FIVE-YEAR REVIEW REPORT FOR TORCH LAKE SUPERFUND SITE HOUGHTON COUNTY, MICHIGAN

Prepared by
U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

March 2013

Approved by: 
Richard C. Karl, Director
Superfund Division
EPA, Region 5

Date: March 29, 2013
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# List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOC</td>
<td>Administrative Order of Consent</td>
</tr>
<tr>
<td>ARAR</td>
<td>Applicable or Relevant and Appropriate Requirement</td>
</tr>
<tr>
<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act</td>
</tr>
<tr>
<td>EPA</td>
<td>United States Environmental Protection Agency</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>COC</td>
<td>Contaminant of Concern</td>
</tr>
<tr>
<td>ESD</td>
<td>Explanation of Significant Difference</td>
</tr>
<tr>
<td>MCL</td>
<td>Maximum Contaminant Level</td>
</tr>
<tr>
<td>MCLG</td>
<td>Maximum Contaminant Level Goal</td>
</tr>
<tr>
<td>MDEQ</td>
<td>Michigan Department of Environmental Quality</td>
</tr>
<tr>
<td>MDNR</td>
<td>Michigan Department of Natural Resources</td>
</tr>
<tr>
<td>NCP</td>
<td>National Contingency Plan</td>
</tr>
<tr>
<td>NPL</td>
<td>National Priorities List</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation and Maintenance</td>
</tr>
<tr>
<td>OU</td>
<td>Operable Unit</td>
</tr>
<tr>
<td>PAH</td>
<td>Poly-aromatic Hydrocarbon</td>
</tr>
<tr>
<td>PCB</td>
<td>Polychlorinated Biphenyl</td>
</tr>
<tr>
<td>PPB</td>
<td>Parts per Billion</td>
</tr>
<tr>
<td>PRP</td>
<td>Potentially Responsible Party</td>
</tr>
<tr>
<td>RA</td>
<td>Remedial Action</td>
</tr>
<tr>
<td>RAO</td>
<td>Remedial Action Objective</td>
</tr>
<tr>
<td>RD</td>
<td>Remedial Design</td>
</tr>
<tr>
<td>RI/FS</td>
<td>Remedial Investigation/Feasibility Study</td>
</tr>
<tr>
<td>ROD</td>
<td>Record of Decision</td>
</tr>
</tbody>
</table>
UOP  Universal Oil Products
VOC  Volatile Organic Compound
EXECUTIVE SUMMARY

This is the third Five-Year Review for the Torch Lake Superfund Site in Houghton County, Michigan. The purpose of this Five-Year Review is to review information to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this statutory FYR was the signing of the previous FYR on March 27, 2008.

The remedy for the Torch Lake Superfund Site in Houghton County, Michigan includes stabilization and covering with soil and vegetation select contaminated mine tailings and slag material in areas of Torch Lake or surrounding water bodies, institutional controls, natural recovery of area water bodies, and long-term monitoring of area water bodies and groundwater. Due to its size and complexity, U.S. EPA divided the Site into three Operable Units (OUs). OU1 includes select surface tailings, drums and slag piles on the western shore of Torch Lake. OU2 includes groundwater, surface water, submerged tailings and sediments within Torch Lake and other waterways. OU3 includes tailings and slag deposits located in the North Entry, Michigan Smelter, Quincy Smelter, Calumet Lake and elsewhere. The Site achieved construction completion on September 23, 2005, with the signature of the Preliminary Close Out Report (PCOR).

Protectiveness Statements

OU1 and OU3

The remedial actions implemented at OU1 and OU3 are protective of human health and the environment in the short term because the vegetative cover has reduced potential risks associated with direct contact or inhalation of contaminants in the tailings. For the remedies to be protective in the long term, a review of institutional controls (ICs) must be performed with follow-up with affected property owners and local governments as appropriate.

OU2

A “no action” ROD for OU2 was signed in March 1994. The ROD for OU2 relied on the implemented remedy for OU1 and OU3, natural recovery of the Lake, and the institutional programs and practices administered by county and local governments to provide sufficient protectiveness for exposure to Site-affected groundwater. The remedy for the groundwater portion of OU2 currently protects human health and the environment in the short term because existing residential wells screened in the stamp sands are not contaminated above drinking water standards, although groundwater monitoring wells at the Site continue to indicate concentrations of arsenic and lead above maximum contaminant levels (MCLs). In order for the “No Action” selected remedy to be protective in the long term, U.S. EPA and MDEQ will periodically monitor residential wells, review the need for more robust ICs and clarify or amend the remedy decision document, if required. An IC Plan will be prepared to ensure that effective ICs are implemented, maintained, monitored, and enforced.
Site-wide

The remedy at the Torch Lake Superfund Site protects human health and the environment in the short term because the vegetative covers prevent erosion of stamp sands to Torch Lake, which prevents the further degradation to the ecologic system of the Lake while it recovers over time. In order for the selected remedy to be protective in the long term, a review of ICs must be performed. Presently, ICs are required on all of the vegetative covers, as specified in the OU1 and OU3 ROD. Additional or modified ICs may need to be recorded or otherwise put in place, as appropriate. As part of the IC Plan, U.S. EPA expects to evaluate whether ICs in the form of use restrictions continue to be necessary, in view of the use of crushed stamp sands at the direction of the Houghton County Road Commission as a winter road safety measure. The IC plan will discuss how to ensure that all necessary ICs are in place and effective.
## SITE IDENTIFICATION

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Torch Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA ID</td>
<td>MID980901946</td>
</tr>
<tr>
<td>Region</td>
<td>5</td>
</tr>
<tr>
<td>State</td>
<td>MI</td>
</tr>
<tr>
<td>City/County</td>
<td>Houghton County</td>
</tr>
</tbody>
</table>

## SITE STATUS

<table>
<thead>
<tr>
<th>NPL Status</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple OUs</td>
<td>Yes</td>
</tr>
<tr>
<td>Has the site achieved construction completion?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

## REVIEW STATUS

- **Lead agency:** EPA
- **Author name (Federal or State Project Manager):** Nabil Fayoumi
- **Author affiliation:** EPA
- **Review period:** March 2012 to March 2013
- **Date of site inspection:** June 20, 2012.
- **Type of review:** Statutory
- **Review number:** 3
- **Triggering action date:** Previous Five Year-Review Report – March 27, 2008
- **Due date (five years after triggering action date):** March 27, 2013
### Issues/Recommendations

<table>
<thead>
<tr>
<th>OU(s): OU1 and 3.</th>
<th>Issue Category: Operations and Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue:</strong> Lack of vegetative cover establishment at certain properties at the Point Mills. Also, minor areas need repair and additional reseeding and fertilization at Point Mills.</td>
<td></td>
</tr>
<tr>
<td><strong>Recommendation:</strong> U.S. EPA and MDEQ are working with property owners to find a cost-effective solution to the vegetation problem at Point Mills.</td>
<td></td>
</tr>
<tr>
<td><strong>Affect Current Protectiveness:</strong> No</td>
<td></td>
</tr>
<tr>
<td><strong>Affect Future Protectiveness:</strong> Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Implementing Party:</strong> U.S. EPA</td>
<td></td>
</tr>
<tr>
<td><strong>Oversight Party:</strong> MDEQ, U.S. EPA</td>
<td></td>
</tr>
<tr>
<td><strong>Milestone Date:</strong> 09/30/13</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OU(s): OU1, 2, and 3.</th>
<th>Issue Category: Institutional Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue:</strong> A determination needs to be made that the required restrictive covenants on residential properties continue to be necessary, and permitting restrictions on wells screened in the stamp sands are in place and effective to ensure long-term protectiveness of human health and the environment for the groundwater.</td>
<td></td>
</tr>
<tr>
<td><strong>Recommendation:</strong> U.S. EPA and MDEQ will review whether restrictive covenants on residential properties continue to be necessary, and the permitting restrictions on wells screened in the stamp sands and confirm that they are in place and effective. Based on that review, U.S. EPA and MDEQ will prepare an IC plan for the Site which will include a plan for long-term stewardship.</td>
<td></td>
</tr>
<tr>
<td><strong>Affect Current Protectiveness:</strong> No</td>
<td></td>
</tr>
<tr>
<td><strong>Affect Future Protectiveness:</strong> Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Implementing Party:</strong> U.S. EPA</td>
<td></td>
</tr>
<tr>
<td><strong>Oversight Party:</strong> MDEQ</td>
<td></td>
</tr>
<tr>
<td><strong>Milestone Date:</strong> 09/30/13</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OU(s): OU1 and 3.</th>
<th>Issue Category: Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue:</strong> Houghton County Road Commission is currently using tailing material at Point Mills to spread on roads during winter to provide traction for motor vehicles.</td>
<td></td>
</tr>
<tr>
<td><strong>Recommendation:</strong> U.S. EPA and MDEQ will work with the Houghton County Road Commission to ensure that road traction tailing excavation practices are consistent with the 1992 ROD.</td>
<td></td>
</tr>
<tr>
<td><strong>Affect Current Protectiveness:</strong> No</td>
<td></td>
</tr>
<tr>
<td><strong>Affect Future Protectiveness:</strong> Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Implementing Party:</strong> U.S. EPA, MDEQ</td>
<td></td>
</tr>
<tr>
<td><strong>Oversight Party:</strong> U.S. EPA/MDEQ</td>
<td></td>
</tr>
<tr>
<td><strong>Milestone Date:</strong> 09/30/13</td>
<td></td>
</tr>
</tbody>
</table>
**OU(s):** OU1 and 3.  

**Issue Category:** Monitoring  

**Issue:** Site-wide O&M Plan have not been finalized. Existing residential wells are screened in the stamp sands. While these wells are not contaminated above drinking water standards, monitoring is necessary to ensure remedy continued protectiveness.

**Recommendation:** MDEQ will finalize the Site-wide O&M Plan. MDEQ will revise the O&M Plan to include monitoring of residential wells screened in the stamp sands.

<table>
<thead>
<tr>
<th>Affect Current Protectiveness</th>
<th>Affect Future Protectiveness</th>
<th>Implementing Party</th>
<th>Oversight Party</th>
<th>Milestone Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>MDEQ</td>
<td>U.S. EPA</td>
<td>09/30/13</td>
</tr>
</tbody>
</table>

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<tr>
<th>Operable Unit</th>
<th>Protectiveness Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>OU1 and OU3</td>
<td>Short-term Protective</td>
</tr>
</tbody>
</table>

**Protectiveness Statement:**
The remedial actions implemented at OU1 and OU3 are protective in the short-term because the vegetative cover has reduced potential risks associated with direct contact or inhalation of contaminants in the tailings. For the remedies to be protective in the long term, a review of institutional controls (ICs) must be performed with follow-up with affected property owners and local governments as appropriate.

<table>
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<tr>
<th>Operable Unit</th>
<th>Protectiveness Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>OU2</td>
<td>Short-term Protective</td>
</tr>
</tbody>
</table>

**Protectiveness Statement:** A “no action” ROD for OU2 was signed in March 1994. The ROD for OU2 relied on the implemented remedy for OU1 and OU3, natural recovery of the Lake, and the institutional programs and practices administered by county and local governments to provide sufficient protectiveness for exposure to site affected groundwater. The remedy for the groundwater portion of OU2 currently protects human health and the environment in the short-term. Existing residential wells screened in the stamp sands are not contaminated above drinking water standards. In order for the “No Action” selected remedy to be protective in the long-term, U.S. EPA and MDEQ will periodically monitor residential wells, review the need for more robust ICs and clarify or amend the remedy decision document, if required. An IC Plan will be prepared to ensure that effective ICs are implemented, maintained, monitored, and enforced.

**Site-wide Protectiveness Statement**

**Protectiveness Determination:**
Short-term Protective

**Protectiveness Statement:**
The remedy at the Torch Lake Superfund Site protects human health and the environment in the short term because the vegetative covers prevent erosion of stamp sands to Torch Lake, which prevents the further degradation to the ecologic system of the Lake while it recovers over time. In order for the selected remedy to be protective in the long term, a review of ICs must be performed. Presently, ICs are required on all of the vegetative covers, as specified in the OU1 and OU3 ROD. Additional or modified ICs may need to be recorded or otherwise put in place, as appropriate. As part of the IC Plan, U.S. EPA expects to evaluate whether ICs in the form of use restrictions continue to be necessary, in view of the use of crushed stamp sands at the direction of the Houghton County Road Commission as a winter road safety measure. The IC plan will discuss how to ensure that all necessary ICs are in place and effective.
Five-Year Review Report

I. Introduction

The purpose of a five-year review is to determine whether the remedy implemented at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them. U.S. EPA has conducted this statutory Five-Year Review for the remedy implemented at the Torch Lake Site, Operable Units 1 and 3. The remedy implemented at these two OUs was evaluated during this Five-Year Review. Operable Unit 2 had a No Action ROD (relying on natural recovery for sediments and existing ICs for groundwater) but it is evaluated in this Review as well because remedial actions taken for OU1 and OU3 affect OU2.

The Agency is preparing this Five-Year Review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The agency interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

U.S. EPA, Region 5, conducted the Five-Year Review of the remedy implemented at the Torch Lake Superfund Site in Houghton County, Michigan. This review was conducted by the Remedial Project Manager (RPM) for the entire Site from March 2012 through March 2013. This report documents the results of the review.

This is the third Five-Year Review for the Torch Lake Superfund Site. The triggering action for this statutory review was the completion of the second Five-Year Review on March 27, 2008. This Five-Year Review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.
II. Site Chronology

Table 1: Chronology of Site Events

<table>
<thead>
<tr>
<th>EVENT</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Concern Develops Concerning Century-Long Deposition of Tailings</td>
<td>1970s</td>
</tr>
<tr>
<td>International Joint Commission Designates Torch Basin as a Great Lakes Area of Concern</td>
<td>1985</td>
</tr>
<tr>
<td>Michigan Department of Public Health (MDPH) Announces Fish Advisory on Sauger and Walleye based on fish tumors</td>
<td>1983</td>
</tr>
<tr>
<td>Proposed on NPL</td>
<td>October 15, 1984</td>
</tr>
<tr>
<td>Listed on NPL</td>
<td>June 10, 1986</td>
</tr>
<tr>
<td>Area of Concern Remedial Action Plan</td>
<td>1987</td>
</tr>
<tr>
<td>Notice Letters Sent to PRPs for RI/FS Work (negotiations fail)</td>
<td>July 13, 1988</td>
</tr>
<tr>
<td>RI/FS (fund lead)</td>
<td>November 1988 - September 1992</td>
</tr>
<tr>
<td>Administrative Order on Consent issued to PRPs to remove shoreline and submerged drums</td>
<td>July 30, 1991</td>
</tr>
<tr>
<td>PRP Removal Activities</td>
<td>September 1991</td>
</tr>
<tr>
<td>ROD for OU1 and OU3 Signed by U.S. EPA</td>
<td>September 30, 1992</td>
</tr>
<tr>
<td>MDPH Removes Tumor Consumption Advisory on Sauger and walleye in Torch Lake and added Mercury Consumption Advisories for Sauger, walleye, and smallmouth bass</td>
<td>1993</td>
</tr>
<tr>
<td>ROD for OU2 Signed by U.S. EPA</td>
<td>March 31, 1994</td>
</tr>
<tr>
<td>Michigan Department of Community Health added PCB Consumption Advisories for walleye and smallmouth bass</td>
<td>1999</td>
</tr>
<tr>
<td>RD (fund lead-USDAlNRCS) for OU1 &amp; OU3 Start &amp; Complete</td>
<td>September 30, 1994 - September 10, 1998</td>
</tr>
<tr>
<td>U.S. EPA Obligates $15.2 million for RA</td>
<td>September 23, 1998</td>
</tr>
<tr>
<td>Work</td>
<td>Date</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>On-Site Construction Begins (Lake Linden Parcel)</td>
<td>Summer 1999</td>
</tr>
<tr>
<td>Hubbell/Tamarack Construction</td>
<td>Summer 2000</td>
</tr>
<tr>
<td>U.S. EPA Completes Baseline Study Report</td>
<td>August 2001</td>
</tr>
<tr>
<td>Mason Construction</td>
<td>Summer 2001/2002</td>
</tr>
<tr>
<td>Michigan Department of Community Health added northern pike to the mercury and PCB Consumptions Advisories</td>
<td>2002</td>
</tr>
<tr>
<td>Point Mills &amp; Dollar Bay Construction</td>
<td>Summer 2002</td>
</tr>
<tr>
<td>Five-Year Review Site Inspections</td>
<td>October 7 - 9, 2002</td>
</tr>
<tr>
<td>OU2 and Lake Linden parcel NPL deletion</td>
<td>2002</td>
</tr>
<tr>
<td>U.S. EPA Completes Terrestrial Ecology Study of Site</td>
<td>March 2003</td>
</tr>
<tr>
<td>First Five Year Review Completed</td>
<td>March 4, 2003</td>
</tr>
<tr>
<td>MDEQ Monitoring Data Collected-Draft Report includes several studies related to sedimentation rates, metal contaminants in sediments, mercury fate, and sediment toxicity</td>
<td>Summer 2004</td>
</tr>
<tr>
<td>Hubbell/Tamarack City parcel was deleted from the NPL</td>
<td>2004</td>
</tr>
<tr>
<td>Construction activities at additional areas in OU3</td>
<td>Summer 2004</td>
</tr>
<tr>
<td>Construction Activities at North Entry and Scales Creek</td>
<td>Spring/Summer 2005</td>
</tr>
<tr>
<td>Removal Action at Quincy Smelter</td>
<td>Summer 2005</td>
</tr>
<tr>
<td>Complete all On-Site Construction Activities</td>
<td>September 13, 2005</td>
</tr>
<tr>
<td>Preliminary Close Out Report (PCOR)</td>
<td>September 23, 2005</td>
</tr>
<tr>
<td>ATSDR Health Consultation-Quincy Smelter</td>
<td>November 2006</td>
</tr>
<tr>
<td>MDEQ Semi Permeable Membrane Device (SPMD) Study to determine PCB distribution in Lake</td>
<td>November 2006</td>
</tr>
<tr>
<td>U.S. EPA data related to sediment samples collected in association with SPMD study</td>
<td>November 2006</td>
</tr>
<tr>
<td>Repair Work at North Entry</td>
<td>Summer 2007</td>
</tr>
<tr>
<td>Event Description</td>
<td>Dates</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>MDEQ-3 Sampling Events in Lake Linden Public Beach area which indicated high levels of lead, PCBs, and other heavy metals</td>
<td>June - July 2007</td>
</tr>
<tr>
<td>U.S. EPA-MDEQ Annual and FYR Site Inspections</td>
<td>June 18-21, 2007, August 6-8, 2007</td>
</tr>
<tr>
<td>Emergency Removal Action – Lake Linden Beach Area</td>
<td>August-September 2007</td>
</tr>
<tr>
<td>Torch Lake Area of Concern Remedial Action Plan Update</td>
<td>August 2007</td>
</tr>
<tr>
<td>Torch Lake Area Assessment</td>
<td>Fall 2007</td>
</tr>
<tr>
<td>Completion of Torch Lake Area Assessment (TLAA) Report</td>
<td>December 13, 2007</td>
</tr>
<tr>
<td>Second Five-Year Review Report</td>
<td>March 27, 2008</td>
</tr>
<tr>
<td>Emergency Removal Action – Mason Sands Area</td>
<td>Fall 2008</td>
</tr>
<tr>
<td>Quincy Smelter Removal Action</td>
<td>August 2008</td>
</tr>
<tr>
<td>ROD Amendment (Quincy Smelter)</td>
<td>July 31, 2009</td>
</tr>
<tr>
<td>Quincy Smelter Design Completion</td>
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<tr>
<td>Quincy Cover Construction</td>
<td>August - September 2011</td>
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<tr>
<td>Interim Remedial Action Completion Report</td>
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<td>Final Remedial Action Completion Report</td>
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<tr>
<td>Michigan Smelter, Isle Royale, and Mason Sands deleted from the NPL</td>
<td>December 23, 2012</td>
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</table>
III. Background

Physical Characteristics

The Torch Lake Superfund site (the Site) is located on the Keweenaw Peninsula in Houghton County, Michigan (Figure 1). The Site includes Torch Lake, the western shore of Torch Lake, the northern portion of Portage Lake, the Portage Lake Canal, Keweenaw Waterway, North Entry to Lake Superior, Boston Pond, and Calumet Lake. Select tailing and slag pile deposits located along the western shore of Torch Lake, Northern Portage Lake, Keweenaw Waterway, Lake Superior, Boston Pond, and Calumet Lake are included as part of the Site. In addition to several tailing piles located throughout these areas, slag piles are located at Quincy Smelter, Michigan Smelter and Hubbell.

The northeast/southwest-trending Keweenaw Peninsula lies within the Superior bedrock-controlled uplands province of the Lake Superior basin. Drainage patterns in the peninsula are controlled largely by bedrock type, and follow faults and fractures in the Precambrian bedrock. Soils in the area primarily consist of sandy loams, and silty loams. They are developed in till, outwash, Holocene alluvium, and red clay. The major surface water bodies in the region comprise the Keweenaw Waterway including Torch Lake, Portage Lake, and Lake Superior. Torch Lake is a tributary to the larger Portage Lake which in turn has outlets to Lake Superior via the Portage Canal (Keweenaw Waterway) and to Keweenaw Bay via the Portage Canal (Keweenaw Waterway). Streams in the region drain to the Keweenaw Waterway and Lake Superior. The Torch Lake watershed comprises about 12 percent of the larger Portage Lake basin.

Forest vegetation in the area is primarily mixed deciduous/coniferous. Spruce, larch, fir, and pine are the common species. Important species include sugar maple, birch, and aspen. In addition, several species of trees and shrubs are prominent on some relatively small areas of tailing piles, including balsam poplar, fir, willow, red osier-dogwood, spruce, alder, tamarack, white birch, aspen, and northern white cedar.

Several small communities are located on the western shore of Torch Lake, the largest of which are Lake Linden, Hubbell/Tamarack City, and Mason. Two large cities, Houghton and Hancock, are located on the south and north side of the Keweenaw Waterway. The Village of Calumet is located 5 miles north of Torch Lake.

Torch Lake has a surface area of approximately 2,700 acres, a mean depth of 56 feet, a maximum depth of 115 feet, and a volume of \(5.2 \times 10^9\) cubic feet. The Trap Rock River and several small creeks discharge into Torch Lake.

Wetlands are located on the east portion of the Lake Linden tailing pile, on the lakeside edge of the Hubbell tailing pile, around Boston Pond, and the eastern shore of Torch Lake. The Site does not lie within the 100-year flood-plain.

This Site is directly connected to Lake Superior and experiences hydrologic fluctuations and seiche events. This accounts for the historically low water levels in Torch Lake and exposure of previously submerged stamp sand areas.
Land and Resource Use

Torch Lake is used for fishing, boating, contact recreation (swimming), non-contact cooling water, treated municipal waste assimilation, and fish and wildlife habitat.

The municipal well for Lake Linden is located upstream of the Trap Rock River, 0.7 miles north of Lake Linden. The supply of drinking water for Hubbell/Tamarack City is piped from wells located on the shore of Lake Superior, 9 miles west of Torch Lake. The municipal well for Mason is located on the tailing pile in Mason, and the municipal wells for the Houghton area are located on the Isle-Royale tailing pile. The municipal well for Hancock is located in Adams Township, 5 miles southeast of Hancock. Several homes are located in the Isle-Royale tailing pile with their own private wells. These wells were installed more than 20 years ago and, based on U.S. EPA's historical understanding, were thought to be cased to bedrock and draw their water from the bedrock aquifer and not from the tailings. In addition, all other homes at Isle-Royale are on municipal water. However, recent review of this information revealed 3 municipal wells located and screened in the unconsolidated materials on top of the bedrock aquifer. The wells are capable of pulling water through the stamp sand deposits. The wells are not screened in the bedrock, as had previously been believed. Groundwater sampling shows that existing residential wells screened in the stamp sands are not contaminated above drinking water standards.

While most tailing pile areas were barren and unused before 1999 (the start of on-site Superfund remediation work), development is beginning to take place. Two sewage lagoons are located on the Lake Linden tailing pile. Two sewage lagoons are also located on the Hubbell/Tamarack City tailing pile. The Portage Lake Water and Sewage Authority has constructed a sewage treatment plant on 12 acres of the Isle-Royale tailings. Superior Block Co., located on the Isle-Royale tailing pile, is currently utilizing 60 acres of the Isle-Royale tailings for the production and storage of cement blocks. The residential development located on the Isle-Royale tailings is estimated to cover 80 acres. The Houghton County Road Commission is currently using tailing materials, approximately 20 acres at Point Mills, to spread on the roads during winter to provide traction for motor vehicles. Tailings have also been used in the past as a base for road construction because of good drainage characteristics. The Village of Lake Linden has developed a facility with a bathing beach, camping, park, and boat ramps at the northeast end of Torch Lake. In general, the Lake Linden portion of the Site (remedy implemented in 1999) has been put to use as a recreation area, including the completion of a perimeter road, stamp sand campground access road and camping pads, nature/hiking trails and a campground. In addition, a State grant-sponsored planting of new trees was recently completed.

The Quincy Mining Company Historic District and Calumet Historic District, which were proposed as a National Historical Park in September 1987, are located near and within the Site, respectively. Public Law 102-543 was enacted on October 27, 1992. The law established the Keweenaw National Historic Park, of which Quincy Smelter is a part. Franklin Township and the National Park Service plan to develop the Quincy Smelter Complex as part of the National Historic Park. The buildings are currently being stabilized by the National Park Service (NPS) and Franklin Township. NPS plans to rebuild their Headquarters on the property in the next few years.

As a result of Superfund remedial action work beginning in 1999, approximately 800 acres along the western shore of Torch Lake, Point Mills/Dollar Bay, Calumet Lake, Boston Pond, North Entry, Scales Creek, Michigan Smelter and Isle-Royale Sands, have been covered with 6 to 10
inches of soil and vegetation. An abundance of wildlife, including several species of birds and mammals are now present in these areas. Two nests of bald eagles, which are designated as Threatened or Recovered Species, are also located on the northern side of Portage Lake.

History of Contamination

Torch Lake was the site of copper milling and smelting facilities and operations for over 100 years. The lake was a repository for all the mining industry-related waste and served as the waterway for transportation to support the area. The first mill opened on Torch Lake in 1868. At the mills, copper was extracted through a series of technologies over the years. First, copper was extracted by crushing or "stamping" the rock into smaller pieces, then by grinding the pieces and driving them through successively smaller meshes. The copper and crushed rocks were separated by gravimetric sorting in a liquid medium. The copper was then sent to a smelter. The crushed rock particles, called "tailings" or "stamp sands," were discarded along with mill processing water, typically by pumping it into the lakes and streams. Eventually, chemical leach technologies were included.

Mining output, milling activity, and tailing production peaked in the Keweenaw Peninsula in the early 1900s to 1920. All of the mills at Torch Lake were located on the western shore of the Lake and many other mining mills and smelters were located throughout the peninsula. In about 1916, advances in technology allowed recovery of copper from tailings previously deposited in Torch Lake. Dredges were used to collect submerged tailings, which were then screened, re-crushed, and gravity-separated. An ammonia leaching process involving cupric ammonium carbonate was used to recover copper and other metals from conglomerate tailings. During the 1920s, chemical reagents were used to further increase the efficiency of reclamation. The chemical reagents included lime, pyridine oil, coal tar creosotes, wood creosote, pine oil, and xanthates. After reclamation activities were complete, chemically treated tailings were returned to the lakes. In the 1930s and 1940s, the Torch Lake mills operated mainly to recover tailings in Torch Lake and to reclaim copper from sources nationwide for the war effort. Mining continued until 1968 when all mining and related activities ceased. Copper reclamation activities continue to date, at Peninsula Copper Industries (PCI).

Over 5 million tons of native copper were produced from the Keweenaw Peninsula and more than half of this was processed along the shores of Torch Lake. Between 1868 and 1968, approximately 200 million tons of milling, tailing, and reclamation wastes were dumped into Torch Lake filling at least 20 percent of the lake's original volume. While the Rivers and Harbors Act of 1890 did prohibit the filing or obstruction of any navigable waterway in the United States without prior consent of the Secretary of War, one locality in the country, Torch Lake, was specifically exempted from this prohibition. In addition, dumping in Torch Lake was further permitted during World War II when the War Production Board operated copper mining, milling, reclamation, and smelting activities for the war effort.

Between 1971 and 1972, a discharge of 27,000 gallons of cupric ammonium carbonate leaching liquor occurred into the north end of Torch Lake from the storage vats at the Lake Linden Leaching Plant. The Michigan Water Resources Commission (MWRC) investigated the spill. The 1973 MWRC report discerned no deleterious effects associated with the spill, but did observe varied discoloration of several acres of lake bottom which indicated previous discharges over time.
Initial Response

In the 1970s, environmental concern developed regarding the century-long deposition of tailings into Torch Lake. High concentrations of copper and other heavy metals in Torch Lake sediments, toxic discharges into the lakes, and fish abnormalities prompted many investigations into long and short-term impacts attributed to mine waste disposal. In 1983, the Michigan Department of Public Health (MDPH) announced an advisory against the consumption of Torch Lake sauger and walleye. The Site was proposed for inclusion on the National Priorities List (NPL) in October of 1984. The International Joint Commission Water Quality Board designated Torch Lake as a Great Lakes Area of Concern (AOC) in 1985. The Site was placed on the NPL in June 1986. The Site is also on the Act 307 Michigan Sites of Environmental Contamination Priority List (as amended and updated), now known as the Part 201 Natural Resource and Environmental Protection Act.

In 1986, Michigan Technological University in Houghton published a report which included various papers on Torch Lake. This report included: a Tumor Induction Study; Environmental Fate of Xanthates and Creosote; Tumor Incidence and Parasite Survey of Perch from Torch Lake; Heavy Metals in Sediments and Mining Wastes of Torch Lake; and a Copper Budget study of Torch Lake.

In October 1987, the Michigan Department of Natural Resources (MDNR) completed a Remedial Action Plan (RAP) for Torch Lake to address the contamination problems and to recommend a remedial action for the Lake. The recommended remedial actions in the RAP were (1) vegetation of lakeshore tailings to minimize air-borne and water-borne particulate matter, (2) prevent erosion into Torch Lake, (3) upgrade wastewater treatment plants, and (4) monitor natural attenuation for Torch Lake due to the wide distribution and large volumes of contaminated sediments.

In 1988, in response to the RAP, the MDNR conducted a water quality and fish tissue study. Tissue from 458 fish was collected from both Torch and Portage Lakes. Only 4 of the 56 fish analyzed for mercury had concentrations that exceeded the 0.5mg/kg consumption advisory action limit, and none exceeded the 1.0mg/kg limit. No internal or external growth anomalies were discovered and no liver neoplasms (i.e., cancerous growths) were found among the 47 walleye examined. Saugers were not collected during this survey because of an extended population decline, which began in the 1960s. In 1993, MDPH lifted the fish consumption advisory for tumors, but added a mercury advisory for walleye, sauger, and smallmouth bass. Based on the Michigan Department of Environmental Quality (MDEQ) Surface Water Quality Division’s routine fish monitoring activities conducted for the Michigan Department of Community Health (MDCH), the MDCH issued fish consumption advisories in 1999 for PCBs on walleye and smallmouth bass for Portage Lake and Torch Lake. In 2002, the MDCH added northern pike to the mercury and PCB consumption advisories. The 2002 fish advisories are currently in effect and are listed in the Michigan Fish Advisories Website www.mdch.state.mi.us pha/fishadvi.htm.

Attempts to establish vegetation on the tailing piles in Hubbell/Tamarack City have been conducted since the 1960s to stabilize the shoreline and to reduce erosion of particulate matter by wind or water flow to surface water from tailings. The Portage Lake Water and Sewage Authority had been spray-irrigating sewage sludge on tailings in Mason to promote natural vegetation prior to implementation of the Superfund remedy.

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None of the original mining companies that disposed of stamp and tailings to surface and submerged areas of the Site exist today. However, U.S. EPA has located companies that may be linked to the original mining companies as corporate successors. On May 9, 1988, Remedial Investigation/Feasibility Study (RI/FS) Special Notice Letters were issued to Universal Oil Products (UOP) and Quincy Mining Co. Universal Oil Products is the successor of Calumet Hecla Mining Company, which operated its milling and smelting on the shore of Lake Linden and disposed of the generated tailings in the area. Quincy Mining Co., conducted smelting operations in the Hubbell area and disposed of tailings. On June 13, 1988, a Notice Letter was issued to Quincy Development Company, which was the current owner of a tailing pile located on the lakeshore in Mason. Negotiations for the RI/FS Consent Order with these Potentially Responsible Parties (PRPs) were unsuccessful due to issues such as the extent of the Site and the number of PRPs. Subsequently, U.S. EPA contracted with Donohue & Associates in November 1988 to perform the RI/FS at the Site.

Due to the Site's size and complex nature, three OUs were defined. Figure 1 shows the locations of OU1, OU2 and OU3.

OU 1 includes select surface tailings, drums, and slag piles on the western shore of Torch Lake. These areas include Lake Linden, Hubbell/Tamarack and Mason Sands. Approximately 442 acres of tailings were located in OU1. A smaller deposit of smelter slag, encompassing approximately 9 acres, is located near Hubbell, south of the C&H Reclamation Plant, now Peninsula Copper Industries (PCI).

OU 2 includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Channel, Keweenaw Waterway, North Entry to Lake Superior, Boston Pond, and Calumet Lake.

OU 3 includes select tailing and slag deposits located at North Entry, Michigan Smelter, Quincy Smelter, Calumet Lake, Isle-Royale, Boston Pond, and Grosse-Point (Point Mills/Dollar Bay).

On June 21, 1989, U.S. EPA collected a total of eight samples from drums located in the old Calumet and Hecla smelting mill site near Lake Linden, the Ahmeek Mill site near Hubbell, and the Quincy site near Mason. On August 1, 1990, nine more samples were collected from drums located above the Tamarack site near Tamarack city. Based on the sampling results, U.S. EPA determined that some of these drums may have contained hazardous substances. During the week of May 8, 1989, the U.S. EPA also conducted ground penetrating radar and a sub-bottom profile (seismic) survey of the Lake bottom. The area in which this survey was conducted is immediately off-shore of the former Calumet and Hecla smelting mill site. The survey located several point targets (possibly drums) on the bottom of Torch Lake. Based on the drum sampling results and seismic survey, U.S. EPA executed an Administrative Order by Consent (AOC), dated July 30, 1991, which required six companies and individuals to sample and remove drums located on the shore and lake bottom. Pursuant to the Administrative Order, these entities removed 20 drums with unknown contents from off-shore of Peninsula Copper Inc., and the old Calumet and Hecla smelting mill site, in September 1991. Eight-hundred-eight (808) drums were found in the Lake bottom, some of which were believed to have contained slag and recycled circuit boards. The remainder were deteriorated drum carcasses; these were left in place. Additionally, 82 drums and minor quantities of underlying soils were removed from the upland areas of Torch Lake. The removed drums and soils were sampled, over-packed, and disposed of off-site at a hazardous waste landfill.

Remedial Investigations were completed for all three operable units. The RI and Baseline Risk

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Assessment (BRA) reports for OU1 were finalized in July 1991. The RI and BRA reports for OU3 were finalized on February 7, 1992. The RI and BRA reports for OU2 were finalized in April 1992. The Ecological Assessment for the Site was finalized in May 1992. A Proposed Plan identifying U.S. EPA's recommended remedy for OU1 and OU3 was presented to the public on May 5, 1992, starting the period for public comment. A Proposed Plan identifying U.S. EPA's recommended remedy for OU2 was presented to the public on February 17, 1994, starting the period for public comment.

During the public comment period for OU1 and OU3, UOP, through its attorneys, made it clear to the community that, under CERCLA, any current owner of a Superfund site can be held jointly and severally liable, and that they, if the United States pursued a claim for cost recovery against it, it would in turn potentially pursue others associated with the Site. Since the Site ownership is dispersed among private individuals, small businesses, and municipal government entities, this statement created considerable concern throughout the community. U.S. EPA responded at the time by stating that no one would be pursued for costs if their sole connection to the Site was ownership of property containing tailings. U.S. EPA subsequently entered into AOCs with several landowners in 1994, giving the landowners covenants not to sue and contribution protection in exchange for agreements for access and recording restrictive covenants. The covenants were to be recorded within six months of the AOC's effective date and required the property owner to ensure cover material remained in place over the tailings. U.S. EPA closed out cost recovery actions for the Site in 1997.

In addition, on January 10, 1997, the U.S. EPA entered into a prospective purchaser agreement (PPA) with the Mason tailing pile landowners (Quincy Development Landowners and Lakeshore Estates Associates). This action was done in the spirit of redevelopment, since current ownership can expose individuals to response cost liability, thereby creating a significant disincentive for prospective purchases and redevelopment. The 1997 PPA was intended to be a catalyst for redevelopment by relieving the Mason tailing pile landowners of potential CERCLA liability. In return, specific benefits were provided to U.S. EPA, including access and borrow soil located on land owned by Lakeshore Estates Associates at no cost.
Basis for Taking Action

Table 2: The following compounds were selected as Contaminant of Concern (COC) for OU 1:

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<th>Inorganics Compounds</th>
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<tr>
<td>bis(2-Ethylhexyl)phthalate</td>
<td>Aluminum</td>
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<tr>
<td>PAHs</td>
<td>Antimony</td>
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<tr>
<td>Naphthalene</td>
<td>Arsenic</td>
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<tr>
<td>2-Methylnaphthalene</td>
<td>Barium</td>
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<tr>
<td>Acenaphthylene</td>
<td>Beryllium</td>
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<tr>
<td>Phenanthrene</td>
<td>Boron</td>
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<tr>
<td>Fluoranthene</td>
<td>Chromium</td>
</tr>
<tr>
<td>Pyrene</td>
<td>Cobalt</td>
</tr>
<tr>
<td>Benzo(a)fluoranthene</td>
<td>Copper</td>
</tr>
<tr>
<td>Chrysene</td>
<td>Lead</td>
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<tr>
<td>Benzo(b)fluoranthene</td>
<td>Manganese</td>
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<tr>
<td>Benzo(k)fluoranthene</td>
<td>Mercury</td>
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<tr>
<td>Benzo(a)pyrene</td>
<td>Nickel</td>
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<tr>
<td>Indeno(1,2,3-cd)pyrene</td>
<td>Silver</td>
</tr>
<tr>
<td>Dibenzo(a,h)anthracene</td>
<td>Titanium</td>
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<td>Benzo(g,h,i)perylene</td>
<td>Vanadium</td>
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The following compounds were selected as COC for OU 3:

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<tr>
<td>Benzo(b)fluoranthene</td>
<td>Lead</td>
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<td>Butylbenzylphthalate</td>
<td>Antimony</td>
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<td>Diethylphthalate</td>
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<td>Fluoranthene</td>
<td>Barium</td>
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<tr>
<td>Pyrene</td>
<td>Beryllium</td>
</tr>
<tr>
<td>Chrysene</td>
<td>Cadmium</td>
</tr>
<tr>
<td>Benzo(k)fluoranthene</td>
<td>Chromium</td>
</tr>
</tbody>
</table>

The baseline risk assessments for OU1 and OU3 were conducted to characterize the current or potential future threat to public health that contaminants in the tailings and slag piles/beach might pose. The ecological assessment for the entire site was also conducted to determine the current and potential future effects of contaminants to ecological receptors. Several human health risk assessment exposure scenarios were evaluated, including current and future off-site residents as well as future on-site residents, construction workers, campers (adults and children) and, specific to the Quincy Smelter area, scenarios for park workers and for park visitors. Except for residences at Hubbell, whose backyards were in the vicinity of the slag pile and slag beach, carcinogenic risks were equal to or below 1.0E-06. Park workers were within acceptable risk range. However, non-carcinogenic health hazards for all exposure routes for all populations evaluated exceeded the acceptable risk range.

Significant ecological risks were determined to exist as the result of exposure of aquatic, terrestrial and wetland species to tailings, slag and sediment. The continuous release of tailing- and slag-borne contaminants via wind, surface water runoff, and wave erosion were deemed to present an unacceptable and actionable source of ecological risk. The most severe ecological impact was the degradation of benthic communities (bottom dwelling organisms) associated with
contaminated sediments in Torch Lake and other water bodies at the Site. The benthic community is an integral part of the base of a complex food web in lakes. A severely impacted benthic community impacts the entire food web. Toxic effects due to metals (especially copper and lead) appear to be related to sediment pore space dynamics and also impact the water column and pelagic organisms.

Prior to implementation of the remedy beginning in 1999, most of the tailing and slag piles were barren. Plant survival and growth on tailing and slag piles were impaired by a combination of chemical and non-chemical stresses, including poor water retention, extreme temperature fluctuation (i.e., tailing and slag piles heat up in sunlight), low organic content, and presence of toxic substances. Studies have shown that high levels of copper inhibit vascular development in some plants.

Animal populations are likely to avoid tailing deposits for many of the same reasons that plants have not colonized them. In addition, tailings lack food and cover required for establishment of ecologically or recreationally important wildlife populations.

Deposition of tailings in surface waters is likely to have destroyed existing wetlands in a number of areas, including Boston Pond and along the western shore of Torch Lake. Wetlands are generally absent along Torch Lake shores where the most significant deposition of tailings took place, except where streams flow into the lake.

IV. Remedial Actions

Remedy Selection

The ROD for OU1 and OU3 was signed on September 30, 1992; and the ROD for OU2 was signed on March 31, 1994.

OU1 and OU3 ROD (September 30, 1992)

The Remedial Action Objectives (RAOs) for OU1 and OU3 were developed as a result of data collected during the RI and included activities to reduce or minimize the exposure to and release of contaminants in tailings and/or slag located at the Site. These include:

1. Reduce or minimize potential risks to human health associated with the inhalation of airborne contaminants from the tailings and slag located at the Site;

2. Reduce or minimize potential risks to human health associated with direct contact with and/or the ingestion of the tailings and the slag located at the Site;

3. Reduce or minimize the release of contaminants in tailings to the groundwater through leaching; and

4. Reduce or minimize the release of contaminants in tailings to the surface water and sediment by soil erosion and air deposition.

The selected remedy for OU1 and OU3 has the following specific components:

1. Deed restrictions to control the use of tailing piles so that tailings will not be left
in a condition which is contrary to the remedy’s objective;

2. Removal of debris such as wood, empty drums, and other garbage in the tailing piles for off-site disposal in order to effectively implement the soil cover with vegetation;

3. Soil cover with vegetation in the following areas:
   - OU 1 tailings in Lake Linden, Hubbell/Tamarack City, and Mason (approximately 442 acres),
   - OU 3 tailings in Calumet Lake, Boston Pond, Michigan Smelter, Dollar Bay, and Grosse-Point (approximately 229 acres), and
   - OU 1 slag pile in Hubbell (approximately 9 acres);

4. The Isle-Royale tailings in OU3 were excluded from the area to be covered with soil and vegetation under the ROD as follows:
   - The portion of Isle-Royale tailings in OU3 that was being developed as a sewage treatment plant was excluded from the area to be covered with soil and vegetation. The part of this area that was to be covered by conventional sewage treatment tanks was approximately 12 acres. The Portage Lake Water and Sewage Authority was to cover the remaining part, approximately 48 acres, with soil and vegetation as part of the sewage treatment facility development plan. However, if this area was not covered and vegetated within 5 years after the final Remedial Design was submitted, then this area would be subject to the ROD’s other requirements for cover and vegetation.
   - The portion of the Isle-Royale tailings that was designated to be developed as a residential area was excluded from the area to be covered with soil and vegetation. This area comprised approximately 90 acres. However, if this area were not developed as a residential area within 5 years after the final Remedial Design was submitted, then this area was to be subject to the ROD’s other requirements for cover and vegetation; and
   - The portion of the Isle-Royale tailings that was being used as source material to make cement blocks and as a finished block storage area for the Superior Block Company was excluded from the area to be covered with soil and vegetation. This area comprised approximately 60 acres. However, if any portion of the area were no longer to be used as a storage and source area, soil cover with vegetation was to be implemented pursuant to the ROD. The owner and/or operator of Superior Block Co. would also be required to use dust control measures such as water spray during the operation of mining and other activities in order to reduce the release of dust into the air;
5. The area the Houghton County Road Commission (HCRC) designated as source material to spread on the road during winter to provide traction for motor vehicles was excluded from the area to be covered with soil and vegetation. This area was located at Point Mills in OU3 and was estimated to contain 46 acres. While this area was in use, the following procedures were to be observed:

- The area was to be covered with enough soil to prevent the release of tailings to the air and Lake;
- Excavation was to stop at seven (7) feet above the water table (defined as the average of seasonal highs and lows over a two year period). This portion subsequently was to be covered with soil or soil and vegetation;
- Once the entire area was excavated to seven (7) feet above the water table, it was to be covered with soil and vegetation;

6. Assuming that the slag pile located in the Quincy Smelter area (approximately 25 acres) would be developed as part of a National Park, no action would be taken there. If this area were not developed as a National Park, deed restrictions would be sought to prevent residential development in the slag pile area;

7. The North Entry (location 4 on Figure 1), Redridge (location 11 on Figure 1) and Freda (location 12), tailings were excluded from the area to be covered with soil and vegetation. Locations 4, 11, and 12 are along the Lake Superior shore where pounding waves and water currents would likely retard or destroy any remedial actions. As a result, U.S. EPA believed it to be technically impracticable to implement the chosen remedy at these locations. However, the North Entry (location 4) and Freda (location 12) tailings, approximately 46 acres, were to be studied during Remedial Design. If U.S. EPA determined that any portion of these areas was sufficiently unaffected by Lake Superior wave activity such that it could be effectively covered with soil and vegetated, then the unaffected area or areas were to be subject to the requirements of the ROD.

Four memoranda to the Site file were prepared in 2002 to document non-significant changes that arose during design and construction. These changes were necessary to ensure effective remedy implementation. The changes included (by date):

1. 03-18-2002. The installation of shoreline protection in the form of rip-rap and lake access ramps at Point Mills;

2. 11-07-2002. Installation of compacted gravel as a cover material on a small portion of the Site at Dollar Bay;

3. 11-22-2002. Taking no action at the Hubbell/Tamarack coal dock;

4. 12-31-2002. Application of vegetation at Gull Island (location presented in Figure 1) in Torch Lake.

In addition, two design reports were finalized in September 1998 to support remedy implementation at North Entry and Scales Creek (Figure 1), and a fifth Memorandum to the Site
File documenting changes to remedial action on Isle-Royale Sands, was completed on July 7, 2004.

Operable Unit 2 ROD (March 31, 1994)

The selected remedy for OU2 (groundwater, surface water and sediments associated with the Site) was “No Action” for surface water and sediments with long-term monitoring and Institutional Controls with respect to groundwater use. OU 2 is related to OU1 and OU3 primarily in that wind-blown and eroded tailings from OU1 and OU3 migrate to OU2. These conditions serve as a continuing source of environmentally harmful contamination to Torch Lake and diminish the effectiveness of the Lake’s natural sedimentation process. The remedy chosen for OU1 and OU3, stabilization and vegetation of the tailing piles near the Lake, was in part selected because it was expected to address the erosion problem.

The remedy selected for OU2 takes into consideration and relies upon:

- The reduction, expected as a result of the remedial action taken at OU1 and OU3, of tailing loading to surface water bodies;
- Ongoing natural sedimentation and detoxification, such as that which is occurring in other surface water bodies in the area;
- Institutional programs and practices controlling potential future exposure to site-affected groundwater which are administered at the county and state level;
- The long-term monitoring component of the OU1 and OU3 remedy and the Five Year Review process’s monitoring requirements; and
- Groundwater, surface water, sediment, and general ecological monitoring including an evaluation of the rate and effectiveness of organic sediment build-up and the recovery of the benthic community, as included as part of the O & M Plan for OU1 and OU3. This monitoring provides information on the effectiveness of the remedy and on the extent of environmental impacts, if any. Since the OU1 and OU3 remedy’s effectiveness is measured in part by assessing effects on Torch Lake, the monitoring program for OU1 and OU3 encompasses the OU2 study area. In addition, the Five-Year Review process includes an evaluation of the status of Torch Lake sediments and ecology, and regularly reassess the necessity for remedial action should the extent of the Lake’s recovery fall short of expectations.

As detailed in the ROD for OU2, U.S. EPA determined that the sediment and surface water contamination associated with OU2 posed no unacceptable threat to human health based on the limited sample data available at that time. The shallow groundwater associated with OU2, which comes into contact with stamp sands, exhibits inorganic contamination and results in unacceptable potential future risks. However, these risks arise only if, in the future, the stamp sands are developed for residential use or if drinking water is taken from the shallow groundwater. The ROD stated that the practice in the region was to drill drinking water wells into the sandstone aquifer which underlies the stamp sands. Stamp sand contamination was found not to affect the sandstone aquifer, so any future risk by contaminated groundwater appeared unlikely. The ROD also stated that the Western Upper Peninsula District Health Department and the MDPH regulated the installation of drinking water wells in the vicinity of the Site and that local authorities were alerted to the potential future threat and had permitting
programs and development review procedures in place providing further assurances against future human exposure to stamp sand-affected groundwater. Thus, the ROD determined that treatment of groundwater to permanently and significantly reduce the toxicity, mobility and volume of contaminants was found to be unnecessary to protect human health.

Contamination associated with Torch Lake sediments, however, was determined to pose an ecological threat, and this was documented in the 1994 ROD for OU2 and later, in the 2001 Baseline Study. The Lake bottom sediment along the western shoreline consists of stamp sands that were deposited in the Lake over many years of active disposal of copper ore milling and associated mining wastes into the Lake. This activity effectively chemically stratified the Lake. Levels of contamination (primarily copper) in the stamp sand and associated sediments are sufficient to create an inhospitable Lake bottom habitat and thus suppress the organisms that would normally inhabit it. However, given the wide distribution (2,700 acres) and large volumes (approximately 200,000,000 tons) of stamp sands deposited in Torch Lake, remediation of the Lake bottom was not practical, feasible, or potentially, in the long run, necessary.

U.S. EPA implemented a removal action at the Quincy Smelter in 2005. The action addressed the highest risks from the Site, yet left the buildings and most historical artifacts in place for future use as part of the Keweenaw National Historic Park. U.S. EPA removed asbestos from two buildings that were determined to pose the greatest risk to public health and the environment, and installed rip-rap along the shoreline and a water diversion system to divert storm water from running across the Site to directly into the Keweenaw Waterway. A fence was also constructed around the buildings.

During 2007, as a result of historical low water levels that included a drop of up to 24 inches in some areas, stamp sands were exposed throughout the area. Of specific concern were areas in the Lake Linden Recreation Area and an area by the public beach that had exposed sediments and clay-like material. Samples collected showed high levels of lead, PCBs, and arsenic. U.S. EPA conducted a removal action at the Lake Linden Beach and Marina beginning in the summer of 2007. In the fall of 2008, approximately 30 tons of arsenic contaminated soil and 10 drums containing residual waste were removed from the Mason Sands. The area from which contaminated soils were removed was backfilled with clean fill.

In 2009, U.S. EPA signed a ROD amendment to include an additional 6 acres of vegetative cover at the Quincy Smelter parcel. In 2010, the United States Department of Agriculture (USDA)-Natural Resources Conservation Service (NRCS) completed the remedial design for this vegetative cover. The remedial action activities were completed by the end of September 2011.

**Remedy Implementation**

**Remedial Design**

In August 1994, an Interagency Agreement (IA) was signed with the USDA-NRCS to perform remedial design (RD) work. The RD was conducted in conformance with the 1992 ROD and was completed for the entire Site in September 1998. At that time, the IAG was amended to perform remedial action (RA) management and oversight.

The IA construction schedule was set at six years (1999 - 2004). It was estimated in the 1992 ROD (Description of Remedial Alternatives section), that remedy implementation time would be 5 years. Other factors that influenced the construction schedule include restricted availability of USDA-NRCS engineers, relatively short construction season due to the Site’s northerly location,
and possible public health and safety issues related to the relatively far distance between Site parcels targeted for remediation. With regard to the last factor, U.S. EPA anticipated large volumes of heavy equipment operating simultaneously on multiple local roads located in populated areas, and USDA-NRCS was expected to maintain strict control of heavy equipment traffic during construction. To accomplish this goal, USDA-NRCS needed to implement the remedy in phases.

**Construction Activities**

Actual on-site construction began in June 1999 and was completed in September 2005. A Preliminary Close-Out Report (PCOR) documenting construction completion was signed on September 23, 2005. Construction activities at specific areas of the Torch Lake site are discussed below:

**Operable Unit 1**

Lake Linden (114 acres covered) was completed by October 1999. U.S. EPA obtained a copy of the required deed restrictions for the Lake Linden in 2001 to verify the completion of this component of the remedy, and filed in the Torch Lake Site Administrative Record.

Hubbell/Tamarack (145 acres covered) was completed by October 2000. However, a washout occurred near the lake outlet of a surface water diversion path in 2001, and a very minor washout occurred in the same area in 2002. Both washouts were promptly repaired and have remained stable.

Mason (225 acres covered) was completed in October 2002. Just prior to on-site construction activities at Mason Sands, the USDA-NRCS commissioned Michigan Technological University to conduct an archaeological survey to evaluate and document the cultural remains at the Mason Sands portion of the Site. This was done because of the numerous historical mining and milling related relics located around the Mason area and the concern over losing important cultural remains as a result of remedy implementation. The survey's results were presented in a report dated May 2001, "Archeological Survey Report of the Quincy Mining Company Torch Lake Smelter & Reclamation Plant at Mason Sands Torch Lake U.S. EPA Superfund Site", which was filed in the U.S. EPA's Torch Lake Site Administrative Record. The May 2001 report concluded that implementation of the remedy at the Mason portion of the Site would have only a minor negative impact on cultural and historical values. Therefore, U.S. EPA proceeded with remedy implementation.

The remedial design specifications related to soil type were modified during the implementation phase from topsoil, as specified in prior research work and pilot project at the Scales Creek "Moonscape", to sandy loam as a result of local concerns over stripping area farmland. The areas remediated included cover material consisting of six to ten inches of sandy-loam soil and a vegetative mat. The vegetative mat was achieved through a seed mix applied directly on top of the sandy-loam soil. The seed mix was typically applied at approximately 90 pounds per acre. The typical seed mix contained six species of plants, including perennial ryegrass (Lolium perene), tall fescue (Festuca arundinacea), creeping red fescue (Festica rubra), red clover (Trifolium pratense), alfalfa (vernal Medicago falcata), and birdsfoot trefoil (Lotus comiculatus). This mix of plant species was selected because of their rapid growth rate and relative resilience with minimal maintenance. Rapid stabilization of the soil cover material with vegetation was important at the Site in order to avoid soil washouts and to accommodate the short growing season. Variations of this seed mix were applied to a small number of areas to accommodate...
landowner preference. Other plantings investigated for the Site included shrubs and trees but their use was not implemented. Overall, the vegetative growth is well-established and is stabilizing the soil portion of the cover material.

Construction firms under contract with the USDA-NRCS to implement the remedy located and obtained the sandy-loam borrow soil, which was then determined to meet modified USDA-NRCS soil specifications. Borrow soils for Lake Linden were obtained approximately 1.5 miles south of Lake Linden near the eastern shore of Torch Lake. Borrow soils for Hubbell/Tamarack were obtained directly west of Highway M-26 at the southern end of Hubbell/Tamarack. Borrow soils for Mason were obtained directly across the narrow Torch Lake channel located on the south-east shore of the Mason tailings.

As-built construction drawings were completed for the Lake Linden (dated November 2, 1999) and Hubbell/Tamarack (dated May 8, 2001) portions of the Site and filed in the U.S. EPA's Torch Lake Site Administrative Record. U.S. EPA completed the construction drawings for the Mason portion of the Site in the Spring 2003. As explained and justified in a memorandum to the Site file dated November 22, 2002, no action was taken at the coal dock property located at Hubbell/Tamarack.

Remedial Action construction activities were performed according to approved design and specifications at Lake Linden, Hubbell/Tamarack City and Mason Sands; and it is anticipated that cover material and shoreline protection will continue to meet RAOs established for the Site. For Lake Linden, U.S. EPA and MDEQ determined that the remedy was functioning as intended and in April 2002, U.S. EPA partial delisted Lake Linden and all of OU2 from the NPL. Hubbell/Tamarack City was delisted from the NPL via a partial deletion in 2004.

Operable Unit 2

No physical work was required for the OU2 remedy, thus no construction activities have occurred there. U.S. EPA included OU2 in the April 2002 partial NPL delisting.

Operable Unit 3

Dollar Bay (15 acres covered) was completed by October 2002. As explained and justified in a memorandum to the Site File dated November 7, 2002, 6.4 acres at Dollar Bay were covered with compacted gravel instead of soil and vegetation like the remainder of that parcel. Borrow soils for Point Mills and Dollar Bay were obtained from a combination of two sources. One source was located near the Mason borrow soil source and one was located on a property directly adjacent to the Point Mills tailings.

Construction activities at Point Mills (96 acres covered), Calumet Lake, Boston Pond, and Michigan Smelter were completed in late October of 2003.

Shoreline protection was also installed along much of the shoreline where the remedy was implemented. Shoreline protection includes rip-rap rock (rock boulders averaging about one-foot in diameter in the shape midway between a sphere and a cube with a specified density and integrity) which protects the remedy from wave erosion. As explained and justified in a Memorandum to the Site File dated March 18, 2002, extensive shoreline protection was installed at Point Mills and included lake access ramps consisting of 24-foot sections of flat, interlocking block at various properties.
Remedial Action construction activities were performed according to approved design and specifications at Dollar Bay, Point Mills, Calumet Lake (14 acres), Boston Pond (25 acres), Michigan Smelter (14 acres), North Entry and Scales Creek, and it is anticipated that cover material and shoreline protection installed at the Site will continue to meet RAOs established for the Site.

As discussed above, the 1992 ROD for OU1 and OU3 designated some exceptions to the soil cover with vegetation remedy as presented above. The exceptions and resulting remedial decisions are discussed in more detail below:

- According to the 1992 ROD, portions of the Isle-Royale tailings in OU3 were to be excluded from the area to be covered with soil and vegetation if other entities were developing or covering the stamp sands. The ROD called for an evaluation of these exclusion areas 5 years after the date of the final remedial design (September 10, 1998) to determine whether the development that was predicted at the time of the ROD had actually occurred. U.S. EPA evaluated the site and determined that remedial action was necessary at all portions of the Isle-Royale stamp sands where development had not taken place by the Waste Water Treatment Plant (WWTP) or the Superior Block Company or where stamp sands were uncovered. The WWTP operator planted areas immediately adjacent to the WWTP. U.S. EPA's remedy included covering the outer areas both east and west of the WWTP. Areas developed as part of a residential area were not included in the areas to be covered and vegetated. The residential area was not included in the remedy because it was developed as envisioned in the ROD and so cover and vegetation were determine to be unnecessary. In 2004, U.S. EPA completed the remedy at the Isle-Royale stamp sands by placing a 6-inch vegetative cover and rip-rap along the shoreline of the Site. The change to include rip-rap was documented in a Memorandum to the Site File dated July 7, 2004.

- The 1992 ROD stated that HCRC property in the Point Mills portion of OU3 was excluded from the remedy. The HCRC uses the stamp sands from this area (approximately 46 acres) for motor vehicle road traction during the winter.

On August 31, 2001, U.S. EPA received a letter from the HCRC requesting that 31 acres of its property in Point Mills be included in the remedy, leaving approximately 15 acres to use for present and future use of road maintenance materials. In response to this letter and to assist the HCRC, U.S. EPA implemented the remedy on approximately 31 of the 46 acres, leaving approximately 15 acres uncovered. The 2001 letter from HCRC also asked U.S. EPA to change the ROD to allow for deeper excavation. However, in a letter dated August 17, 2004, HCRC rescinded their request to re-open the ROD.

- The Quincy Smelter portion of the site was excluded from the remedy, assuming that the on-site slag pile was developed as part of the Keweenaw National Historic Park. The ROD further stated that if this area were not developed as a National Park, then deed restrictions would be sought to prevent residential development in the slag pile area.

Since the ROD was signed in 1992, there has been no actual implementation of development plans for the Historic Park, and while the goals are still the same, neither the property's owner, Franklin Township, nor National Park Service has taken steps or to implement any efforts in this area. Erosion of stamp sands from the Smelter into the Keweenaw Waterway continues to be a
concern, and in an effort to minimize erosion, yet remain sensitive to the National Park Service’s concerns over the historical and economic importance of the Smelter as it currently exists, U.S. EPA implemented a removal action at the Smelter in 2005.

The action addressed the highest risks from the Site, yet left the buildings and most historical artifacts in place for future use as part of the Keweenaw National Historic Park. In July 2005, U.S. EPA removed asbestos from two buildings that were determined to pose the greatest risk to public health and the environment. From August through September 2005, the U.S. EPA Emergency Response Branch installed rip-rap along the shoreline and a water diversion system to divert storm water from running across the site directly into the Keweenaw Waterway. A fence was also constructed around the buildings.

- The North Entry, Red ridge and Freda tailings were excluded from the remedy according to the 1992 ROD. These locations are along the Lake Superior shore where pounding waves, water currents and weather conditions would likely retard or destroy any remedial action. As a result, U.S. EPA believed at the time of the ROD, that it was technically impracticable to implement the chosen remedy at these locations. However, the ROD also stated that the North Entry and Freda tailings should be studied during remedial design. If U.S. EPA determined that any portion of these areas was sufficiently unaffected by Lake Superior wave activity, such that it could be effectively covered with soil and vegetation, then the unaffected area or areas, would be subject to the requirements of the ROD.

As part of the remedial design and the IAG, NRCS evaluated and concluded that the remedial action could be implemented at North Entry, and U.S. EPA concurred. The remedy was implemented at North Entry with a slight modification: due to weather constraints (wind, wave, and ice actions), the cover and vegetation was only brought to within 40 feet of the shoreline. U.S. EPA believes this is protective, as data indicate that the North Entry is a depositional area and so erosion should not be a concern.

In May 2003 and May 2004, U.S. EPA undertook action at Gull Island that was not specifically laid out in the OU1 and OU3 ROD. Gull Island is a 13.6-acre island located approximately 1500 feet off the western shore of Hubbell in Torch Lake. Gull Island is primarily made of crushed mine rock or “stamp sands” deposited in Torch Lake during the copper milling operations during the 19th and early 20th centuries. In 2002, U.S. EPA received written and verbal communication from citizens and local government officials that significant clouds of stamp sand dust from Gull Island were blowing into Torch Lake. NRCS staff confirmed the public observations and while, approximately one-third to one-half of the island was already vegetated, U.S. EPA, with MDEQ and NRCS assistance, planted approximately 38,000 individual trees, shrubs and beach grass into the stamp sands that comprise the island, without the use of clean cover material. The Memorandum to File prepared and dated December 21, 2002 documents the decision for implementing remedial efforts at Gull Island. Based on Gull Island stamp sand characteristics, the significant size of the exposed area (7.9 acres) and observed transport mechanism (wind erosion) into Torch Lake, U.S. EPA believed that the potential for exposed stamp sands on Gull Island to contribute to the severe degradation of the benthic community in Torch Lake was high enough to justify taking an action consistent with the 1992 ROD.

During 2007, as a result of historical low water levels, a drop of up to 24 inches in some areas, stamp sands were exposed throughout the area. Of specific concern were areas in the Lake Linden Recreation Area and an area by the public beach that had exposed sediments and clay-like material. Samples collected showed high levels of lead, PCBs, and arsenic. U.S. EPA
performed a removal action at the Lake Linden Beach and Marina in the summer of 2007.

In the fall of 2008, approximately 30 tons of arsenic-contaminated soil and 10 drums containing residual waste were removed from the Mason Sands. The area from which contaminated soils were removed was backfilled with clean fill.

In 2009, U.S. EPA signed a ROD amendment to include an additional 6 acres of vegetative cover at the Quincy Smelter parcel. In 2010, NRCS completed the remedial design for this vegetative cover was completed in 2010. The remedial action activities were completed by the end of September 2011.

**Operation and Maintenance (O&M)**

In 1999 and 2000, as part of long-term monitoring, U.S. EPA conducted environmental sampling as a way to establish the environmental baseline conditions of Torch Lake. The results of the sampling efforts are presented in the Baseline Study Report dated August 2001. It was anticipated that future long-term monitoring events will be conducted by the MDEQ and the results compared to the 2001 baseline study to identify changes and/or establish trends in lake conditions. MDEQ has had the lead for OU2 monitoring since 2002, when OU2 was deleted from the NPL.

In 2002, U.S. EPA conducted a study of terrestrial environments at the Site to characterize and document the ecological conditions of the tailing areas before and after implementation of the remedy. The results of the study were presented in the Torch Lake Stamp Sand Evaluation Report dated March 2003.

In 2004, MDEQ conducted sampling activities for monitoring of Torch Lake. The monitoring was undertaken to document and measure the status of natural recovery of the lake following remedial actions. The 2004 sampling work included assessing the benthic community populations, measuring sediment toxicity to benthic invertebrates, measuring concentrations of metals and semi-volatile organic compounds in sediment and groundwater, and studying the sedimentation process in lake sediments.

At the time of the first Five-Year Review, the only parcel that had officially entered into the O&M phase was Lake Linden. The MDEQ has been conducting O&M at Lake Linden in accordance with the January 2000 O&M Plan. The official O&M start date for Lake Linden was September 27, 2001. This date is based on a MDEQ letter to U.S. EPA dated September 27, 2001. The letter confirmed MDEQ's belief that the cover on the Lake Linden parcel is functioning properly and performing as designed, and further requested that Lake Linden be deleted from the NPL. The rest of the parcels entered the O&M Phase in 2008, in accordance with the SSC. U.S.EPA and MDEQ jointly inspected the parcels and determined that they were ready to be transferred to MDEQ for O&M.

The O&M period for all OUs was initiated December 23, 2008. MDEQ will take the lead in implementing a Site-Wide O&M by September 2013.

**Institutional Controls**

Institutional controls are non-engineered instruments, such as administrative or legal controls, that help minimize the potential for exposure to contamination and protect the remedy's integrity. Compliance with ICs is required to assure long-term protectiveness at any areas of the
Table 3 below summarizes ICs for the restricted areas of the Site.

**Table 3. Institutional Controls Summary Table**

<table>
<thead>
<tr>
<th>Media, Engineered Controls, &amp; Areas that Do Not Support UU/UE Based on Current Conditions</th>
<th>Institutional Control Objective</th>
<th>Title of Institutional Control Instrument Implemented (or planned)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soils with residual contamination in OU1 and OU 3*</td>
<td>Protect vegetative cover and prevent residual mining contamination from entering surface water by ensuring that: (1) no disturbance of vegetative cover occurs; or (2) if disturbance occurs, owner is required to replace soil and repair vegetative cover.</td>
<td>Declaration of Restrictive Covenants on approximately 60 properties. U.S. EPA is in process of confirming that all necessary restrictive covenants are in place.</td>
</tr>
<tr>
<td>Groundwater associated with the entire Site (OU 2).</td>
<td>Prohibit well installation or screening at depths where groundwater will be impacted by residual mining wastes.</td>
<td>Institutional programs and practices administered by county and local government.</td>
</tr>
</tbody>
</table>

*OU 1 consists of Mason Sands, Hubbell/Tamarack City and Lake Linden Sands and the Gull Island areas. OU 3 includes the following areas: Calumet Lake, Boston Pond, North Entry, Red ridge, Freda, Michigan Smelter, Quincy Smelter, Isle Royale Sands, Dollar Bay, Point Mills, and Scales Creek areas. (A map of these areas is attached as Figure 1).

The Site consists of areas where mining wastes, known as tailing piles or stamp sands, have been disposed of or have come to be located. The OU1 and OU3 ROD required, in part, that a soil and vegetative cover be constructed over large portions of these tailings piles. The 1992 ROD further required that deed restrictions be placed on those properties where the vegetative cover had been constructed in order to prevent future erosion of mining wastes into Torch Lake. Specifically, the ROD required deed restrictions to ensure that mine tailings and/or slag material are ultimately re-vegetated after any activity which disturbs the soil cover.

In 1994, U.S. EPA entered into an AOC with certain affected landowners requiring them, within six months of the AOC’s effective date, to implement the appropriate deed restriction on their property. The deed restrictions were to bind future owners by running with the land.

Institutional controls were also part of the remedy selected by U.S. EPA for OU2’s Site-wide groundwater component. The remedy relied on county and local government programs and practices to control potential future exposure to Site-affected groundwater.
IC Evaluation Activities

U.S. EPA is in the process of evaluating the ICs for this Site. U.S. EPA has been able to determine that all properties at OU1 (Lake Linden, Hubbell/Tamarack City, and Mason Sands) are subject to appropriate restrictive covenants. U.S. EPA currently believes that appropriate covenants have been implemented for many, but not all, of the properties at OU3. U.S. EPA is working with the MDEQ (with the assistance of a local realtor) to ascertain what additional properties need controls.

Additional evaluation activities are needed with regard to the properties comprising OU3 to ensure that the IC component of the selected remedy is functioning as intended, and to ensure effective procedures are in place for long-term stewardship at the Site. As noted above, U.S. EPA has yet to confirm that appropriate restrictions are in place at all properties comprising OU3. The IC evaluation will clearly identify the properties subject to restriction, and indicate whether the property owners have recorded the restrictions. As part of the IC evaluation, U.S. EPA will consider comments received by homeowners at the Site questioning the necessity of restrictive covenants (with their potential to decrease the value of the restricted properties) in light of the fact that the HCRC uses the stamp sands for anti-skid control on local roads. Additionally, the IC evaluation will consider whether existing restrictions should be modified to ensure that they are enforceable and bind future owners (i.e., run with the land). Finally, the IC evaluation will determine whether existing encumbrances potentially interfere with the Site remedy.

With regard to OU2, groundwater use is controlled by the Western Upper Peninsula District Health Department. The County Health Department also has a permitting program for the installation of private wells. U.S. EPA has recently learned that the County does not specifically prohibit the installation of drinking water wells in or directly beneath the stamp sands. U.S. EPA’s IC study will include an evaluation of the effectiveness of the County’s permitting program to ensure that potentially contaminated groundwater is not used for drinking water purposes.

Data generated from the May and August 2012 investigation indicated there is no current unacceptable exposure of site-related contaminants via groundwater. Local governmental units responsible for well installation permitting are aware of the stamp sands’ location, and should help assure that no new wells are installed within existing stamp sands. U.S. EPA has provided the HCCHD with maps showing the areas of stamp sands with each parcel’s respective locators, which include Township, Range, and Section. These maps were provided to every well permitting office for the HCCHD; this should increase the likelihood that the wells installed in the stamp sand areas are not screened in the stamp sands, but drilled further down into bedrock where there is no known Site-related contamination.

Once the IC evaluation activities have been completed, U.S. EPA anticipates developing an IC Plan by September 2013. Based on the results of the IC evaluation, U.S. EPA will plan for additional IC activities, as needed. If necessary, U.S. EPA will work with the Western Upper Peninsula District Health Department and other local government agencies to ensure that the required institutional protections are in place and effective.

Operable Unit 1 and Operable Unit 3

Long Term Stewardship: Long-term protectiveness at the Site requires compliance with land
use restrictions. As noted above, U.S. EPA will review the implications of HCRC’s stamp-sand spreading activities to determine whether existing ICs may be modified or whether additional ICs are needed. Monitoring of these ICs is also necessary to ensure long-term protectiveness at the Site. MDEQ will conduct annual inspections at the Site and include the results of the inspection in an annual report to U.S. EPA.

**Current Compliance:** According to the 2012 Site inspections, most of the parcels affected by mining wastes at the Site remain unused. Some areas are now being developed for residential use. Adjacent properties are currently zoned for residential/commercial and industrial use, and are being used for commercial and industrial purposes. U.S. EPA does not anticipate that residential, industrial or commercial use on adjacent parcels will adversely impact the vegetated cover. During the last Site visits in 2012, U.S. EPA and MDEQ did not observe any activities that would have violated the existing restrictive covenants.

**Site-wide Groundwater (Operable Unit 2)**

**Long-Term Stewardship:** Long-term protectiveness at the Site requires compliance with groundwater use restrictions, currently implemented through local government permitting requirements. Long-term stewardship of the site will require monitoring to ensure the effectiveness of and compliance with these requirements. Long-term stewardship may also require the development of additional ICs, more stringent permitting requirements, or the development of a local zoning ordinance to prohibit the installation or screening of groundwater wells in mining wastes. During the preparation of the IC Plan, the County’s existing ordinance will be reviewed to assure that it is effective. Also, U.S. EPA will evaluate existing procedures, including the O&M plans to assure that a mechanism exists for monitoring compliance and conducting inspections.

**Current Compliance:** At the time of the ROD, it was assumed no drinking water wells were screened within stamp sands. During the last Five-Year review, U.S. EPA acquired well logs that suggested that some private and municipal wells were screened within stamp sands. Local units of government with the permitting responsibility for well installations appeared not to be fully aware of the stamp sands’ locations. Data generated from the May and August 2012 investigation indicated there is no current unacceptable exposure of Site-related contaminants via groundwater. U.S. EPA has provided the HCHD with maps showing the areas of stamp sands with each parcel’s respective locators, which include Township, Range, and Section. These maps were provided to every HCHD well permitting office; this gesture should help ensure that wells installed in the stamp sand areas are not screened in the stamp sands, but drilled further down into bedrock where there is no Site-related contamination.

**V. Progress Since the Last Review**

This is the third Five-Year Review for the Site. Actions taken since the 2008 Five-Year Review is summarized in Table 4. The 2008 Five-Year Review found the OU1 and OU3 remedies to be protective in the short-term while the OU2 remedy was protectiveness-deferred due to uncertainties with ecological risks posed by sediments at the Lake bottom. Since that Five-Year Review, U.S. EPA has determined that a protectiveness determination for the sediments at OU2 is not appropriate, since no action was taken under CERCLA and the OU2 remedy relies upon remedial actions taken at OUs 1 and 3. Therefore, the protectiveness determination at OU2 is now based on just the groundwater component of the remedy.

Since the completion of the second Five-Year Review in 2008, the remedial implementation...
work at OUI and OUI3 was completed in 2011 as described above, and construction completion was documented in the Remedial Action completion report dated September 23, 2012. Groundwater and sediment samples were taken in 2010 in response to the concern about well screening in the stamp sands. The sediment samples were taken at Calumet Lake and Boston Pond. Samples were taken in the sediment of Boston Pond and Calumet Lake to establish a baseline. Previous investigations did not sample these water bodies directly, but assumed the contamination would be similar to the contamination in Torch Lake. The results of the 2010 sampling event indicate that this is indeed the case—there are high levels of copper and other heavy metals in the sediment of Boston Pond and Calumet Lake. The groundwater samples were taken on parcels suspected of having wells screened in the stamp sands; samples were also taken from the monitoring wells. Municipal groundwater data was obtained and evaluated as well. The groundwater data did not have exceedances of the relevant Safe Drinking Water Act MCLs for the contaminants of concern.
Table 4: Actions Taken Since the Last Five-Year Review

<table>
<thead>
<tr>
<th>Issues from Previous Review</th>
<th>Recommendation and Follow-up Actions</th>
<th>Party Responsible</th>
<th>Milestone Date</th>
<th>Action Taken and Outcome</th>
<th>Date of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Follow-up actions</td>
<td>Continue to seek documentation from landowners at the Site to verify proper deed restrictions have been put in place, and if they are not, work with the landowners and/or county to ensure deed restrictions are put in place.</td>
<td>U.S. EPA</td>
<td>9/2008</td>
<td>This is action is on-going. U.S. EPA conducted a Title Search to see if owners had the proper restrictions on their property. U.S. EPA and MDEQ met with property owners individually to educate them on the ICs and encourage them to record use restrictions.</td>
<td>On-going</td>
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<tr>
<td>2. Possible groundwater</td>
<td>Evaluate groundwater data and uses at the Site, as well as develop a plan for periodic on-Site inspections of groundwater use and work with county officials to evaluate the effectiveness of the county well permitting process in preventing the installation of drinking water wells in tailings.</td>
<td>U.S. EPA/ MDEQ/ Houghton County</td>
<td>9/2008</td>
<td>Additional GW sampling conducted May and August 2010. Sampling Report finalized February 2011. No exceedances of site-related contaminants were found in the wells that were sampled. Also, a letter with site maps was sent to HCJID to enhance the effectiveness of their efforts to prevent installation of wells in the stamps sands.</td>
<td>02/2011</td>
</tr>
<tr>
<td>Issues from Previous Review</td>
<td>Recommendation and Follow-up Actions</td>
<td>Party Responsible</td>
<td>Milestone Date</td>
<td>Action Taken and Outcome</td>
<td>Date of Action</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>--------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>3. Possible groundwater exposures/complete GSI pathway, needs to be evaluated.</td>
<td>Collect more current groundwater data and complete an evaluation of exposure pathway.</td>
<td>MDEQ/ U.S. EPA</td>
<td>06/2009</td>
<td>Additional GW sampling conducted May and August 2010. Sampling Report finalized February 2011. No exceedances of site-related contaminants were found in the wells that were sampled.</td>
<td>08/2010 and 02/2011</td>
</tr>
<tr>
<td>5. Lack of cover and sedimentation basin issues at Quincy Smelter to prevent further erosion of stamp sands into surface water.</td>
<td>Prepare and Finalize a Decision Document (ROD Amendment) to implement appropriate remedy at Quincy Smelter.</td>
<td>U.S. EPA/ NRCS</td>
<td>09/2009</td>
<td>Completed ROD Amendment and Remedial Action</td>
<td>07/2009 and 09/2011</td>
</tr>
<tr>
<td>7. Possible additional contaminant sources at Mason Sands and determine need for additional work.</td>
<td>Further assessment evaluation and remediation as necessary in the Mason Sands parcel.</td>
<td>U.S. EPA/ MDEQ</td>
<td>06/2008</td>
<td>U.S. EPA conducted a removal action at Mason Sands Fall of 2008. No additional assessment was necessary.</td>
<td>12/2008</td>
</tr>
<tr>
<td>Issues from Previous Review</td>
<td>Recommendations and Follow-up Actions</td>
<td>Party Responsible</td>
<td>Milestone Date</td>
<td>Action Taken and Outcome</td>
<td>Date of Action</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------</td>
<td>-------------------</td>
<td>---------------</td>
<td>--------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>8. Need to determine if additional areas from Torch Lake Area Assessment (TLAA) Report need assessing or remediation.</td>
<td>Determine if any areas from the TLAA Report need additional evaluation.</td>
<td>U.S. EPA/MDEQ</td>
<td>09/2008</td>
<td>U.S. EPA reviewed the TLAA and determined that no additional sampling or actions needed to be taken in response to the report.</td>
<td>05/2010</td>
</tr>
<tr>
<td>9. Long-Term access for conducting monitoring and O&amp;M activities has not been formally established.</td>
<td>Review 1994 Administrative Order of Consent (AOC) and other access agreements for applicability to long-term access. Seek appropriate long-term solution for access agreements where necessary. Evaluate the need for additional ICs</td>
<td>U.S. EPA/MDEQ</td>
<td>09/2008</td>
<td>A determination was made that MDEQ should obtain signed access agreements when performing O&amp;M activities.</td>
<td>03/2013</td>
</tr>
<tr>
<td>10. Houghton County Road Commission's road traction tailing excavation practices at Point Mills relative to 1992 ROD requirements are a possible concern.</td>
<td>Work with the Houghton County Road Commission to ensure practices are consistent with the 1992 ROD.</td>
<td>U.S. EPA/MDEQ</td>
<td>09/2008</td>
<td>U.S. EPA/MDEQ plans to contact Houghton County to follow up with their plans for this area</td>
<td>Not yet completed; planned in 09/2013</td>
</tr>
<tr>
<td>11. Deed restrictions to prevent the development of residences in the slag area of Quincy Smelter were not implemented.</td>
<td>Work with Franklin Township to ensure they record appropriate deed restrictions at Quincy Smelter.</td>
<td>U.S. EPA</td>
<td>09/2008</td>
<td>Restrictive Covenant was recorded on 1/24/13.</td>
<td>01/2013</td>
</tr>
<tr>
<td>Issues from Previous Review</td>
<td>Recommendations and Follow-up Actions</td>
<td>Party Responsible</td>
<td>Milestone Date</td>
<td>Action Taken and Outcome</td>
<td>Date of Action</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>--------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>12. Slow-sedimentation and lack of detoxification of sediments in Torch Lake as assumed in OU2 ROD, leading to an estimate of Natural Recovery in excess of several hundred years.</td>
<td>Determine and develop alternative studies or measures for OU2, Torch Lake, as appropriate.</td>
<td>U.S. EPA/ MDEQ</td>
<td>09/2009</td>
<td>U.S. EPA and MDEQ had several meetings from 2009-2012 discussing slow sedimentation. The sediments will take a long time to recover. Adjusting the monitoring frequency and sample location has been proposed to account for the long recovery time.</td>
<td>3/2013</td>
</tr>
<tr>
<td>13. A next round of monitoring and data collection for Torch Lake is required by 2009.</td>
<td>Develop Data collection plan/Monitoring for Torch Lake.</td>
<td>MDEQ/ U.S. EPA</td>
<td>12/2009</td>
<td>Monitoring is not necessary. No monitoring was performed due to the slow recovery of the sediments. No monitoring is planned.</td>
<td>NA</td>
</tr>
<tr>
<td>14. Lack of acceptable vegetative cover establishment in certain areas of Point Mills.</td>
<td>Evaluate vegetative cover establishment in certain areas of Point Mills and determine possible solution.</td>
<td>U.S. EPA/ MDEQ</td>
<td>9/2008</td>
<td>U.S. EPA agreed to fertilize the properties. U.S. EPA and MDEQ will continue to work with the property owners in improving the vegetative covers.</td>
<td>Not yet completed; planned in 09/2013.</td>
</tr>
</tbody>
</table>

VI. Five-Year Review Process

Administrative Components

MDEQ was notified of the initiation of the Five-Year Review in March 2012 by the U.S. EPA Project Manager for the Site (Copy of EPA letter to MDEQ in Attachment B). The Torch Lake Five-Year Review team was led by Nabil Fayoumi, Remedial Project Manager (RPM) for the Torch Lake Superfund Site, and included Scott Cornelius of MDEQ and Rob Aho, representative of the USDA-NRCS. The RPM established the review schedule from March 2012 to March 2013. Its components included: Community Notification; Document Review; Data Review; Site Inspections; and Five-Year Review Report Development and Review. MDEQ's comments on the draft Five-Year Review Report are included in Attachment C.
Community Notification and Involvement

Activities to involve the community in the Five-Year Review process were initiated in January 2012 with a notification to the Community Involvement Coordinator (CIC) for the Torch Lake Superfund Site. A notice was published on April 6, 2012 in the local newspaper (Daily Mining Gazette) that a Five-Year Review was to be conducted. A copy of the Advertisement is included in Attachment D.

In September 2011, U.S. EPA worked with the local University (Michigan Tech) and the 5 local high schools to qualitatively assess the vegetative cover. The high school students conducted soil testing and bird identification; they also measured plant diversity, cover productivity, and rooting depth. Later, they conducted statistical analysis of data. Local high school students gained invaluable experience with the scientific process, monitoring skills, and data analysis. They will also understand more about the historical significance of their community.

Based on this qualitative data from the students, U.S. EPA determined that some of the covers are growing well (e.g., Lake Linden which has 72% vegetative coverage). On the other hand some covers are not as successful (e.g., Point Mills property with only 37% plant coverage). U.S. EPA and MDEQ are working on developing solutions for those covers that are not doing so well.

U.S. EPA received comments by homeowners at the Site questioning the necessity of restrictive covenants (with their potential to decrease the value of the restricted properties) in light of the fact that the HCRC uses the stamp sands for anti-skid control on local roads. The concerns of these property owners will be considered during the IC review process.

Document Review


Data Review

Sediment Results:
Since no action was taken for OU2, the sediment does not need to be monitored and a specific sediment O&M plan is not necessary. However, monitoring of the sediments nearest the vegetative covers could serve to measure the effectiveness of such covers in preventing additional stamp sand migration into Torch Lake. Given that U.S. EPA has determined that Torch Lake will take an unprecedented amount of time to recover, monitoring of the lake sediments should occur relatively infrequently. Future evaluations of the sediment will be tied to the remedy for OU1 and OU3 and should only be used to reflect the effectiveness of the vegetative covers in preventing further stamp sand releases into Torch Lake.

Biotic Recovery and Community Results:
On October 14, 2010, the U.S. EPA, MDEQ, and Michigan Technical University (MTU) met to discuss the slow recovery of the Torch Lake benthic environment. MTU and MDEQ asserted that the sedimentation rate calculated for Torch Lake was about 0.08 to 0.17 centimeters (cm) per year, and at this rate it would take 800 years for Torch Lake to recover. MTU and MDEQ
further asserted that the surface sediments of Torch Lake have the highest concentrations of copper. At the meeting MTU used the recovery of the sediment in Portage Lake as a comparison. In the same time frame, Torch Lake accumulated 4 cm of sediment, while Portage Lake accumulated 25 cm. The benthic community in Portage Lake is doing well with 25 cm of post-mining sediments. The difference could be attributed to the degree of isolation from other water bodies. Portage Lake is connected to more tributaries and water bodies than Torch Lake, and therefore receives an increased supply of new sediment.

The MTU 2007 study has significant uncertainty about the extent to which the report can be used to evaluate the effectiveness of the Torch Lake remedial action. If Portage Lake has had relatively successful recovery with 25 cm of post-mining sediment, then Torch Lake should show similar results in an additional 160 years, when 25 cm of surface sediment can be expected to have accumulated at Torch Lake. In addition, the samples MTU took to determine Torch Lake’s sedimentation rate were collected in a limited area of the eastern portion of the Lake. The Torch Lake Superfund remedy was implemented on the western shores of the Lake; therefore the MTU study is likely not representative of sedimentation rates for the entire Lake. Furthermore, the higher levels of copper in the upper layers of Torch Lake sediment found in the MTU study are likely due to the organic carbon binding the copper. This phenomenon is likely preventing copper from affecting the surface water, and may be making copper less bioavailable in the sediments.

Natural Recovery Evaluation:
There is information that suggests that some of the ecological community in Torch Lake is recovering. A study of Torch Lake called “Sediment Core Studies of Biotic Recovery following Mining Perturbations in Torch Lake” was completed by Charles Kerfoot and associates from MTU in March 2007. This study indicates that some areas of the Torch Lake ecosystem have recovered. Many planktonic organisms have returned to the water since mining ceased; pelagic species have developed viable egg banks. The benthic organisms, however, have not shown signs of recovery.

Groundwater Sampling:
In May and August 2010, the U.S. EPA collected groundwater samples from residential and monitoring wells potentially screened in the stamp sands; and reviewed existing data collected from municipal water supply wells. This investigation was conducted to assess the current human health exposure to contaminated groundwater from the site stamp sands. Data generated from this investigation indicates there is no current unacceptable exposure of site-related contaminants via groundwater. The residential wells sampled in May and August of 2010 and the municipal well data reviewed revealed no metal concentrations in excess of the Safe Drinking Water Act MCLs. Two of the ten monitoring wells sampled had concentrations of arsenic above the MCL of 10 parts per billion (ppb). Groundwater from a monitoring well in Hubbell/Tamarack had arsenic concentration of 22.5 ppb and groundwater from a monitoring well in Lake Linden had arsenic concentration of 14.8 ppb. However, there are no residential wells currently screened in stamp sands in these areas. Water from municipal wells located in the Torch Lake area (Osceola Township and the City of Houghton) had no concentrations of arsenic or copper above MCLs.
Site Inspections

Inspections at the Site were conducted during the week of June 20, 2012 by the U.S. EPA RPM and the MDEQ PM. The purpose of the inspections was to assess the progress of remedy implementation, protectiveness of the remedy, evaluate the performance of the soil and vegetative cap where applied, and evaluate future remedy implementation problems and needs. Issues identified at the completed areas of the remedy included minor areas which needed repair and the need for additional re-seeding and fertilization at Point Mills. Inspection field notes are included in Attachment E.

Interviews

One interview with an individual was conducted. Since the newspaper ad was placed, no additional members of the community or any other individual voiced any interest in conducting an interview related to the Five-year Review. An interview was held with one of the property owners at Point Mills. They expressed significant disappointment in the type of soil and vegetative cover they received. They were promised a soil cover with grasses and wildflowers, and sandy loam material. Although the cover is functioning to prevent erosion, it is mostly clay, rocks, and weeds, and does not drain when wet. U.S. EPA and MDEQ are working together with the property owner to see how the cover can be enhanced in a cost effective manner.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes. Based on a review of relevant documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the Site inspections, the soil cover and vegetation remedy has been implemented per the 1992 ROD for OU1 and OU3, and the soil cover is functioning as intended to reduce erosion of stamp sands into the surface water of Torch Lake. Most of the affected property owners have recorded restrictive covenants that require re-establishment of the cover if the vegetative cover is disturbed. Based on inspections, monitoring and conversations with city officials, there appears to be compliance with the use restrictions.

During 2007, as a result of historical low water levels, a drop of up to 24 inches in some areas, stamp sands were exposed throughout the area. Of specific concern were areas in the Lake Linden Recreation Area and an area by the public beach that had exposed sediments and clay-like material. Samples collected showed high levels of lead, PCBs, and arsenic. U.S. EPA performed a removal action at the Lake Linden Beach and Marina in the summer of 2007. In the fall of 2008, approximately 30 tons of arsenic contaminated soil and 10 drums containing residual waste were removed from the Mason Sands. The area from which contaminated soils were removed was backfilled with clean fill.

In 2009, U.S. EPA signed a ROD amendment to include an additional 6 acres of vegetative cover at the Quincy Smelter parcel. In 2010, NRCS completed the remedial design for this vegetative cover. The remedial action activities were completed by the end of September 2011.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

OU1 and OU3 1992 ROD; Yes. The exposure assumptions, toxicity data, and remedial action
objectives used at the time of the 1992 ROD for the stamp sands remain valid today.

OU2 1994 ROD: Yes. At the time of the 1994 ROD, it was assumed no drinking water wells were screened within stamp sands. During the last Five-year Review, acquired well logs suggested that private and municipal source wells are screened within stamp sands. Data generated from the May and August 2012 investigation indicated there is no current unacceptable exposure of Site-related contaminants via groundwater. U.S. EPA has provided the HCHD with maps showing the areas of stamp sands with each parcel's respective locators, which include Township, Range, and Section. These maps were provided to every well permitting office for the HCHD; this gesture should help ensure that wells installed in the stamp sand areas are not screened in the stamp sands, but screened further down in the bedrock where there is no Site-related contamination. Monitoring will continue once the O & M plan is implemented to ensure that no exposure exists as the result of wells screened in the stamp sands.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

OU1 and OU3: The exposure assumptions used to develop the Human Health Risk Assessment included exposure to contaminated tailings and slag from a possible current and future ingestion, inhalation, and dermal contact pathway.

OU2: The exposure assumptions used to develop the ecological assessment included high toxicity to benthic communities from high metal concentrations in sediments. Toxicity tests confirmed these expectations.

There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. No change to these assumptions is warranted. There has been no change to the standardized risk assessment methodology that could affect the remedy’s protectiveness.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. No other events have affected the protectiveness of the remedy and there is no information that calls into question the protectiveness of the remedies. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy.

Technical Assessment Summary

Based on a review of relevant documents, data, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the Site inspections, it appears that the soil and vegetative cover remedy implemented for OU1 and OU3 (1992 ROD) are functioning as intended by the ROD and the five memoranda to the Site file. The implemented remedy has reduced the erosion and loadings into Torch Lake as well as the windblown exposure of stamp sand dust.

There are no changes in the physical conditions of the Site that would affect the remedies. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the remedies’ protectiveness. There have been no changes in exposure pathways or toxicity factors for the contaminants of concern which would impact the remedies. There is no other information that calls into question the protectiveness of the
remedies.

VIII. Issues

The table below discusses issues which may affect future protectiveness at the site.

Table 5: Issues

<table>
<thead>
<tr>
<th>Issues</th>
<th>Affects Current Protectiveness (Y/N)</th>
<th>Affects Future Protectiveness (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Lack of vegetative cover establishment at certain properties at the Point Mills. Also, minor areas need repair and additional reseeding and fertilization at Point Mills.</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>2) A determination needs to be made that the required restrictive covenants on residential properties continue to be necessary, and that permitting restrictions on wells screened in the stamp sands are in place and effective to ensure long-term protectiveness of human health and the environment for the groundwater.</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>3) Houghton County Road Commission is currently using tailing material at Point Mills to spread on roads during winter to provide traction for motor vehicles.</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>4) Site-wide O&amp;M Plan have not been finalized. Existing residential wells are screened in the stamp sands. While these wells are not contaminated above drinking water standards, monitoring is necessary to ensure remedy continued protectiveness.</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

IX. Recommendations and Follow-up Actions

Table 6 identifies the recommended follow-up actions to address the issues from Table 5.
Table 6: Recommendations and Follow-up Actions

<table>
<thead>
<tr>
<th>Issue</th>
<th>Recommendations and Follow-up</th>
<th>Party Responsible</th>
<th>Oversight Agency</th>
<th>Milestone Date</th>
<th>Affects Current Protectiveness</th>
<th>Affects Future Protectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Lack of vegetative cover establishment at certain properties at the Point Mills. Also, minor areas need repair and additional reseeding and fertilization at Point Mills.</td>
<td>U.S. EPA and MDEQ will work with property owners to find a cost-effective solution to the vegetation problem at Point Mills.</td>
<td>EPA MDEQ</td>
<td>EPA MDEQ</td>
<td>09/30/13</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>2) A determination needs to be made that the required restrictive covenants on residential properties and permitting restrictions on wells screened in the stamp sands are in place and effective to ensure long-term protectiveness of human health and the environment for the groundwater.</td>
<td>U.S. EPA and MDEQ will review the required restrictive covenants on residential properties and the permitting restrictions on wells screened in the stamp sands and confirm that they are necessary, in place and effective. U.S. EPA and will prepare an IC plan for the Site which will include a plan for long-term stewardship.</td>
<td>U.S. EPA</td>
<td>MDEQ</td>
<td>09/30/13</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>3) Houghton County Road Commission is currently using tailing material at Point Mills to spread on roads during winter to provide traction for motor vehicles.</td>
<td>U.S. EPA and MDEQ will work with the Houghton County Road Commission to ensure that road traction tailing excavation practices are consistent with the 1992 ROD.</td>
<td>EPA MDEQ</td>
<td>EPA MDEQ</td>
<td>09/30/13</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>4) Site-wide O&amp;M Plan have not been finalized. Existing residential wells are screened in the stamp sands. While these wells are not contaminated above drinking water standards, monitoring is necessary to ensure remedy continued protectiveness.</td>
<td>MDEQ will finalize the Site-wide O&amp;M Plan. MDEQ will revise the O&amp;M Plan to include monitoring of residential wells screened in the stamp sands.</td>
<td>MDEQ</td>
<td>EPA</td>
<td>09/30/13</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>
X. Protectiveness Statement(s)

**OU1 and OU3:** The remedial actions implemented at OU1 and OU3 are protective of human health and the environment in the short term because the vegetative cover has reduced potential risks associated with direct contact or inhalation of contaminants in the tailings. For the remedies to be protective in the long term, a review of ICs must be performed with follow-up with affected property owners and local governments as appropriate.

**OU2:** A “no action” ROD for OU2 was signed in March 1994. The ROD for OU2 relied on the implemented remedy for OU1 and OU3, natural recovery of the Lake, and the institutional programs and practices administered by county and local governments to provide sufficient protectiveness for exposure to Site-affected groundwater. The remedy for the groundwater portion of OU 2 currently protects human health and the environment in the short term because existing residential wells screened in the stamp sands are not contaminated above drinking water standards, although groundwater monitoring wells at the Site continue to indicate concentrations of arsenic and lead above MCLs. In order for the “No Action” selected remedy to be protective in the long term, U.S. EPA and MDEQ will periodically monitor residential wells, review the need for more robust ICs and clarify or amend the remedy decision document, if required. An IC Plan will be prepared to ensure that effective ICs are implemented, maintained, monitored, and enforced.

**Site-Wide:** The remedy at the Torch Lake Superfund Site protects human health and the environment in the short term because the vegetative covers prevent erosion of stamp sands to Torch Lake, which prevents the further degradation to the ecologic system of the Lake while it recovers over time. In order for the selected remedy to be protective in the long term, a review of ICs must be performed. Presently, ICs are required on all of the vegetative covers, as specified in the OU1 and OU3 ROD. Additional or modified ICs may need to be recorded or otherwise put in place, as appropriate. As part of the IC Plan, U.S. EPA expects to evaluate whether ICs in the form of use restrictions continue to be necessary, in view of the use of crushed stamp sands at the direction of the HCRP as a winter road safety measure. The IC plan will discuss how to ensure that all necessary ICs are in place and effective.

XI. Next Review

The next Five-Year Review for the Torch Lake Superfund Site is required five years from the date of this review.
<table>
<thead>
<tr>
<th>Superfund Area Number</th>
<th>Area Name</th>
<th>Operable Unit</th>
<th>Year Remedy Completed</th>
<th>Delisted from NPL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calumet Lake</td>
<td>3</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Boston Pond</td>
<td>3</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>North Entry</td>
<td>3</td>
<td>2005</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Redridge</td>
<td>3</td>
<td>No remedial action planned</td>
<td>Not applicable</td>
</tr>
<tr>
<td>5</td>
<td>Freda</td>
<td>3</td>
<td>No remedial action planned</td>
<td>Not applicable</td>
</tr>
<tr>
<td>6</td>
<td>Michigan Smelter</td>
<td>3</td>
<td>2003</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Quincy Smelter</td>
<td>3</td>
<td>2005 removal action</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Isle Royale Sands</td>
<td>3</td>
<td>2004</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Dellar Bay</td>
<td>3</td>
<td>2002</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>Mason Sands</td>
<td>1</td>
<td>2002</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Hubbell/Tamarack City</td>
<td>1</td>
<td>2000</td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>Lake Linden Sands</td>
<td>1</td>
<td>1999</td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>Point Mills</td>
<td>3</td>
<td>2002</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>Scales Creek</td>
<td>3</td>
<td>2005</td>
<td>No</td>
</tr>
</tbody>
</table>
Dear Mr. Cornelius:

This letter is to notify you that U.S. EPA has begun the process of the Five Year Review for the Torch Lake Superfund Site (Torch Lake) in Houghton County, Michigan. A Statutory Five Year Review for the Site will be conducted at the site as required by Section 121 of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Language for Statutory Reviews.

The Five Year Review (FYR) for Torch Lake is due on March 27, 2013, and we are providing you a twelve month notification so that U.S. EPA and Michigan Department of Environmental Quality (MDEQ) can begin the necessary coordination activities. This is the third FYR for the site and all of the remedial actions have been implemented, including the most recent vegetative cover at the Quincy Smelter parcel. U.S. EPA is currently evaluating the status of the FYR Issues and Recommendations from the 2008 FYR and has begun discussions with MDEQ about how to ensure proper implementation of the institutional controls as required by the 1992 ROD.

Issues and Recommendations - 2008 FYR
Attached is a list of the FYR issues and recommendations from the last FYR, along with an explanation as to what has been done or what EPA plans to do to address them. If you have any additional information about the issues and recommendations please provide this information.

Data Review
There has been no O&M data collected since the previous FYR; therefore the data review for this FYR will consist of the 2010 sampling data collected by EPA. If MDEQ has any additional site-related data that should be included in this data review, please forward those reports to EPA for inclusion in the FYR report.

FYR Interviews
EPA plans to schedule interviews with the PAC, NPS, and other interested parties. If you have additional recommendations as to who should be interviewed, please provide their name and
contact information to me.

**FYR Site Inspection**
We plan to have the FYR site inspection this summer coupled with other TL activities, like the interviews and Michigan Community Health Department’s community meeting during the week of June 17. Please provide MDEQ’s availability for this week.

**FYR Schedule**
Below is a preliminary schedule of tasks and events that are necessary to complete the FYR on schedule. The pink highlight indicates tasks that are due in the next 30 days and orange represents tasks that should begin in the next quarter of the fiscal year. This schedule is meant to be a guideline and individual dates for tasks can be adjusted based on the availability of personnel.

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Task Lead</th>
<th>Start</th>
<th>End</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Notify Stakeholders of FYR Start</td>
<td>DiCosmo</td>
<td>3/18/12</td>
<td>4/30/12</td>
<td>44</td>
</tr>
<tr>
<td>1.1 Notify Review Team</td>
<td>DiCosmo</td>
<td>4/3/12</td>
<td>4/4/12</td>
<td>2</td>
</tr>
<tr>
<td>1.1.1 ORC and send documents</td>
<td>DiCosmo</td>
<td>4/9/12</td>
<td>4/11/12</td>
<td>2</td>
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<tr>
<td>1.2 CIC and prepare to send public notice</td>
<td>DiCosmo</td>
<td>4/30/12</td>
<td>5/13/12</td>
<td>15</td>
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<tr>
<td>1.3 Send Letter to State- FYR Start</td>
<td>DiCosmo</td>
<td>4/3/12</td>
<td>4/11/12</td>
<td>8</td>
</tr>
<tr>
<td>1.4 Evaluate needs for Geos/HH/ECO reviews</td>
<td>DiCosmo</td>
<td>4/1/12</td>
<td>4/30/12</td>
<td>30</td>
</tr>
<tr>
<td>1.5 Verify Accurate Dates in CERCLIS</td>
<td>DiCosmo</td>
<td>3/1/12</td>
<td>3/22/12</td>
<td>5</td>
</tr>
<tr>
<td>1.6 Meeting with Stakeholders to Discuss FYR Needs and Schedule</td>
<td>DiCosmo</td>
<td>4/23/12</td>
<td>4/23/12</td>
<td>1</td>
</tr>
<tr>
<td>2. Review Data and Documents</td>
<td>DiCosmo</td>
<td>3/19/12</td>
<td>9/12/12</td>
<td>178</td>
</tr>
<tr>
<td>2.1 Review FYR Recommendations from Previous FYR</td>
<td>DiCosmo/Cornelius</td>
<td>4/4/12</td>
<td>6/4/12</td>
<td>60</td>
</tr>
<tr>
<td>2.2 Review 2010 GW/Sediment Report</td>
<td>DiCosmo/Cornelius</td>
<td>4/2/12</td>
<td>5/1/12</td>
<td>30</td>
</tr>
<tr>
<td>2.3 Review MDEQ Data</td>
<td>DiCosmo/Cornelius</td>
<td>6/30/12</td>
<td>7/29/12</td>
<td>30</td>
</tr>
<tr>
<td>2.4 Review RODs, ROD Amendment, and FYR addendum</td>
<td>DiCosmo/Cornelius</td>
<td>7/30/12</td>
<td>9/12/12</td>
<td>45</td>
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<tr>
<td>2.5 Review Qualitative Data from Houghton HS</td>
<td>DiCosmo/Cornelius</td>
<td>4/24/12</td>
<td>7/22/12</td>
<td>90</td>
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<tr>
<td>2.6 Review Institutional Controls</td>
<td>DiCosmo/Cornelius</td>
<td>4/24/12</td>
<td>6/22/12</td>
<td>60</td>
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<tr>
<td>2.7 Review QS Remedial Action Report</td>
<td>DiCosmo/Cornelius</td>
<td>6/15/12</td>
<td>7/29/12</td>
<td>45</td>
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<tr>
<td>3. Site Inspection</td>
<td>DiCosmo</td>
<td>12/6/11</td>
<td>7/11/12</td>
<td>239</td>
</tr>
<tr>
<td>3.1 Request Availability from Stakeholders</td>
<td>DiCosmo</td>
<td>3/25/12</td>
<td>4/8/12</td>
<td>15</td>
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<tr>
<td>3.2 Site Inspection</td>
<td>DiCosmo/Cornelius</td>
<td>3/25/12</td>
<td>7/22/12</td>
<td>3</td>
</tr>
<tr>
<td>3.3 Send Completed Inspection Sheet to Stakeholders</td>
<td>DiCosmo/Cornelius</td>
<td>7/30/12</td>
<td>7/31/12</td>
<td>2</td>
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<tr>
<td>4. Interviews</td>
<td>DiCosmo/Novak</td>
<td>3/2/12</td>
<td>7/2/12</td>
<td>250</td>
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<tr>
<td>4.1 Interview with PAC</td>
<td>DiCosmo/Novak</td>
<td>3/2/12</td>
<td>7/2/12</td>
<td>3</td>
</tr>
<tr>
<td>4.2 Interview with Mayor</td>
<td>DiCosmo/Novak</td>
<td>6/30/12</td>
<td>7/22/12</td>
<td>3</td>
</tr>
<tr>
<td>4.2.1 Interview with Community Members</td>
<td>DiCosmo/Novak</td>
<td>6/30/12</td>
<td>7/22/12</td>
<td>3</td>
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<tr>
<td>5. FYR Report</td>
<td>DiCosmo</td>
<td>6/21/12</td>
<td>3/23/12</td>
<td>256</td>
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<tr>
<td>5.1 Draft FYR</td>
<td>DiCosmo</td>
<td>7/12/12</td>
<td>9/29/12</td>
<td>90</td>
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<tr>
<td>5.1.1 Prepare Draft Report</td>
<td>DiCosmo</td>
<td>7/12/12</td>
<td>9/29/12</td>
<td>90</td>
</tr>
<tr>
<td>5.1.2 Environmental Indicator Worksheets w/supervisor signature</td>
<td>DiCosmo</td>
<td>7/12/12</td>
<td>9/04/12</td>
<td>60</td>
</tr>
<tr>
<td>5.1.3 Send FYR Report for Review</td>
<td>DiCosmo</td>
<td>8/05/12</td>
<td>10/03/12</td>
<td>60</td>
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<td>Section</td>
<td>Task Description</td>
<td>Responsible</td>
<td>Start Date</td>
<td>End Date</td>
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<tr>
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<td>----------</td>
</tr>
<tr>
<td>5.2</td>
<td>Final FYR</td>
<td>DiCosmo</td>
<td>10/04/12</td>
<td>3/03/13</td>
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<tr>
<td>5.2.1</td>
<td>Incorporate Comments</td>
<td>DiCosmo</td>
<td>10/05/12</td>
<td>12/03/12</td>
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<tr>
<td>5.2.2</td>
<td>Begin Sign off of Final FYR</td>
<td>DiCosmo</td>
<td>12/04/12</td>
<td>3/03/13</td>
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<tr>
<td>6</td>
<td>Community Involvement</td>
<td>Novak</td>
<td>3/03/12</td>
<td>2/01/13</td>
</tr>
<tr>
<td>6.1</td>
<td>Publish Notice of FYR Start</td>
<td>Novak</td>
<td>3/24/12</td>
<td>4/07/12</td>
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<tr>
<td>6.2</td>
<td>Schedule FYR Interviews</td>
<td>Novak</td>
<td>5/08/12</td>
<td>5/12/12</td>
</tr>
<tr>
<td>6.3</td>
<td>Publish Notice of FYR Completion</td>
<td>Novak</td>
<td>1/03/13</td>
<td>2/01/13</td>
</tr>
<tr>
<td>7</td>
<td>CERCLIS</td>
<td>DiCosmo</td>
<td>5/12/12</td>
<td>5/12/13</td>
</tr>
<tr>
<td>7.1</td>
<td>Enter FYR Start Date in CERCLIS</td>
<td>DiCosmo</td>
<td>4/01/12</td>
<td>4/01/12</td>
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<tr>
<td>7.2</td>
<td>Record FYR Issues and Recommendations</td>
<td>DiCosmo</td>
<td>3/03/13</td>
<td>4/16/13</td>
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<tr>
<td>7.3</td>
<td>Enter FYR Completion in CERCLIS</td>
<td>DiCosmo</td>
<td>3/04/13</td>
<td>3/08/13</td>
</tr>
</tbody>
</table>

We look forward to working with you on the third FYR for the Torch Lake Superfund Site. Please contact me, 312.886.6148, if you have any questions. Thank you.

Sincerely,

Nefertiti DiCosmo
Remedial Project Manager
U.S. EPA

Enclosures

cc: Thomas Short
    Ajit Vaidya
    Tom Williams
    Dave Novak
## Issues and Recommendations Progress

### March 2008 – March 2012

<table>
<thead>
<tr>
<th>Issues from Previous Review</th>
<th>Recommendations / Follow-up Actions</th>
<th>Party Responsible</th>
<th>Milestone Date</th>
<th>Action Taken and Outcome</th>
<th>Date of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Follow-up actions are required to ensure that Deed Restrictions on the remaining private properties are implemented. Further review of the institutional controls is needed to assure that the remedy is functioning as intended with regard to the ICs and to ensure effective procedures are in place for long-term stewardship at the Site.</td>
<td>Continue to seek documentation from landowners at the Site to verify proper deed restrictions have been put in place, and if they are not, work with the landowners and/or county to ensure deed restrictions are put in place.</td>
<td>EPA</td>
<td>9/2008</td>
<td>EPA conducted a Title Search to see if owners had the proper restrictions on their property. EPA plans to work with MDEQ to get more property owners to put ICs on the covers.</td>
<td>03/2012 – 03/2013</td>
</tr>
<tr>
<td>2. Possible groundwater exposures and the effectiveness of the county well permitting process in preventing drinking water well installation in tailings at the Site. EPA has recently been informed that there may be drinking water wells at the Site that are screened in mining tailings. Specifically evaluate residential areas within the Site (Isle Royale, Dollar Bay, Mason Sands, Point Mills)</td>
<td>Evaluate groundwater data and uses at the Site, as well as develop a plan for periodic on-Site inspections of groundwater use and work with county officials to evaluate the effectiveness of the county well permitting process in preventing the installation of drinking water wells in tailings.</td>
<td>EPA/MDEQ/Houghton County</td>
<td>9/2008</td>
<td>Additional GW sampling conducted May and August 2010. Sampling Report finalized February 2011. No exceedances of site-related contaminants were found in the wells that were sampled. Also, a letter with site maps attached was sent to Houghton County Health Department to enhance the effectiveness of their efforts to prevent installation of wells in the stamps sands.</td>
<td>02/2011</td>
</tr>
<tr>
<td>Issues from Previous Review</td>
<td>Recommendations Follow-up Actions</td>
<td>Party Responsible</td>
<td>Milestone Date</td>
<td>Action Taken and Outcome</td>
<td>Date of Action</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>4. Additional concerns with possible continuing sources in the Lake Linden Area</td>
<td>Further assessment, evaluation and remediation as necessary</td>
<td>EPA</td>
<td>12/2008</td>
<td>EPA assessed the current data from the removal report and has determined that additional remediation is not necessary.</td>
<td>9/2010</td>
</tr>
<tr>
<td>5. Lack of Cover at Quincy Smelter to prevent further erosion of stamp sand into surface water</td>
<td>Implement Remedial Action: vegetative cover to prevent erosion</td>
<td>EPA/NRCS</td>
<td>09/2009</td>
<td>ROD Amendment and Remedial Action</td>
<td>09/2011</td>
</tr>
<tr>
<td>7. Possible additional sources of contamination at Mason Sands</td>
<td>Further assessment evaluation and remediation as necessary.</td>
<td>EPA/MDEQ</td>
<td>06/2008</td>
<td>Removal Action</td>
<td>12/2008</td>
</tr>
<tr>
<td>8. Additional areas of concern found from TLAA Report</td>
<td>Determine if any areas need additional evaluation</td>
<td>EPA/MDEQ</td>
<td>09/2008</td>
<td>EPA reviewed the TLAA and determined that no additional sampling or actions needed to be taken in response to the report.</td>
<td>05/2010</td>
</tr>
<tr>
<td>9. Lack of Long-Term access agreements to conduct O&amp;M and inspection activities</td>
<td>Review 1994 AOC and other access agreements for applicability to long-term access. Seek appropriate long term solution for access agreements where necessary. Evaluate the need for additional ICs</td>
<td>EPA/MDEQ</td>
<td>09/2008</td>
<td>Access agreements include language to show that EPA has access for certain tasks. There is not a specific time limit. The 2002AOC with Simonson allows similar access to EPA. MDEQ is not mentioned in this agreement. → EPA can send out revised access agreements to emphasize O&amp;M activities and include MDEQ.</td>
<td>Planned for fall 2012.</td>
</tr>
<tr>
<td>Issues from Previous Review</td>
<td>Recommendations / Follow-up Actions</td>
<td>Party Responsible</td>
<td>Milestone Date</td>
<td>Action Taken and Outcome</td>
<td>Date of Action</td>
</tr>
<tr>
<td>-----------------------------</td>
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</tr>
<tr>
<td>10. Evaluate Houghton County Road Commission’s road traction tailing excavation practices at Point Mills.</td>
<td>Work with the Houghton County Road Commission to ensure practices are consistent with the 1992 ROD.</td>
<td>EPA/MDEQ</td>
<td>9/2008</td>
<td>EPA believes that HCRC will be filling in the pit soon and will follow up with HCRC in April 2012.</td>
<td>Planned for spring 2012</td>
</tr>
<tr>
<td>11. Require Deed restrictions to prevent the development of residences in the slag area of Quincy Smelter.</td>
<td>Work with Franklin Township to ensure they record appropriate deed restrictions</td>
<td>EPA</td>
<td>09/2008</td>
<td>EPA provided Franklin Township with the model Restrictive Covenant</td>
<td>6/2011</td>
</tr>
<tr>
<td>12. Slow expectant recovery at Torch Lake</td>
<td>Determine alternative studies or potential measures.</td>
<td>EPA/MDEQ</td>
<td>9/2009</td>
<td>EPA and MDEQ had several meetings from 2009-2012 discussing slow sedimentation. The sediments will take a long time to recover. Adjusting the monitoring frequency and sample location has been proposed to account for the long recovery time. Any additional remediation to the sediment is cost-prohibitive.</td>
<td>12/2012</td>
</tr>
<tr>
<td>13. A next round of monitoring and data collection for Torch Lake is required by 2009</td>
<td>Develop Data collection plan/Monitoring for Torch Lake</td>
<td>MDEQ/EPA</td>
<td>12/2009</td>
<td>EPA provided MDEQ with some proposed locations to help with their future monitoring plans.</td>
<td>12/2012</td>
</tr>
<tr>
<td>14. Lack of acceptable establishment in certain areas of Point Mills</td>
<td>Evaluate cover condition and determine how to address the problem.</td>
<td>EPA/MDEQ</td>
<td>9/2008</td>
<td>EPA agreed to fertilize the properties once more prior to handing over the responsibility to MDEQ. The fertilization will take place in 2012.</td>
<td>6/2012</td>
</tr>
</tbody>
</table>
February 21, 2013

Mr. Nabil Fayoumi  
United State Environmental Protection Agency  
Region 5  
77 West Jackson Boulevard (SRF-5J)  
Chicago, Illinois 60604-3590

Dear Mr. Fayoumi:

SUBJECT: Draft Five Year Review for the Torch Lake Superfund Site  
Houghton County

The State of Michigan, Department of Environmental Quality (MDEQ) staff has completed its review of the draft Five Year Review for the Torch Lake Superfund site. The Five Year Review is an important overview of site activities, site risks, and issues to be resolved. Most of the recommendations in the report, if implemented, will increase the reliability of the remedy. However, the MDEQ cannot agree with several important recommendations in the report. Our primary concern is that Operational Unit 2 (OU2) Remedial Actions (RAs) (more precisely the “No Action” decision) appear to be failing, and are not protective of human health and the environment. Some conditions are actually worsening with regard to environmental impact. Fish, in at least Torch Lake, continue to have unacceptable levels of Polychlorinated Biphenyls (PCBs), and these levels are greater than background levels of PCBs in fish from surrounding waters. Sediment contamination by PCBs clearly shows that the contamination originated from the industrial areas/stamp sand areas. It appears that the Conceptual Site Models (CSM) for Torch Lake, and possibly Boston Pond and Calumet Lake, are inadequate to explain the rise in sediment toxicity. Data has only been gathered on sediment toxicity within Torch Lake, but the conditions of low natural sedimentation rates, and lack of currents to flush the sediments, could be creating the same phenomena in Boston Pond and Calumet Lake.

The MDEQ is also concerned that the prevention of the use of groundwater in the tailings does not appear to be reliably restricted by the RAs for OU2. There appears to be a severe lack of data on the quality of interstitial water in the stamp sands. Some of the data that has been relied upon is actually from wells that were screened below the tailings in glacial formations (this is explained in the attached redline draft Five Year Review document).

Finally, there is no listing of the chemicals of concern for the mining operations. For instance, as part of the Five Year Review, it would be helpful to know if PCBs are covered in the Torch Lake Superfund site. Waters of OU2 are impacted by PCBs as
shown by elevated PCB levels in fish and sediments. Are they covered by the Superfund remedy for OU2?

MDEQ staff appreciate that the removal of the tailings themselves is technically infeasible, and they likely will cause continuing impact to interstitial waters and surface waters into the foreseeable future. However, an accurate CSM could make it possible to perform limited RAs that might reduce PCB and/or mercury contamination in fish. It is also possible that an understanding of enrichment of sediments by heavy metals might allow for RAs that would allow for limited restoration of the benthic community in some areas of Torch Lake. Without an accurate CSM, decision makers can only guess what possible risks the site poses, and cannot plan effectively to address those risks.

The MDEQ does not expect the United States Environmental Protection Agency (U.S. EPA) to address these issues under this Superfund Action. However, the MDEQ does want to be on record, for the sake of clarity for the public at risk, to understand what the remedy does and does not accomplish. The remedy does include reduction of human health risks and some positive environmental improvements; however, the public and policy makers must be informed of the risks that remain to make informed decisions.

The attached redline version of the draft Five Year Review contains specific comments and suggested text changes of MDEQ staff.

Thank you for your consideration of our comments. If you need further information, please contact me.

Sincerely,

Robert Delaney, Project Manager
Geology and Defense Site Management Unit
Superfund Section
Remediation and Redevelopment Division
517-373-7406

Attachment

cc: David Kline, MDEQ
    Eric Alexander, MDEQ
    cc/att: Scott Cornelius, CDM Smith
FIVE-YEAR REVIEW REPORT FOR TORCH LAKE SUPERFUND SITE
HOUGHTON COUNTY, MICHIGAN

Prepared by
U.S. Environmental Protection Agency
Region 5
Houghton County, MI

March 2013
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Attachment C – Newspaper Advertisement Announcing the Initiation of the Five-Year Review Process
LIST OF ABBREVIATIONS

ARAR  Applicable or Relevant and Appropriate Requirement
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
EPA United States Environmental Protection Agency
CFR Code of Federal Regulations
ESD Explanation of Significant Difference
MCL Maximum Contaminant Level
MCLG Maximum Contaminant Level Goal
MDEQ Michigan Department of Environmental Quality
MDNR Michigan Department of Natural Resources
NCP National Contingency Plan
NPL National Priorities List
O&M Operation and Maintenance
OU Operable Unit
PAH Poly-aromatic Hydrocarbon
PCB Polychlorinated Biphenyl
PPB Parts per Billion
PRP Potentially Responsible Party
RA Remedial Action
RAO Remedial Action Objective
RD Remedial Design
RI/FS Remedial Investigation/Feasibility Study
ROD Record of Decision
UOP Universal Oil Products
VOC Volatile Organic Compound
EXECUTIVE SUMMARY

The remedy for the Torch Lake Superfund Site in Houghton County, Michigan is intended to address the ecological risk from the presence of large quantities of tailings and slag produced and disposed of in and around the Torch Lake area by the activities of historical copper mines. This remedial action was not taken to address risk to human health because the baseline risk assessment indicates that the risk to human health was at an acceptable level. However as a secondary benefit the soil covers prevent direct contact and inhalation which are identified as the major routes of human exposure from the tailings and slag. The remedy includes stabilization and covering (soil and vegetation) of select contaminated mine tailings and slag material in areas of Torch Lake or surrounding water bodies, institutional controls, natural recovery of area water bodies, and long-term monitoring of area water bodies and groundwater. Due to its size and complexity, EPA divided the Site into three Operable Units (OUs). OU1 includes select surface tailings (Lake Linden tailings, Hubell/Tamarack City tailings, Mason tailings, and Hubell slag pile/beach), drums and slag piles on the western shore of Torch Lake. OU2 includes groundwater, surface water, submerged tailings and sediments within Torch Lake and other waterways. OU3 includes tailings and slag deposits located in the North Entry tailings, Michigan Smelter tailings, Quincy Smelter slag, Calumet Lake tailings and poor rock, Boston Pond tailings, Isle Royale tailings, Dollar Bay slag, Grosse Point tailings, Redridge tailings and Freda tailings and elsewhere. This site however does not include the historical copper mining facilities responsible for the production of the tailings and slag. It also did not consider PCB contamination impacting Torch Lake and other water bodies from mining activities and possible disposal of PCB containing materials in the tailings disposal areas. This is significant because of the ongoing fish advisories for PCBs in fish in Torch Lake.

The Site achieved construction completion on September 23, 2005, with the signature of the Preliminary Close Out Report (PCOR). The trigger for this five-year review was the last five-year review signed on March 27, 2008.
Five-Year Review Summary Form

<table>
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<tr>
<th>SITE IDENTIFICATION</th>
</tr>
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<tbody>
<tr>
<td>Site Name: Torch Lake</td>
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<tr>
<td>EPA ID: MID980901946</td>
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<tr>
<td>Region: 5</td>
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</table>

<table>
<thead>
<tr>
<th>SITE STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPL Status: Final</td>
</tr>
<tr>
<td>Multiple OUs?: Yes</td>
</tr>
<tr>
<td>Has the site achieved construction completion?: Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REVIEW STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead agency: EPA</td>
</tr>
<tr>
<td>Author name (Federal or State Project Manager): Nabil Fayoumi</td>
</tr>
<tr>
<td>Author affiliation: EPA</td>
</tr>
<tr>
<td>Review period: October 1, 2012 to March 27, 2013</td>
</tr>
<tr>
<td>Date of site inspection: June 20, 2012.</td>
</tr>
<tr>
<td>Type of review: Statutory</td>
</tr>
<tr>
<td>Review number: 3</td>
</tr>
<tr>
<td>Triggering action date: Previous Five Year-Review Report – March 27, 2008</td>
</tr>
<tr>
<td>Due date (five years after triggering action date): March 27, 2013</td>
</tr>
</tbody>
</table>
OU2. The 1994 ROD documented the “No Action” decision for OU2. The ROD for OU2 relied on the ICs already in place to provide sufficient protectiveness for exposure to site affected groundwater. OU2 was delisted from the National Priorities List in 2002.

**Issues and Recommendations Identified in the Five-Year Review:**

**OU(s): OU1 and 3.**  
**Issue Category: Operations and Maintenance**

**Issue:** Lack of vegetative cover establishment at certain properties at the Point Mills. Also, minor areas need repair and additional reseeding and fertilization at Point Mills. Lack of establishment of a sustainable vegetative cover on all the soil covers with the possible exception of the Mason Sands area that has been receiving biosolids from the Houghton Waste Water Treatment Plant since before the Superfund remedy was constructed. Some areas of the soil cover, such as Lake Linden and Hubbell slag pile, are eroding from the wave action of Torch Lake. These areas were not armored during the initial construction of the soil covers.

**Recommendation:** U.S. EPA and MDEQ are working with property owners to find a cost-effective solution to the problem of lack of sustainable vegetative cover at the site. U.S. EPA will be addressing the wave erosion problem with installation of riprap.

**Affect Current Protectiveness** | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date
--- | --- | --- | --- | ---
No | Yes | U.S. EPA/MDEQ | U.S. EPA/MDEQ | September 2013

**OU(s): OU1 and 3.**  
**Issue Category: Institutional Controls**

**Issue:** A determination needs to be made that the required Institutional Controls are in place and effective to ensure long-term performance protectiveness of the soil covers and restrictions on the installation of drinking water wells in the stamp sands, human health and the environment for the groundwater.

**Recommendation:** U.S. EPA and MDEQ will review the required Institutional Controls and confirm that they are in place and effective. U.S. EPA and MDEQ will prepare an IC plan for the Site which will include a plan for long-term stewardship.

**Affect Current Protectiveness** | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date
--- | --- | --- | --- | ---
No | Yes | U.S. EPA/MDEQ | U.S. EPA/MDEQ | September 2013

**OU(s): OU1**  
**Issue Category: Monitoring**
### Issue:
Houghton County Road Commission is currently using tailing material at Point Mills to spread on roads during winter to provide traction for motor vehicles.

### Recommendation:
Work with the Houghton County Road Commission to ensure that road traction tailing excavation practices are consistent with the 1992 ROD.

<table>
<thead>
<tr>
<th>Affect Current Protective</th>
<th>Affect Future Protective</th>
<th>Implementing Party</th>
<th>Oversight Party</th>
<th>Milestone Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>U.S. EPA/MDEQ</td>
<td>U.S. EPA/MDEQ</td>
<td>September 2013</td>
</tr>
</tbody>
</table>
**OU(s):** OU1 and 3  
**Issue Category:** Monitoring

**Issue:** Existing residential wells are screened in the stamp sands. While these wells are not contaminated above drinking water standards, periodical monitoring is necessary to ensure remedy protective ness.

**Recommendation:** Revise the O & M Plan to include periodical residential wells monitoring.

<table>
<thead>
<tr>
<th>Affect Current Protectiveness</th>
<th>Affect Future Protectiveness</th>
<th>Implementing Party</th>
<th>Oversight Party</th>
<th>Milestone Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>U.S. EPA/MDEQ</td>
<td>U.S. EPA/MDEQ</td>
<td>September 2013</td>
</tr>
</tbody>
</table>

**Comment [CS01]:** Delete this issue and. This statement is screened and DEQ recommends that this issue be deleted. The ROD stated that the practice in the region was to drill drinking water wells into the sandstone aquifer which underlies the stamp sands. And that the sandstone aquifer was found to be unaffected by stamp sand contamination, to any future risk by contaminated groundwater was deemed unlikely. The ROD also stated that the Western Upper Peninsula District Health Department and the Michigan Department of Public Health regulated the installation of drinking water wells in the vicinity of the site and that local authorities were alerted to the potential future threat and had permitting programs and development review procedures in place providing further assurances against future public exposure to stamp sand affected groundwater. Thus, the ROD determined that treatment of groundwater to permanently and significantly reduce the toxicity, mobility and volume of contaminants was not found to be necessary to protect human health. In 2009-2010 it was determined that some wells were not screened in the sandstone as previously thought but in the glacial till below the stamp sands. Testing of these wells indicated that the wells contained no contaminants found in the stamp sands or slags and that they were not impacted. This confirmed the findings of the ROD that future risk is unlikely. This issue was raised in the last (2008) 5 year review, was thoroughly investigated by DEQ PM and determined to be a non-issue at the site. The Agencies (EPA, DEQ, MDCH and WUPHD) have been unable to locate any wells used for potable drinking water that are screened in the stamp sands. The local well drillers indicate that the fines in the stamp sands would plug the screen making the wells poor water producers. DEQ has checked with the local stockholders and they are not aware of any wells screened in the stamp sands. These wells screened in stamp sands just do not exist and therefore cannot be an issue identified in this 5 year review. There are certainly wells screened below the stamp sands but again these have not shown any impact from the stamp sands recommendation because there is no problem.
### Protectiveness Statement(s)

<table>
<thead>
<tr>
<th>Operable Unit:</th>
<th>Operable Unit:</th>
<th>Protectiveness Determination:</th>
<th>Protectiveness Determination:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OU1 and OU3</td>
<td>OUI and OU3</td>
<td>Protective</td>
<td>Protective</td>
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<tr>
<td></td>
<td></td>
<td>Addendum Due Date (if applicable):</td>
<td>Addendum Due Date (if applicable):</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

#### Protectiveness Statement:

The remedial actions implemented at OU1 and OU3 are protective in the short term. The vegetative cover has reduced potential risks associated with direct contact or inhalation of contaminants in the tailings. For actions to be protective in the long term, a review of institutional controls must be performed and modified as appropriate. The remedial actions implemented at OU1 and OU3 are protective in the short term. The soil cover has reduced potential ecological risks associated with metal toxicity to macroinvertebrates and aquatic plants caused by the migration of tailings and slag into the water bodies of this site. For actions to be protective in the long-term, a review of institutional controls must be performed and they must be modified as appropriate.

<table>
<thead>
<tr>
<th>Operable Unit:</th>
<th>Operable Unit:</th>
<th>Protectiveness Determination:</th>
<th>Protectiveness Determination:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OU2</td>
<td>OU2</td>
<td>Short-term Protective</td>
<td>Short-term Protective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Addendum Due Date (if applicable):</td>
<td>Addendum Due Date (if applicable):</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

#### Protectiveness Statement:

No Action ROD for OU2 was signed March 1994. The ROD for OU2 relied on the implemented remedy for OU1 and OU3. Natural recovery of the Lake, and the ICs already in place to provide sufficient protective health for exposure to site affected groundwater. OU2 was delisted from the National Priorities List in 2002. The remedy for the groundwater portion of OU2 currently protects human health and the environment in the short term. Existing residential wells screened in the pump sands are not contaminated above drinking water standards. In order for the “No Action” selected remedy to be protective in the long term, U.S. EPA and MDEQ will periodically monitor residential wells; review the need for more robust ICs and clarify or amend the remedy decision document, if required. An IC Plan will be prepared to ensure that effective ICs are implemented, maintained, monitored, and enforced.

#### Sitewide Protectiveness Statement (if applicable)

<table>
<thead>
<tr>
<th>Protectiveness Determination:</th>
<th>Addendum Due Date (if applicable):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term Protective</td>
<td>NA</td>
</tr>
</tbody>
</table>

#### Protectiveness Statement:

Comment [CSD2]: Iu above box (Delete this statement and the ICs already in place to provide sufficient protective health for exposure to site affected groundwater: cannot be made at this time because all of the Restrictive Covenants are not in place yet so this must be deleted)

Comment [CSD3]: In above box (There are no wells identified that are screened in the pump sands so this is not an issue and the sentence should be deleted “Existing residential wells screened in the pump sands are not contaminated above drinking water standards”)
The remedy at the Torch Lake Superfund Site currently protects human health and the environment in the short-term because the vegetative covers prevent erosion of silt and sand to Torch Lake, which prevents the further degradation of the aquatic system at the lake while it recovers over time. In order for the selected remedy to be protective in the long-term, a review of ICs must be performed and modified as appropriate. ICs are required on all of the vegetative covers. The IC plan will discuss how to ensure that the ICs are in place and effective. The remedy at the Torch Lake Superfund Site currently protects human health and improves the environment in the short-term because the soil covers prevent erosion of silt and sand to Torch Lake and other water bodies, which prevents some the further degradation to the aquatic system of the waterbodies while they recover over time. In order for the selected remedy to be protective in the long-term, a review of ICs must be performed and modified as appropriate. ICs are required on all of the soil covers. The IC plan will discuss how to ensure that the ICs are in place and effective.
Five-Year Review Report

I. Introduction

The purpose of a five-year review is to determine whether the remedy implemented at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them. U.S. EPA has conducted this statutory Five-Year Review for the remedy implemented at the Torch Lake Site, Operable Units 1 and 3. The remedy implemented at these two OUs was evaluated during this Five-Year Review. Operable Unit 2 had a No Action ROD (relying on natural recovery for sediments) but it is evaluated in this Review as well because remedial actions taken for OU1 and OU3 affect OU2.

The Agency is preparing this Five-Year Review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than every five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The agency interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

U.S. EPA, Region 5, conducted the Five-Year Review of the remedy implemented at the Torch Lake Superfund Site in Houghton County, Michigan. This review was conducted by the Remedial Project Manager (RPM) for the entire Site from March 2012 through March 2013. This report documents the results of the review.

This is the third Five-Year Review for the Torch Lake Superfund Site. The triggering action for this statutory review was the completion of the second Five-Year Review on March 27, 2008. This Five-Year Review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology
Table 1: Chronology of Site Events

<table>
<thead>
<tr>
<th>EVENT</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Concern Develops Concerning Century-Long Deposition of Tailings</td>
<td>1970s</td>
</tr>
<tr>
<td>International Joint Commission Designates Torch Basin as a Great Lakes Area of Concern (AOC)</td>
<td>1985</td>
</tr>
<tr>
<td>Michigan Department of Public Health (MDPH) Announces Fish Advisory on Sauger and Walleye based on fish tumors</td>
<td>1983</td>
</tr>
<tr>
<td>Proposed on NPL</td>
<td>October 15, 1984</td>
</tr>
<tr>
<td>Listed on NPL</td>
<td>June 10, 1986</td>
</tr>
<tr>
<td>Area of Concern Remedial Action Plan</td>
<td>1987</td>
</tr>
<tr>
<td>Notice Letters Sent to PRPs for RI/FS Work (negotiations fail)</td>
<td>June 13, 1988</td>
</tr>
<tr>
<td>RI/FS (fund lead)</td>
<td>November 1988 - September 1992</td>
</tr>
<tr>
<td>Administrative Order on Consent (AOC) issued to PRPs to remove shoreline and submerged drums</td>
<td>July 30, 1991</td>
</tr>
<tr>
<td>PRP AOC Removal Activities</td>
<td>September 1991</td>
</tr>
<tr>
<td>ROD for OU1 and OU3 Signed by EPA</td>
<td>September 30, 1992</td>
</tr>
<tr>
<td>MDPH Removes Tumor Consumption Advisory on Sauger and walleye in Torch Lake and added Mercury Consumption Advisories for Sauger, walleye, and smallmouth bass</td>
<td>1993</td>
</tr>
<tr>
<td>ROD for OU2 Signed by EPA</td>
<td>March 31, 1994</td>
</tr>
<tr>
<td>Michigan Department of Community Health added PCB Consumption Advisories for walleye and smallmouth bass</td>
<td>1999</td>
</tr>
<tr>
<td>RD (fund lead-USDANRCS) for OU1 &amp; OU3 Start &amp; Complete</td>
<td>September 30, 1994 - September 10, 1998</td>
</tr>
<tr>
<td>EPA Obligates $15.2 million for RA Work</td>
<td>September 23, 1998</td>
</tr>
<tr>
<td>Event</td>
<td>Date</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>On-Site Construction Begins (Lake Linden Parcel)</td>
<td>Summer 1999</td>
</tr>
<tr>
<td>Hubbell/Tamarack Construction</td>
<td>Summer 2000</td>
</tr>
<tr>
<td>EPA Completes Baseline Study Report</td>
<td>August 2001</td>
</tr>
<tr>
<td>Mason Construction</td>
<td>Summer 2001/2002</td>
</tr>
<tr>
<td>Michigan Department of Community Health added northern pike to the mercury and PCB Consumptions Advisories</td>
<td>2002</td>
</tr>
<tr>
<td>Point Mills &amp; Dollar Bay Construction</td>
<td>Summer 2002</td>
</tr>
<tr>
<td>Five-Year Review Site Inspections</td>
<td>October 7 - 9, 2002</td>
</tr>
<tr>
<td>OU2 and Lake Linden parcel NPL delisting</td>
<td>2002</td>
</tr>
<tr>
<td>EPA Completes Terrestrial Ecology Study of Site</td>
<td>March 2003</td>
</tr>
<tr>
<td>First Five Year Review Completed</td>
<td>March 4, 2003</td>
</tr>
<tr>
<td>MDEQ Monitoring Data Collected-Draft Report includes several studies related to sedimentation rates, metal contaminants in sediments, mercury fate, and sediment toxicity</td>
<td>Summer 2004</td>
</tr>
<tr>
<td>Hubbell/Tamarack City parcel was delisted from the NPL</td>
<td>2004</td>
</tr>
<tr>
<td>Construction activities at additional areas in OU3</td>
<td>Summer 2004</td>
</tr>
<tr>
<td>Construction Activities at North Entry and Scales Creek</td>
<td>Spring/Summer 2005</td>
</tr>
<tr>
<td>Removal Action at Quincy Smelter</td>
<td>Summer 2005</td>
</tr>
<tr>
<td>Complete all On-Site Construction Activities</td>
<td>September 13, 2005</td>
</tr>
<tr>
<td>Preliminary Close Out Report (PCOR)</td>
<td>September 23, 2005</td>
</tr>
<tr>
<td>ATSDR Health Consultation-Quincy Smelter</td>
<td>November 2006</td>
</tr>
<tr>
<td>MDEQ Semi Permeable Membrane Device(SPMD) Study to determine PCB distribution in Lake</td>
<td>November 2006</td>
</tr>
<tr>
<td>EPA data related to sediment samples collected in association with SPMD study</td>
<td>November 2006</td>
</tr>
<tr>
<td>Repair Work at North Entry</td>
<td>Summer 2007</td>
</tr>
<tr>
<td>Event Description</td>
<td>Dates</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
</tr>
<tr>
<td>MDEQ-3 Sampling Events in Lake Linden Public Beach area which indicated high levels of lead, PCBs, and other heavy metals</td>
<td>June - July 2007</td>
</tr>
</tbody>
</table>
| EPA-MDEQ Annual and FYR Site Inspections | June 18-21, 2007  
  August 6-8, 2007 |
| Emergency Removal Action – Lake Linden Beach Area | August-September 2007 |
| Torch Lake Area of Concern Remedial Action Plan Update | August 2007 |
| Torch Lake Area Assessment | Fall 2007 |
| Completion of Torch Lake Area Assessment (TLAA) Report | December 13, 2007 |
| Second Five-Year Review Report | March 2008 |
| ROD Amendment (Quincy Smelter) | July 2009 |
| Quincy Smelter Design Completion | September 2010 |
| Quincy Cover Construction | August - September 2011 |
| Interim Remedial Action Completion Report | September 2011 |
| Final Remedial Action Completion Report | September 2012 |
| Michigan Smelter, Isle Royale, and Mason Sands delisted from the NPL | December 23, 2012 |
| Third Five-Year Review Report | March 2013 |
III. Background

Physical Characteristics

The Torch Lake Superfund site (the Site) is located on the Keweenaw Peninsula in Houghton County, Michigan (Figure 1). The Site includes Torch Lake, the western shore of Torch Lake, the northern portion of Portage Lake, the Portage Lake Canal, Keweenaw Waterway, North Entry to Lake Superior, Boston Pond, and Calumet Lake. Select tailing and slag pile deposits located along the western shore of Torch Lake, Northern Portage Lake, Keweenaw Waterway, Lake Superior, Boston Pond, and Calumet Lake are included as part of the Site. In addition to several tailing piles located throughout these areas, slag piles are located at Quincy Smelter, Michigan Smelter and Hubbell.

The northeast/southwest trending Keweenaw Peninsula lies within the Superior bedrock controlled uplands province of the Lake Superior basin. Drainage patterns in the peninsula are controlled largely by bedrock type, and follow faults and fractures in the Precambrian bedrock. Soils in the area primarily consist of sandy loams, and silty loams. They are developed in till, outwash, Holocene alluvium, and red clay. The major surface water bodies in the region comprise the Keweenaw Waterway including Torch Lake, Portage Lake, and Lake Superior. Torch Lake is a tributary to the larger Portage Lake which in turn has outlets to Lake Superior via the Portage Canal (Keweenaw Waterway) and to Keweenaw Bay via the Portage Canal (Keweenaw Waterway). Streams in the region drain to the Keweenaw Waterway and Lake Superior. The Torch Lake watershed comprises about 12 percent of the larger Portage Lake basin.

Forest vegetation in the area is primarily mixed deciduous/coniferous. Spruce, larch, fir, and pine are the common species. Important species include sugar maple, birch, and aspen. In addition, several species of trees and shrubs are prominent on some relatively small areas of tailing piles, including balsam poplar, fir, willow, red osier-dogwood, spruce, alder, tamarack, white birch, aspen, and northern white cedar.

Several small communities are located on the western shore of Torch Lake, the largest of which are Lake Linden, Hubbell/Tamarack City, and Mason. Two large cities, Houghton and Hancock, are located on the south and north side of the Keweenaw Waterway. The Village of Calumet is located 5 miles north of Torch Lake.

Torch Lake has a surface area of approximately 2,700 acres, a mean depth of 56 feet, a maximum depth of 115 feet, and a volume of 5.2 X 10^9 cubic feet. Torch Lake is chemically stratified based on information contained in the 2001 Baseline Report. The Trap Rock River and several small creeks discharge into Torch Lake.

Wetlands are located on the east portion of the Lake Linden tailing pile, on the lakeside edge of the Hubbell tailing pile, around Boston Pond, and the eastern shore of Torch Lake. The Site does not lie within the 100 year flood-plain.

This Site is directly connected to Lake Superior and experiences hydrologic fluctuations and seiche events. This accounts for the historically low water levels in Torch Lake and exposure of previously submerged stamp sand areas.

Land and Resource Use
Torch Lake is used for fishing, boating, contact recreation (swimming), non-contact cooling water, treated municipal waste assimilation, and fish and wildlife habitat.

The municipal well for Lake Linden is located upstream of the Trap Rock River, 0.7 miles north of Lake Linden. The supply of drinking water for Hubbell/Tamarack City is piped from wells located on the shore of Lake Superior, 9 miles west of Torch Lake. The municipal well for Mason is located on the tailing pile in Mason, and the municipal wells for the Houghton area are located on the Isle-Royale tailing pile. The municipal well for Hancock is located in Adams Township, 5 miles southeast of Hancock. Several homes are located in the Isle-Royale tailing pile with their own private wells. These wells were installed more than 20 years ago and, based on U.S. EPA's historical understanding, these wells were thought to be cased to bedrock and draw their water from the bedrock aquifer and not from the tailings. In addition, all other homes at Isle-Royale are on municipal water. However, recent review of this information revealed 3 municipal wells located and screened in the unconsolidated materials on top of the bedrock aquifer. The wells are capable of pulling water through the stamp sand deposits. The wells are not screened in the bedrock as previously believed. Groundwater sampling shows that existing residential wells screened beneath in the stamp sands (there have been no wells identified that are screened in the stamp sands) are not contaminated above drinking water standards.

While most tailing pile areas were barren and unused before 1999 (the start of on-site Superfund remediation work), development is beginning to take place. Two sewage lagoons are located on the Lake Linden tailing pile. Two sewage lagoons are also located on the Hubbell/Tamarack City tailing pile. Portage Lake Water and Sewage Authority has constructed a sewage treatment plant on 12 acres of the Isle-Royale tailings. Superior Block Co., located on the Isle-Royale tailing pile, is currently utilizing 60 acres of the Isle-Royale tailings for the production and storage of cement blocks. The residential development located on the Isle-Royale tailings is estimated to cover 80 acres. The Houghton County Road Commission is currently using tailing materials, approximately 20 acres at Point Mills, to spread on the roads during winter to provide traction for motor vehicles. Tailings have also been used in the past as a base for road construction because of good drainage characteristics. The Village of Lake Linden has developed a facility with a bathing beach, camping, park, and boat ramps at the northeast end of Torch Lake. In general, the Lake Linden portion of the Site (remedy implemented in 1999) has been put to use as a recreation area, including the completion of a perimeter road, stamp sand campground access road and hiking trails and a campground. In addition, a State grant sponsored planting of new trees was recently completed.

The Quincy Mining Company Historic District and Calumet Historic District, which were proposed as a National Historical Park in September 1987, are located near and within the Site. Public Law 102-543 was enacted on October 27, 1992. The law established the Keweenaw National Historic Park, of which Quincy Smelter is a part. Franklin Township and the National Park Service are looking to develop the Quincy Smelter Complex as part of the National Historic Park. The buildings are currently being stabilized by the National Park Service (NPS) and Franklin Township. NPS plans to rebuild their Headquarters on the property in the next few years.

As a result of Superfund remedial action work beginning in 1999, approximately 800 acres along the western shore of Torch Lake, Point Mills/Dollar Bay, Calumet Lake, Boston Pond, North Entry, Scales Creek, Michigan Smelter and Isle Royale Sands, have been covered with 6 to 10 inches of soil and vegetation. An abundance of wildlife, including several species of bird and mammals, now are present in these areas. Two nests of bald eagles, which are designated as
Threatened or Recovered Species, are also located on the northern side of Portage Lake.

History of Contamination

Torch Lake was the site of copper milling and smelting facilities and operations for over 100 years. The lake was a repository for all the mining industry-related waste and served as the waterway for transportation to support the area. The first mill opened on Torch Lake in 1868. At the mills, copper was extracted through a series of technologies over the years. First by crushing or “stamping” the rock into smaller pieces, then by grinding the pieces and, driving them through successively smaller meshes. The copper and crushed rocks were separated by gravimetric sorting in a liquid medium. The copper was then sent to a smelter. The crushed rock particles, called “tailings” or “stamp sands,” were discarded along with mill processing water, typically by pumping it into the lakes and streams. Eventually, chemical leach technologies were included as well.

Mining output, milling activity, and tailing production peaked in the Keweenaw Peninsula in the early 1900s to 1920. All of the mills at Torch Lake were located on the western shore of the lake and many other mining mills and smelters were located throughout the peninsula. In about 1916, advances in technology allowed recovery of copper from tailings previously deposited in Torch Lake. Dredges were used to collect submerged tailings, which were then screened, re-crushed, and gravity separated. An ammonium leaching process involving cupric ammonium carbonate was used to recover copper and other metals from conglomerate tailings. During the 1920s, chemical reagents were used to further increase the efficiency of reclamation. The chemical reagents included lime, pyridine oil, coal tar creosotes, wood creosote, pine oil, and xanthates. After reclamation activities were complete, chemically treated tailings were returned to the lakes. In the 1930s and 1940s, the Torch Lake mills operated mainly to recover tailings in Torch Lake and to reclaim copper from sources nationwide for the war effort. Mining continued until 1968 when all mining and related activities ceased. Copper reclamation activities continue to date, at Peninsula Copper Industries (PCI).

Over 5 million tons of native copper was produced from the Keweenaw Peninsula and more than half of this was processed along the shores of Torch Lake. Between 1868 and 1968, approximately 200 million tons of milling, tailing, and reclamation wastes were dumped into Torch Lake filling at least 20 percent of the lake's original volume. While the Rivers and Harbors Act of 1890 did prohibit the filling or obstruction of any navigable waterway in the United States without prior consent of the Secretary of War, one locality in the country, Torch Lake, was specifically exempted from this prohibition. In addition, dumping in Torch Lake was further permitted during World War II when copper mining, milling, reclamation, and smelting operations were operated for the war effort, by the War Production Board.

Between 1971 and 1972, a discharge of 27,000 gallons of cupric ammonium carbonate leaching liquor occurred into the north end of Torch Lake from the storage vats at the Lake Linden Leaching Plant. The Michigan Water Resources Commission (MWRC) investigated the spill. The 1973 MWRC report discussed no deleterious effects associated with the spill, but did observe varied discoloration of several acres of lake bottom which indicated previous discharges over time.

Initial Response

In the 1970s, environmental concern developed regarding the century-long deposition of tailings into Torch Lake. High concentrations of copper and other heavy metals in Torch Lake Five-Year Review Report - 18
sediments, toxic discharges into the lakes, and fish abnormalities prompted many investigations into long and short-term impacts attributed to mine waste disposal. In 1983, the Michigan Department of Public Health (MDPH) announced an advisory against the consumption of Torch Lake sauger and walleye. The Site was proposed for inclusion on the National Priorities List (NPL) in October of 1984. The International Joint Commission Water Quality Board designated Torch Lake as a Great Lakes Area of Concern (AOC) in 1985. The Site was placed on the NPL in June 1986. The Site is also on the Act 307 Michigan Sites of Environmental Contamination Priority List (as amended and updated) now known as the Part 201 Natural Resource and Environmental Protection Act.

In 1983, Michigan Technological University in Houghton, published a report which included various papers on Torch Lake. This report included: a Tumor Induction Study; Environmental Fate of Xanthates and Creosote; Tumor Incidence and parasite survey of Perch from Torch Lake; Heavy Metals in Sediments and Mining Wastes of Torch Lake; and a Copper Budget study of Torch Lake. No reasons for the tumors in sauger and walleye were identified and by 1988 the tumors on the fish had disappeared prior to the Superfund remediation.

A Remedial Action Plan (RAP) for Torch Lake was completed by the Michigan Department of Natural Resources (MDNR) in October, 1987 to address the contamination problems and to recommend a remedial action for the lake. The recommended remedial actions in the RAP were vegetation of lakeshore tailings to minimize air-borne and water-borne particulate matter, prevent erosion into Torch Lake, upgrade wastewater treatment plants, and monitor natural attenuation for Torch Lake due to the wide distribution and large volumes of contaminated sediments.

In 1988, in response to the RAP, the MDNR conducted a water quality and fish tissue study. Tissue from 458 fish was collected from both Torch and Portage Lakes. Only 4 of the 56 fish analyzed for mercury had concentrations that exceeded the 0.5mg/kg consumption advisory action limit and none exceeded the 1.0mg/kg limit. No internal or external growth anomalies were discovered and no liver neoplasms (i.e., cancerous growths) were found among the 47 walleye examined. Saugers were not collected during this survey because of an extended population decline, which began in the 1960s. In 1993, the fish consumption advisory for tumors was lifted by MDPH but a mercury advisory was added for walleye, sauger, and smallmouth bass. Based on routine fish monitoring activities conducted by the Michigan Department of Environmental Quality (MDEQ) Surface Water Quality Division for the Michigan Department of Community Health (MDCH), in 1999, the MDCH issued fish consumption advisories for PCBS on walleye and smallmouth bass for Portage Lake and Torch Lake. In 2002, the MDCH added northern pike to the mercury and PCB consumption advisories. The 2002 fish advisories are currently in effect and are listed in the Michigan Fish Advisories Website www.michigan.gov/phalfishadvis.htm.

Attempts to establish vegetation on the tailing piles in Hubbell/Tamarack City have been conducted since the 1960s to stabilize the shoreline and to reduce erosion of particulate matter by wind or water flow to surface water from tailings. The Portage Lake Water and Sewage Authority had been spray irrigating sewage sludge on tailings in Mason to promote natural vegetation prior to implementation of the Superfund remedy.

None of the original mining companies directly responsible for the Site are in existence. U. S. EPA instead located companies linked to the original mining companies. On May 9, 1988, Remedial Investigation/Feasibility Study (RI/FS) Special Notice Letters were issued to Universal Oil Products (UOP) and Quincy Mining Co. Universal Oil Products (UOP)...
is the successor of Calumet Hecla Mining Company which operated its milling and smelting on
the shore of Lake Linden and disposed of the generated tailings in the area. Quincy Mining Co.,
conducted smelting operations in the Hubbell area and disposed of tailings. On June 13, 1988, a
Notice Letter was issued to Quincy Development Company, which was the current owner of a
tailing pile located on the lake shore in Mason. Negotiations for the RIfFS Consent Order with
these Potentially Responsible Parties (PRPs) were not successful due to issues such as the extent
of the Site and the number of PRPs. Subsequently, U.S. EPA contracted with Donohue &
Associates in November 1988 to perform the RIfFS at the Site.

Due to its size and complex nature, three Operable Units (OUs) were defined for the Site. Figure
1 shows the locations of OU1, OU2 and OU3.

Operable Unit 1 includes select surface tailings, drums, and slag piles on the western shore of
Torch Lake. These areas include Lake Linden, Hubbell/Tamarack and Mason Sands.

Operable Unit 2 includes groundwater, surface water, submerged tailings and sediments in Torch
Lake, Portage Lake, the Portage Channel, Keweenaw Waterway, North Entry to Lake Superior,
Boston Pond, and Calumet Lake.

Operable Unit 3 includes select tailing and slag deposits located at North Entry, Michigan
Smelter, Quincy Smelter, Calumet Lake, Isle-Royale, Boston Pond, and Grosse-Point (Point
Mills/Dollar Bay).

On June 21, 1989, U.S. EPA collected a total of eight samples from drums located in the old
Calumet and Hecla smelting mill site near Lake Linden, Ahmeek Mill site near Hubbell, and
Quincy site near Mason. On August 1, 1990, nine more samples were collected from drums
located above the Tamarack site near Tamarack city. Based on the results of these samples, U.S.
EPA determined that some of these drums may have contained hazardous substances. During
the week of May 8, 1989, the U.S. EPA also conducted ground penetrating radar and a sub­
bottom profile (seismic) survey of the lake bottom. The area in which this survey was conducted
is immediately off-shore of the former Calumet and Hecla smelting mill site. The survey located
several point targets (possibly drums) on the bottom of Torch Lake. Based on the drum
sampling results and seismic survey, U.S. EPA executed an Administrative Order by Consent,
dated July 30, 1991, which required six companies and individuals to sample and remove drums
located on the shore and lake bottom. Pursuant to the Administrative Order, these entities
removed 20 drums with unknown contents from off-shore of Peninsula Copper Inc., and the old
Calumet and Hecla smelting mill site in September 1991. Eight-hundred-eight (808) drums were
found in the lake bottom, some of which are believed to have contained slag, recycled circuit
boards, and the remainder were deteriorated drums carcasses. These empty drums were not
removed from the lake bottom. A total of 82 drums and minor quantities of underlying soils
were removed from the upland areas of Torch Lake. The removed drums and soils were
sampled, over-packed, and disposed off-site at a hazardous waste landfill. During 2007, MDEQ
conducted a survey of the western part of Torch Lake in search of a possible source of PCBs. A
total of 71 discrete sediment samples were collected from 36 locations in Torch Lake. A Report
"A Sediment Chemistry Survey of Torch Lake" was provided by MDEQ.

Remedial Investigations were completed for all three operable units. The RI and Baseline Risk
Assessment (BRA) reports for OU1 were finalized in July 1991. The RI and BRA reports for
OU3 were finalized on February 7, 1992. The RI and BRA reports for OU2 were finalized in April 1992. The Ecological Assessment for the Site was finalized in May 1992. A Proposed Plan identifying U.S. EPA’s recommended remedy for OU1 and OU3 was presented to the public on May 5, 1992, starting the period for public comment. A Proposed Plan identifying U.S. EPA’s recommended remedy for OU2 was presented to the public on February 17, 1994, starting the period for public comment.

During the public comment period for OU1 and OU3, UOP, through their attorneys, made it clear to the community that, under Superfund, any current owner of a Superfund site can be held jointly and severally liable, and that they, if pursued for cost recovery by U.S. EPA, would in turn potentially pursue others associated with the Site. Since the ownership of property containing tailings is very dispersed (much of the area is owned by private citizens, small businesses, or municipalities), this statement created considerable concern throughout the community. U.S. EPA responded at the time by promising that no one would be pursued for costs if their sole connection to the Site was ownership of property containing tailings. U.S. EPA subsequently entered into administrative agreements (Administrative Order on Consent) with several landowners in 1994, giving the landowners covenants not to sue and contribution protection in exchange for actions such as access and deed restrictions. The deed restrictions required the owner of the property to ensure cover material remain in place over tailings. In addition, the deed restrictions were to be placed on the property within six months of the effective date of the Order. Because of a combination of circumstances, including the historical distance, and the indirect connection between successors and the original mining companies, U.S. EPA closed out cost recovery actions for the Site in 1997.

In addition, on January 10, 1997, the U.S. EPA entered into a prospective purchaser agreement (PPA) with the Mason tailing pile landowners (Quincy Development Landowners and Lakeshore Estates Associates). This action was done in the spirit of redevelopment. Listing on the Superfund NPL makes owners of on-site property potentially liable for cleanup, creating a significant disincentive for prospective purchasers and redevelopers. The 1997 PPA was intended to be a catalyst for redevelopment by relieving the Mason tailing pile landowners of potential Superfund liability. In return, specific benefits were provided to EPA, including access and borrow soil located on land owned by Lakeshore Estates Associates at no cost.

**Basis for Taking Action**

The baseline risk assessments for OU1 and OU3 were conducted to characterize the current or potential future threat to public health that may be posed by contaminants in the tailings and slag piles/beach. The ecological assessment for the entire site was also conducted to determine the current and potential future effects of contaminants to the environment. Several human health risk assessment exposure scenarios were evaluated including current and future off-site residents as well as future on-site residents, construction workers, campers (adults and children) and specific to the Quincy Smelter area; scenarios for park workers and for park visitors. Except for residents at Hubbell whose backyards were in the vicinity of the slag pile and slag beach, carcinogenic risks were equal to or below 1.0E-06. Workers were within acceptable risk range. However, non-carcinogenic health hazards for all exposure routes for all populations evaluated were greater than the acceptable risk range.

Significant ecological risks were determined to exist as the result of exposure of aquatic, terrestrial and wetland species to tailings, slag and sediment. The continuous release of tailing- and slag-borne contaminants via wind, surface water runoff, and wave erosion were deemed to represent an unacceptable and actionable source of ecological risk. The most severe ecological
impact is the degradation of benthic communities (bottom dwelling organisms) associated with contaminated sediments in Torch Lake and other water bodies at the Site. The benthic community is an integral part of the base of a complex food web in lakes. A severely impacted benthic community impacts the entire food web. Toxic effects due to metals (especially copper and lead) appear to be related to sediment pore space dynamics and also impact the water column and pelagic organisms.

Prior to implementation of the remedy beginning in 1999, most of the tailing and slag piles were barren. Plant survival and growth on tailing and slag piles were impaired by a combination of chemical and non-chemical stresses, including poor water retention, extreme temperature fluctuation (i.e., tailing and slag piles heat up in sunlight), low organic content, and presence of toxic substances. Studies have shown that high levels of copper inhibit vascular development in some plants.

Animal populations are likely to avoid tailing deposits for many of the same reasons that the tailings have not been colonized by plants. In addition, tailings lack food and cover required for establishment of ecologically or recreationally important wildlife populations.

Deposition of tailings in surface waters is likely to have destroyed existing wetlands in a number of areas, including Boston Pond and along the western shore of Torch Lake. Wetlands are generally absent along Torch Lake shores where the most significant deposition of tailings took place, except where streams flow into the lake.

IV. Remedial Actions

Remedy Selection

The ROD for OUI and OU3 was signed on September 30, 1992; and the ROD for OU2 was signed on March 31, 1994.

OUI and OU3 ROD (September 30, 1992)

The Remedial Action Objectives (RAOs) for OUI and OU3 were developed as a result of data collected during the RI and included activities to reduce or minimize the exposure to and release of contaminants in tailings and/or slag located at the Site. These include:

1. Reduce or minimize potential risks to human health associated with the inhalation of airborne contaminants from the tailings and/or slag located at the Site;

2. Reduce or minimize potential risks to human health associated with direct contact with and/or the ingestion of the tailings and/or the slag located at the Site;

3. Reduce or minimize the release of contaminants in tailings to the groundwater through leaching; and

4. Reduce or minimize the release of contaminants in tailings to the surface water and sediment by soil erosion and/or air deposition.

The selected remedy for OUI and OU3 has the following specific components:
1. Deed restrictions to control the use of tailing piles so that tailings will not be left in a condition which is contrary to the intent of the remedy;

2. Removal of debris such as wood, empty drums, and other garbage in the tailing piles for off-site disposal in order to effectively implement the soil cover with vegetation;

3. Soil cover with vegetation in the following areas:
   - Operable Unit I tailings in Lake Linden, Hubbell/Tamarack City, and Mason (approximately 442 acres),
   - Operable Unit III tailings in Calumet Lake, Boston Pond, Michigan Smelter, Dollar Bay, and Grosse-Point (approximately 229 acres), and
   - Operable Unit I slag pile in Hubbell (approximately 9 acres);

4. The Isle-Royale tailings in OU3 were excluded from the area to be covered with soil and vegetation under the ROD as follows:
   - The portion of Isle-Royale tailings in OU3 which is being developed as a sewage treatment plant is excluded from the area to be covered with soil and vegetation. The part of this area to be covered by conventional sewage treatment tanks is approximately 12 acres. The remaining part, approximately 48 acres, will be covered with soil and vegetation by the Portage Lake Water and Sewage Authority as part of the sewage treatment facility development plan. However, if this area is not covered and vegetated within 5 years after the date that the final Remedial Design is submitted, then this area shall be subject to the requirements of the ROD;
   - The portion of the Isle-Royale tailings which is designated to be developed as a residential area is excluded from the area to be covered with soil and vegetation. This area covers approximately 90 acres. However, if this area is not developed as a residential area within 5 years after the date that the final Remedial Design is submitted, then this area shall be subject to the requirements of the ROD;
   - The portion of the Isle-Royale tailings which is currently being used as source material to make cement blocks and as a finished block storage area for the Superior Block Company is excluded from the area to be covered with soil and vegetation. This area covers approximately 60 acres. However, if any portion of the area is no longer to be used as a storage and source area, soil cover with vegetation must be implemented pursuant to the ROD. The owner and/or operator of Superior Block Co. must use dust control measures such as water spray during the operation of mining and other activities in order to reduce the release of dust into the air;

5. The area designated by the Houghton County Road Commission as source material to spread on the road during winter to provide traction for motor vehicles is excluded from the area to be covered with soil and vegetation. This area is located at Point Mills in OU3 and is estimated to be 46 acres. While this area is
being utilized, the following procedures must be observed:

- The area should be covered with enough soil to prevent the release of tailings to the air and lake;
- Excavation should stop at seven (7) feet above the water table (defined as the average of seasonal highs and lows over a two year period). This portion must subsequently be covered with soil or soil and vegetation;
- Once the entire area is excavated to seven (7) feet above the water table, it must be covered with soil and vegetation;

6. Assuming that the slag pile located in the Quincy Smelter area (approximately 25 acres) will be developed as part of a National Park, no action will be taken. If this area is not developed as a National Park in the future, deed restrictions will be sought to prevent the development of residences in the slag pile area;

7. The North Entry (location 4 on Figure 1), Redridge (location 11 on Figure 1) and Freda (location 12), tailings are excluded from the area to be covered with soil and vegetation. Locations 4, 11, and 12 are along the Lake Superior shore where pounding waves and water currents will likely retard or destroy any remedial actions. As a result, EPA currently believes it to be technically impracticable to implement the chosen remedy at these locations. However, the North Entry (location 4) and Freda (location 12) tailings, approximately 46 acres, shall be studied during Remedial Design. If EPA determines that any portion of these areas is sufficiently unaffected by Lake Superior wave activity such that it can be effectively covered with soil and vegetated, then the unaffected area or areas shall be subject to the requirements of the ROD; and

Four memoranda to the Site file were prepared in 2002 to document non-significant changes that arose during design and construction. These changes were necessary to ensure effective implementation of the remedy. The changes included:

1. 03-18-2002. The installation of shoreline protection in the form of rip-rap and lake access ramps (Point Mills);
2. 11-07-2002. Installation of compacted gravel as a cover material on a small portion of the Site (Dollar Bay);
3. 11-22-2002. Taking no action at the Hubbell/Tamarack coal dock;
4. 12-31-2002. Application of vegetation at Gull Island (location presented in Figure 1) located in Torch Lake.

In addition, two design reports were finalized in September 1998 to support remedy implementation at North Entry and Scales Creek (Figure 1), and a fifth Memo to the File documenting changes to remedial action on Isle Royale Sands, was completed on July 7, 2004.

Operable Unit 2 ROD (March 31, 1994)

The selected remedy for OU2 (groundwater, surface water and sediments associated with the
Site) selected a “No Action” remedy with long-term monitoring and Institutional Controls with respect to groundwater use. Operable Unit 2 is related to OU1 and OU3 primarily in that wind-blown and eroded tailings from OU1 and OU3 end up in OU2. These conditions serve as a continuing source of environmentally harmful contamination to the lake and diminish the effectiveness of the lake’s natural sedimentation process. The remedy chosen for OU1 and OU3, stabilization and vegetation of the tailing piles near the lake, was in part selected because it will address the erosion problem.

The remedy selected for OU2 takes into consideration and relies upon:

- The reduction of tailing loading to surface water bodies expected as a result of the remedial action taken at OU1 and OU3.
- Ongoing natural sedimentation and detoxification such as that which is occurring in other surface water bodies in the area.
- Institutional programs and practices controlling potential future exposure to site-affected groundwater which are administered at the county and state level.
- The long-term monitoring and the Five Year Review process monitoring requirements of the remedy selected for OU1 and OU3 under the 1992 ROD for this Site
- Groundwater, surface water, sediment, and general ecological monitoring including an evaluation of the rate and effectiveness of organic sediment build-up and the recovery of the benthic community as included as part of the O & M Plan for OU1 and OU3. This monitoring will provide information on the effectiveness of the remedy and on the extent of environmental impacts, if any. Since the effectiveness of the remedy chosen for OU1 and OU3 will in part be measured by assessing effects on Torch Lake, the monitoring program for OU1 and OU3 would be incomplete if it did not encompass the OU2 study area. In addition, the Five-Year Review process will include an evaluation of the status of Torch Lake sediments and ecology, and will reassess the necessity for remedial action should the extent of the lake's recovery fall short of expectations.

As detailed in the ROD for OU2, U.S. EPA determined that the sediment and surface water contamination associated with OU2 posed no unacceptable threat to human health based on the limited sample data available at that time. The shallow groundwater associated with OU2 which comes into contact with stamp sands exhibits inorganic contamination and results in unacceptable potential future risks; however these risks are only applicable if, in the future, the stamp sands are developed for residential use or drinking water is taken from the shallow groundwater. The ROD stated that the practice in the region was to drill drinking water wells into the sandstone aquifer which underlies the stamp sands. And that the sandstone aquifer was found to be unaffected by stamp sand contamination, so any future risk by contaminated groundwater was deemed unlikely. The ROD also stated that the Western Upper Peninsula District Health Department and the Michigan Department of Public Health regulated the installation of drinking water wells in the vicinity of the site and that local authorities were alerted to the potential future threat and had permitting programs and development review procedures in place providing further assurances against future public exposure to stamp sand affected groundwater. Thus, the ROD determined that treatment of groundwater to permanently and significantly reduce the toxicity, mobility and volume of contaminants was not found to be
necessary to protect human health.

Contamination associated with Torch Lake sediments, however, was determined to pose an ecological threat and was documented in the 1994 ROD for OU2 and later, in the 2001 Baseline Study. The lake bottom sediment consists of stamp sands along the western shoreline which were deposited in the lake over many years of active disposal of copper ore milling and associated mining wastes into the lake. This activity effectively chemically stratified the lake. Levels of contamination (primarily copper) in the stamp sand and associated sediments are sufficient to create an inhospitable lake bottom habitat and thus suppress the organisms which are normally expected to inhabit it. However, given the wide distribution (2,700 acres) and large volumes (approximately 200,000,000 tons) of stamp sands deposited in Torch Lake, remediation of the lake bottom was not practical, feasible, nor potentially, in the long run, necessary.

Remedy Implementation

Remedial Design

In August 1994, an Interagency Agreement (lAG) was signed with the United States Department of Agriculture (USDA)-Natural Resources Conservation Service (NRCS) to perform remedial design (RD) work. The remedial design was conducted in conformance with the 1992 ROD and was completed for the entire Site in September 1998. At that time the IAG with USDA-NRCS was amended to perform remedial action (RA) management and oversight.

The IAG construction schedule was set at six years (1999 - 2004). It was estimated in the 1992 ROD (Description of Remedial Alternatives section) that remedy implementation time would be 5 years. Other factors that influenced the construction schedule include restricted availability of USDA-NRCS engineers, relatively short construction season due to the northerly location of the Site, and possible public health and safety issues related to the relatively vast distance between Site parcels targeted for remediation. Because of the distance between Site parcels, EPA anticipated large volumes of heavy equipment operating simultaneously on multiple local roads located in populated areas, and USDA-NRCS was expected to maintain strict control of heavy equipment traffic during construction. To accomplish this goal, USDA-NRCS needed to implement the remedy in phases.

Construction Activities

Actual on-site construction began in June 1999 and was completed in September 2005. A Preliminary Close-Out Report (PCOR) documenting construction completion was signed on September 23, 2005.

Operable Unit 1

Lake Linden (114 acres covered) was completed by October 1999. A copy of the required deed restrictions for the Lake Linden parcel was obtained by EPA in 2001 to verify the completion of this component of the remedy and filed in the EPA's Torch Lake Site Administrative Record.

Hubbell/Tamarack (145 acres covered) was completed by October 2000. However, a washout occurred near the lake outlet of a surface water diversion path in 2001 and a very minor washout occurred in the same area in 2002. Both washouts were promptly repaired and have remained.
Mason (225 acres covered) was completed in October 2002. Just prior to on-site construction activities at Mason Sands, the USDA-NRCS commissioned Michigan Technological University to conduct an archaeological survey to evaluate and document the cultural remains at the Mason Sands portion of the Site. This was done because of the numerous historical mining and milling related relics located around the Mason area and the concern over losing important cultural remains as a result of remedy implementation. The results of the survey were presented in a report dated May 2001, "Archaeological Survey Report of the Quincy Mining Company Torch Lake Smelter & Reclamation Plant at Mason Sands Torch Lake U.S. EPA Superfund Site", which was filed in the EPA's Torch Lake Site Administrative Record. The May 2001 report concluded that implementation of the remedy at the Mason portion of the Site would have only a minor negative impact on cultural and historical values, and therefore, U.S. EPA proceeded with remedy implementation.

The remedial design specifications related to soil type were modified during the implementation phase from topsoil, as specified in prior research work and pilot project at the Scales Creek "Moonescape", to sandy loam as a result of local concerns over stripping area farmland. The areas remediated included cover material consisting of six to ten inches of sandy-loam soil and a vegetative mat. The vegetative mat was achieved through a seed mix applied directly on top of the sandy-loam soil. The seed mix was typically applied at approximately 90 pounds per acre. The typical seed mix contained six species of plants, including perennial ryegrass (Lolium perene), tall fescue (Festuca arundinacea), creeping red fescue (Festica rubra), red clover (Trifolium pratense), alfalfa (vernal Medicago falcata), and birdsfoot trefoil (Lotus comicolatus). This mix of plant species was selected because of their rapid growth rate and relative resilience with minimal maintenance. Rapid stabilization of the soil cover material with vegetation was important at the Site in order to avoid soil washouts and to accommodate the short growing season. Variations of this seed mix were applied to a small number of areas to accommodate landowner preference. Other plantings investigated for the Site included shrubs and trees but their use was not implemented. Overall, the vegetative growth is well established and is stabilizing the soil portion of the cover material.

The sandy-loam borrow soil was located and obtained by the construction firms under contract with the USDA-NRCS to implement the remedy and met modified USDA-NRCS soil specifications. Borrow soils for Lake Linden were obtained approximately 1.5 miles south of Lake Linden near the eastern shore of Torch Lake. Borrow soils for Hubbell/Tamarack were obtained directly west of Highway M-26 at the southern end of Hubbell/Tamarack. Borrow soils for Mason were obtained directly across the narrow Torch Lake channel located on the southeast shore of the Mason tailings.

As-built construction drawings were completed for the Lake Linden (dated November 2, 1999) and Hubbell/Tamarack (dated May 8, 2001) portions of the Site and filed in the U.S. EPA's Torch Lake Site Administrative Record. U.S. EPA completed the construction drawings for the Mason portion of the Site in Spring 2003. As explained and justified in a memorandum to the Site file dated November 22, 2002, no action was taken at the coal dock property (see attachment 2) located at Hubbell/Tamarack.

Remedial Action construction activities were performed according to approved design and specifications at Lake Linden, Hubbell/Tamarack City and Mason Sands, and it is anticipated that cover material and shoreline protection will continue to meet remedial action objectives established for the Site. For Lake Linden, U.S. EPA and MDEQ determined that the remedy was...
functioning as intended and in April 2002, a partial NPL delisting of Lake Linden and all of OU2 was finalized. Hubbell/Tamarack City was delisted from the NPL via a partial delisting in 2004.

Operable Unit 2

No physical work was required as part of the OU2 - No Action ROD, thus no construction activities for this OU2. Because no physical work was required to complete the No Action remedy for OU2, U.S. EPA included OU2 in the April 2002 partial NPL delisting.

Operable Unit 3

Dollar Bay (15 acres covered) was completed by October 2002. As explained and justified in a memorandum to the Site file dated November 7, 2002, 6.4 acres at Dollar Bay were covered with compacted gravel instead of soil and vegetation like the remainder of that parcel. Borrow soils for Point Mills and Dollar Bay were obtained from a combination of two sources. One source was located near the Mason borrow soil source and one was located on a property directly adjacent to the Point Mills tailings.

Construction activities at Point Mills (46 acres covered), Calumet Lake, Boston Pond, and Michigan Smelter were completed in late October of 2003.

Shoreline protection was also installed along much of the shoreline where the remedy was implemented. Shoreline protection includes rip-rap rock (rock boulders averaging about one-foot in diameter in the shape midway between a sphere and a cube with a specified density and integrity) which protects the remedy from wave erosion. As explained and justified in a memorandum to the Site file dated March 18, 2002, extensive shoreline protection was installed at Point Mills and included lake access ramps consisting of 24-foot sections of flat, interlocking block at various properties.

Remedial Action construction activities were performed according to approved design and specifications at Dollar Bay, Point Mills, Calumet Lake (14 acres), Boston Pond (25 acres), Michigan Smelter (14 acres), North Entry and Scales Creek and it is anticipated that cover material and shoreline protection installed at the Site will continue to meet remedial action objectives established for the Site.

As discussed above, the 1992 ROD for OU1 and OU3 designated some exceptions to the soil cover with vegetation remedy as presented above. The exceptions and resulting remedial decisions are discussed in more detail below:

- According to the 1992 ROD, portions of the Isle-Royale tailings in OU3 were to be excluded from the area to be covered with soil and vegetation if other entities were developing or covering the stamp sands. The ROD called for an evaluation of these exclusion areas 5 years after the date of the final remedial design (September 10, 1998) to determine if the development that was predicted at the time of the ROD, had actually occurred. U.S. EPA evaluated the site and determined that remedial action was necessary at all portions of the Isle-Royale stamp sands where development had not taken place by the Waste Water Treatment Plant (WWTP) or the Superior Block Company or where stamp sands were uncovered. The areas immediately adjacent to the WWTP were planted by the WWTP. The outer areas both east and west of the WWTP were covered by the remedy implemented by EPA. Areas developed as part of a residential area
were not included in the areas to be covered and vegetated. The residential area was not included in the remedy because it was developed as envisioned in the ROD and the remedy was not deemed necessary. In 2001, U.S. EPA completed the remedy at the Isle-Royale stamp sands by placing a 6 inch vegetative cover and rip-rap along the shoreline of the site. The change to include rip-rap was documented in a Memo to the file dated July 7, 2004.

- The 1992 ROD stated that Houghton County Road Commission property in the Point Mills portion of OU3 was excluded from the remedy. The Commission uses the stamp sands from this area (approximately 46 acres) for motor vehicle road traction during the winter.

On August 31, 2001, U.S. EPA received a letter from the Houghton County Road Commission (HCRC) requesting that 31 acres of its property in Point Mills be included in the remedy, leaving approximately 15 acres to use for present and future use of road maintenance materials. In response to this letter and to assist the Commission, U.S. EPA implemented the remedy on approximately 31 of the 46 acres, leaving approximately 15 acres uncovered. The 2001 letter from HCRC also asked U.S. EPA to change the conditions of the ROD to allow for deeper excavation. However, in a letter dated August 17, 2004, HCRC rescinded their request to open the ROD for this condition.

- The Quincy Smelter portion of the site was excluded from the remedy, assuming that the on-site slag pile was developed as part of the Keweenaw National Historic Park. The ROD further stated that if this area was not developed as a National Park, then deed restrictions will be sought to prevent the development of residences in the slag pile area.

Since the ROD was signed in 1992, there has been no actual implementation of development plans for the Historic Park, and while the goals are still the same, neither the owner of the property, Franklin Township, nor National Park Service has taken steps, nor has had the funding, to implement any efforts in this area. Erosion of stamp sands from the Smelter into the Keweenaw Waterway continues to be a concern, and in an effort to minimize erosion, yet remain sensitive to the National Park Service's concerns over the historical and economic importance of the Smelter as it currently exists, U.S. EPA implemented a removal action at the Smelter in 2005.

The action addressed the highest risks from the site, yet left the buildings and most historical artifacts in place for future use as part of the Keweenaw National Historic Park. In July 2005, U.S. EPA removed asbestos from two buildings that were determined to pose the greatest risk to public health and the environment. From August through September 2005, the U.S. EPA Removal program installed rip-rap along the shoreline and a water diversion system to divert storm water from running across the site directly into the Keweenaw Waterway. A fence was also constructed around the buildings.

- The North Entry, Redridge and Freda tailings were excluded from the remedy according to the 1992 ROD. These locations are along the Lake Superior shore where pounding waves, water currents and weather conditions would likely retard or destroy any remedial action. As a result, U.S. EPA believed at the time of the ROD, that it was technically impracticable to implement the chosen remedy at these locations. However, the ROD also stated that the North Entry and Freda tailings should be studied during remedial design. If U.S. EPA determined that any portion of these areas is sufficiently unaffected by Lake Superior wave...
activity, such that it could be effectively covered with soil and vegetation, then
the unaffected area or areas, should be subject to the requirements of the ROD.

As part of the remedial design and the IAG, NRCS evaluated and concluded that the remedial
action could be implemented at North Entry and U.S. EPA concurred. The remedy was
implemented at North Entry with a slight modification. Due to weather constraints (wind, wave,
and ice actions), the cover and vegetation was only brought to within 40 feet of the shoreline.
U.S. EPA believes this is protective as data indicate that the North Entry is a depositional area
and erosion should not be a concern.

In May 2003 and May 2004, U.S. EPA undertook action at Gull Island that was not specifically
laid out in the OU1 and OU3 ROD. This was undertaken as a modification to the remedy. Gull
Island is a 13.6 acre island located approximately 1500 feet off the western shore of Hubbell in
Torch Lake. Gull Island is primarily made of crushed mine rock or "stamp sands" deposited in
Torch Lake during the copper milling operations during the 19th and early 20th centuries. In
2002, it was brought to U.S. EPA's attention via written and verbal communication from citizens
and local government officials that significant clouds of stamp sand dust from Gull Island were
blowing into Torch Lake. NRCS staff confirmed the public observations and while,
approximately one third to one half of the island was already vegetated, U.S. EPA, with the
assistance from MDEQ and NRCS, planted approximately 38,000 individual trees, shrubs and
beach grass directly into the stamp sands that comprise the island (without the use of clean cover
material). The Memo to File prepared and dated December 21, 2002 documents the decision for
implementing remedial efforts at Gull Island. Based on Gull Island stamp sand characteristics,
the significant size of the exposed area (7.9 acres) and observed transport mechanism (wind
erosion) into Torch Lake, U.S. EPA believed that the potential for exposed stamp sands on Gull
Island to contribute to the severe degradation of the benthic community in Torch Lake was high
enough to justify taking an action consistent with the 1992 ROD.

Operation and Maintenance (O&M)

Based on the Superfund Site Contract (SSC) for the Site, "since the State has not elected to take
the lead after construction is complete, pursuant to the CA, U.S. EPA will conduct, those
activities necessary to ensure that the remedy is operational and functional for a period up
to three years after the construction of the last parcel, or until the remedy is jointly determined by
U.S. EPA and MDEQ to be functioning properly and performing as designed, whichever is
earlier." It was also established that U.S. EPA would conduct annual observations of the
remediated areas as part of the O&M activities for these three years after construction and
conduct major repairs as necessary, on each area where the remedy was implemented. At the
end of three years, MDEQ, U.S. EPA and NRCS will jointly inspect the areas to determine
whether each parcel is stable and anticipated to withstand future weathering and erosion in a
satisfactory manner.

In 1999 and 2000, as part of long-term monitoring, U.S. EPA conducted environmental sampling
as a way to establish the environmental baseline conditions of Torch Lake. The results of the
sampling efforts are presented in the Baseline Study Report dated August 2001. It was
anticipated that future long-term monitoring events will be conducted by the MDEQ and the
results compared to the 2001 baseline study to identify changes and/or establish trends in lake
conditions. MDEQ has had the lead for OU2 monitoring since 2002, when OU2 was deleted
from the NPL.

In 2002, U.S. EPA conducted a study of terrestrial environments at the Site to characterize and
document the ecological conditions of the tailing areas before and after implementation of the remedy. The results of the study were presented in the Torch Lake Stamp sand Evaluation Report dated March 2003.

In 2004, MDEQ conducted sampling activities for monitoring of Torch Lake. The monitoring was undertaken to document and measure the status of natural recovery of the lake following remedial actions. The 2004 sampling work included assessing the benthic community populations, measuring sediment toxicity to benthic invertebrates, measuring concentrations of metals and semi-volatile organic compounds in sediment and groundwater and studying the sedimentation process in lake sediments.

At the time of the first Five-Year Review, the only parcel that had officially entered into the O&M phase was Lake Linden. The MDEQ has been conducting O&M at Lake Linden in accordance with the January 2000 O&M Plan. The official O&M start date for Lake Linden was September 27, 2001. This date is based on a MDEQ letter to U.S. EPA dated September 27, 2001. The letter confirmed MDEQ’s belief that the cover on the Lake Linden parcel is functioning properly and performing as designed, and further requested that Lake Linden be deleted from the NPL. The rest of the parcels entered the O&M Phase in 2008, in accordance with the SSC. U.S. EPA and MDEQ jointly inspected the parcels and determined that they were ready to be transferred to MDEQ for O&M.

**Institutional Controls**

Institutional controls (ICs) are non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness at any areas of the Site which do not allow for unlimited use or unrestricted exposure (UU/UE).

Table 3 below summarizes ICs for the restricted areas of the Site.

**Table 3. Institutional Controls Summary Table**

<table>
<thead>
<tr>
<th>Media, Engineered Controls, &amp; Areas that Do Not Support UU/UE Based on Current Conditions</th>
<th>Institutional Control Objective</th>
<th>Title of Institutional Control Instrument Implemented (or planned)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soils with residual contamination in OUI and OU 3*</td>
<td>Protect vegetative cover and prevent residual mining contamination from entering surface water by ensuring that: (1) no disturbance of vegetative cover occurs; or (2) if disturbance occurs, owner is required to replace soil and repair vegetative cover.</td>
<td>Declaration of Restrictive Covenants on approximately 60 properties. U.S. EPA is in process of confirming that all necessary restrictive covenants are in place.</td>
</tr>
</tbody>
</table>

Five-Year Review Report - 31
Western Upper Peninsula District Health Department

**Ordinance**

Prohibit well installation or screening at depths where groundwater will be impacted by residual mining wastes.

<table>
<thead>
<tr>
<th>Groundwater associated with the entire Site (OU 2)</th>
<th>Prohibit well installation or screening at depths where groundwater will be impacted by residual mining wastes.</th>
<th>Western Upper Peninsula District Health Department Ordinance.</th>
</tr>
</thead>
</table>

*OU 1 consists of Mason Sands, Hubbell/Tamarack City and Lake Linden Sands and possibly the Gull Island areas. OU 3 includes the following areas: Calumet Lake, Boston Pond, North Entry, Redridge, Freda, Michigan Smelter, Quincy Smelter, Isle Royale Sands, Dollar Bay, Point Mills, and Scales Creek areas. (A map of these areas is attached as Figure 1).*

The Site is a repository of mining wastes known as tailing piles or stamp sands. The OU1 and OU3 ROD required, in part, that a soil and vegetative cover be constructed over large portions of these tailing piles. The 1992 ROD further required that deed restrictions be placed on those properties where the vegetative cover had been constructed in order to prevent future erosion of mining wastes into the surface water of Torch Lake. Specifically, the ROD required deed restrictions to ensure that mine tailings and/or slag material are ultimately re-vegetated after any activity which disturbs the soil cover.

In 1994, U.S. EPA issued an Administrative Order of Consent (AOC) to all affected landowners requiring them, within six months of the AOC, to implement the appropriate deed restriction on their property. The deed restrictions were to bind future owners by running with the land.

Institutional controls were also part of the remedy selected by U.S. EPA for OU2 (Site-wide groundwater). The remedy relied on institutional programs and practices administered by county and local governments to control potential future exposure to Site-affected groundwater.

**IC Evaluation Activities**

U.S. EPA is in the process of evaluating the ICs for this Site. U.S. EPA has been able to determine that all properties at OU1 (Lake Linden, Hubbell/Tamarack City, and Mason Sands) are subject to appropriate deed restrictions. U.S. EPA currently believes that appropriate deed restrictions have been implemented for many, but not all, of the properties at OU3. U.S. EPA is working with the MDEQ and NRCS (with the assistance of a local realtor) to ascertain to what extent appropriate deed restrictions have been recorded.

Additional evaluation activities are needed with regard to the properties comprising OU3 to ensure that the IC component of the selected remedy is functioning as intended, and to ensure effective procedures are in place for long-term stewardship at the Site. As noted above, U.S. EPA has yet to confirm that appropriate deed restrictions are in place at all properties comprising OU3. The IC evaluation will clearly identify the properties subject to restriction, and determine if the required ICs have been implemented by the property owners. Additionally, the IC evaluation will consider whether existing restrictions should be modified to ensure that they are enforceable and bind future owners (i.e., run with the land). Finally, the IC evaluation will determine whether existing encumbrances potentially interfere with the Site remedy.

With regard to OU2, groundwater use is controlled by the Western Upper Peninsula District Health Department. The County Health Department also has a permitting program for the installation of private wells. U.S. EPA has recently learned that the County does not specifically prohibit the installation of drinking water wells in or directly beneath the stamp sands. U.S.
EPA’s IC study will include an evaluation of the effectiveness of the County’s permitting program to ensure that potentially contaminated groundwater is not used for drinking water purposes.

Data generated from the May and August 2012 investigation indicated there is no current unacceptable exposure of site-related contaminants via groundwater. Local units of government with the permitting responsibility for well installations are aware of where stamp sands are located to assure that no new wells get installed within existing stamp sands. U.S. EPA has provided the HCHD with maps showing the areas of stamp sands with each parcel’s respective locators, which include Township, Range, and Section. These maps were provided to every well permitting office for the HCHD; this should increase the likelihood that the wells installed in the stamp sand areas are not screened in the stamp sands, but drilled further down into bedrock where there is no site-related contamination.

Once the IC evaluation activities have been completed, an IC Plan will be developed by U.S. EPA. U.S. EPA anticipates that the IC Plan will be developed by September 2013. Based on the results of the IC evaluation, U.S. EPA will plan for additional IC activities, as needed. If necessary, U.S. EPA will work with the Western Upper Peninsula District Health Department and other local government agencies to ensure that the institutional protections required by the selected remedy are in place and effective.

Operable Unit 1 and Operable Unit 3

Long Term Stewardship: Long-term protectiveness at the Site requires compliance with land use restrictions. Monitoring of these institutional controls is necessary to ensure long-term protectiveness at the Site. MDEQ will conduct annual inspections at the Site and includes the results of the inspection in an annual report to U.S. EPA.

Current Compliance: According to the 2012 site inspections, most of the parcels affected by mining wastes at the Site remain unused. Some areas are now being developed for residential use. Adjacent properties are currently zoned for residential/commercial and industrial use, and are being used for commercial and industrial purposes. U.S. EPA does not anticipate that industrial or commercial use on adjacent parcels will adversely impact the vegetated cover. U.S. EPA and MDEQ did not observe any activities during the last site visits in 2012 which would have violated the institutional controls.

Site-wide Groundwater (Operable Unit 2)

Long-Term Stewardship: Long-term protectiveness at the Site requires compliance with groundwater use restrictions, currently implemented through local government permitting requirements. Long-term stewardship of the site will require monitoring to ensure the effectiveness of and compliance with these requirements. Long-term stewardship may also require the development of additional ICs, more stringent permitting requirements, or the development of a local zoning ordinance to prohibit the installation or screening of groundwater wells in mining wastes. During the preparation of the IC Plan, the County’s existing ordinance will be reviewed to assure that it is effective. Also, U.S. EPA will evaluate existing procedures, including the O&M plans to assure that a mechanism exists for monitoring compliance and conducting inspections.

Current Compliance: At the time of the ROD, it was assumed no drinking water wells were screened within stamp sands. During the last Five-Year review, U.S. EPA acquired well logs.
which indicates that private and municipal wells were located on the stamp sands but screened within below the stamp sands. Local units of government with the permitting responsibility for well installations appeared not to be fully aware of the location of stamp sands. Data generated from the May and August 2012 investigation indicated there is no current unacceptable exposure of site-related contaminants via groundwater. Local units of government with the permitting responsibility for well installations are aware of where stamp sands are located to assure that no new wells get installed within existing stamp sands. U.S. EPA has provided the HCHD with maps showing the areas of stamp sands with each parcel’s respective locators, which include Township, Range, and Section. These maps were provided to every well permitting office for the HCHD; this would increase the likelihood that the wells installed in the stamp sand areas are not screened in the stamp sands, but drilled further down into bedrock where there is no site-related contamination. MDEQ working with the other agencies conducted an extensive search for wells screened in the stamp sands and could not locate even one well. MDEQ future contacted and interviewed well drillers in the area. These well drillers have indicated that they would never install screens in the stamp sands. Also they informed the MDEQ that the stamp sands fines would plug the screens and interfere with water production. When asked if they knew of any existing wells screened in stamp sands they indicated that they did not know of any. The MDEQ, U.S. EPA, MDCH and HCHD could not locate any wells screened in the stamp sands leading to the conclusion that this is not an issue for this site and no human exposure is occurring.

V. Progress Since the Last Review

This is the third Five-Year Review for the Site. Since the completion of the second Five-Year Review in 2008, the remedial implementation work at OU1 and OU3 was completed in 2011 as described above, and construction completion was documented in the Remedial Action completion report dated September 23, 2012. Groundwater and sediment samples were taken in 2010 in response to the concern about wells screening the stamp sands. The sediment samples were taken at Calumet Lake and Boston Pond. Samples were taken in the sediment of Boston Pond and Calumet Lake to establish a baseline. Previous investigations did not sample these water bodies directly, but assumed the contamination would be similar to the contamination in Torch Lake. The results of the 2010 sampling event indicate that indeed is the case — there are high levels of copper and other heavy metals in the sediment of Boston Pond and Calumet Lake. Groundwater samples were taken on parcels that suspected of having wells screened below in the stamp sands; samples were also taken from the monitoring wells. Municipal wells screened below the stamp sands were also sampled. Groundwater data was obtained and evaluated as well from these wells. The groundwater data did not have exceedances of the MCL.

In 2009 the MDEQ produced the Torch Lake Monitoring Report that provided an understanding of why the Torch Lake was not recovering as fast as expected. The estimate for the recovery of this lake by natural means under the existing conditions would be approximately 850 years, although that may not be accurate as the sediments continue to increase in toxicity over time.

The MDEQ working in conjunction with MTU conducted survey of the vegetative growth on the soil covers and a scientific means of measuring a number of parameters as part of the O&M for the site. In December 2012 the Analysis of Vegetation Communities Inventory and Restoration Status report was completed. The investigation examined a number of different parameters.
including species composition and erosion potential for each soil cover. The recommendations for future O&M of the soil covers were as follows.
Develop species composition restoration goals for the Torch Lake Superfund Site which include:

- Weighting factors for weedy/invasive and erosion susceptibility;
- Evaluate seed mixtures for supplemental plantings;

1. U.S. EPA and MDEQ conducted a Title Search to see if owners had the proper restrictions on their property, and if not, work with the landowner and/or county to ensure deed restrictions are put in place.
2. U.S. EPA and MDEQ met with property owners to educate them on the ICs and encourage them to place them on the deed.

Table 3: Actions Taken Since the Last Five-Year Review

<table>
<thead>
<tr>
<th>Issues from Previous Review</th>
<th>Recommendation and Follow-up Actions</th>
<th>Party Responsible</th>
<th>Milestone Date</th>
<th>Action Taken and Outcome</th>
<th>Date of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Follow-up actions are required to ensure that Deed Restrictions on the remaining private properties are implemented. Further review of the institutional controls is needed to ensure that the remedy is functioning as intended with regard to the ICs and to ensure effective procedures are in place for long-term stewardship at the Site.</td>
<td>Continue to seek documentation from landowners at the Site to verify proper deed restrictions have been put in place, and if they are not, work with the landowners and/or county to ensure deed restrictions are put in place.</td>
<td>U.S. EPA</td>
<td>9/2008</td>
<td>U.S. EPA conducted a Title Search to see if owners had the proper restrictions on their property. U.S. EPA and MDEQ met with property owners individually to educate them on the ICs and encourage them to place them on the deed.</td>
<td>Nov/2012</td>
</tr>
<tr>
<td>Issues from Previous Review</td>
<td>Recommendations and Follow-up Actions</td>
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<td>2. Possible groundwater exposures and the effectiveness of the county well permitting process in preventing drinking water well installation in tailings at the Site. U.S. EPA has recently been informed that there may be drinking water wells at the Site that are screened in mining tailings. Specifically evaluate residential areas within the Site (Isle-Royale, Dollar Bay, Mason Sands, Point Mills).</td>
<td>Evaluate groundwater data and uses at the Site, as well as develop a plan for periodic on-Site inspections of groundwater use and work with county officials to evaluate the effectiveness of the county well permitting process in preventing the installation of drinking water wells in tailings.</td>
<td>U.S. EPA/ MDEQ/ Houghton County</td>
<td>9/2008</td>
<td>Additional GW sampling conducted May and August 2010. Sampling Report finalized February 2011. No exceedances of site-related contaminants were found in the wells that were sampled. Also, a letter with site maps was sent to Houghton County Health Department to enhance the effectiveness of their efforts to prevent installation of wells in the stamps sands.</td>
<td>02/2011</td>
</tr>
<tr>
<td>3. Possible groundwater exposures/complete GSI pathway, needs to be evaluated</td>
<td>Collect more current groundwater data and complete an evaluation of exposure pathway</td>
<td>MDEQ/ U.S. EPA</td>
<td>06/2009</td>
<td>Additional GW sampling conducted May and August 2010. Sampling Report finalized February 2011. No exceedances of site-related contaminants were found in the wells that were sampled. However, no sampling of actual interstitial water has been done.</td>
<td>08/2010 and 02/2011</td>
</tr>
<tr>
<td>4. Additional concerns with possible continuing sources in the Lake Linden Area</td>
<td>Further assessment, evaluation and remediation as necessary</td>
<td>U.S. EPA</td>
<td>12/2008</td>
<td>U.S. EPA reviewed the removal data and determined that no additional assessment was necessary.</td>
<td>09/2011</td>
</tr>
</tbody>
</table>

Comment [C5D12]: Question what the source of the groundwater? The Groundwater Surface Water Interface can't be assessed using residential wells and the wells that are used need to be installed in the zone were the GSI actually is located.
<table>
<thead>
<tr>
<th>Issues from Previous Review</th>
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</tr>
</thead>
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<tr>
<td>5. Lack of cover and sedimentation basin issues at Quincy Smelter to prevent further erosion of stamp sands into surface water.</td>
<td>Prepare and Finalize a Decision Document (ROD Amendment) to implement appropriate remedy at Quincy Smelter.</td>
<td>U.S. EPA/ NRCS</td>
<td>09/2009</td>
<td>ROD Amendment and Remedial Action</td>
<td>09/2011</td>
</tr>
<tr>
<td>8. Need to determine if additional areas from LAA Report need assessing or remediation.</td>
<td>Determine if any areas from the TLAA Report need additional evaluation</td>
<td>U.S. EPA/ MDEQ</td>
<td>09/2008</td>
<td>U.S. EPA reviewed the TLAA and determined that no additional sampling or actions needed to be taken in response to the report.</td>
<td>05/2010</td>
</tr>
<tr>
<td>9. Long-Term access for conducting monitoring and O&amp;M activities has not been formally established.</td>
<td>Review 1994 AOC and other access agreements for applicability to long-term access. Seek appropriate long term solution for access agreements where necessary. Evaluate the need for additional ICs</td>
<td>U.S. EPA/ MDEQ</td>
<td>09/2008</td>
<td>Access agreements include language to show that U.S. EPA has access for certain tasks. There is not a specific time limit. The 2002 AOC with Simonson allows similar access to U.S. EPA.</td>
<td>09/2012</td>
</tr>
<tr>
<td>Issues from Previous Review</td>
<td>Recommendations and Follow-up Actions</td>
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<td>10. Houghton County Road Commission’s road traction tailing excavation practices at Point Mills relative to 1992 ROD requirements are a possible concern.</td>
<td>Work with the Houghton County Road Commission to ensure practices are consistent with the 1992 ROD.</td>
<td>U.S. EPA/MDEQ</td>
<td>09/2008</td>
<td>U.S. EPA/MDEQ plans to contact Houghton County to follow up with their plans for this area</td>
<td>06/2013</td>
</tr>
<tr>
<td>11. Deed restrictions to prevent the development of residences in the slag area of Quincy Smelter were not implemented.</td>
<td>Work with Franklin Township to ensure they record appropriate deed restrictions at Quincy Smelter.</td>
<td>U.S. EPA</td>
<td>09/2008</td>
<td>U.S. EPA provided Franklin Township with the model Restrictive Covenant</td>
<td>06/2011</td>
</tr>
<tr>
<td>12. Slow-sedimentation and lack of detoxification of sediments in Torch Lake as assumed in OU2 ROD, leading to an estimate of Natural Recovery in excess of several hundred years.</td>
<td>Determine and develop alternative studies or measures for OU2, Torch Lake, as appropriate.</td>
<td>U.S. EPA/MDEQ</td>
<td>09/2009</td>
<td>U.S. EPA and MDEQ had several meetings from 2009-2012 discussing slow sedimentation. The sediments will take a long time to recover. Adjusting the monitoring frequency and sample location has been proposed to account for the long recovery time. Any additional remediation to the sediment is cost-prohibitive.</td>
<td>2012</td>
</tr>
<tr>
<td>13. A next round of monitoring and data collection for Torch Lake is required by 2009.</td>
<td>Develop Data collection plan/Monitoring for Torch Lake.</td>
<td>MDEQ/U.S. EPA</td>
<td>12/2009</td>
<td>No monitoring was performed by MDEQ due to the slow natural recovery of the sediments.</td>
<td>2010</td>
</tr>
</tbody>
</table>

Comment [CSD14]: MDEQ provided Township with the model RC and worked with the Township and NPS place the RC. Completed 12/2012

Comment [CSD15]: 2009 the MDEQ produced a monitoring report detailing the reasons for the slow recovery. Should set a goal for developing a long-term monitoring plan and schedule.
VI. Five-Year Review Process

Administrative Components

MDEQ was notified of the initiation of the Five-Year Review in March 2012 by the EPA Project Manager for the Site (Copy of EPA letter to MDEQ in Attachment B). The Torch Lake Five-Year Review team was led by Nabil Fayoumi, Remedial Project Manager (RPM) for the Torch Lake Superfund Site, and included Scott Cornelius of MDEQ and Rob Abo, representative of the USDA-NRCS. The RPM established the review schedule from March 2012 to March 2013. Its components included: Community Notification; Document Review; Data Review; Site Inspections; and Five-Year Review Report Development and Review.

Community Notification and Involvement

Activities to involve the community in the Five-Year Review process were initiated in January 2012 with a notification to the Community Involvement Coordinator (CIC) for the Torch Lake Superfund Site. A notice was published on April 6, 2012 in the local newspaper (Daily Mining Gazette) that a Five-Year Review was to be conducted. A copy of the Advertisement is included in Attachment C.

EPA conducted an interview with one property owner. They were upset with the cover because it was not as vegetated as they were promised. The cover is effective at preventing the wind and wave erosion of stamp sands into the adjacent water body, however, the cover has minimal vegetation. MDEQ and EPA are working with the property owner to find a cost-effective solution the vegetation problem.

In September 2011, EPA worked with the local University (Michigan Tech) and the 5 local high schools to qualitatively assess the vegetative cover. The high school students conducted soil testing and bird identification; they also measured plant diversity, cover productivity, and rooting depth. Later, they conducted statistical analysis of data. Local high school students gained invaluable experience with the scientific process, monitoring skills, and data analysis. They will also understand more about the historical significance of their community.

Based on this qualitative data from the students, it can be stated that some of the covers are growing well like Lake Linden which has 72% vegetative coverage. On the other hand some covers are not as verdant, like the Point Mills property with only 37% plant coverage. U.S. EPA and MDEQ are working on developing solutions for those covers that are not doing so well.
Document Review

This Five-Year Review consisted of a review of relevant documents including the 1992 ROD for OU1 and OU3, 1994 ROD for OU2, Preliminary Close-Out Report (PCOR), the 2011 Interim Remedial Action Report, O&M records, Site Inspections, applicable cleanup standards/goals, as listed in the 1992 and 1994 RODs, and the 2011 groundwater and sediment sampling report.

Data Review

Sediment Results:
Since no action was taken for OU2, the sediment does not need to be monitored and a specific sediment O&M plan is not necessary. However, monitoring of the sediments nearest the vegetative covers could serve to measure the effectiveness of such covers in preventing additional stamp sand migration into Torch Lake. Given that EPA has determined that Torch Lake will take an unprecedented amount of time to recover, monitoring of the lake sediments should occur infrequently. Future evaluations of the sediment will be tied to the remedy for OUs 1 and 3 and should only be used to reflect the effectiveness of the vegetative covers in preventing further stamp sand releases into Torch Lake.

Biotic Recovery and Community Results:
On October 14, 2010, the EPA, MDNRE, and MTU met to discuss the slow recovery of the Torch Lake benthic environment. MTU and MDNRE asserted that the sedimentation rate calculated for Torch Lake was about 0.08 to 0.17 centimeters (cm) per year, and at this rate it would take 800 years for Torch Lake to recover. MTU and MDNRE further asserted that the surface sediments of Torch Lake have the highest concentrations of copper. At the meeting MTU used the recovery of the sediment in Portage Lake as a comparison. In the same time frame, Torch Lake accumulated 4 cm of sediment, while Portage Lake accumulated 25 cm. The benthic community in Portage Lake is doing well with 25 cm of post-mining sediments. The difference could be attributed to the degree of isolation from other water bodies. Portage Lake is connected to more tributaries and water bodies than Torch Lake, and therefore receives an increased supply of new sediment.

The MTU 2007 study has significant uncertainty about the extent to which the report can be used to evaluate the effectiveness of the Torch Lake remedial action. If Portage Lake has had relatively successful recovery with 25 cm of post-mining sediment, then Torch Lake should show similar results in an additional 160 years, when 25 cm of surface sediment can be expected to have accumulated at Torch Lake. In addition, the samples taken by MTU to determine Torch Lake's sedimentation rate were collected in a limited area of the eastern portion of the Lake. The Torch Lake Superfund remedy was implemented on the western shores of the Lake; therefore the MTU study is likely not representative of sedimentation rates for the entire Lake. Furthermore, the higher levels of copper in the upper layers of Torch Lake sediment found in the MTU study are likely due to the organic carbon binding the copper. This phenomenon is likely preventing copper from affecting the surface water, and may be making copper less bioavailable in the sediments.

Natural Recovery Evaluation:
There is information that suggests that pelagic plankton species some of the ecological community in Torch Lake is showing signs of recovering as the water column clears up. A study of Torch Lake called “Sediment Core Studies of Biotic Recovery following Mining
Perturbations in Torch Lake was completed by Charles Kerfoot and associates from Michigan Technical University (MTU) in March 2007. This study indicates that the water column is clearing up in some areas of the Torch Lake ecosystem. A few many planktonic organisms have returned to the water since mining ceased, pelagic species have developed viable egg banks. The benthic organisms, however, have not shown signs of recovery.

Groundwater Sampling
In May and August 2010, the EPA collected groundwater samples from residential and monitoring wells screened and potentially screened in the stamp sands, and reviewed existing data collected from municipal water supply wells. This investigation was conducted to assess the current human health exposure to contaminated groundwater from the site stamp sands. Data generated from this investigation indicates there is no current unacceptable exposure of site-related contaminants via groundwater. The residential wells sampled in May and August of 2010 and the municipal well data reviewed revealed no metal concentrations in excess of the Safe Drinking Water Act Maximum Contaminant Levels (MCLs). Two of the ten monitoring wells sampled had concentrations of arsenic above the MCL of 10 parts per billion (ppb). Groundwater from a monitoring well in Hubbell/Tamarack had arsenic concentration of 22.5 ppb and groundwater from a monitoring well in Lake Linden had arsenic concentration of 14.8 ppb. However, there are no residential wells currently screened in stamp sands in these areas. Water from municipal wells located in the Torch Lake area (Osceola Township and the City of Houghton) had no concentrations of arsenic or copper above MCLs.

Site Inspections
Inspections at the Site were conducted during the week of June 20, 2012 by the EPA RPM and the MDEQ PM. The purpose of the inspections was to assess the progress of remedy implementation, protectiveness of the remedy, evaluate the performance of the soil and vegetative cap where applied, and evaluate future remedy implementation problems and needs. Issues identified at the completed areas of the remedy included high erosion areas on the edge of Torch Lake need rip rap placement and other minor areas which needed fill repair. Point Mills like all the other areas and the need for additional re-seeding and fertilization at Point Mills. However, the vegetation on all the soil covers is inadequate, with the possible exception of one area at Mason Sands that has been receiving biosolids for long-term O&M purposes. Soil enhancement is needed at all areas before re-seeding and fertilization will be effective and worthwhile.

Interviews
One interview with an individual was conducted. Since the newspaper ad was placed, no additional members of the community or any other individual voiced any interest in conducting an interview related to the Five-year Review. An interview was held with one of the property owners at Point Mills. They expressed significant disappointment in the type of soil and vegetative cover they received. They were promised a soil cover with grasses and wildflowers, and sandy loam material. This is the same complaint that the MDEQ has received from numerous property owners since the soil covers were constructed. Although there is evidence of wind and water erosion on all the covers it is there lack of steep gradation that allows them to cover is functioning in a minimal way to prevent erosion. The soil covers at all areas are mostly clay, rocks, and weeds, and does not drain when well when wet. U.S. EPA and MDEQ are working together with the property owner to see how the cover can be enhanced in a cost effective manner.
VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes. Based on a review of relevant documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the Site inspections, it appears to EPA that the soil cover and vegetation remedy has been implemented as per the 1992 ROD for OU1 and OU3, and the soil cover is functioning as intended: to reduce erosion of stamp sands into the surface water of Torch Lake. Deed Restrictions required by the 1992 ROD have been implemented by most of the property owners, which require that if the vegetative cover is disturbed, the property owner will re-establish the cover. Based on inspections, monitoring and conversations with city officials, there appears to be compliance with the land use restrictions.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

OU1 and OU3: Yes. The exposure assumptions, toxicity data, and remedial action objectives used at the time of the remedy selection for the stamp remain valid today.

OU2: Yes. At the time of the ROD, it was assumed no drinking water wells were screened within stamp sands. During the last Five-year Review, acquired well logs appeared to indicate that private and municipal source wells are screened within stamp sands. Data generated from the May and August 2012 investigation indicated there is no current unacceptable exposure of site-related contaminants via groundwater. Local units of government with the permitting responsibility for well installations are aware of where stamp sands are located to assure that no new wells get installed within existing stamp sands. EPA has provided the HCHD with maps showing the areas of stamp sands with each parcel's respective locators, which include Township, Range, and Section. These maps were provided to every well permitting office for the HCHD; this should increase the likelihood that the wells installed in the stamp sand areas are not screened in the stamp sands, but drilled further down into bedrock where there is no site-related contamination.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

OU1 and OU3: The exposure assumptions used to develop the Human Health Risk Assessment included exposure to contaminated tailings and slag from a possible current and future ingestion, inhalation, and dermal contact pathway.

OU2: The exposure assumptions used to develop the ecological assessment included high toxicity to benthic communities from high metal concentrations in sediments. Toxicity tests confirmed these expectations.

There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. No change to these assumptions is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. No other events have affected the protectiveness of the remedy and there is no information
that calls into question the protectiveness of the remedies. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy.

Technical Assessment Summary

Based on a review of relevant documents, data, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the Site inspections, it appears that the soil and vegetative cover remedy implemented for OU1 and OU3 are functioning as intended by the ROD and the five memoranda to the Site file. The implemented remedy has reduced the erosion and loadings into Torch Lake as well as the windblown exposure of stamp sand dust. However, the remedy for OU2 is not progressing as expected. There are no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedies. There have been no changes in exposure pathways or toxicity factors for the contaminants of concern which would impact the effectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedies.
VIII. Issues/Recommendations

<table>
<thead>
<tr>
<th>OU(s) without Issues/Recommendations Identified in the Five-Year Review:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OU2. The 1994 ROD documented the “No Action” decision for OU2. The ROD for OU2 relied on the ICs already in-place to provide sufficient protectiveness for exposure to Site-affected groundwater. OU2 was delisted from the National Priorities List in 2002.</td>
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<table>
<thead>
<tr>
<th>Issues and Recommendations Identified in the Five-Year Review:</th>
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<tbody>
<tr>
<td><strong>OU(s): OU1 and 3.</strong></td>
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<table>
<thead>
<tr>
<th><strong>Issue Category:</strong> Operations and Maintenance</th>
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<tbody>
<tr>
<td><strong>Issue:</strong> Lack of vegetative cover establishment at certain properties at the Point Mills. Also, minor areas need repair and additional reseeding and fertilization at Point Mills. Lack of establishment of a sustainable vegetative cover on all the soil covers with the possible exception of an area within the Mason Sands that has been receiving biosolids from the Houghton Waste Water Treatment Plant since before the Superfund remedial construction was completed. Some areas of the soil cover, such as Lake Linden and Hubbell slag pile, are eroding from the wave action of Torch Lake. These areas were not armored during the initial construction of the soil covers. Soil enhancement is needed to produce a sustainable vegetative cover.</td>
</tr>
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</table>

| Recommendation: | U.S. EPA and MDEQ are working with property owners to find a cost-effective solution to the vegetation problem at the Point Mills. U.S. EPA and MDEQ are working with property owners to find a cost-effective solution to the vegetation problem for the entire site. |

<table>
<thead>
<tr>
<th>Affect Current</th>
<th>Affect Future</th>
<th>Implementing</th>
<th>Oversight</th>
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<tbody>
<tr>
<td>Protectiveness</td>
<td>Protectiveness</td>
<td>Party</td>
<td>Party</td>
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<tr>
<td>No</td>
<td>Yes</td>
<td>U.S. EPA/MDEQ</td>
<td>U.S. EPA/MDEQ</td>
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| **OU(s): OU1 and 3.** |

<table>
<thead>
<tr>
<th><strong>Issue Category:</strong> Institutional Controls</th>
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<tbody>
<tr>
<td><strong>Issue:</strong> A determination needs to be made that the required Institutional Controls are in place and effective to ensure long-term protectiveness of human health and the environment for the groundwater.</td>
</tr>
</tbody>
</table>

| Recommendation: | U.S. EPA and MDEQ will review the required Institutional Controls and confirm that they are in place and effective. U.S. EPA and MDEQ will prepare an IC plan for the Site which will include a plan for long-term stewardship. |

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| **OU(s): OU1** |

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<tr>
<th><strong>Issue Category:</strong> Monitoring</th>
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| Five-Year Review Report - 45 |
**Issue:** Houghton County Road Commission is currently using tailing material at the Point Mills to spread on roads during winter to provide traction for motor vehicles.

**Recommendation:** Work with the Houghton County Road Commission to ensure that road traction tailing excavation practices are consistent with the 1992 ROD.

<table>
<thead>
<tr>
<th>Affect Current Protectiveness</th>
<th>Affect Future Protectiveness</th>
<th>Implementing Party</th>
<th>Oversight Party</th>
<th>milestone Date</th>
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<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>U.S. EPA/MDEQ</td>
<td>U.S. EPA/MDEQ</td>
<td>September 2013</td>
</tr>
</tbody>
</table>
OU(s): OU1 and 3.

Issue Category: Monitoring

<table>
<thead>
<tr>
<th>Issue</th>
<th>Monitoring</th>
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<tbody>
<tr>
<td>Issue: Existing residential wells are screened in the stamp sands. While these wells are not contaminated above drinking water standards, periodical monitoring is necessary to ensure remedial protectiveness.</td>
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<tr>
<td>Recommendation: Revise the O&amp;M Plan to include periodical residential wells monitoring.</td>
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</table>

Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
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<td>U.S. EPA/MDEQ</td>
<td>September 2013</td>
</tr>
</tbody>
</table>

IX. Protectiveness Statement(s)

OU1 and 3: The remedial actions implemented at OU1 and OU3 are protective in the short-term. The vegetative cover has reduced potential risks associated with direct contact or inhalation of contaminants in the tailings. For actions to be protective in the long-term, a review of institutional controls must be performed and modified as appropriate.

OU2: No Action ROD for OU2 was signed March 1994. The ROD for OU2 relied on the implemented remedy for OU1 and OU3, natural recovery of the Lake, and the ICs already in place to provide sufficient protectiveness for exposure to site affected groundwater. OU2 was delisted from the National Priorities List in 2002. The remedy for the groundwater portion of OU2 currently protects human health and the environment in the short-term. Existing residential wells screened in the stamp sands are not contaminated above drinking water standards. In order for the “No Action” selected remedy to be protective in the long-term, U.S. EPA and MDEQ will periodically monitor residential wells, review the need for more robust ICs and clarify or amend the remedy decision document, if required. An IC Plan will be prepared to ensure that effective ICs are implemented, maintained, monitored, and enforced.

Site-Wide: The remedy at the Torch Lake Superfund Site currently protects human health and the environment in the short-term because the vegetative covers prevent erosion of stamp sands to Torch Lake, which prevents the further degradation to the ecologic system of the Lake while it recovers over time. In order for the selected remedy to be protective in the long-term, a review of ICs must be performed and modified as appropriate. ICs are required on all of the vegetative covers. The IC plan will discuss how to ensure that the ICs are in place and effective.

X. Next Review

The next Five-Year Review for the Torch Lake Superfund Site is required five years from the date of this review.
Attachment D -- Newspaper Advertisement Announcing the Initiation of the Five-Year Review Process
FOR THE RECORD

SISU — a Finnish characteristic that takes over when fortune runs out. Rob6erHira.com

OBITUARIES

FOR THE ICORD

• OBJUARIES

bandied by AiliA Illmera

On Oct. 11, 1947, he was married to the former Annie M. Koeki in Laurium. She preceded him in death on February 4, 1981.

Earl was employed for 27 years in the electrical department of Michigan Technological University where he worked in the machine shop, retiring in 1981.

He was a member of Gloria Dei Lutheran Church in Hancock.

Earl and his wife, Aune, enjoyed going to sporting events in which their grandchildren participated. He also enjoyed hunting deer and small game, golfing and walking.

Surviving are one son and two daughters: Sandra W. (Somy) Nistriud in the Cobson Funeral Home, South Range, Antilie Funeral Service Inc.

On Oct. 22, 2012. Memorial arrangements are incomplete and will be announced by the Jakuri-Antila Funeral Home of Hancock, Antila Funeral Service Inc.

Helen L. Savola


Memorial services will be held at noon Oct. 27, 2012, at the Mountain View Mortuary in South Range. Visitations will be from 10:30 a.m. until the time of services on Saturday.

A full obituary will be published on Wednesday.

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Five Year Review Field Notes

CALUMET LAKE
Date: June 19, 2012

• Paul Lehto from the City of Calumet met with us at the Site to show us around and let us know about how the property was being used.
• The Calumet Lake area is not being used as a park and there is a walking trail being built to go around Calumet Lake. It is kept up by the City of Calumet who mows it and occasionally adds seeds. The cover is mossy and has sparse vegetation in some areas.

BOSTON POND
Date: June 19, 2012

• The cover is well vegetated throughout with minimal areas of sparse vegetation and moss.

NORTH ENTRY
Date: June 20, 2012

• Both property owners came to the site visit. Stanton Township and the Alvords.
• Some visitors tore off part of the fence to drive their vehicle over the cover. This has left a trail through the cover and vegetation in that area is sparse.
• The Alvords have planted trees on their side of the cover and have put a conservation easement on it to ensure it is only used for wildlife and nature.
• The cover has sparse vegetation in some areas and thick vegetation in others.
• There were no signs of erosion from the cover.

MICHIGAN SMELTER
Date: June 19, 2012

• One of the property owners was at the site visit. He expressed his discontent with the rocky clay soil material and sparse vegetation.
• Some of the fences were damaged from snowmobiles in the winter.

QUINCY SMELTER
Date: June 20, 2012

• We met with the property owner, the ski hill managers, and some engineers from Michigan Tech to discuss the erosion from the ski hill onto Quincy Smelter property. The county drain commissioner had the ski hill remedy the situation by building a sedimentation area on their own property. The Ski Hill will be responsible for removing the silt for the Quincy Smelter.
drainage way. It is not expected that this issue will occur in the future. However, a plan will be developed to address this issue just in case.

**ISLE ROYALE SANDS**
Date: 6/19

- Sparse but adequate vegetation
- Biosolids being spread on portion of the cove

**DOLLAR BAY**
Date: 6/20

- Tall grass and lead litter present
- Adequate coverage

**MASON SANDS**
Date: 6/19

- Slight erosion on the east northern bank because no rip rap was installed
- Hunting evidence and ATV tracks
- Some sparsely vegetated areas but good coverage in general

**HUBBELL/TAMARACK**
Date: 6/20

- Tamarack
  - Lots of grass and bushes. Trees are growing.
  - Red stamp sands on edge with some plant growth
  - Good wildlife habitat
- Hubbell
  - Needs rip rap
  - Sparsely vegetated

**LAKE LINDEN SANDS**
Date: 6/21

- Some shoreline has a lot of plant growth. Some has mostly stamp sands showing due to low tide
- Strawberries growing on the cover
- Sparse but adequate vegetation
POINT MILLS
Date: 6/21

Troesch

- Rock clay soil
- Minimal coverage with weeds
- No erosion issues

Fellishini

- Pretty good vegetation.
- Sparse in some areas but grass is growing, not just weeds

SCALES CREEK
Date: 6/21

- Rip rap repair needed in some areas
- Sparse vegetation but adequate cover with little erosion