabeth Mine are available for public review at:

The Norwich Vermont Public Library  
Norwich, Vermont

The EPA Records Center  
1 Congress Street, Suite 1100  
Boston, MA 02114-2023  
(617) 918-1453

EPA will hold meetings to answer questions about the proposed cleanup on:

- March 13, 7:00 PM at Barrett Hall in South Strafford, VT and
- March 14, 7:00 PM at Parish Players Hall in Thetford, VT.

Parish Players Hall is ADA accessible, but Barrett Hall is not. Should you have specific needs or questions about the facilities or their accessibility or transportation, please contact Ed Hathaway at 1-888-372-7341.

### Cleanup Costs

EPA will pay the cleanup construction costs. Construction cost estimates for Alternative 2C range from \$13 to \$16 million. The State of Vermont will be responsible for long-term O&M costs. Projected O&M costs are approximately \$90,000 per year for the activities associated with TP-1 and TP-2 and range from \$153,000—\$400,000 per year for the treatment of the run-off from TP-3. Local communities will not bear any of the cleanup construction or O&M costs.

### Opportunities to Comment

The public comment period for the proposed cleanup action will begin March 15, 2002 and end April 15, 2002. After the comment period closes, EPA will review all comments, revise the proposed plan as appropriate, and issue an Action Memorandum describing the chosen cleanup plan. If funding is available, EPA will then start the detailed cleanup design process. Cleanup construction will begin in 2003 or 2004, at the earliest.

**You may speak your comments into the record** at the formal hearing to receive public comment on the proposed cleanup on April 10, 2002 at 7:00 PM at Barrett Hall in South Strafford, VT.

**You may send written comments** postmarked no later than

April 15, 2002 to: Edward Hathaway, RPM  
U.S. EPA Region I  
Suite 1100 (HBT)  
1 Congress Street  
Boston, MA 02114-2023  
1-888-372-7341, ext. 81372 (toll free)

**or e-mail comments** by April 15, 2002 to: [hathaway.ed@epa.gov](mailto:hathaway.ed@epa.gov)