TORCH LAKE SITE, MI
OPERABLE UNITS I AND III

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Torch Lake Site, Operable Units I and III
Houghton County, Michigan

Statement of Basis and Purpose

This decision document represents the selected remedial action for the Torch Lake site, in Houghton County, Michigan, Operable Units I and III, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based on the Administrative Record for the Torch Lake site.

The State of Michigan concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of Remedy

These operable units are the first and third of three operable units for the site. The selected remedial action for these operable units addresses the tailings and slag piles/beach at the site. Operable Unit II, which is not a part of this ROD, addresses the groundwater, surface water, and sediments.

The major components of the selected remedy include:

* 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 this ROD;

* 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;

* 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/beach in Hubbell (approximately 9 acres);

* The Isle-Royale tailings in OU III will be excluded from the area to be covered with soil and vegetation under this ROD as follows:

  - The portion of Isle-Royale tailings in OU III which is being developed as a sewage treatment plant will be excluded from the area to be covered with soil and vegetation under this ROD. 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 this ROD;

  - The portion of the Isle-Royale tailings which is designated to be developed as a residential area will be excluded from the area to be covered with soil and vegetation under this ROD. 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 this 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 will be excluded from the area to be covered with soil and vegetation under this ROD. 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 this 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;

* 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 will be excluded from the area to be covered with soil and vegetation. This area is located in Grosse-Point in OU III 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 pursuant to this ROD;

* 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; and

* The North Entry (location 4), Redridge (location 11) and Freda (location 12) tailings are excluded from the area to be covered under this ROD. 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, U.S. 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 U.S. 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 this ROD.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State environmental requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable; however, because treatment of the principal threats of the Site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

David A. Ullrich

Valdas V. Adamkus
Regional Administrator

9/30/92
Date

RECORD OF DECISION

DECISION SUMMARY

TORCH LAKE SITE

OPERABLE UNITS I AND III

HOUGHTON COUNTY, MICHIGAN

Prepared By:

U.S. Environmental Protection Agency

Region V

Chicago, Illinois

September, 1992

ROD SUMMARY
TORCH LAKE SUPERFUND SITE
OPERABLE UNITS I AND III
HOUGHTON COUNTY, MICHIGAN

TABLE OF CONTENTS

I. SITE NAME, LOCATION, AND DESCRIPTION 3

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES 7

III. COMMUNITY RELATIONS HISTORY 11

IV. SCOPE AND ROLE OF REMEDIAL ACTIVITIES 11

V. SITE CHARACTERISTICS 12

VI. SUMMARY OF SITE RISKS 21

VII. DESCRIPTION OF REMEDIAL ALTERNATIVES 35

VIII. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES . . 39

IX. THE SELECTED REMEDY 44

X. STATUTORY DETERMINATIONS SUMMARY 47

XI. DOCUMENTATION OF SIGNIFICANT CHANGES 51

ROD SUMMARY
TORCH LAKE SUPERFUND SITE
OPERABLE UNITS I AND III
HOUGHTON COUNTY, MICHIGAN

I. SITE NAME, LOCATION, AND DESCRIPTION

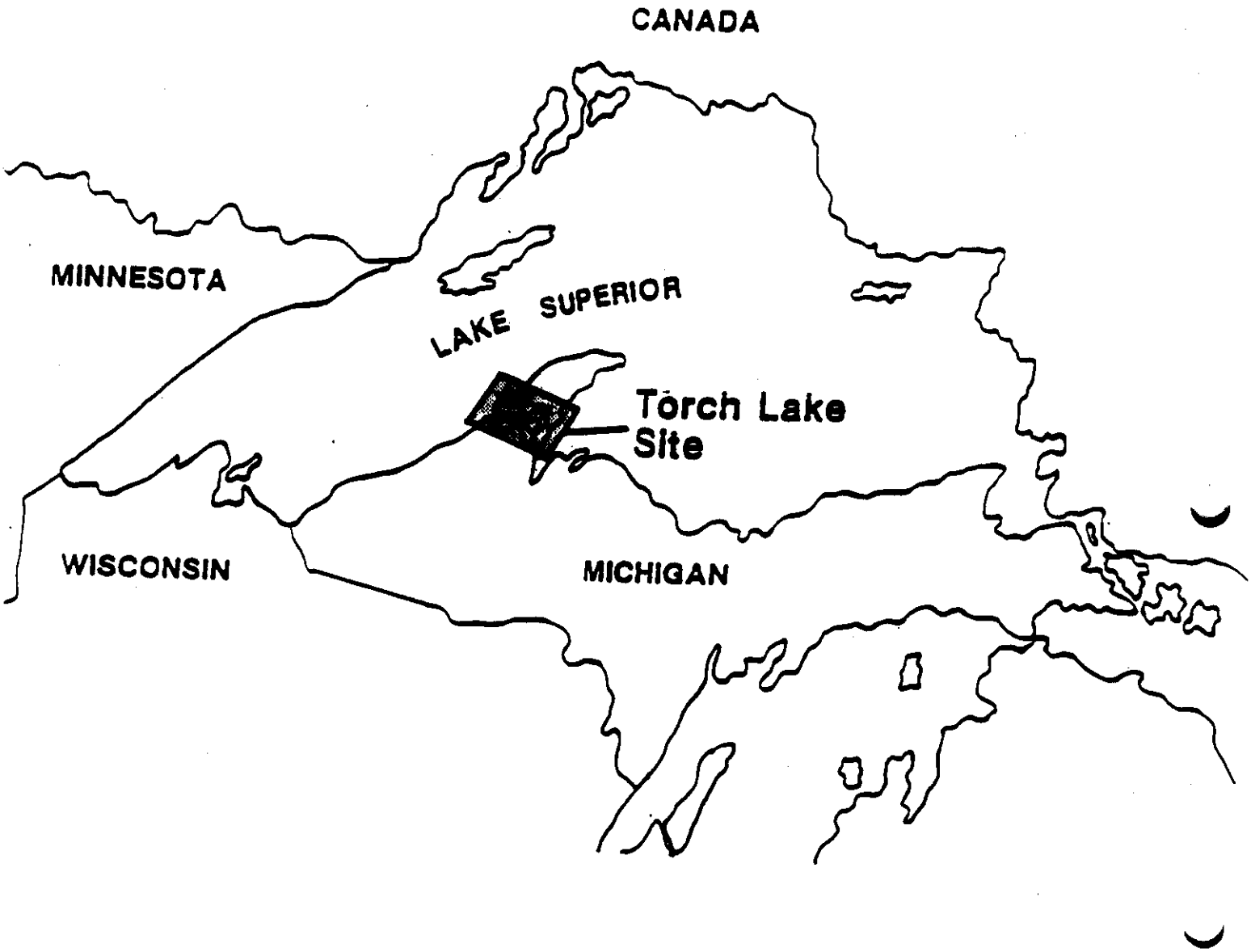
The Torch Lake Superfund site (the "Site") is located on the Keweenaw Peninsula in Houghton County, Michigan (See Figure 1). The Site includes Torch Lake, the west shore of Torch Lake, the northern portion of Portage Lake, the Portage Lake Canal, Keweenaw Waterway, the North Entry to Lake Superior, Boston Pond, Calumet Lake, and other areas associated with the Keweenaw Basin. Tailing piles and slag piles/beach deposited along the western shore of Torch Lake, Northern Portage Lake, Keweenaw Waterway, Lake Superior, Boston Pond, and Calumet Lake are also included as part of the Site. These tailing piles include tailings in Lake Linden, Hubbell/Tamarack City, Mason, Calumet Lake, Boston Pond, Michigan Smelter, Isle-Royale, Lake Superior, and Gross Point. The slag piles/beach are located in Quincy Smelter and Hubbell (See Figure 2).

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. The Torch Lake is a tributary to the larger Portage Lake which in turn has outlets to Lake Superior via the Portage Canal 14 miles to the northwest and to Keweenaw Bay via the Portage River. 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 coniferous. Spruce, larch, fir, and pine are the common species. Deciduous vegetation also occurs in the area although to a lesser degree. Important species include sugar maple, birch, and aspen.

Several small communities are located on the west 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 Keweenaw Waterway. Calumet City is located 5 miles north of Torch Lake (See Figure 2).

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. The Trap Rock river and several small creeks discharge into Torch Lake.

Figure 1



Donohue

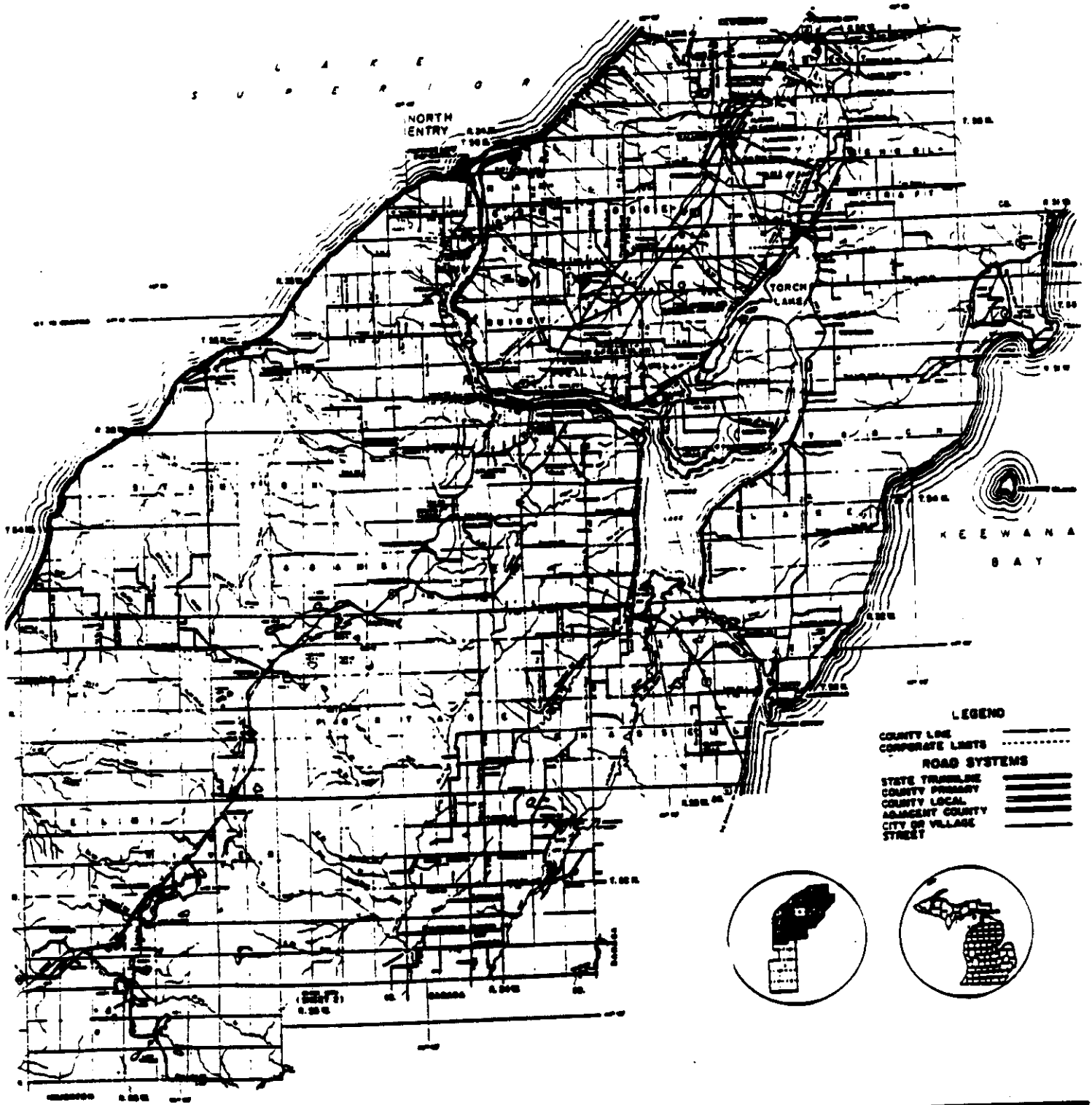
MARCH 1989

SITE LOCATION MAP
TORCH LAKE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
HOUGHTON COUNTY, MICHIGAN

N

Engineers • Architects • Scientists

Figure 2



Donohue

JUNE 1989

TORCH LAKE SITE

TORCH LAKE

REMEDIAL INVESTIGATION / FEASIBILITY STUDY

HOUGHTON COUNTY, MICHIGAN

N

Engineers • Architects • Scientists

C-91132

Torch Lake is used for fishing, boating, limited contact recreation (swimming), non-contact cooling water supply, treated municipal waste assimilation, and wildlife habitat. The Village of Lake Linden has been developing a facility with a bathing beach, camping, park, and boat ramps at the northeast end of the Torch Lake.

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 well for Houghton is 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. (See Section V, below)

Wetlands are located on the east portion of the Lake Linden tailing pile, on the eastern edge of the Hubbell tailing pile, around Boston Pond, and the eastern shore of Torch Lake. Two nests of bald eagles, which are designated as Endangered Species, are located on the northern side of Portage Lake. The Site does not lie within the 100 year flood-plain. The Quincy Mining Company Historic District and Calumet Historic District, which were proposed as a National Historical Park in September 1987, are located within the Site.

While most of the area of the various tailing piles are barren and unused, there is some development on the tailing piles. 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 set aside 12 acres on the Isle-Royale tailings to construct a sewage treatment plant. Construction of the plant is on-going. 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 homes located on Isle-Royale tailing are estimated to cover 10 acres of surface area. The City of Houghton indicated that the City has a plan to develop approximately 90 acres of Isle-Royale tailings into a residential area. The plan includes covering the tailings with two feet of clean soils and is expected to be implemented within the next five years. The Houghton County Road Commission is currently using tailing materials, approximately 46 acres at Grosse-Point, to spread on the roads during winter to provide traction for motor vehicles. Tailings also had been used in the past as a base for road construction because of good drainage characteristics.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Torch Lake was the site of copper milling and smelting facilities and operations for over 100 years. The lake was a repository of milling wastes, and served as the waterway for transportation to support the mining industry. The first mill opened on Torch Lake in 1868. At the mills, copper was extracted by crushing or "stamping" the rock into smaller pieces, grinding the pieces, and driving them through successively smaller meshes. The copper and crushed rock were separated by gravimetric sorting in a liquid medium. The copper was sent to a smelter. The crushed rock particles, called "tailings," were discarded along with mill processing water, typically by pumping into the lakes.

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 west 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, recrushed, 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. In the 1950s, copper mills were still active, but by the late 1960s, copper milling had ceased.

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 tailings were dumped into Torch Lake filling at least 20 percent of the lake's original volume.

In June 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 that discoloration of several acres of lake bottom indicated previous discharges.

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. The International Joint Commission Water Quality Board designated Torch Lake as a Great Lakes Area of Concern in 1983. Also in 1983, the Michigan Department of Public Health announced an advisory against the consumption of Torch Lake sauger and walleye. The Torch Lake site was proposed for inclusion on the National Priorities List (NPL) in October of 1984. The Site was placed on the NPL in June 1986. The Torch Lake site is also on the Act 307 Michigan Sites of Environmental Contamination Priority List.

A Draft Remedial Action Plan ("RAP") for Torch Lake was developed by MDNR in October, 1987 to address the contamination problems and to recommend the remedial action for Torch Lake. Revegetation of lakeshore tailings to minimize air-borne particulate matter was one of the recommended remedial actions in the RAP.

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 air particulate from tailings. It has been estimated that 40 to 50 percent of tailings in this area are vegetated. The Portage Lake Water and Sewage Authority has been spray-irrigating sewage sludge on tailings in Mason to promote natural vegetation.

On May 9, 1988, Remedial Investigation/Feasibility Study (RI/FS) Special Notice Letters were issued to Universal Oil Products (UOP) and Quincy Mining Co. UOP is the successor of Calumet Hecla Mining Company which operated its milling and smelting on the shore of Lake Linden and disposed 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 RI/FS 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 RI/FS at the Site.

Due to the size and complex nature of the Site, three Operable Units ("OUs") have been defined for the Site. Torch Lake and the surrounding shoreline comprise OU I and OU II. OU III consists of locations outside this area. Figure 3 shows the location of OU I and OU III. This ROD is being developed for Operable Units I and III.

OU I includes surface tailings, drums, and slag pile/beach on the western shore of Torch Lake. An estimated 440 acres of tailings are exposed surficially in OU I. A smaller deposit of smelter slag pile/beach, encompassing approximately 9 acres, is located near Hubbell, south of the Peninsula Reclamation Plant.

OU II includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Channel, and other water bodies at the Site.

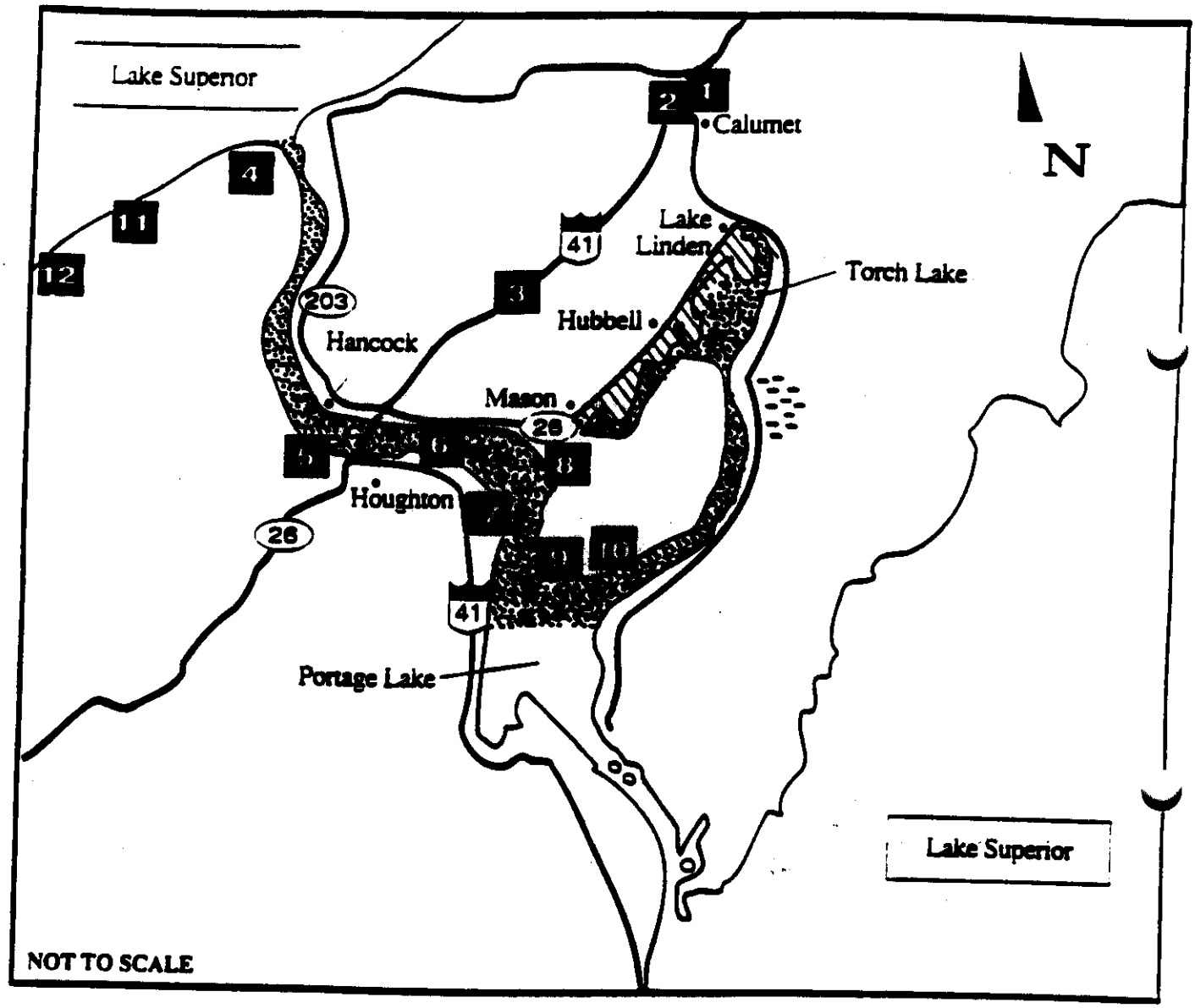
OU III includes tailings and slag deposits located in the north entry of Lake Superior, Michigan Smelter, Quincy Smelter, Calumet Lake, Isle-Royale, Boston Pond, and Grosse-Point. Figure 3 shows the locations of the OU III sampling locations. Quincy Smelter (Location 6) is part of the Quincy Mining Historic District which is proposed as the National Historical Park.

Depending on the boundary of the proposed National Historic Park for the Calumet Historic District, the Calumet Lake tailings (Location 1) might be part of the proposed National Historic Park.

The Remedial Investigations (RI) have been completed for all three operable units. The RI and Baseline Risk Assessment (BRA) reports for OU I were finalized in July 1991. The RI and BRA reports for OU III were finalized on February 7, 1992. The RI and BRA reports for OU II were finalized in April 1992. The Ecological Assessment for the Site was finalized in May 1992. The Feasibility Study (FS) and Proposed Plan which contains the U.S. EPA's recommended remedy for OU I and III were issued to the public on May 1, 1992. U.S. EPA is currently evaluating the scope of FS for OU II, and the FS and Proposed Plan for OU II are expected to be issued to the public in late Fall of 1993.

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 subbottom profile (seismic) survey of the lake bottom. The area in which this survey was conducted is immediately off-shore from the old 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. 808 empty drums were found in the lake bottom. 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 shore of Torch Lake. The removed drums and soils were sampled, overpacked, and disposed off-site at a hazardous waste landfill.

Figure 3
Torch Lake Site
Operable Unit III Locations



1 = Calumet Lake/Copper City
2 = Calumet Poor Rock
3 = Boston Pond
4 = North Entry
5 = Atlantic Stamp Mill/Michigan Smelter
6 = Quincy Smelter
7 = Isle Royale Stamp Mill
8 = Clark Mine/Lake Superior
9 = Gross Point (Franklin Stamp Mill)
10 = Gross Point (Arcadian/Centennial Stamp Mill)
11 = Baltic/Atlantic Stamp Mills
12 = Adventure/Trimountain/Champion Stamp Mills

III. COMMUNITY RELATIONS ACTIVITIES

A Community Relations Plan for the Site was finalized in July 1988. This document lists contacts and interested parties throughout the local government and community. It also establishes communication pathways to ensure timely dissemination of pertinent information.

An RI "Kickoff" meeting was held on August 8, 1989 to explain the RI process for the Site. A fact sheet was developed in conjunction with this meeting. Advertisements were placed in the Daily Mining Gazette and a press release was sent to all local media.

A public meeting was held on August 27, 1990 to explain the results of the OU I investigation and the scope of work for the OU II and III investigations. A fact sheet was developed in conjunction with this meeting. Advertisements were placed to announce the meeting and a press release was sent to all local media.

A public meeting was held on October 17, 1991 to update the investigation results for OUs II and III, and the drum removal activity. A fact sheet was developed in conjunction with this meeting. Advertisements were placed to announce the meeting and a press release was sent to all local media.

The RI/FS and the Proposed Plan for OUs I and III were released to the public in May 1992. All of these documents were made available in the information repositories maintained at the Lake Linden-Hubbell Public Library and Portage Lake District Library. An administrative record containing these documents and other site-related documents was placed at the Portage Lake District Library. The notice of availability of these documents was published in the Daily Mining Gazette on April 29, 1992. Press releases were also sent to all local media. A public comment period was held from May 1, 1992 to June 1, 1992. Requests for an extension of the comment period were made and the public comment period was extended until July 13, 1992. In addition, a public meeting was held on May 12, 1992 to present the results of the RI/FS and the recommended alternatives as presented in the Proposed Plan for the Site. All comments which were received by U.S. EPA during the public comment period, including those expressed verbally at the public meeting, are addressed in the Responsiveness Summary which is the third section of this ROD.

IV. SCOPE AND ROLE OF OPERABLE UNIT

As discussed in Section III, U.S. EPA has divided the Site into three operable units. Operable Unit I consists of surface tailings and the slag pile/beach, and disposed drums on the western shore of Torch Lake. Operable Unit II includes areas of potential contamination in and around Torch Lake, including groundwater, submerged tailings at the bottom of the lake, sediment, and surface water. Operable Unit III consists of 12 areas of tailings and slag

pile locations throughout the mid-Keweenaw Peninsula. Operable Units I and III are the subject of this Record of Decision.

U.S. EPA identified contaminated surface tailings and the slag piles/beach located in Operable Units I and III as potential risks to human health and the environment. To address these risks, U.S. EPA developed the following remedial objectives for Operable Units I and III based on the data obtained during the RI:

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.

This ROD was developed to meet these objectives and it addresses the contamination problems identified in Operable Units I and III. This response action is being implemented to protect human health and the environment from risks posed by the contamination problems.

This present response action, by addressing contaminated surface tailings and slag piles/beach in Operable Units I and III, is fully consistent with all future site investigation and cleanup work, including the on-going study in Operable Unit II. The contamination problems in and around Torch Lake, including groundwater, sediments, submerged tailings, surface water, and the risks posed thereby will be evaluated and addressed during Operable Unit II.

V. SITE CHARACTERISTICS

In November 1990 and January 1992, a Remedial Investigation (RI) report for Operable Unit I and Operable Unit III was completed. The RI for Operable Units I and III was to determine the nature and extent of contamination in the surface tailings and slag piles/beach deposited on the shore of Torch Lake and other water bodies at the Site, and evaluate possible exposure pathways. These reports summarized all sampling of the surface tailings and slag piles/beach, drums, residential soil, background soil, air monitoring, and site survey data that had been collected. In addition, a RI report for Operable Unit II was completed in January 1992. The RI for Operable Unit II was to determine the nature and extent of contamination in the groundwater, surface water,

submerged tailings, and sediments of Torch Lake and other water bodies in the Site. This report summarized all groundwater, surface water, and sediment data that had been collected. U.S. EPA also conducted long-term leachability tests for tailings, a fish reproduction study, a bald eagle and bird study, a bio-assay test for the sediment and surface water of Torch Lake, fish survey, wetlands identification study, Toxicity Characteristic Leaching Procedure (TCLP) test for tailings and the slag piles/beach, and a treatability study for soil cover with vegetation. These reports should be consulted for a more thorough description of the Site.

Although this ROD does not address the contamination problems for OU II, the data collected during the RI of OU II are discussed in order to determine the nature and extent of contamination problems in OU II caused by the contaminants located in Operable Unit I and III.

The following are the results of the RI at the Site:

- Based on the site survey activity conducted during the RI, the following acreage was estimated for each tailing and slag pile/beach:

		Area (acres)
OU I :	Lake Linden tailings	124
	Hubbell/Tamarack City tailings	121
	Mason tailings	197
	Hubbell slag pile/beach	9
OU III:	Calumet Lake tailings (location 1)	2
	Calumet Poor Rock (location 2)	-
	Boston Pond tailings (location 3)	65
	North Entry tailings (location 4)	46
	Michigan Smelter tailings (location 5)	23
	Quincy Smelter slag (location 6)	25
	Isle-Royale tailings (location 7)	223
	Dollar Bay slag (location 8)	28
	Grosse-Point tailings (location 9)	63
	Grosse-Point tailings (location 10)	94
	Redridge tailings (location 11)	85
	Freda tailings (location 12)	4

- An archive search was conducted to determine the type and source of tailings in OUs I and III. Based on this search, tailings were assigned to sectors which reflect uniqueness of tailing type and source. The tailings in OUs I and III are either red conglomerate or black amygdaloid tailings.

- Ambient air samples were collected in the Torch Lake area to determine the type and level of contaminants in the air released from tailing piles. Contaminants such as arsenic

(0.0016 $\mu g/m^3$), cadmium (0.0276 $\mu g/m^3$), and copper (0.202 $\mu g/m^3$) were detected in the air. The highest PM_{10} concentrations predicted by modeling was 42 $\mu g/m^3$ in OU I and 16 $\mu g/m^3$ in OU III. The National Ambient Air Quality Standard for PM_{10} is 50 $\mu g/m^3$. It should be noted that cadmium was not found in OU I tailings, but was found in OU III tailings.

Magnetometry and ground penetrating radar surveys were conducted on OU I tailings to locate buried drums. A geophysical survey utilizing a remotely operated vehicle to locate drums in the lake bottom was also conducted. Based on ground-surface geophysical survey data, 10 test pits were excavated in OU I tailings area. No drums were discovered. Drums exposed on the surface were sampled. One overturned and leaking drum contained 4,000 parts per million (ppm) of trichloroethylene. Composite samples from these drums indicate that these drums contained hazardous substances. A total of 82 drums and minor quantities of underlying soils, along with 28 drums containing unidentified materials from the bottom of Torch Lake, were removed from the shore of Torch Lake. The removed drums and soils were sampled, overpacked, and disposed off-site in a hazardous waste landfill.

- Prior to the field sampling, field monitoring was conducted to detect alpha/beta/gamma radiation using a Monitor 4 detector. No radiation readings above background were measured for any tailing sample.

- Composite samples were collected from tailings and slag pile/beach in OU I. Two classes of Semi-Volatile Organic Compounds (SVOCs), phthalates and polycyclic aromatic hydrocarbons (PAHs) and inorganic compounds were found in surface tailings and slag pile/beach in OU I. Bis(2-Ethylhexyl)phthalate (1.2 mg/kg), naphthalene (0.17 mg/kg), benzo(k)fluoranthene (0.56 mg/kg), benzo(a)pyrene (0.44 mg/kg), arsenic (8.3 mg/kg), chromium (46.3 mg/kg), copper (3,020 mg/kg), and lead (104 mg/kg) were found in OU I tailings. Bis(2-Ethylhexyl)phthalate (0.11 mg/kg), arsenic (118 mg/kg), chromium (649 mg/kg), copper (12,800 mg/kg), and lead (113 mg/kg) were found in OU I slag pile/beach. No PCBs or Pesticides were detected in OU I tailings (See Table 1).

Table 1

Summary of Chemicals of Potential Concern - Tailings and Slag Piles/Beach
Operable Units I and III

Maximum Concentration Detected						
Contaminants	OU I (mg/kg)		OU III (mg/kg)		BG (mg/kg)	Residence[4] (mg/kg)
Inorganics	Tailings[1]	Slag[2]	Tailings[3]	Slag[3]		
Aluminum	37,200	32,900	51,000	63,900	13,200	7,600
Antimony	11.7	10	23.2	164	10.5	ND
Arsenic	8.3	118	55.82	37.8	6.3	7
Barium	135	392	645	323	31.8	101
Beryllium	1.7	1.4	2.2	1.9	0.35	ND
Cadmium	ND	ND	9.8	13.9	0.69	1.40
Chromium	46.3	649	303	745	23.3	20.1
Cobalt	52.6	20.4	44.7	67.9	18.0	ND
Copper	4,360	12,800	13,100	13,500	1,670	459
Lead	104	113	63.6	27.1	52.6	329
Manganese	1,080	561	1,000	1,640	404	357
Mercury	1.1	0.12	0.14	0.21	0.20	0.47
Nickel	57.3	19.4	149	29.9	27.1	33.7
Silver	8.2	3.6	52.3	8.6	ND	ND
Thallium	ND	ND	0.43	ND	ND	ND
Vanadium	159	115	164	197	40.7	26.3
Organics						
bis(2-Ethylhexyl)phthalate	1.2	0.11	0.12	ND	925,000	3.8
Butylbenzylphthalate	ND	ND	ND	0.36	ND	0.110
Diethylphthalate	ND	ND	2.5	ND	ND	ND
Naphthalene	0.17	ND	ND	ND	5,000	0.071
2-Methylnaphthalene	0.24	ND	ND	ND	ND	0.054
Acenaphthylene	0.037	ND	ND	ND	ND	0.130
Phenanthrene	0.27	0.045	ND	ND	ND	1.9
Fluoranthene	0.4	0.081	ND	0.068	40	2.8
Pyrene	0.39	0.07	0.067	0.081	15	2.6
Chrysene	0.41	0.058	0.071	ND	5,000	1.6
Benzo(b)fluoranthene	0.56	0.042	0.07	ND	30	1.5
Benzo(k)fluoranthene	0.56	ND	0.07	ND	15	0.970
Benzo(a)pyrene	0.27	ND	ND	ND	8,000	1.6
Indeno(1,2,3-cd)pyrene	0.22	ND	ND	ND	15	0.630
Dibenzo(a,h)anthracene	0.079	ND	ND	ND	ND	0.290
Benzo(g,h,i)perylene	0.24	ND	ND	ND	20	0.670

BG:Background
ND:Not Detected
NA:Not Available
1: Samples collected from Surface Tailings (0-6 inches, does not include locations 6 or 8)
2: Collected from Hubbel Slag pile/beach
3: Samples collected from Quincy Smelter area (location 6)
4: Samples collected from residential backyards

- Composite samples were collected from tailings and slag pile in OU III. No SVOCs were detected above the Contract Required Quantification Limits (CRQL). Inorganic compounds such as arsenic (55.8 mg/kg), cadmium (13.9 mg/kg), chromium (745 mg/kg), copper (15,900 mg/kg), and lead (39.6 mg/kg) were detected in OU III tailings. Arsenic (150 mg/kg), and lead (63.6 mg/kg) were detected in OU III Quincy Smelter slag pile (See Table 1).

- Geotechnical analysis was done for tailings, and slag samples collected in OU I and III to determine moisture content, grain size distribution, Atterberg Limits, water holding capacity, volume calculations, and cation exchange capacity. The results of this analysis indicate that surface tailings in OU I are predominantly silty sands and poorly graded sand with silt. The most heavily vegetated tailings exhibit the greatest moisture content. Water holding capacity ranges from 22 to 43 percent.

- Eleven soil samples were collected from nine residential backyards and a football field in Lake Linden, Hubbell/ Tamarack City, and Mason to determine if contaminants from the tailings along the Torch Lake have impacted soil adjacent to or near the tailing sources. PAH compounds such as benzo(a)pyrene (1.6 mg/kg), pyrene (2.6 mg/kg), and inorganic compounds such as arsenic (7 mg/kg), chromium (20.1 mg/kg), copper (459 mg/kg), and lead (329 mg/kg) were detected in the residential soil. The U.S. EPA has determined that the level of these contaminants does not pose a significant threat to human health (See Table 1).

- Four soil background samples were collected from the Torch Lake area which were not affected by tailing deposition. Bis(2-ethylhexyl_phthalate (925 mg/kg), naphthalene (5 mg/kg), and benzo(b)fluoranthene (0.03 mg/kg) were detected in the background soil samples. Inorganic compounds such as arsenic (6.3 mg/kg), chromium (23.3 mg/kg), copper (1,670 mg/kg), and lead (52.6 mg/kg) were detected (See Table 1).

- TCLP tests were conducted for the tailings and slag pile/beach in OU I to determine the leachability of the contaminants in tailings and slag piles/beach. Cadmium, copper, and lead were detected in leachate above the background level.

- Eight groundwater monitoring wells were installed in the OU I tailings to evaluate groundwater flow direction and to determine if contaminants are leaching from the tailings into groundwater. Groundwater flow within OU I tailings is to the south-southeast with groundwater discharge to Torch Lake. Acetone (14 µg/l), bis(2-Ethylhexyl)phthalate (36 µg/l), arsenic (25.2 µg/l), chromium (119 µg/l), copper (6,150 µg/l),

and lead (30 µg/l) were detected in the groundwater. Two private wells, which are located north from the tailings, were sampled to determine the background groundwater levels. Copper (48.4 µg/l) was detected in the background groundwater. Arsenic, chromium, and lead were not detected in the background wells (See Table 2).

- Four private wells in the Torch Lake area, a municipal well in Mason's tailings, four private wells in the Dollar Bay area, three private wells in the Isle-Royale tailing area, and the municipal well of Houghton in Isle-Royale tailings were sampled to determine whether it is safe to drink from these wells. All contaminants detected were below health standards specified by U.S. EPA and the Michigan Department of Public Health (MDPH) (See Table 2).

- 25 surface water samples from Torch Lake, and 15 surface water samples from Keweenaw waterway were collected to determine the contaminant levels in the lakes. Arsenic (3.4 µg/l), copper (73.8 µg/l), lead (7.2 µg/l), and mercury (98 µg/l) were found in Torch Lake water. Arsenic (5.7 µg/l), copper (44.4 µg/l), and lead (41.1 µg/l) were found in Keweenaw Waterway. Surface water samples were collected from Lake Gogebic which is located 80 miles south-west from Torch Lake as background samples. Arsenic (2 µg/l) and lead (2.5 µg/l) were detected. Copper was not detected in the background lake sample (See Table 2). The contaminant level of arsenic, copper, lead, and mercury found in Torch Lake are above the human health and aquatic life protection criteria under the Clean Water Act.

- Based on a bathymetric survey conducted on Torch Lake, 25 sediment samples were collected from Torch Lake where tailing deposition had occurred. In addition, 15 sediment samples were collected from Keweenaw Waterway. Arsenic (41.2 mg/kg), chromium (83.8 mg/kg), copper (3,760 mg/kg), and lead (187 mg/kg) were found in Torch Lake sediment samples (excluding SD9 and SD10). A hot-spot area near Peninsula Copper Inc. in Torch Lake was identified (samples SD9 and SD10). Arsenic (4,560 mg/kg), cadmium (57.2 mg/kg), chromium (179 mg/kg), copper (6,890 mg/kg), lead (2,240 mg/kg), and aroclor-1254 (1,800 µg/kg) were detected in the hot-spot. Arsenic (311 mg/kg), chromium (124 mg/kg), copper (4,200 mg/kg), and lead (93.6 mg/kg) were found in the Keweenaw Waterway. Arsenic (5.6 mg/kg), chromium (16.8 mg/kg), copper (47.6 mg/kg), and lead (27 mg/kg) were found in Lake Gogebic. Cadmium and Mercury were not found in Lake Gogebic (See Table 3).

Table 2

Summary of Chemicals of Potential Concern
Surface Water and Groundwater in Torch Lake

Maximum Concentration Detected						
Contaminants	Surface Water (ug/l)			Groundwater (ug/l)		
Inorganics	Torch Lake	Keweenaw Waterway	BG	Torch Lake area	BG	Residential
Aluminum	958	178	57.6	84,300	76.4	50.2
Antimony	27.8	ND	ND	31	ND	3.0
Arsenic	3.4	5.7	2	25.2	ND	4.5
Barium	66.4	18.4	15.8	1,320	118	145
Beryllium	ND	ND	ND	2.2	ND	1.0
Cadmium	11.1	ND	ND	3.7	0.33	0.10
Chromium	8.8	ND	ND	119	ND	6.0
Cobalt	4	ND	ND	117	ND	8.0
Copper	73.8	44.4	ND	6,150	48.4	154
Lead	7.2	1.2	2.5	39	ND	1.0
Manganese	100	48	14.2	3,730	73.3	137
Mercury	98	ND	ND	ND	ND	0.20
Nickel	26.5	206	ND	131	ND	13.0
Potassium	2,200	ND	ND	7,820	NA	3,030
Selenium	3.3	ND	ND	10.6	NA	2.0
Silver	ND	ND	ND	ND	ND	3.0
Sodium	26,600	ND	2,000	104,000	NA	18,900
Thallium	ND	ND	ND	ND	NA	1.1
Vanadium	4.3	ND	ND	341	ND	7.0
Organics						
Acetone	25	ND	ND	14	ND	ND
bis(2-Ethylhexyl)phthalate	89	ND	ND	36	9	ND
Butylbenzylphthalate	6.0	ND	ND	ND	ND	ND
Diethylphthalate	NA	ND	ND	NA	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Acenaphthylene	NA	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	7	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND
Benzoic acid	ND	ND	ND	ND	ND	ND
Dibenzofuran	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND

BG:Background
ND:Not Detected
NA:Not Analyzed

Table 3

Summary of Chemicals of Potential Concern
Sediments in Torch Lake and Keweenaw Waterway

Maximum Concentration Detected (mg/kg)				
Contaminants	Torch Lake		Keweenaw Waterway	BG
Inorganics	All Samples	Excluding SD9 and SD10		
Aluminum	45,100	45,100	44,000	11,000
Antimony	28.4	28.4	21.8	ND
Arsenic	4,560	41.2	311	5.6
Barium	227	227	129	95.1
Beryllium	1.6	1.6	0.92	0.29
Cadmium	57.2	0.81	3.1	ND
Chromium	179	83.8	124	16.8
Cobalt	74.5	74.5	55.0	9.9
Copper	6,890	3,760	4,200	47.6
Iron	72,700	72,700	57,000	22,300
Lead	2,240	187	93.6	27
Manganese	3,310	3,310	1,250	459
Mercury	0.75	0.75	0.54	ND
Nickel	196	130	131	11.7
Silver	41.9	10.2	2.7	ND
Vanadium	199	199	149	42.3
Organics				
Acetone	ND	ND	260	0.048
Toluene	0.053	0.053	ND	0.002
bis(2-Ethylhexyl)phthalate	2.0	2.0	280	ND
Naphthalene	1.1	ND	ND	ND
2-Methylnaphthalene	0.73	ND	79	ND
Acenaphthene	6.7	ND	95	ND
Phenanthrene	53	0.49	1,400	ND
Fluoranthene	58	0.92	1,600	ND
Pyrene	50	1.3	1,600	ND
Benzo(a)anthracene	42	0.48	810	ND
Chrysene	30	0.6	940	ND
Benzo(b)fluoranthene	17	ND	1,400	ND
Benzo(k)fluoranthene	13	0.95	1,100	ND
Benzo(a)pyrene	33	ND	ND	ND
Indeno(1,2,3-cd)pyrene	12	ND	ND	ND
Dibenzo(a,h)anthracene	7.2	ND	ND	ND
Benzo(g,h,i)perylene	8.4	ND	ND	ND
Benzoic Acid	0.31	0.31	ND	ND
Dibenzofuran	4.1	ND	ND	ND
Phenol	0.47	0.18	ND	ND

BG:Background
ND:Not Detected

- A bio-assay test was conducted in the surface water samples from Torch Lake to determine the chronic effect of contaminants. The results of this test indicate that surface water of Torch Lake is not toxic relative to the test control. A bio-assay test also was conducted in the sediment samples from Torch Lake to determine both acute and toxic effect levels in the Torch Lake sediment. Lethal Concentration$_{50}$s (LC_{50}s) for copper as the sole contaminant was calculated as 498 parts per million (ppm) with a 95 percent confidence range of 480 ppm to 520 ppm. Most of sediment samples collected from Torch Lake and Keweenaw Waterway have higher copper concentration levels than LC_{50}s. The results of this sediment bio-assay test indicate that the vast majority of the sediments in Torch Lake are toxic and not able to support a normal benthic community.

- A reproduction study was conducted in bald eagles and gulls nested in the Portage Lake and Torch Lake areas to determine whether bald eagles and gulls have been impacted by contaminants in the tailings. The reproduction study includes observation of food habits, and analysis of feather, egg, and blood. Based on the analytical chemistry results for copper, there does not appear to be any adverse reproductive effect on gulls or eagles that can be associated with exposure to copper in the tailings. Reproductive anomalies such as bill defects in two ring-billed gulls are usually attributed to PCB pollution in the Great Lakes.

- Reproduction by yellow perch was studied to determine if chronic exposure to elevated copper concentrations in Torch Lake has reduced the reproductive success of yellow perch. The results of this study indicate that copper concentration in Torch Lake did not significantly reduce hatching success. Duration of hatching was significantly longer for Torch Lake egg masses than was for reference lake egg masses, indicating that copper may be affecting hatching rates.

- In 1988, 458 fish were collected from the Torch Lake and Portage Lake and analyzed to determine the presence of fish contaminants and tumors. Only four of the 56 fish analyzed for mercury had concentrations that exceeded the 0.5 mg/kg consumption advisory action limit and none exceeded 1.0 mg/kg. No internal or external growth anomalies were observed among the 458 fish collected. No liver neoplasms (cancerous growths) were found among the 47 walleyes collected. Saugers were not collected in 1988 following an extended period of population decline which began in the 1960's.

- A treatability study is currently being conducted by the Soil Conservation Service to determine the effectiveness of soil cover with vegetation in the tailings and slag pile/beach.

The preliminary results of this study indicate that 4 to 6 inches of sandy loam soils with a grass/legume mixture would be necessary in the non-vegetated area to achieve the remediation objectives. The study also indicates that a good maintenance program such as mulching, fertilizing, and irrigation would be necessary to increase the effectiveness of soil cover with vegetation.

- A study was conducted to identify the wetlands located at the Site. The study indicates that wetlands are located in the Boston Pond, Lake Linden, Hubbell and Portage Canal.

It should be noted that one composite sample per 10 acres for OU I tailing and one composite sample per 20 acres for OU III tailings were collected. Composite samples consisted of 4 subsamples collected. This small number of samples is based on the assessment that the tailings would be homogeneous in terms of their origin and chemical contents. However, based on the finding of hot-spots in the sediment, the disposal practice of waste in the tailings, and the detection of cadmium in the air but not in OU I tailings, it is possible that concentrations in the tailings would be higher if the sampling size was increased.

VI. SUMMARY OF SITE RISKS

The baseline risk assessments for OUs I and III were conducted to characterize the current and 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. Both current and potential future use conditions were examined in the baseline risk assessment. Under current conditions, the Site was assessed in the absence of any remedial action for tailings and slag piles/beach.

A risk assessment consists of four primary parts: identifying chemicals of potential concern; assessing pathways through which humans, plants, and animals could be exposed to contamination; assessing the toxicity of the contaminants; and characterizing cancerous and non-cancerous health effects on humans.

a. Human Health Risks

1. Contaminant Identification

The first step of the risk assessment was to select chemicals of potential concern for detailed evaluation. This was conducted by summarizing and evaluating RI data, including a consideration of the presence of chemicals in blank samples. Based on this evaluation, 31 chemicals of potential concern were selected for detailed assessment for OU I. These chemicals were considered most

likely to be of concern to human health and environment. The following compounds were selected as the chemicals of potential concern for OU I;

Organic Compounds	Inorganics
bis(2-Ethylhexyl)phthalate	Aluminum
PAHs	Antimony
Naphthalene	Arsenic
2-Methylnaphthalene	Barium
Acenaphthylene	Beryllium
Phenanthrene	Boron
Fluoranthene	Chromium
Pyrene	Cobalt
Benzo(a)fluoranthene	Copper
Chrysene	Lead
Benzo(b)fluoranthene	Manganese
Benzo(k)fluoranthene	Mercury
Benzo(a)pyrene	Nickel
Indeno(1,2,3-cd)pyrene	Silver
Dibenzo(a,h)anthracene	Titanium
Benzo(g,h,i)perylene	Vanadium

The chemicals of concern for OU III includes cadmium and the inorganic compounds listed above (except for boron, titanium, iron and thallium) and 6 organic compounds (benzo(b)fluoranthene, benzo(k)fluoranthene, butylbenzylphthalate, chrysene, diethylphthalate, fluoranthene, pyrene, and bis(2-ethylhexyl)phthalate).

These contaminants were detected in tailings and slag piles/beach of OUs I and III. Table 1 identifies the maximum concentration of contaminants in tailings and slag piles/beach.

2. Exposure Assessment

An exposure assessment was conducted to identify potential pathways of exposure under both current and future site and surrounding land use conditions.

Exposure Scenarios for OU I

The exposure pathways quantified in the OU I baseline risk assessment for current and future populations are based on the following scenarios:

(a) Current Populations Exposure Pathways

- Adult and child residents in off-site dwellings exposed to tailings, slag, and particulate;
- Occupational populations (lagoon workers and sludge spreaders) exposed to tailings and particulate from the

tailings; and

- Adult and child campers exposed to tailings and particulate from the tailings.

(b) Future Populations Exposure Pathways

- Adult and child residents of on-site dwellings exposed to tailings and particulate from the tailings; and

- Adult and child residents of off-site dwelling exposed to tailings and particulate from tailings and slag.

For the ingestion of tailings by current and future residents, adult residents were assumed to weigh 70 kg and ingest 100 mg of tailings per day, 365 days per year and to live in the same location for 70 years of their 70-year expected lifetime. For the inhalation of air-borne contaminants by current and future residents, adult residents were assumed to weigh 70 kg and inhale 0.84 m^3 of air per hour. A frequency of exposure of 365 days per year, and a duration of exposure of 70 years were assumed.

Scenarios involving children consider children to be between the ages of 0 and 6 years old. Generally, children above 6 years old are assumed to ingest and inhale particulate on a per kilogram bodyweight basis which is similar to adults. The occupational populations represent workers at four existing sewage lagoons in Lake Linden and Tamarack City and workers currently spreading sewage sludge on tailings in Mason.

The upper bound (95% confidence limit) of the arithmetic average of concentration of contaminants of concern at each assumed exposure location was used for tailings and slag piles/beach to calculate the risk. For the inhalation exposures, the exposure point concentrations were calculated using air emission and transport models.

Exposure Scenarios for OU III

The exposure pathways quantified in the OU III baseline risk assessment for both current and future populations are based on the following scenarios:

(a) Current Populations Exposure Pathways

- Adult residents of on-site dwellings exposed to tailings and tailing particulate at the Isle-Royale tailings;
- Adults scavenging in areas of OU III exposed to tailings;
- Teenagers scavenging in areas of OU III exposed to tailings and tailing particulate;
- Workers exposed to tailings and tailing particulate; and
- Adult and child visitors exposed to tailings and tailing

particulate.

(b) Future Populations Exposure Pathways

- Adult and child residents of on-site dwellings exposed to tailings and tailings particulate; and
- Workers exposed to tailings.

(c) Future National Park Scenario

- Visitors and workers exposed to slag.

The human activity patterns and physical features of each area were evaluated to determine the exposure pathways likely to occur at each location. The OU III Baseline Risk assessment included the exposure pathway of "Teenage Scavenger". This separate scenario is predicated on the exposure of teenagers (considered adults for other exposure scenarios) to tailings based on their likely social/leisure activities which may be around tailings and/or slag piles. The same exposure factor assumptions were made as in OU I.

3. Toxicity Assessment

The purpose of the toxicity assessment is to evaluate the available evidence regarding the potential for a chemical to cause adverse health effects. This evidence, initially derived through the research of the potential cancerous and non-cancerous health effects (i.e. toxicity) of individual chemicals, is subsequently obtainable and can be employed in the assessment of site-related contamination. In the research of a chemical's toxicity, the effects of low levels of chemical exposure on people in the workplace are studied over long periods of time. Also, test animals are studied in laboratories, where animals are exposed to varying levels of chemicals over different lengths of time.

Cancer slope factors have been developed by EPA's Carcinogen Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. Slope factors, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the cancer slope factor. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer slope factors are derived from the results of human epidemiological studies or chronic animal bioassays. Table 4 contains the cancer slope factors for carcinogenic contaminants of concern at the Site. The cancer risks resulting from these calculations are expressed in terms of the probability that an individual exposed for his or her entire lifetime will develop

cancer (i.e. one chance in one million = 1×10^{-6}, one chance in one thousand = 1×10^{-3}). Typically, excess cancer risks of 1×10^{-6} or lower are considered acceptable, while higher excess cancer risk levels may be cause for concern. U.S. EPA has the discretion to select remedies resulting in upperbound cancer risks that fall within a range of 1×10^{-4} to 1×10^{-6} based on site-specific factors. A cancer risk of 1×10^{-6} serves as the point of departure for U.S. EPA's cancer risk goal when selecting a remedy.

Reference doses (RfDs) have been developed by U.S. EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of the daily exposure to the human population (including sensitive subpopulations) that is likely to be without an appreciable risk of deleterious effects during a chronic or subchronic exposure duration. RfDs are derived from human epidemiological studies or animal studies; uncertainty factors are applied to help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects. The reference doses for contaminants of concern at this Site are specified in Table 4.

4. Risk Characterization

OU I Cancer Risks

A summary of cancer risks is presented in Table 5. The OU I risk assessment results showed that cancer risks to all current residential populations are equal to or below 1×10^{-6} except in the vicinity of the Hubbell slag pile and slag beach. Cancer risks for these current residents are 9×10^{-6} (inhalation and ingestion at slag beach) and 9×10^{-5} (inhalation and ingestion at slag pile) for a combined excess cancer risk of 1×10^{-4}. However, due to the nature of the slag and snow cover, this area does not present an unacceptable health risk to humans. Total cancer risks for future residents at tailings in Lake Linden, Hubbell/Tamarack City, and Mason range from 8×10^{-6} to 3×10^{-5}. The risks are attributable primarily to arsenic, beryllium, and chromium. As indicated in the table, cancer risks for children are generally less than cancer risks for adults.

Risks to lagoon workers range from 8×10^{-6} to 1×10^{-5}. This risk is attributable primarily to ingestion of tailings containing arsenic and beryllium.

OU I Non-Cancer Risks

A hazard index, determined by summing the hazard quotients (HQs) for each chemical, greater than one indicates that some possibility that non-cancer, chronic or subchronic health effects exists. Chronic hazard indices do not exceed 1.0 for any exposure pathway

evaluated in OU I. Subchronic hazard indices exceed 1.0 for exposure pathways involving children at the Lake Linden Campground, at current residences near the slag pile/beach, and future residences assumed to be built on the tailings piles. Chemicals contributing to these hazard indices include antimony, arsenic, barium, chromium, copper, manganese and vanadium. However, since these chemicals impact different systems and organs in the human body, it is appropriate to evaluate each chemical separately. In only one instance did any chemical exceed an HQ of 1.0. At the slag pile and beach, both copper and arsenic had an HQ of approximately 2.0 for a current child resident. For the other two exposure pathways involving children, listed above, which have subchronic hazard indices which exceed 1.0, copper was the dominant compound contributing to the hazard indices calculations for ingestion of contaminants. For a future child resident at Mason, a subchronic inhalation risk was driven by manganese and chromium. A summary of subchronic non-cancer risks is presented in Table 5. U.S. EPA has determined that, except at the slag pile/beach, OU I does not present an unacceptable non-cancer health risk to humans.

OU III Cancer Risks

Estimated cancer risks from exposures to the chemicals of potential concern at Torch Lake OU III for current and future populations are summarized in Table 6.

Cancer risks which exceeded 1×10^{-6} for OU III are primarily attributed to the ingestion of tailings by current or future adult or child residents at all of the OU III locations. Estimated excess cancer risks for current populations range from 3×10^{-6} to 9×10^{-5}. Cancer risks exceed 1×10^{-6} for current residents at Isle-Royale, Gross Point, and Lake Superior shoreline, for current workers at Isle-Royale and Quincy Smelter, and visitors (adult and child) to Boston Pond and North entry of Lake Superior. The estimated risks for future residents range from 1×10^{-5} to 2×10^{-4}. Cancer risks exceed 1×10^{-6} for hypothetical future residents (adults and children) at all areas evaluated, however, only one location, Michigan Smelter, presents an unacceptable cancer risk (2×10^{-4}). Chemicals contributing to these risks are mainly arsenic and beryllium via ingestion of contaminated tailing and slag. Inhalation of air-borne chromium contaminated materials also contributes to the risk in those areas where this pathway was evaluated.

Estimated cancer risks to workers range from 2×10^{-7} to 1×10^{-5} and for scavengers and visitors, risks range from 3×10^{-8} to 8×10^{-6}.

OU III Non-Cancer Risks

Ingestion of tailings by current or future child residents poses most of the potential non-cancer risks. Subchronic hazard indices

calculated for the OU III exposure scenarios are summarized in Table 6.

Subchronic health hazards (hazard indices greater than 1.0) were calculated for current child residents at locations 7, 9, 10, 11, and 12 and for future child residents at all other areas. These risks are due principally to ingestion of tailings or slag containing antimony, arsenic, copper and vanadium. Copper is the most pronounced contaminant contributing to these hazard indices, with hazard quotients greater than 1.0 for current child residents at location 12 and for future child residents at locations 1, 3, 4, 5, 6, and 8. Arsenic has an HQ of 2.0 for a future resident child at location 5 and antimony has an HQ of 5.0 for a future resident child at location 6.

The only calculated chronic hazard index which exceeds 1.0 is for future adult residents at location 6. The chemicals contributing to this hazard index include antimony, copper and chromium, although no single chemical contributed an HQ greater than 1.0.

OU III National Park Scenario

Because location 6 (Quincy Smelter area) is a part of the Quincy Mining Company Historic District which is proposed for inclusion in the National Historical Park, an exposure pathway was formulated to investigate the potential risks to future populations who might be exposed to the slag pile deposited at the Quincy Smelting area if this area were developed as a National Historical Park.

The potentially exposed populations at a national historical park are visitors to the park (adults and children) and workers at the site, including guides, caretakers and administrative personnel. Considering the location of the site and the proposed development of the Quincy smelting works, local residents may visit the park with their children for picnicking and/or other recreational activities.

Of the several types of workers at the site, the caretaker is likely to have the greater exposure. This individual is assumed to work outdoors during the five months of the year without snow cover and indoors during the remaining months. He is assumed to engage in activities (cleaning, building maintenance, etc.) which involve direct or indirect contact with tailings.

The estimated cancer risks for visitors to the Quincy Smelting area are 3×10^{-6} for both adults and children and the risk to workers is 2×10^{-5}. Arsenic is the major contributor to these risks. Hazard index (HI) values (subchronic an chronic) calculated for all populations are less than 1.0, indicating that noncarcinogenic health effects are not of concern.

Depending on the boundary line of the Calumet Historic District, location 1 (Calumet Lake tailings) would be a part of the proposed National Historic Park. It is estimated that the cancer risk from the tailings located in Calumet Lake, if developed as a National Historic Park in the future, is less than 1×10^{-6} and non-cancer risk is less than 1.0. This estimation is based on the extrapolation from the risk data for a current exposure scenario. However, the release of tailing materials from this location to the lake would continue.

Table 4

Toxicity Values for Contaminants of Potential Concern
Operable Units I and III - Torch Lake

Contaminants	Oral			Inhalation		
Inorganics	RfDs	RfDc	SF	RfDs	RfDc	SF
Aluminum	NA	NA	NA	NA	NA	NA
Antimony	4.0×10^{-4}	4.0×10^{-4}	NA	NA	NA	NA
Arsenic	1.0×10^{-3}	3.0×10^{-4}	1.75	NA	NA	15
Barium	5.0×10^{-2}	7.0×10^{-2}	NA	1.0×10^{-3}	1.0×10^{-4}	NA
Beryllium	5.0×10^{-3}	5.0×10^{-3}	4.3	NA	NA	8.4
Boron	9.0×10^{-2}	9.0×10^{-2}	NA	NA	NA	NA
Chromium	2.0×10^{-2}	5.0×10^{-3}	NA	5.7×10^{-6}	5.7×10^{-7}	42
Cobalt	NA	NA	NA	NA	NA	NA
Copper	4.0×10^{-2}	4.0×10^{-2}	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA
Manganese	5.0×10^{-1}	0.2	NA	1.1×10^{-4}	1.1×10^{-4}	NA
Mercury	3.0×10^{-4}	3.0×10^{-4}	NA	8.6×10^{-5}	8.6×10^{-5}	NA
Nickel	2.0×10^{-2}	2.0×10^{-2}	NA	NA	NA	8.4×10^{-1}
Silver	3.0×10^{-3}	3.0×10^{-3}	NA	NA	NA	NA
Titanium	NA	NA	NA	NA	NA	NA
Vanadium	7.0×10^{-3}	7.0×10^{-3}	NA	NA	NA	NA
Organics						
Acenaphthylene[1]	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	11.5	NA	NA	6.1
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene[2]	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene[1,2]	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene[1,2]	NA	NA	NA	NA	NA	NA
Chrysene[1,2]	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene[2]	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	2.0×10^{-2}	2.0×10^{-2}	1.4×10^{-2}	NA	NA	NA
Fluoranthene	4.0×10^{-1}	4.0×10^{-2}	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene[1]	NA	NA	NA	NA	NA	NA
Naphthalene	4.0×10^{-1}	4.0×10^{-1}	NA	NA	NA	NA
Phenanthrene[1]	NA	NA	NA	NA	NA	NA
Pyrene	3.0×10^{-1}	3.0×10^{-2}	NA	NA	NA	NA

Toxicity Values: RfDs-Subchronic Reference Dose (mg/kg-day)
RfDc-Chronic Reference Dose (mg/kg-day)
SF- Slope Factor $(mg/kg\text{-}day)^{-1}$

NA- No value available

1: Noncarcinogenic effects of this PAH evaluated using the RfD for napthalene.

2: Carcinogenic effects of this PAH evaluated using the SF for benzo(a)pyrene.

Table 5
Summary of Cancer and Non-Cancer Subchronic Risk
Operable Unit I - Torch Lake

Exposure Pathway	Cancer Risk	Non-Cancer Risk (Hazard Index)
Current Resident		
Lake Linden (Inhalation)	3×10^{-7}	0.03
Hubbell/Tamarack City (Inhalation)	2×10^{-7}	0.01
Mason (Inhalation)	1×10^{-6}	0.1
Hubbell Slag (Ingestion & Inhalation)	1×10^{-4}	4.0
Future Resident		
Lake Linden (Inhalation and Ingestion)	2×10^{-5}	2.0*
Hubbell/Tamarack City	1×10^{-5}	1.0
Mason	3×10^{-5}	3.0*
Camper for Children		
Lake Linden	8×10^{-7}	3.0*
Workers		
Lake Linden	1×10^{-5}	0.4
Hubbell/Tamarack City	8×10^{-6}	0.3
Mason	6×10^{-7}	0.06

* : Although Hazard Index exceeds 1.0, no individual Hazard Quotient exceeds 1.0.

Table 6
Summary of Cancer and Non-Cancer Subchronic Risk
Operable Unit III - Torch Lake

Exposure Pathway	Cancer Risk	Non-Cancer Risk (Hazard Index)
Current Resident		
Isle-Royale (location 7)	6×10^{-5}	2.0*
Grosse-Point (location 9)	3×10^{-5}	2.0*
Grosse-Point (location 10)	4×10^{-5}	2.0*
Redridge (location 11)	9×10^{-5}	2.0*
Freda (location 12)	3×10^{-5}	3.0
Future Resident		
Calumet Lake (location 1)	3×10^{-5}	4.0
Calumet Poor Rock (location 2)	6×10^{-5}	2.0*
Boston Pond (location 3)	3×10^{-5}	3.0
North Entry (location 4)	1×10^{-4}	3.0
Michigan Smelter (location 5)	2×10^{-4}	5.0
Quincy Smelter (location 6)	1×10^{-4}	10
Dollar Bay (location 8)	1×10^{-4}	7.0
Worker		
Calumet Poor Rock (location 2)	2×10^{-7}	0.005
Quincy Smelter (location 6)	9×10^{-7}	0.9
Isle-Royale (location 7)	1×10^{-5}	NA
Dollar Bay (location 8)	8×10^{-7}	0.5
Teenage Scavenger		
Calumet Lake (location 1)	3×10^{-8}	0.02
Michigan Smelter (location 5)	2×10^{-7}	0.03
Quincy Smelter (location 6)	1×10^{-7}	0.06
Dollar Bay (location 8)	1×10^{-7}	0.04
National Park Scenario		
Quincy Smelter (location 6)	2×10^{-5}	0.5

NA: Value not Available
* : Although Hazard Index exceeds 1.0, no individual Hazard Quotient exceeds 1.0.

5. Ecological Assessment

As part of the Baseline Risk Assessment, an environmental evaluation, or ecological assessment, was conducted. The Ecological Assessment identified terrestrial, wetland and aquatic environments as potentially affected by the tailings in and around the lakes.

(a) Adverse Effects in the Terrestrial Environment

Although well established and healthy plant communities exist in areas surrounding tailing deposits, most of the tailings remain barren. Pioneer vegetation is conspicuously absent except in localized, isolated patches where streams flow through tailings, along wooded edges of deposits, and in depressions where moisture and organic matter accumulate. Plant survival and growth on tailings are impaired by a combination of chemical and non-chemical stresses, including poor water retention, extreme temperature fluctuation, low organic content, and presence of toxic substances. Studies have shown that high levels of copper inhibit vascular development in some plants (Strieleman 1979).

Six species of plants classified as State threatened or of special concern have been recorded in the vicinity of tailings deposits. Several are shoreline species or have habitat requirements which increase the likelihood that the species may be exposed to tailing deposits. Populations of these species have not been investigated to determine whether adverse effects from exposure to tailings are occurring or tailings deposits have destroyed their habitat in the study area.

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.

(b) Adverse Effects in Wetlands

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.

Failure of wetlands to develop on tailing deposits in Torch Lake is a serious problem. Large areas of the Torch Lake shoreline where water is sufficiently shallow and suitable for growth of wetland plants are devoid of wetland communities. The reasons for failure of wetland vegetation to become established along shoreline areas

of Torch Lake have not been investigated, but substrate and surface water toxicity are likely to be involved. Ionic copper is likely to be the toxic factor.

The loss of wetland habitat in Torch Lake is likely to impact a number of migratory and residential animal populations that use this type of habitat for resting, feeding, and breeding at other locations.

(c) Adverse Effects in Aquatic Environments

Severe degradation of benthic communities is the most significant impact associated with tailing deposits and contaminated sediments in Torch Lake and other surface waters 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 would impact the entire food web. Data is available to indicate that most of Torch Lake, the northern 6 miles of the Portage Lake Shipping Canal and nearshore areas of Lake Superior between Redridge and the North Entry suffer these adverse effects (Charters 1991, Leddy 1984, Malueg et al. 1984b). Field and laboratory studies indicate that toxicity due primarily to elevated copper concentrations in sediments is responsible for observed environmental degradation.

Very few locations where sediment was sampled in Torch Lake have sediment copper concentrations that are below laboratory estimates of the LC_{50} (400 to 630 mg/kg) for Hyalella exposed to copper in contaminated sediment. These include three areas farthest removed from the tailing deposits: in the mouth of the Trap Rock River; near the mouth of the Trap Rock River; and in the south-central area of the lake near the entrance to drainage into Portage Lake. Extremely high concentrations of arsenic and lead in submerged tailings near Hubbell are likely to enhance copper toxicity, so this area represents the greatest risk to aquatic life in Torch Lake. All other areas of the lake where tailings have been deposited are likely to be too toxic for development of pollution intolerant benthic organisms.

All measurements of copper concentrations in samples from tailings at Boston Pond exceed the LC_{50}. Therefore, major reduction of benthic populations is expected at that location.

Other metals in tailings and contaminated sediment are likely to contribute to aquatic impacts in the study area. A series of benchmark sediment concentrations have been developed for evaluating biological effects of sediment contamination by the National Oceanic and Atmospheric Administration from data collected for the National Status and Trends Program. One of these, the Effects Range-Low (ER-L) is the lower ten percentile concentration of the range over which adverse effects have been observed at contaminated sites. A comparison of ER-Ls to Torch Lake sediment

concentrations indicates that most other metals are present at levels that have the potential to contribute to adverse biological effects in the Torch Lake ecosystem. This is not the case in Lake Gogebic, 60 miles to the southwest.

The extremely limited benthic communities in Torch Lake suggest the lake is below its full potential for supporting fish production. Plankton are assumed to provide a food base for a portion of the fish community in Torch and Portage Lakes. Data on plankton communities is too limited to estimate the productive potential provided by this portion of the aquatic ecosystem in the study area.

A major issue in evaluating adverse effects of contaminants on fish communities is reproduction of fish populations in Torch and Portage Lakes. Adult fish are likely to migrate extensively throughout the waterway. Data on fish migration and reproduction in the waterway are not available, so the relative contributions of exogenous and endogenous production cannot be evaluated. Hatching duration in perch eggs from Torch Lake are significantly longer than the hatching duration in eggs from a control lake. However, yellow perch are well represented in recent samples from Torch and Portage Lakes.

Fish may be reproducing along the eastern and southern shores of Torch Lake and in its tributaries. Areas where tailings deposits occur are unlikely to provide suitable habitat for breeding. Given the extensive area covered by tailings, it appears that Torch Lake now contains less suitable habitat for fish spawning than existed before tailings were deposited in the lake.

Tumors and accumulation of toxic chemicals are two adverse effects in fish populations attributed in the past to contamination in the lakes. Liver tumors in fish, once an obvious problem in the study area, were not observed in the most recent samples from Torch and Portage Lakes. Other types of tumors were not included in the examinations. Mercury, PCBs and 4-4'-DDE have been observed at trace levels in northern pike, smallmouth bass and walleye in recent samples from Torch Lake. These chemicals are likely to be associated with sources other than contaminated tailings.

Copper concentrations in surface water in Torch Lake generally exceed Federal acute and chronic ambient water quality criteria for protection of aquatic life. Aluminum, cadmium, iron, lead and mercury also exceed criteria for protection of aquatic life at one or more sampling locations. However, fish bioassays using the fathead minnow do not indicate that surface water in Torch Lake is toxic to fish. This lack of toxicity in bioassays may be due to complexation of metals by dissolved humic substances.

Study results indicate that the short-term reproductive biology of bald eagles and gulls nesting within the Site ecosystem appears

normal. The effect of copper on long term productivity is unclear. Long-term productivity data on the Portage Lake eagle nest indicated a poor reproductive history. However, poor productivity in eagles nesting near the Great Lakes has been associated with organochlorine and PCB contamination; making interpretation of the effects of other contaminants such as copper more difficult. Based on the analytical chemistry results for copper, there does not appear to be an adverse reproductive effect on gulls or eagles that can be associated with exposure to Torch Lake copper concentrations.

U.S. EPA has determined that actual or threatened releases of hazardous substances from this site, if not addressed by implementing the remedy selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VII. DESCRIPTION OF REMEDIAL ALTERNATIVES

Based on the results of the RIs and risk assessments for OUs I and III, a Feasibility Study was conducted to identify and evaluate a variety of alternatives for protecting human health and the environment from the contamination associated with tailings and slag piles/beach at the Site. After identifying and screening potential remedial technologies for the Site, two alternatives for the tailing piles and four alternatives for the slag piles/beach were selected for further evaluation. The selection of these six alternatives from various remedial technologies was based on the screening process considering the remediation goal, state-of art technology, technical impracticability, cost, volume of tailings to be addressed, contaminant levels, and the merit of the technology. Each of the alternatives is evaluated using a set of nine criteria that reflect the goals of the Superfund program and are used by U.S. EPA to compare the merits of each alternative. These criteria are explained in Section VIII.

Four locations in OU III are not being considered for further evaluation of alternatives at this time. These locations are Location 2, Calumet Poor Rock; Location 4, the North Entry to Lake Superior; and Locations 11 and 12 along the Lake Superior shoreline of the Keweenaw Peninsula. Location 2 is a site of disturbed but unprocessed rock piles which present no risk, and do not contain the properties of tailings or slag materials. Locations 4, 11, and 12 are along the Lake Superior shore where pounding waves and water currents will likely retard or destroy any remedial action. As a result, U.S. EPA currently believes it to be technically impracticable to implement the chosen remedy at these locations. However, a portion of the tailings at locations 4 and 12 may be sufficiently unaffected by the lake to effectively implement the soil cover and vegetation remedy. This possibility will be explored during Remedial Design. The poor rock and slag materials located upstream of Trap Rock river are also excluded because these

materials are unprocessed rocks.

Descriptions of the six alternatives considered by U.S. EPA are provided below, including costs, estimated in terms of capital cost and annual operation and maintenance cost. Together these two dollar amounts are converted to net present worth. U.S. EPA's evaluation of each remedial alternative using the evaluation criteria is summarized in Section VIII.

The alternatives considered for tailing piles in OUs I and III are:

Alternative T1: No Action.

Alternative T2: Soil cover with Vegetation.

The alternatives considered for slag piles/beach in OUs I and III are:

Alternative S1: No Action.

Alternative S2: Fencing.

Alternative S3: Soil cover with vegetation for slag pile/beach located in Hubbell.

Alternative S4: Excavation and Off-site Disposal.

A Description of each of these alternatives follows:

Alternative T1: No Action

U.S. EPA requires consideration of a no-action alternative to serve as a basis against which other remedial alternatives can be compared. The no action alternative involves no treatment or containment of the contaminants present in the tailings. Therefore, the potential risk to human health at a few of the tailing piles in OU III through the inhalation and ingestion pathways will remain the same. The environmental impact from the tailings will also remain the same.

Alternative T2: Soil Cover with Vegetation

Alternative T2 consists of installing a soil cover over the exposed tailings, and then vegetating the cover by seeding with appropriate native plant species. A maintenance program including mulching, fertilizing, and irrigating would be also implemented. Deed restrictions would be sought to control the use of tailing piles so that tailings will not be left, long term, in a state that will expose humans and animals to contaminants. Before the soil cover is installed, debris such as wood, empty drums, and other garbage in the tailing piles would be removed for off-site disposal in order to effectively implement the soil cover with vegetation.

The total area of tailing piles to be addressed under this alternative would be approximately 671 acres; 442 acres for OU I tailings and 229 acres for OU III tailings.

The costs for Alternative T2 for OUs I and III would be:

	OU I	OU III	Total
Capital Cost:	$3,297,500	$2,890,000	$6,187,500
Operation and Maintenance:	$ 50,000	$ 58,000	$ 108,000
Present Net Worth:	$3,146,000	$2,868,000	$6,014,000

The implementation time for this alternative would be 5 years. Operation and Maintenance includes 10 years of a maintenance program of planted vegetation such as mulching, fertilizing and irrigating.

(The total present net worth is lower than the capital cost because the placement of soil cover is estimated to take 5 years. The interest accrued over five years would cover the increased cost).

<u>Alternative S1:</u> No Action

The no action alternative, S1, for slag piles/beach involves no treatment or containment of the slag piles/beach. Therefore, the potential for these contaminants at a few of the slag piles in OU III to be ingested or to be released to air and inhaled by humans will continue to exist. The environmental impact from the slag pile should remain the same.

<u>Alternative S2:</u> Fencing

This alternative consists of a 4-foot high fence around the slag piles/beach located in OUs I and III, three strands of barbed wire, and warning signs to restrict access.

The perimeter of slag material to be fenced would be approximately 7,000 linear feet, 4,000 linear feet for OU I slag and 3,000 linear feet for OU III slag.

The costs for Alternative S2 are:

	OU I	OU III	Total
Capital Cost:	$ 30,000	$ 22,000	$ 52,000
Operation and Maintenance:	$ 300	$ 300	$ 600
Present Net Worth:	$ 34,000	$ 26,100	$ 60,100

The implementation time for this alternative would be 1 month.

<u>Alternative S3:</u> Soil Cover with Vegetation (Slag pile/beach in Hubbell)

Alternative S3 consists of installing a soil cover over the exposed slag pile/beach in Hubbell (OU I), and then vegetating the cover by seeding with appropriate native plant species. The maintenance program including mulching, fertilizing, and irrigating would be also implemented. Deed restrictions would be sought to prevent the use of slag pile/beach that will expose humans and animals to contaminants.

This alternative only applies to the slag piles/beach at Hubbell (OU I), and does not apply to the slag pile at the Quincy Smelter (Location 6, OU III) for the following reasons:

- The slag pile at Hubbell (OU I) is located in the middle of a residential area and therefore poses a greater risk of exposure to the residents living near the slag pile/beach at Hubbell than the Quincy slag pile which is located in an industrial area.
- The Hubbell slag pile (OU I) is amenable to the installation of soil cover and vegetation.
- The Quincy slag pile (OU III) is very steep and requires regrading before an effective soil cover can be installed.

The capital cost for implementing this alternative is $105,000 and operation and maintenance cost is anticipated to be $1,000. Present net worth is $112,400. The implementation time for this alternative would be 3 months.

<u>Alternative S4:</u> Excavation for off-site Disposal

This alternative consists of excavation of the slag piles/beach in OUs I and III, transportation of the excavated material, and disposal of the material in an off-site landfill.

Implementing this alternative should allow for unrestricted future development of the property on which the slag piles/beach are presently situated if it is determined that no institutional controls are required after slag removal.

The volume of slag materials to be addressed under this alternative would be approximately 236,000 cubic yards, 94,000 cubic yards for OU I slag and 141,000 cubic yards for OU III slag.

The costs for Alternative S4 for OUs I and III would be:

	OU I	OU III	Total
Capital Cost:	$4,463,000	$6,685,000	$11,148,000
Operation and Maintenance:	$ 0	$ 0	$ 0
Present Net Worth:	$4,463,000	$6,685,000	$11,148,000

The implementation time for this alternative would be 1 year.

VIII. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

A detailed analysis was performed on the six alternatives using the nine evaluation criteria in order to select control remedies for tailings and slag piles/beach. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These nine criteria are:

1) **Overall Protection of Human Health and the Environment**
2) **Compliance with Applicable or Relevant and Appropriate Requirements (ARAR's)**
3) **Long-Term Effectiveness and Permanence**
4) **Reduction of Toxicity, Mobility, or Volume through Treatment**
5) **Short-Term Effectiveness**
6) **Implementability**
7) **Cost**
8) **State Acceptance**
9) **Community Acceptance**

1. Overall Protection of Human Health and the Environment

Alternative T1 represents the no action alternative for the tailings. This alternative does not satisfy the requirement for overall protection of human health and the environment. Non-cancer risks at OU III Locations 1, 3 through 6, 8, and 12 were higher than acceptable levels due principally to copper and, at Location 5, arsenic. Alternative T1 will not mitigate these risks. Further, Alternative T1 will not address environmental harm.

Severe degradation of benthic communities and absence of wetlands in shallow areas are the most significant impacts associated with tailing deposits and contaminated sediments in Torch Lake and other surface waters in the area. Data is available to indicate that most of Torch Lake and the northern 6 miles of the Portage Lake Shipping Canal suffer these adverse affects. Reduction of productivity in fish populations is a possible secondary result of these impacts. Under a no-action alternative, degradation of the lake environment could continue. This may preclude the re-establishment of a more typical lake environment found in northern Michigan lakes.

Alternative T2 is protective of human health and the environment in those few areas where the risk to human health is unacceptable. Soil cover over exposed tailings will reduce or eliminate the potential risks due to the inhalation and ingestion pathways. Vegetation will control erosion of the soil cover. Alternative T2 will also minimize surface water run-off from the tailings and will reduce potential transport of contaminants into the lake. Thus, installing soil cover and vegetation would benefit the aquatic environment by substantially reducing the potential for contaminant

transport via surface water erosion of and air borne from tailings into the lake. The establishment of healthy vegetation will facilitate potential development of animal habitat by providing forage and cover for terrestrial animals.

Alternative S1 represents the no action alternative for the slag piles/beach. This alternative is not protective of human health for OU I slag. Contaminants would continue to be transported off-site by wind dispersion. The OU I slag piles/beach do not promote vegetation and could be detrimental to establishment of habitat in the future. The risk scenario for OU III slag is different as it is located in an industrial area. Under the National Historic Park scenario in which a national historic park will be developed, which includes Quincy Smelter (OU III, Location 6), in the future, risks to human health for potential visitors and workers are in the acceptable range. In addition, because the slag at this location is in a massive, vitrified form, it is not thought to be a contaminant source to the lake.

Alternative S2 includes fencing the slag piles/beach. Although fencing does not treat or contain contaminants, it reduces the risk of exposure to contaminants by limiting the opportunity for ingestion. Currently, unrestricted access permits certain areas of the slag piles/beach to be used for unauthorized dumping or other activities. Fencing will deter such activities and reduce associated exposure scenarios. In this way, Alternative S2 could be sufficiently protective of human health. However, contaminants would continue to be carried off-site by wind dispersion and the slag will not promote vegetation.

Alternative S3 will achieve the established remedial objectives because exposure to contaminants will be eliminated since the principle source of threat would be contained.

Alternative S4 will achieve the established remedial objectives and will protect human health because contaminants will be removed from the site. Risk associated with exposure to contaminants from the slag will be eliminated because the source of the threat will be removed from the site.

2. <u>Compliance with ARARs</u>

A detailed evaluation of ARARs pertaining to each tailing and slag pile/beach alternative is presented in the FS.

Alternative T2 complies with pertinent ARARs specific to this alternative. The Michigan Environmental Response Act 307 is an applicable requirement for this site. U.S. EPA has determined that this alternative complies with an Act 307 Type "C" cleanup. Under the MDNR's reading of Act 307, this ROD is to be considered an Act 307 interim remedy, as allowed by R 299.5509. U.S. EPA considers this remedy to be a final remedy for Operable Units I and III.

The Clean Air Act (CAA), 40 CFR Parts 50, 51 and Michigan Air Pollution Act 348 are relevant and appropriate because air-borne tailings dust generated during construction of the site cover could migrate through the air pathway which could affect human residents as well as environmental recipients of the contaminants including animals (including endangered species) and the lakes. During implementation, air sampling will be performed to monitor potential release of contaminants into the air. In addition, dust control measures will be employed to assure compliance with these ARARs.

The Protection of Wetlands Act and Michigan Act 203 (1974) are relevant and appropriate because of wetlands in OUs I and III which may be affected by Alternative T2. To comply with this ARAR, care will be taken to ensure that wetland areas are clearly delineated and protected from soil cover installation at all locations within OU I and OU III.

Alternative T2 will comply with the requirements of Michigan Act 347 (1972), Soil Erosion and Sedimentation Control Act.

Alternative S2 complies with the Federal ARARs. The State of Michigan has indicated that it believes that Alternative S2 does not meet Michigan Act 245, Act 348, or Act 307 Type C cleanup criteria triggered by this alternative. Fencing cannot prevent migration of contaminants via wind dispersion, groundwater movement, and/or surface water runoff. If this alternative were selected for slag materials, then a waiver of ARARs would potentially be needed.

Alternative S3 complies with all listed ARARs for Alternative T2. Alternative S4 complies with all applicable ARARs listed for Alternative T2 except that the Quincy Smelter historic area could be impaired.

3. <u>Long-Term Effectiveness and Permanence</u>

The evaluation of alternatives under this criterion address the risk remaining at the Torch Lake site at the conclusion of remedial activities and the ability of alternatives to maintain reliable protection of human health and the environment over time.

Alternative T1 provides no long-term protection and would allow the current conditions to remain at the Torch Lake site. Alternative T2 on the other hand, is effective because the contaminants would be contained, minimizing tailing erosion into the lake and enhancing the development of terrestrial habitat. Residual risk is minimal as long as the integrity of the soil cover is maintained.

Alternatives S1 provides no long-term effectiveness and would result in the elevated risk levels that currently exist where the slag piles/beach are located. Alternative S2 provides some degree of effectiveness because fencing will reduce the risk of exposure

to contaminants by ingestion. Alternative S3 will provide long-term effectiveness because it would reduce the risks of environmental harm and would reduce inhalation and ingestion of material from a few of the contaminated piles. Alternative S4 will provide long-term effectiveness because the source of contamination will be permanently removed from the site.

4. Reduction of Toxicity, Mobility and Volume through treatment

This criterion addresses the statutory preference for selecting remedial actions which use treatment technologies that permanently and significantly reduce toxicity, mobility or volume of contaminants. Because of the large area covered by the contaminants and the volume of material to be treated, potential remedial actions involving treatment were determined to be impractical for the Torch Lake site. Consequently, none of the proposed alternatives involve treatment of contaminants.

Alternative T1 does not reduce toxicity, mobility or volume of contaminants on-site. Alternative T2 also does not reduce toxicity or volume of the contaminants through treatment. However, this alternative reduces the release of the contaminants through the air, groundwater and lakes.

Alternatives S1, S2, S3, and S4 do not reduce toxicity, mobility or volume of contaminants through treatment. However, Alternative S4 eliminates the toxicity, mobility, or volume of contaminants with respect to the site via off-site shipment of slag to a landfill. Alternative S3 reduces the mobility of contaminants by reducing the potential for redistribution via wind, surface water runoff (erosion), or by water infiltration.

5. Short-Term Effectiveness

This criterion addresses the effects of the alternatives on human health and the environment during the construction and implementation phases. The short-term effectiveness period extends until the remedial response objectives are met.

This criterion is not applicable to Alternative T1 because no action will be taken. Alternative T2 will potentially generate short-term particulate emissions and noise. Dust control measures and development of health and safety plans are proposed as part of this alternative to minimize these hazards. Incidental noise pollution will be minimized by proper scheduling of work hours.

Alternative S1 poses no short-term hazards. Alternative S2 would need to include health and safety measures to protect workers installing the fence from exposure to contaminants. Alternatives S3 and S4 would need to include a health and safety plan, as well as dust control measures to control fugitive emissions. For Alternative S3, the soil cover can be placed within 1 year.

6. Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative, and the availability of various services and materials required for its implementation.

Alternative T1 involves no action and thus, no implementation. Alternative T2 can be readily implemented, except in those areas wherein U.S. EPA believes implementation to be technically impracticable, because installing a vegetated soil cover is an established technology and competitive bids can be obtained from many commercial vendors.

Alternative S1 requires no implementation because it represents the no action alternative. Alternatives S2 and S3 can both be implemented. Alternatives S3 and S4 are more difficult to implement than Alternative S2 because they require more detailed planning. Alternative S3 may be more efficiently implemented and cost-effective if Alternative T2 is also implemented. Because large quantities of slag have to be transported off-site for Alternative S4, landfill cells will have to be prepared in advance to receive the material.

7. Cost

For Alternative T2, a modified approach was adopted for present worth analysis. This alternative will require 5 years for implementation. Since contractors performing the remediation will require payment as services are rendered, the total capital expenditure was assumed to be received in five equal installments. The costs incurred in the second, third, fourth, and fifth years are adjusted to the base year by applying the appropriate present worth factor. Because the capital expenditure is distributed over 5 years, this approach for calculating present worth will result in a slightly lower present worth cost than would be obtained by assuming that all of the capital cost will be incurred at the end of 5 years. The O&M costs for Alternative T2 is expected to be incurred for only 10 years after which a full vegetative cover is anticipated to be established.

Alternative S4 is the most expensive and Alternative S1 is the least expensive.

See Section VII for detailed cost information of each alternative.

8. State Acceptance

The Michigan Department of Natural Resources (MDNR) concurs with the selected remedy.

9. Community Acceptance

The specific comments received and U.S. EPA's response are outlined in the attached Responsiveness Summary.

IX. THE SELECTED REMEDY

As provided in CERCLA and the NCP, and based upon the evaluation of the RI/FS and the nine criteria, the U.S. EPA, in consultation with the MDNR, has selected Alternative T2 for tailing piles in OU I and III, Alternative S3 for the Hubbell slag pile/beach and certain slag piles in OU I, and Alternative S1 for Quincy Smelter slag pile in OU III as the remedial action at the Torch Lake Site, Operable Units I and III.

These alternatives were selected for tailings and slag piles/beach located in OUs I and III of the Site based on the cancer risk to current and future residents from inhaling and ingesting certain tailings and slag piles/beach, the non-cancer risk from tailings and slag materials at certain tailing/slag piles in OU III, the adverse impact of the tailings on Torch Lake and other water bodies, the adverse impact of the tailing piles on the natural habitat surrounding Torch Lake, including the loss of wetlands, and the location of these contaminants in a Great Lake "Area of Concern". In addition, the selected alternatives provide the best balance of the nine evaluation criteria.

The major components of selected remedy include the following:

* Deed restrictions would be sought to control the use of tailing piles and slag piles/beach so that tailings and/or slag will not be left in a condition which will expose humans and animals to contaminants or increase the potential for run-off of contaminants into the lake;

* 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;

* Soil cover with vegetation over OU I tailings in Lake Linden (124 acres), Hubbell/Tamarack City (121 acres), and Mason (197 acres). OU I tailings was estimated as 442 acres;

* Soil cover with vegetation over OU III tailings in Calumet Lake (location 2, 2 acres), Boston Pond (location 3, 65 acres), Michigan Smelter (location 5, 23 acres), Dollar Bay slag pile (location 8, 28 acres), and Grosse-Point (location 9 and 10, 157 acres). OU III tailings were estimated as 229 acres;

* Soil cover with vegetation over OU I slag pile/beach in Hubbell. OU I slag pile/beach was estimated as 9 acres;

* The Isle-Royale tailings in OU III will be excluded from the

area to be covered with soil and vegetation under this ROD as follows:

- The portion of Isle-Royale tailings which is being developed as a sewage treatment plant will be excluded from the area to be covered with soil and vegetation under this ROD. 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. 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 this ROD. The completed sewage treatment facility will achieve the remedial objectives by reducing the release of contaminants into the air;

- The portion of the Isle-Royale tailings which is designated to be developed as a residential area will be excluded from the area to be covered with soil and vegetation under this ROD. 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 this 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 will be excluded from the area to be covered with soil and vegetation under this ROD. This area is estimated to be 60 acres. It is determined that the use of tailings as a storage area for cement blocks would somewhat achieve the remedial objectives by reducing the release of contaminants into the air. However, if any portion of the area is no longer to be used as a storage area, soil cover with vegetation must be implemented pursuant to this 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;

* The area designated by Houghton County Road Commission as source material to spread on the road during winter to provide traction for motor vehicles will be excluded from the area to be covered with soil and vegetation. This area is located in Grosse-Point and is estimated to be 46 acres. The tailing pile presents no unacceptable risk to human health. 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 pursuant to this ROD;

* No action for the OU III slag pile located in the Quincy Smelter area (location 6, approximately 25 acres), based on the assumption that this area will be developed as part of a National Historic Park. 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;

* The North Entry (location 4), Redridge (location 11) and Freda (location 12) tailings are excluded from the area to be covered under this ROD. 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, U.S. 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 U.S. EPA determines that any portion of these two 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 this ROD.

Estimated costs for implementing the selected remedies, based on an assumption of 442 acres of OU I tailings, 9 acres of OU I slag, and 290 acres of OU III tailings, are as follows:

<u>Capital Costs:</u>

Operable Unit I : $3,402,000
Operable Unit III : $2,890,000

<u>Annual Maintenance Costs:</u>

Operable Unit I : $51,000

Operable Unit III : $58,000

Present Net Worth:

Operable Unit I : $3,258,000
Operable Unit III : $2,868,000

Total Present Net Worth:

Operable Units I and III : $6,126,000

X. STATUTORY DETERMINATIONS

The selected remedy must satisfy the requirements of Section 121 of CERCLA to:

A. protect human health and environment;
B. comply with ARARs;
C. Be cost-effective;
D. Utilize permanent solutions and alternate treatment or resource recovery technologies to the maximum extent practicable; and,
E. Satisfy the preference for treatment as a principle element of the remedy or document in the ROD why the preference for treatment was not satisfied.

The implementation of the selected remedy at the Site satisfies the requirements of CERCLA as detailed below:

A. Protection of Human Health and the Environment

This selected remedy will provide adequate protection of human health and the environment through soil cover with vegetation.

Risk posed by contaminants in the tailings and slag piles/beach in OU I and in the few tailing/slag piles in OU III through direct contact and air inhalation will be reduced and controlled by soil cover and vegetation over tailings and slag pile/beach. The North Entry (location 4) and Freda (location 12) tailings do present a non-cancer health risk based on current (location 12) and future (location 4) residential scenarios, however these areas are excluded from the area to be covered under this ROD. Locations 4 and 12 are situated along the Lake Superior shore where pounding waves and water currents will likely retard or destroy any remedial actions. As a result, U.S. EPA currently believes it to be technically impracticable to implement the chosen remedy at these locations. However, portions of locations 4 and 12 may be sufficiently unaffected by wave activity such that soil coverage and vegetation may be possible. Therefore, during Remedial Design, location 4 and location 12 will be studied so as to determine whether the residential scenario, and therefore remedial action under this ROD, is appropriate for any portion of either area.

Obviously, areas which are subject to violent wave action could not be justifiably described as residential.

No unacceptable short-term risks will be caused by implementation of the remedy. Standard safety programs, such as monitoring, and use of protective equipment, should mitigate any short-term risks. Short-term risks include exposure of site workers and the community to dust particles, and to noise nuisance during implementation of the soil cover with vegetation. Ambient air monitoring would be conducted and appropriate safety measures would be taken if contaminants were emitted.

B. Compliance with ARARs

The selected Remedial Action for Operable Units I and III of the Site will comply with all Federal and more stringent State applicable or relevant and appropriate requirements.

U.S. EPA has determined that alternatives T2 and S3 comply with a Michigan Environmental Response Act 307 Type "C" cleanup. Under the MDNR's reading of Act 307, this ROD is to be considered an Act 307 interim remedy, as allowed by R 299.5509. U.S. EPA considers this remedy to be a final remedy for Operable Units I and III.

During implementation of Alternatives T2 and S3, air sampling will be performed to monitor potential release of contaminants into the air and dust control measures will be employed to meet compliance with CAA and Michigan Air Pollution Act 348.

Alternatives T2 and S3 shall be designed and implemented not to destroy, lose or injure the wetlands located at the Site in order to comply with Protection of Wetlands and Michigan Act 203.

The State has indicated that it believes the Michigan Solid Waste Act 641 (1979) to be an ARAR for this ROD. U.S. EPA does not concur with this assessment. First, U.S. EPA has determined that Act 641 is not applicable. Secondly, even if Act 641 may be relevant in that tailings and slag from copper mining may be considered a solid waste from an industrial process, U.S. EPA has determined that Act 641 is not appropriate in that an Act 641 cap is not well-suited to this site due to the size and situation of the areas addressed by this ROD.

The following ARARs are associated with the selected remedy for this site:

Chemical Specific

- Clean Air Act (CAA) 40 CFR 50.1-6,8,9,11 and 12.

- Michigan Environmental Response act 307 (1982), MCL 299.601 R

299.5101

- Michigan Air Pollution Control Act 348 (1965) Part 2,3,9 and 10

Action Specific

- Clean Air Act (CAA), 40 CFR Parts 50, 51
- Federal Protection of Wetlands Act, 40 CFR 6, APP.A
- Michigan Act 203 (1974), Wetland Protection Act
- Michigan Shoreland Protection and Management Act 245 (1970)
- Michigan Act 347 (1972), Soil Erosion and Sedimentation Control Act, MCL 282.101 R 323.1701
- Michigan Act 348 (1965), Parts 2, 3, 9, and 10, Air Pollution Act

Location Specific

- Archaeological and Historic Preservation Act, 40 CFR 6.301(c)/16 USC 469
- National Historic Preservation act, 40 CFR 6.301(b)/16 USC 470
- Historic Sites, Buildings and Antiquities Act, 40 CFR 6.301(a)/16 USC 461-467
- Fish and Wildlife Coordination Act, 40 CFR 6.302(g)/16 USC 1531-1566
- Endangered Species Act, 50 CFR Parts 17 and 402/16 USC 1531-1543
- Protection of Wetlands, 40 CFR 6 (App. A)
- Michigan Endangered Species Act 203 (1974), MCL 299.221 R299.1021
- Michigan Wetland Protection Act 203 (1979), MCL 281.701 R281.921
- Michigan Shoreland Protection and Management act 245 (1970), MCL 281.641
- Michigan Soil Erosion and Sedimentation Control act 347 (1972), MCL 282.101 R323.1701

The following regulations are identified as to be considered (TBC)

for this ROD:

- Occupational Safety and Health Act, 29 CFR 120
- Michigan Act 154, Rule 3301 (1974), Michigan Occupational Safety and Health Act.
- MCLA 257.722, Michigan Vehicle Code

C. Cost-Effectiveness

Cost-effectiveness compares the effectiveness of an alternative in proportion to its cost of providing its environmental benefits.

The selected remedy is cost-effective because it provides a high degree of overall effectiveness proportional to its costs. The estimated cost of the selected remedy is comparable with the other alternatives and assures a high degree of certainty that the remedy will be effective in the long-term due to the significant reduction of the risks due to the direct contact and air inhalation and of the release of contaminants into the environment.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy does not involve treatment technologies because any form of treatment for the tailings and slag piles/beach is not practicable or cost effective at this time. However, U.S. EPA believes and the State of Michigan concurs that the selected remedy represents the maximum extent to which permanent solutions can be utilized in a cost-effective manner for the remedial action at the Site. Soil cover with vegetation over tailings and slag pile/beach located at the Site will significantly reduce the risks posed through direct contact and air inhalation. The selected remedy would also reduce the release of tailings into the lakes through erosion, water infiltration, and air deposition. U.S. EPA has determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, short-term effectiveness, implementability, cost and State and community acceptance.

E. Preference for Treatment as a Principal Element

The risks to human health and the environment associated with Operable Units I and III of the Site are presented by the contaminated tailings and slag pile/beach.

Although treatment was not found to be practical, the selected remedy addresses these risks by installing soil cover with vegetation over contaminated tailings and slag pile/beach. The

groundwater, surface water, sediments, and associated biota at the Site will be addressed in an Operable Unit II ROD.

XI. DOCUMENTATION OF SIGNIFICANT CHANGES

After a careful review of the comments received from the public during the public comment period and public meeting, U.S. EPA has determined that the following areas should be excluded from the area to be covered with soil and vegetation under this ROD:

* The Isle-Royal tailings in OU III will be excluded as follows:

  - The portion of Isle-Royale tailings in OU III which is being developed as a sewage treatment plant. 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 this ROD;

  - The portion of the Isle-Royale tailings which is designated as an area to be developed as a residential area. 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 this ROD;

  - The portion of Isle-Royale tailings in OU III which is currently being used as source material to make cement blocks and as a finished block storage area for the Superior Block Company. 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 this 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; and

* The portion of the Grosse-Point tailings which is currently being used by the Houghton County Road Commission as source material to spread on the road during winter to provide traction for motor vehicles.

This area covers approximately 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 pursuant to this ROD

U.S. EPA has determined that the completed sewage treatment facility would achieve the remedial objectives by covering the tailings. The use of tailings as a cement block storage area would also somewhat achieve the remedial objectives by reducing the release of contaminants into the air. Therefore; U.S. EPA has determined to exclude the Isle-Royale tailings (as described above) from the area to be covered with soil and vegetation under this ROD. However, if the area is no longer used as a cement block storage area, soil cover with vegetation must be conducted under this 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.

The City of Houghton has indicated that the City has a plan to develop approximately 90 acres of Isle-Royale tailings into a residential area. This plan includes covering tailings with 2 feet of soils. It is expected to implement this plan within 5 years. Since this plan is similar to the remedy under this ROD, U.S. EPA has determined to exclude this 90 acre tract from the area to be covered with soil and vegetation in order to allow the local township to implement their plan. However, if this plan is not implemented within 5 years after the date that the Remedial Design is submitted, then the soil cover with vegetation under this ROD must be implemented.

It is also determined that the use of tailings from the Grosse-Point tailing pile as road-friction material over such a large area, given the limited time period of exposure involved, would not cause significant adverse impact to humans and/or the environment. Tailings spread on a road during the wet conditions of winter are unlikely to become airborne. Tailings would likely accumulate on the sides along the roads and become mixed with existing soil. In the Baseline Risk Assessment for OU III, the estimated cancer risks

in the Isle-Royale area, like the Grosse-Point area, were approximately 1×10^{-5}. This risk level is considered acceptable to humans. At Isle-Royale, tailings are excavated, vehicular traffic frequently resuspends the tailings, and the bare piles are subject to wind erosion. This activity results in acceptable risk at Isle-Royale. The mass of tailings expected to be taken from Grosse-Point and used in road spreading activities would be many orders of magnitude less than that from the Isle-Royale area. The risk to the environment from the tailings spread on the road would not be significant because the volume per area of tailings on the road would be small, and most of the tailings would settle near the road. Therefore, it is not expected that a large volume of tailings on the road would travel to water bodies and subsequently cause adverse effects to the environment. It is estimated that an additional 15 million dollars would be needed over the next ten years if the Houghton County Road Commission was required to find another source for road-friction material. Therefore, it is determined that the tailings in Grosse-Point can be used as road-friction material. However, the tailings area should be covered with enough soil to prevent the release of tailings into the air and the lake. Once any portion of the area has been excavated to a level seven feet above the water table (defined as the average of seasonal highs and lows over a two year period), excavation should cease, and that portion should either be covered with soil or covered with soil and vegetation. After completion of excavation of this entire area to a level seven feet above the water table, the area should be covered with soil and vegetation pursuant to this ROD.

The Proposed Plan excluded the slag/tailing pile located in the Dollar Bay area (Location 8) of OU III because of the nature of material and recent commerce activity. However, based on further assessment, it is determined that the slag/tailing pile is located outside of the commerce area and should be addressed under this ROD. Several homes are located around this slag/tailing pile and the non-cancer risk due to the ingestion of slag/tailing was considered as unacceptable. Partial regrading of this slag/tailing pile would be necessary to implement soil cover with vegetation. This slag/tailing pile covers approximately 28 acres.

The North Entry (location 4), Redridge (location 11) and Freda (location 12) tailings are excluded from the area to be covered under this ROD. 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, U.S. 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 U.S. EPA determines that any portion of the two 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 this ROD.

Due to the these changes, the total areas in OU III to be addressed are approximately 229 acres. However, for the purposes of estimating the capital cost for OU III, this ROD uses 290 acres, due to the potential inclusion of the North Entry (location 4) tailings, and in an attempt to compensate for some uncertainty in acreage designation. The capital cost to implement Alternative T2 for OU III is approximately $2,890,000, and annual maintenance cost is $58,000. The present worth is approximately $2,868,000.

Index of Guidelines
Torch Lake Superfund Site
Operable Units I and III
Houghton County, Michigan

1985 Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites, EPA/600/8-85/002, Office of Health and Environmental Assessment, Washington, D.C.

1986 Superfund Public Health Evaluation Manual, NTIS PB87-183125

9/87 Superfund Exposure Assessment Manual, OSWER Directive #9285.5-1

1988 Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final, Office of Emergency and Remedial Response

1/88 Preliminary Assessment Guidance, OSWER 9345 0-01 (OERR/HSCD) Final

1/83 Emergency Response Procedures for Control of Hazardous Substance Releases, EPA-600/D-84-023 (Rockwell International) Final

2/88 Superfund Removal Procedures, Revision # 3 OSWER #9360.0-038 (OSWER/OERR) Final

10/88 Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER #9355.3-01 (OSWER/OERR) Final

3/87 Data Quality Objectives for Remedial Response Activities: Development Process, OSWER #9355.0-7B (CDM Federal Programs Corp.) Final

6/84 Geophysical Techniques for Sensing Buried Wastes and Waste Migration, EPA-600/7-84/064 (Technos, Inc.) Final

2/88 Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses, (Viar and Co.) Draft

9/85 Practical Guide for Ground-Water Sampling, EPA/600/2-85/104 (Illinois St. Water Survey) Final

10/85 CERCLA Compliance with Other Environmental Statutes, OSWER #9234.0-2, Final

8/88 CERCLA Compliance with Other Laws Manual, OSWER #9234.1-01 Draft

9/86 Guidelines for Carcinogen Risk Assessment Federal Register, September 24, 1986. p.33922 (EPA) Final

9/86 Guidelines for Exposure Assessment Federal Register, September 24, 1986, p.34042. Final

Integrated Risk Information System (IRIS), Final

9/88 Public Health Risk Evaluation Database, Final

6/88 Community Relations in Superfund: A Handbook, OSWER #9230.0-038, Final

11/87 Revised Procedures for Planning and Implementing Off-Site Response Actions, OSWER # 9834.11 (OWPE), Interim Final

12/90 Superfund Removal Procedures, Action Memorandum Guidance, EPA/540/P-90/004

1/90 Handbook on In Situ Treatment of hazardous Waste-Contaminated Soils, EPA/540/2-90/002

12/88 Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites, EPA/540/G-88/003

12/89 Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part A, Interim Final, EPA/504/1-89/002

12/86 Interim Guidance on Superfund Selection of Remedy, OSWER # 9355.0-19

4/91 Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions, OSWER Directive 9355.0-30

References specified in Remedial Investigation Reports for OU I, II and III, Risk Assessment Reports for OU I, II and III, Ecological Assessment Report, and Feasibility Study Report for OU I/III.

AR

ADMINISTRATIVE RECORD INDEX

ORIGINAL

TORCH LAKE SITE. OPERABLE UNITS I AND III

TORCH LAKE. MICHIGAN

04/29/92

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	00/00/00			Calumet and Hecla Mining Company Annual Reports: 1907, 1917, 1927, 1937, 1947, 1957, 1967	146
2	00/00/00	Taggart, A., Professor		Excerpt from Book Entitled: Handbook of Mineral Dressing	12
3	00/00/00	Weston	USEPA	Incomplete Project Plan for Characterization of Bank Anomalies (no cover page)	14
4	00/00/00			Map of Lake Superior District	1
5	00/00/00			Map:Laurium Quadrangle	1
6	00/00/00			Maps--Roads, Wetlands, Soil	7
7	00/00/00			Moody's Industrial Manual Pages on Universal Oil Products for Years 1969, 1984	5
8	00/00/00			NPL Candidate: Narrative Summary	1
9	00/00/00	USEPA		National Priorities List Site: Torch Lake	1
10	00/00/00	US Geological Survey		Pages From Mineral Resources of the United States for Years 1910, 1920, 1930, 1940	34
11	00/00/00	Bureau of Mines		Pages From Vol. 3 of Minerals Yearbook for Years 1955, 1960, 1960, 1975	21
12	00/00/00			Population of Places--Michigan	1
13	00/00/00	Black, J., Evans, E., et.al.		Revised Manuscript: Epizootic Neoplasms in Fish From a Lake Polluted by Copper Mining Wastes	28
14	00/00/00			Various Newspaper Articles from 1983-84	18
15	00/00/42	Quincy Mining Company		Assay of Waste Sands	44
16	00/00/70	MDNR		Ground Water & Geology of Keweenaw Peninsula, Michigan	47

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
17	10/00/70	MDNR		Biological Evaluation of Torch Lake	13
18	00/00/73	Wright, T., et.al., Professor		Article: Water Quality Alternation of Torch Lake by Copper Leach Liquor	14
19	00/00/73	Joralemon, I.		Excerpt From Book Entitled: Copper, The Encompassing Story of Mankind's First Metal	16
20	02/07/73	Michigan Water Resources Commission		An Evaluation of a Cupric Ammonium Carbonate Spill into Torch Lake	17
21	00/00/81	Kraft, K., et.al., Professor		Article: Effect of Sediment Copper on the Distribution of Benthic Macroinvertebrates in the Keweenaw Waterway	27
22	04/00/81	L.M.Miller & Associates	Houghton County	Hydrogeological Evaluation for Houghton County Wastewater Disposal	139
23	11/00/81	Quincy Mine Hoist Association		Excerpt From Book Re: Quincy Mining Company	19
24	10/14/82			USEPA Preliminary Assessment: Site Information	4
25	11/30/83	Smith, G., MDPH	Davis, Honorable R.	Response to Inquiry	1
26	00/00/84	Maluego, K. et.al. USEPA		Environmental Toxicology and Chemistry Article on Toxicity of Sediments (includes Torch Lake)	13
27	01/04/84	Sause, A. USEPA	Evans, "Red"	Phone Conversation	4
28	01/23/84	Sause, A., USEPA	USEPA	Preliminary Assessment Comments	1
29	01/25/84	Sause, A., USEPA	Courchaine, C., MDPH	Phone Conversation Report on Well Water	2
30	01/25/84	Courchaine, C., MDPH	Sause, A., USEPA	Safety of Well Information	5
31	01/27/84	Sause, A., USEPA		USEPA Site Inspection Report	14
32	01/30/84	Sause, A., USEPA		HRS Work Sheets	25
33	02/21/84	Levin, C., Senator	Aittama, J., Village Water Dept.	Pollution Study	2
34	03/01/84			Meeting Notes on Trout for Torch Lake (Handwritten)	2
35	03/07/84	Aittama, J. Village Water Dept.	Juntunen, R., MDNR	Request to Stock Fish in Torch Lake	2

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
36	03/09/84	Harvey, T., Former Resident	Village of Lake Linden	Family Histories	[illegible]
37	03/09/84	Juetten, R., MDNR	Rittama, J., Village Water Dept.	Fish Stocking	[illegible]
38	06/05/84	Calabrese, J., USEPA	Owens, R., US Fish & Wildlife Service	Record of Communication Re: Distance to Critical Habitats	[illegible]
39	06/06/84	Calabrese, J., USEPA	Konlar, M., US Fish & Wildlife Service	Record of Communication: Information on Distance to Sensitive Environments	[illegible]
40	06/11/84	Rowe, K., Western Upper Peninsula Health Dept.	Jolly, V., Village President	Cover to Hesse Letter and Water Analysis	11
41	06/13/84	Leddy, D., Michigan Technological Univ.	Heralson, S., Village Clerk	Comments on Sediment	[illegible]
42	07/00/84			References for Torch Lake (Handwritten)	[illegible]
43	[illegible]	Thomas, T., USEPA		HRS Work Sheets	[illegible]
44	07/10/84	Leddy, D., Michigan Technological University	Thomas, T., USEPA	Sediment Data	10
45	07/11/84	Leddy, D., Michigan Technological University	Thomas, T., USEPA	Sediment Data	20
46	07/19/84	USEPA		Documentation Records for Hazard Ranking System	13
47	11/00/84	Copps, L., US Bureau of Mines		Copper, Lead, Zinc, Gold and Silver Waste Disposal Activities and Practices in the United States	196
48	05/14/86	Viegelahn, G., Peninsula Material Processing		Six Slag Samples	3
49	07/29/86			Handwritten Notes of Meeting at Michigan Technological Univ.	1
50	08/00/86	Michigan Technological University	MDNR	Torch Lake Study: A Project Completion Report	306
51	08/00/86	Rose, W., et. all, Michigan Technological University		Torch Lake Study: Heavy Metals in Sediments & Mining Wastes	33

ITEM	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
52	12/05/86	Evans, E., MDNR	Aittama, J., Village Water Dept.	Comments on Conditions in Torch Lake	2
53	02/05/87	Spence, J., Michigan Technological University	Martin, T. MDNR	Documentation of Fish Tumors and Parasites	12
54	07/20/87	Kleemans, D., MDNR	Concerned Individuals	Status Report	3
55	10/23/87	Irvin, T., MDNR		'Mistake' of Markings for Lake Linden and Hubbel (Handwritten)	1
56	10/27/87	MDNR		Remedial Action Plan	81
57	00//1888			Topographical Map of the Portage Lake Mining District	2
58	00/00/88	Clements, W., et. al. Scientists		Environmental Toxicology and Chemistry Article on Insect Exposure to Copper	6
59	00/00/88	Michigan Water Resources Commission		Permit Authorizing Discharge & all Relevant Communications Including Public Notice. Previous Permit. Transmittals	62
60	03/00/88	National Park Service		Options for National Park Service Involvement in the Management of Historic Copper Mining Resources on Michigan s Keweenaw Peninsula	48
61	09/28/88	Spence, J.,		The Keweenaw Waterway: Staus Report with Suggested RI/FS Options for Developing a Comprehensive RI Plan	47
62	11/22/88	Center for the Great Lakes		Fact Sheet: Great Lakes Areas of Concern	3
63	12/00/88	Donohue & Associates		Compository Summary	21
64	12/06/88	Grannemann, N., US Dept. of Interior	Anderson, J., Donohue	Letter and Groundwater Data	22
65	12/20/88	De Grand, D., MDPH	Lee, J., USEPA	Documents re: Private and Public Water Supply Wells	70
66	00/00/89			Two Articles from Enhancing States' Lake Management Programs	8
67	01/30/89	Evans, E., MDNR	Aittama, J., Village Water Dept.	Review Comments on the Michigan Technological Univ.'s Final Report	15

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
68	02/00/89	Michigan Fish Commission		Fish Collection Data From Torch Lake	71
69	02/23/89	Hesse, J., MDPH	Rowe, K., MDPH	Cover Memo and A Risk Assessment of Contaminants Present in Soils in Isolated Areas of the Jefferson Conner Industrial Revitalization Project Site (2/16/89)	69
70	03/00/89	USEPA		Superfund Fact Sheet	8
71	03/02/89	Reith, S., USEPA	Croce, M., USEPA	Memorandum: Torch Lake CR Trip Information	16
72	04/10/89		MDNR	Muncipal Discharge Application	29
73	04/24/89	Center for Environmental Health Sciences & MDPH	Office of Health Assessment, ATSDR	Preliminary Health Assessment (November 9, 1988)	6
74	05/00/89	Markelz, F., Donohue	USEPA	Site-Specific Health & Safety Plan: Torch Lake Geophysical Investigation	15
75	06/00/89	Donohue & Associates	USEPA	RI/FS: Field Sampling Plan, Vol. 2, Revision	142
76	06/00/89	Donohue & Associates	USEPA	RI/FS: Final Work Plan, Vol. 1A, Revision 1	149
77	06/00/89	Donohue & Associates	USEPA	RI/FS: Health & Safety Plan, Vol. 4, Revision	115
78	06/00/89	Donohue & Associates	USEPA	RI/FS: QAPjP For Phase 1, Revision 1	180
79	06/05/89	Teoh, R., MDNR	Gruben, D., MDNR	RI/FS Air Sampling Program	3
80	07/00/89			Revisions/Additions to Field Sampling Plan	37
81	07/14/89	Gruben, D.,MDNR	Lee, J., USEPA	Cover, Field Notes and Well Sampling Map	4
82	07/25/89	Anderson, A. & Beodray, F., Weston-Spec	Lee, J., USEPA	Well/Sample Data Sheets: July 17-21, 1989	104
83	07/28/89	Rector, D., MDNR	Adamkus, V., USEPA	Michigan s Cooperative Agreement for Technical Assistance	5
84	08/00/89	USEPA		Superfund Fact Sheet	8
85	08/08/89	Healy, M., Weston	O'Mara, M., Weston	Analytical Reports	84
86	08/23/89	Healy, M., Weston	O'Mara, M., Weston	Cover and Analytical Reports	48
87	08/28/89	Richardson, D., Donohue	Markelz, F. & Ransome, L., Donohue	Health & Safety Program	2

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
88	08/29/89	Richardson, D., et.al., Donohue	Ransome, L., Donohue	Surface Tailing Sampling	19
89	08/29/89	Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: Documentation of Soil/Tailings During Phase 1 RI Work	16
90	09/14/89	Stenson, R., Donohue	Ransome, L., Donohue	Bureau of Mines Site Visit	1
91	09/15/89	Stenson, R., Donohue	Ransome, L., Donohue	Shallow Surface Tailings Sampling	4
92	09/15/89	Stenson, R., Donohue	Ransome, L., Donohue	Technical Memorandum: Inventory of Existing Wells	16
93	09/18/89	Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: Operable Unit #3, Archive Search & Field Reconnaissance	26
94	09/18/89	Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: Soil/Tailings Sample Shipment	5
95	09/25/89	Stenson, R., Donohue	Lee, J., USEPA	Cover Letter to Field Technical Memoranda for 8/89	1
96	09/29/89	Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: Phase 1 Soil Sampling	3
97	10/02/89	Ray, D., Center for the Great Lakes	Lee, J., USEPA	Letter and Partial Fact Sheet on Areas of Concern dated 8/1/89	5
98	10/18/89	Ross, C., USEPA	USEPA	Mineral Sampling Results	8
99	10/24/89	Tang, C., USEPA	Lee, J., USEPA	Record of Communication: Metal Analysis on Torch Lake Filter Papers	1
100	10/27/89	Kubiak, T., US Dept. of Interior	Lee, J., USEPA	Proposal: Reproduction in Gulls & Bald Eagles in the High Copper Environment of Torch Lake	10
101	10/29/89	Casey, S., MDNR	Lee, J., USEPA	Water Analysis	3
102	11/00/89	USEPA		Interagency Agreement/Amendment between USEPA & USFWS	7
103	11/02/89	O'Riordan, D. & Lee, J., USEPA	Individual Well Owners	Report of Non-Contamination of Well Water	7
104	11/13/89	USEPA		News Release Re: Water from Mason and Lake Linden Municipal Wells	2
105	11/29/89	Ross, C., USEPA	USEPA	Metal Sampling Results	13
106	12/01/89	Stenson, R., USEPA	Ransome, L., USEPA	Technical Memorandum: OUIII, Archive Search & Field Reconnaissance	39

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
107	12/01/89	Lee, J., USEPA	Ransome, L., USEPA	Technical Memorandum: OUIII Archive Search & Field Reconnaissance	17
108	12/04/89	Evans, E., MDNR	Hesse, J., MDNR	Portage Lake Fish Tumor Data	5
109	12/05/89	Irvin, T., MDNR	Gruben, D., MDNR	Air Monitoring Locations	2
110	12/05/89			Air Sample Data and Meterological Data	15
111	12/05/89	Irvin, T., MDNR	Gruben, D., MDNR	Torch Lake Air Monitoring	52
112	12/15/89	Bowser-Morner, Inc.	Donohue & Associates	Geotechnical Testing of Subsurface Soil Samples	83
113	12/20/89	Black, J., Roswell Park	Evans, E., MDNR	Comments on Torch Lake Fish Consumption	2
114	01/11/90	Ransome, L., Donohue	Lee, J., USEPA	Geotechnical Analysis Results	84
115	01/22/90	MDPH		Public Health News	3
116	02/02/90	Hesse, J. MDPH	Nied, W., USEPA	Report on Fish Consumption Advisory	5
117	02/28/90	Anderson, A., Beodray, F., Doyle, W., Weston	Heaton, D., USEPA	Site Assessment Report	73
118	03/00/90	MDNR		Staff Report: Fish Growth Anomalies in Torch & Portage Lakes 1974-88	48
119	03/19/90	Stenson, R., Donohue	Ransome, L., Donohue	Technical Memorandum: Water Supply and Monitoring Wells	57
120	04/00/90	Donohue & Associates	USEPA	Final Community Relations Plan	47
121	04/00/90	US Bureau of Mines		Tailings Leachability Evaluation	34
122	04/20/90	Zahl, E., Dept. of Interior	Lee, J., USEPA	Status Report of Lab Evaluation of Tailings & Water Samples	37
123	05/00/90	Donohue & Associates	USEPA	RI/FS: QAPjP for Phase 1 (Revision 1) Addendum No. 1	62
124	05/01/90	Ransome, L., Donohue	Lee, J., USEPA	Modification to QAPjP for Phase 1	17
125	06/00/90	Donohue & Associates	USEPA	RI/FS: Final QAPjP for Operable Unit II, Vol.	241
126	06/27/90	Kelley, J., USEPA	LaFornara, J., Environmental Response Team	Request for Assistance	1

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
127	07/00/90	Donohue & Associates	USEPA	RI/FS: Final Field Sampling Plan, Vol. 2	124
128	07/00/90	Donohue & Associates	USEPA	RI/FS: Final Health & Safety Plan, Vol. 4, Revision 2	105
129	07/00/90	Donohue & Associates	USEPA	RI/FS: Final Work Plan (Revision 2) Vol. 1A	150
130	07/20/90	Kubiak, T., Dept. of Interior	Lee, J., USEPA	Progress Report (includes funds expended)	3
131	07/25/90	Bowden, R., USEPA	Hesse, J., Michigan Dept. of Health	Report on Drum Sampling	2
132	07/26/90	Bowden, R. USEPA	Kubiak, T., US Dept. of Interior	Report on Drum Sampling	2
133	07/30/90	Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: Torch Lake Well Inventory	62
134	07/31/90	Stenson, R., Donohue	Ransome, L., Donohue	Technical Memorandum: Bathymetric Survey	9
135	08/00/90	USEPA		EPA Newsletter	4
136	09/13/90	Maletzke, J., Donohue	Lee, J., USEPA	Health & Safety Audit	7
137	09/14/90	Kubiak, T., Dept. of Interior	Lee, J., USEPA	Progress Report (includes funds expended)	3
138	09/18/90	Ransome, L., Donohue	Crosser, M., Donohue	Field Investigation Systems Audit Report	3
139	10/05/90	Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: Boring Geotechnical Sampling & Monitoring Well Installation	25
140	10/05/90	Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: Staff Gauge Installation	9
141	10/29/90	Heiser, E., USEPA	Lee, J., USEPA	Wetlands Investigation	25
142	10/31/90	Casey, S., MDNR	Taft, W., MDNR	Copper Sampling	11
143	11/00/90	Eder Associates	USEPA	Draft: Health & Safety Plan	74
144	11/00/90	Baumann, P. et al., U.S. Fish & Wildlife Service	Lee, J., USEPA	Effects of High Copper Concentrations on Reproduction by Yellow Perch in Torch Lake	27
145	11/00/90	Donohue & Assoc.	USEPA	Final RI Report, Operable Unit I: Volume 1	276
146	11/12/90	Gruben, D., MDNR	Wilder, B., Property Owner	Results of Sampling	3

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
147	12/03/90	Baumann, A., USEPA	Lee, J., USEPA	Review of the Health & Safety Plan (Handwritten)	2
148	12/05/90	Rubsam, K., Donohue	Ransome, L., Donohue	Technical Memorandum: Groundwater Sampling	24
149	12/06/90	Maletzke, J., et. al., USEPA	Ransome, L., USEPA	Technical Memorandum: OUIII Tailing Sampling	13
150	12/06/90	Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: OUIII Tailing Sampling	84
151	12/12/90	Rubsam, K., Donohue	Ransome, L., Donohue	Technical Memorandum: In Field Hydraulic Conductivity Testing & Water Level Measurement	19
152	12/13/90	Wolf, K. & Maletzke, J., Donohue	Ransome, L., Donohue	Technical Memorandum: Site Survey	12
153	12/14/90	Rubsam, K., Donohue	Ransome, L., Donohue	Technical Memorandum: Surface water & Sediment Sampling	144
154	12/17/90	Rubsam, K., Donohue	Ransome, L., Donohue	Technical Memorandum: Well Development	15
155	12/19/90	Helmer, E., USEPA	Lee, J., USEPA	Photos From Wetlands Investigation	18
156	00/00/91	Wells, J. et al. Scientists		Michigan Botanist Article on Revegetation Potential	10
157	01/16/91	Taft, W., MDNR	Cowles, F. MDNR	Portage Lake, Water & Sewer Authority Permit Recommendations	9
158	02/05/91	Hartsig, T. & Stenson, R., USEPA	Lee, J., USEPA	Memorandum: Preliminary Sediment Sample Results	4
159	03/07/91	Irvin, T., MDNR	Gruben, D., MDNR	Map of Discharge Points	2
160	04/00/91	Donohue & Assoc.	USEPA	Final RI Report, Operable Unit 1: Volume 2	165
161	04/00/91	MDNR		Michigan Background Soil Survey	34
162	04/00/91	Donohue & Associates	USEPA	RI/FS: Final Work Plan (Revision 2), Amendment No. 1	12
163	04/04/91	Gruben, D., MDNR	Lee, J., USEPA	Soil Sampling	29
164	05/14/91	Helmer, E., USEPA	Lee, J., USEPA	Investigation of Aquatic & Sediment Toxicities	2
165	05/15/91	Jordon-Izaquirre, D., ATSDR	Lee, J., USEPA	Results of Well Sampling	1

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
166	05/28/91	Bartelt, R., Geraghty & Miller, Inc.	Nied, W. USEPA	Scope of Work Outline for Drum Removal Effort	-
167	06/00/91	Donohue & Assoc.	USEPA	Final RI Report, Operable Unit I: Hodgenum No. 1	58
168	06/00/91	Donohue & Associates	USEPA	RI/FS: Final Field Sampling Plan, Revision 2, Addendum No. 1	85
169	06/00/91	Donohue & Associates	USEPA	RI/FS: Final QAPjP For Operable Unit II	95
170	06/00/91	Donohue & Associates	USEPA	RI/FS: Final Work Plan (Revision 2) Amendment No. 1a	16
171	06/04/91	Dubuis, E., Resident	Lee, J., USEPA	Public Input	1
172	07/05/91	Drake, P., USDept of Interior	Lee, J., USEPA	Leaching Assay Results	7
173	07/10/91	Kruger, G. & Bartelt, R., Geraghty & Miller, Inc.	Nied, W., & Felitti, F., USEPA	Final Work Plan for Drum Removal	120
174	07/12/91	Maynard, J., Dykema Gossett	Lee, J., USEPA	Legal Description of Quincy Property	2
175	07/18/91	Life Systems, Inc.	Donohue & Assoc.	Final Baseline Risk Assessment Report, Operable Unit #1	250
176	07/23/91	Gruben, D., MDNR	Lee, J., USEPA	Sampling Data on Soil, Tailings, & Slag	3
177	08/20/91	Eily, C., USEPA		Cover and Chronic Toxicity Study FY '91	13
178	08/21/91	USEPA		Interagency Agreement/Amendment between USEPA and the Dept. of Agriculture, Soil Conservation Service	18
179	09/06/91	Koenia, R., The Daily Mining Gazette		Newspaper Article	1
180	09/20/91	Sottile, W., MDPH	Gruben, D., MDNR	Finding of Medical Waste on Site	2
181	09/24/91	Manty, K., The Daily Mining Gazette		Newspaper Article	1
182	09/25/91	Hartsig, T., Donohue	Lee, J., USEPA	Addendum #2 Final Field Sampling Plan	6
183	10/00/91	Donohue & Assoc.	USEPA	RI Report, Operable Unit II: Volume 2, Appendices A, B, and C	543

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
184	10/00/91	USEPA		Superfund Program Information Update	5
185	10/01/91	Lee, J., USEPA	Hughes, G., Well Owner	Resident Well Sample Analysis	22
186	10/01/91	Casey, S., MDNR	Haralson, R., Peninsula Copper Products, Inc.	Sampling Results	4
187	10/01/91	Tyson, M., USEPA	Schupp, G., USEPA	Transmittal of QAPjP	1
188	10/08/91	Hartsig, T., Donohue	Lee, J., USEPA	Addendum #2, Final Field Sampling Plan	6
189	10/18/91	Manty, K., The Daily Mining Gazette		Newspaper Article re: Public Meeting	1
190	11/00/91	Charters, D., USEPA		Environmental Response Team's Final Report	25
191	11/00/91	Kozie, K., U.S. Fish & Wildlife Service	Lee, J., USEPA	Reproduction in Bald Eagles and Gulls in the High Copper Environmental Torch Lake	53
192	11/13/91	Elly, C., USEPA	Lee, J., USEPA	Review of CLP Data	20
193	11/20/91			Newspaper Article--The Daily Mining Gazette	1
194	11/21/91	Zahl, E. & Drake, P., US Dept. of Interior	Lee, J., USEPA	September Status Report	17
195	12/00/91	Donohue & Assoc.	USEPA	Alternative Array Memorandum: Operable Units I and III	37
196	12/03/91	Jordan-Izaguirre, D., ATSDR	Lee, J., USEPA	Resident Well Water Analysis	1
197	12/10/91	USDA		Preliminary Cost Estimates for the Vegetation of the Copper Mine Tailings	8
198	12/11/91	Hartsig, T., Donohue	Lee, J., USEPA	Technical Memorandum: Occurrence of Polynuclear Aromatic Hydrocarbons in Residential Soils	13
199	00/00/92	Life Systems, Inc.	USEPA and MDNR	ICAIR Responses to EPA and MDNR Comments on Torch Lake OUII Draft Baseline Risk Assessment	11
200	01/00/92	Donohue & Assoc.	USEPA	Addendum: Final QAPP for Operable Unit II: Remedial Investigation Activities	70

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
201	01/00/92	Donohue & Assoc.	USEPA	Final Field Sampling Plan: Addendum No. 3, Revision 2	21
202	01/00/92	Donohue & Assoc.	USEPA	Final RI Report, Operable Unit II: Volume 1	107
203	01/00/92	Donohue & Assoc.	USEPA	Final RI Report, Operable Unit III: Volume 1	182
204	02/00/92	Donohue & Assoc.	USEPA	Final Health & Safety Plan: Addendum No. 1, Revision 2	22
205	02/00/92	Donohue & Assoc.	USEPA	Final RI Report, Operable Unit III: Volume 2	195
206	02/08/92	Huetter, B., USDA	Lee, J., USEPA	Report of Phase I Literature Search for the Establishment of Vegetative Species on Stamp Sands	60
207	02/25/92	Duchene, J., Life Systems, Inc.	Lee, J., USEPA	Revision of RfD-Arsenic	4
208	02/26/92	Life Systems, Inc.	Donohue & Associates	Addendum to the Draft Baseline Risk Assessment Report for Torch Lake OUIII	32
209	02/29/92	Kruger, G., Geraghty & Miller	Lee, J., USEPA	Transmittal and Torch Lake Ground Penetrating Radar Survey, May 9 -11 1989	37
210	03/00/92	Donohue & Assoc.	USEPA	Appendix D: Final Baseline Risk Assessment, RI Report, Operable Unit II	238
211	03/00/92	Donohue & Assoc.	USEPA	Final RI Report, Operable Unit # 1: Addendum No. 1	29
212	03/00/92	Donohue & Assoc.	USEPA	Final RI Report, Operable Unit II: Addendum No. 1	135
213	03/18/92	Smith, L. & Maletzke, J., USEPA	Hartsig, T., USEPA	Technical Memorandum: Residential Well Sampling & Data Interpretation	4
214	03/24/92	Geraghty & Miller, Inc.	Universal Oil Products, Quincy Mining, etc.	Final Drum Removal Report	362
215	03/24/92	Hartsig, T. & Maletzke, J., USEPA	Lee, J., USEPA	Technical Memorandum: OUII Sediment Sampling, February 1992	5
216	04/00/92	Donohue & Assoc.	USEPA	Final Ecological Assessment	140
217	04/00/92	Donohue & Assoc.	USEPA	Final Feasibility Study for Operable Units I and III	165

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
218	00//1897	Mine and Quarry News Bureau		The Mine Quarry and Metallurgical Record of the US, Canada & Mexico	5
219	04//1897			Summary of Operations of Calumet & Hecla Mining Co. For Fiscal YearEnding 1887	4

U.S. EPA ADMINISTRATIVE RECORD INDEX

AR

UPDATE #1

TORCH LAKE SITES

TORCH LAKE, MICHIGAN

07/23/92

DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	05/24/92			Radio Interview of J. Lee, U.S. EPA--Tape	0
2	06/09/92			Radio Interview of R. Bailod, D., Lorenzetti, & Rev. Longeth--Tape	0
3	06/24/92			Town Meeting Proceedings--Tape	0
4	07/09/92	Daily Mining Gazette		Editorial: "EPA Go Home"	1

RESPONSIVENESS SUMMARY

TORCH LAKE SUPERFUND SITE
OPERABLE UNITS I AND III
HOUGHTON COUNTY, MICHIGAN

September 1992

RESPONSIVENESS SUMMARY

TORCH LAKE SUPERFUND SITE
OPERABLE UNITS I AND III
HOUGHTON COUNTY, MICHIGAN

1.0 OVERVIEW

At the start of the public comment period for the Torch Lake Superfund site, the U.S. Environmental Protection Agency (U.S. EPA) and the Michigan Department of Natural Resources (MDNR) proposed two alternatives for addressing the tailings and slag pile/beach on the western shore of Torch Lake (OU I) and tailings and slag pile in 12 locations in Houghton County (OU III), and four alternatives for addressing the slag piles/beach in OU I and OU III. The U.S. EPA's preferred alternative, as specified in the Proposed Plan, is to cover the OU I and OU III tailings with soil and vegetation, cover the slag pile/beach at Hubbell with soil and vegetation, and take no action regarding the slag pile near Quincy Smelter in OU III. After careful review of the comments received from the public during the public comment period and public meeting, U.S. EPA has modified the preferred remedy. Section XI of the ROD explains in detail the content of the modified remedy.

Comments received at a May 12, 1992, public meeting in Hancock, Michigan, and written comments received through the mail reflected a fairly even division between community opposition and support for the alternatives proposed by the U.S. EPA.

This Responsiveness Summary responds to the comments and concerns expressed by the public and the potentially responsible parties (PRPs) in written and oral comments received by U.S. EPA during the public comment period, which ran from May 1 to July 13, 1992. A court reporter recorded spoken comments at a public meeting that was held on May 12, 1992.

Two sections follow:

* Background on community involvement and history of community relations activities at the Site
* Summary of comments received during the public comment period, including EPA responses

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT/HISTORY OF COMMUNITY RELATIONS ACTIVITIES

See Section III of the ROD.

3.0 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

The public comment period designated for the Torch Lake Superfund site (Operable Units I and III) was held from May 1 to July 13, 1992, and included a public meeting on May 12, 1992. Comments on the Proposed Plan received during the public comment period are listed below. Some of the comments have been paraphrased so they could be summarized effectively in this document. For original comments in their entirety, the reader is referred to the public meeting transcript and written comments which are available for review at public information repositories at Lake Linden-Hubbell Public Library in Lake Linden, at Portage Lake District Library in Houghton, and at U.S. EPA offices in Chicago, Illinois. The locations of these repositories are listed in Appendix A.

A U.S. EPA response follows each comment. Comments and responses have been divided into three sections and are categorized by topic within each section, where appropriate. The three sections are:

3.1 Summary of comments from the local community

3.2 Summary of comments from elected government officials

3.3 Summary of comments from Universal Oil Products, Inc.

3.1 Summary of Comments from the Local Community

3.1.1 Low Risk Levels and Uncertainty of Data or Analysis

3.1.1(a)
COMMENT: Many residents comment that EPA has not proven there are significant hazards either to human health or to the environment. One comments that the risk assessment estimates "don't seem to be very precise." Seeing these risks as "marginal" or "minuscule," they question whether the risk level warrants the action EPA proposes.

U.S. EPA RESPONSE: As stated in the Proposed Plan, most of the cancer and non-cancer risk, due to the potential inhalation and ingestion of contaminants from the Torch Lake tailings and slag pile/beach, are within U.S. EPA's generally acceptable range. However, it should be noted that the excess cancer risk from Location 5 (Michigan Smelter) of OU III is 2 additional cancer cases in 10,000 people exposed (2×10^{-4}), which is above U.S. EPA's acceptable level. The non-cancer risks from Hubbell slag pile/beach in OU I and Locations 1, 3, 5, and 8 of OU III are above the acceptable level of U.S. EPA. In addition, tailings have adverse environmental impacts. Such environmental impacts include the loss of plant communities, failure of wetland development, loss of migratory and resident animal populations, and significant impact on the benthic communities.

The OSWER Directive 9355.0-30 states that "Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less

than [1 in 10,000 (1 X 10^{-4})], and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts." U.S. EPA's decision to cover the tailings with soil and vegetation is based on these adverse environmental impacts and on unacceptable non-carcinogenic human risk.

U.S. EPA acknowledges that, for the most part, the risk posed by the tailings falls with the risk range generally considered to be acceptable (1 in 10,000 to 1 in one million for carcinogenic risk). However, clarification is required based on the April 22, 1991 OSWER Directive 9355.0-30. First of all, the role of the baseline risk assessment is to assist the Agency in making risk management decisions, not to preclude the Agency from taking an action where other factors warrant action is necessary. U.S. EPA acknowledges that where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 1 in 10,000 (1 X 10^{-4}), and the non-carcinogenic Hazard Quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts.

At the Torch Lake site, as stated earlier, there are some Hazard Quotient exceedences, one location where the carcinogenic risk is greater than 1 in 10,000 (1 X 10^{-4}) and there are adverse environmental impacts. As background, the 1990 National Contingency Plan (NCP) (55 Fed. Reg. 8665-8865 (Mar. 8, 1990)) calls for a site-specific baseline risk assessment to be conducted, as appropriate, as part of the remedial investigation (Section 300.430(d)(1)). Specifically, the NCP states that the baseline risk assessment should "characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to ground water or surface water, releasing to air, leaching through soil, remaining in the soil, and bioaccumulating in the food chain" (Section 300.430(d)(4)). The primary purpose of the baseline risk assessment is to provide U.S. EPA with an understanding of the actual and potential risks to human health and the environment posed by the site and any uncertainties associated with the assessment. This information is useful in determining whether a current or potential threat to human health or the environment exists that warrants remedial action.

Whenever there is a release or substantial threat of release of a hazardous substance into the environment (or a release or threat of release into the environment of a pollutant or contaminant "which may present an imminent and substantial danger to public health or welfare"), Section 104(a)(1) of CERCLA provides U.S. EPA with the authority to take any response action consistent with the National Contingency Plan it deems necessary to protect public health or welfare or the environment.

Generally, where the baseline risk assessment indicates that a cumulative site risk to an individual using reasonable maximum exposure assumptions for either current or future land use

exceeds the 1 in 10,000 (1×10^{-4}) lifetime excess cancer risk end of the risk range, action under CERCLA is generally warranted at the site. For sites where the cumulative site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 1 in 10,000 (1×10^{-4}), action generally is not warranted, but may be warranted if a chemical-specific standard that defines acceptable risk is violated, or there are non-carcinogenic effects or an adverse environmental impact that warrants action. Again, at the Torch Lake site, there are several exceedences of the Hazard Quotient, and adverse environmental impacts, including exceedences of chemical-specific standards in Torch Lake.

U.S. EPA uses the general 1 in 10,000 to 1 in one million (1×10^{-4} to 1×10^{-6}) risk range as a "target range" within which the Agency strives to manage risks as part of a Superfund cleanup. Once a decision has been made to take an action, the Agency has expressed a preference for cleanups achieving the more protective end of the range (i.e., 1 in one million). Although waste management strategies achieving reductions in site risks anywhere within the risk range may be deemed acceptable at the Torch Lake site, the tailings will be covered with soil and vegetation, thus minimizing the exposure and risk to human health.

Unacceptable environmental risks also may prompt remedial action and may occur where there is no significant risk to human health which, as stated earlier, is generally the case at Torch Lake, although the risks do exceed U.S. EPA's 1 in one million (1×10^{-6}) point of departure and there are several Hazard Quotient exceedences. Threats or potential threats to sensitive habitats, such as wetlands, are especially important to consider when determining whether to take an action under CERCLA Section 104 for 106. Ambient Water Quality Criteria for aquatic organisms are chemical-specific standards that will generally be considered when determining whether to take an action based on the environmental risk of releases to surface waters. (The maximum contaminant levels of arsenic and mercury found in Torch Lake and Keweenaw Waterway were 5.7 µg/l and 98 µg/l, respectively. These levels are higher than the water quality criteria for water and fish ingestion under Clean Water Act (CWA) for human health protection (0.002 µg/l for arsenic and 0.14 µg/l for mercury). Copper (73.8 µg/l) and lead (7.2 µg/l) were found in Torch Lake, which are higher than the freshwater chronic ambient water quality criteria for protection of aquatic life under CWA (12 µg/l for copper and 3.2 µg/l for lead).

Based on the above discussion, U.S. EPA has determined that action is warranted at the Torch Lake site, and has selected a cost-effective remedial action to address the environmental and human health risks posed.

3.1.1(b)
COMMENT: "When using human risk to justify a course of action, it has to be placed in the context of hazards encountered in

everyday life. Your statistical estimates of possible cancer indicate that this is a negligible risk compared to other common risks. . . . The low population density in this area combined with the low probability factor lead to the conclusion that reference to sand ingestion as a high risk is not valid and is being used to justify intervention."

RESPONSE: A baseline risk assessment/human health evaluation assesses potential risks to humans from hazardous materials present at a site (U.S. EPA 1989) used as one measure of whether remedial action is warranted at a site. It does not attempt to compare these risks to risks which may be incurred from any other human activities. Thus, the potential cancer risks estimated for Torch Lake have not been classified as "negligible . . . compared to other common risks." The risks estimated for adults and children potentially exposed to Torch Lake OU I and OU III contaminants are risks to individual members of a population, in addition to, and irrespective of, any other risks they might incur. The low population density in the area is not a factor, since total population risks are not calculated for a baseline risk assessment.

3.1.1(c)
COMMENT: "The EPA choice of covering the visible stampsand appears to be unnecessary if there is no significant health hazard. If there was a significant health hazard, you wouldn't have offered a 'No Action' alternative."

RESPONSE: See comments 3.1.1(a). The no action alternative is considered at every site, as required by the National Contingency Plan (NCP), to be used as a baseline comparison for all alternatives.

3.1.1(d)
COMMENT: Several residents question whether the tailings and "poor rock" piles present a health hazard. One states that he is willing to live with the health risk, since it is within the EPA's generally acceptable range. Another comments, "As a child who grew up near the slag piles and as a father of children who also grew near the slag piles, the concern that your report puts forth for 'children accidentally eating contaminated dirt particles' approaches the ridiculous."

RESPONSE: The estimated risks for exposure to contaminants at Torch Lake do not imply that any health effects will occur to any individual, but rather estimate the likelihood of health effects occurring to any individual within an exposed population from these exposures. The exposure assumptions used to estimate these risks are conservative assumptions as suggested by the U.S. EPA guidance (1989) or based upon site-specific information. Therefore, the risks estimated for children (or adults) may be conservative, but not "ridiculous."

Whether or not an individual is willing to accept certain risks is an individual decision, and not relevant to a risk management decision which affects the public.

3.1.1(e)
COMMENT: A resident notes that there is stampsand naturally present in the soil, which is different from processed stampsand only in that the natural sand still has most of its copper and arsenic. Another resident comments that copper, arsenic and other hazardous materials produced by copper mining are very stable in the environment and therefore are neither a health threat nor toxic to the environment. Another resident states that stampsand is just large, local rocks ground up mechanically. He adds that much of the stampsand is from the 1800s, "long before chemical reagents were used in milling the ore."

RESPONSE: The stampsands that were investigated as a part of the Torch Lake Remedial Investigation (RI), located at various locations around Houghton County but most notably along Torch Lake, are indeed elements of the natural geologic environment on the Keweenaw Peninsula. The stampsands are, however, processed ores from well below the surface. Mining activities brought stampsands from below the surface to the surface. As a result, human populations may become exposed to more elevated concentrations of copper and arsenic than they normally might be.

3.1.1(f)
COMMENT: A local geologist states that it is not clear from EPA's studies that the mine tailings and slag piles present any serious health risks to the community. "Analysis of the tailings and slags for harmful chemicals have only shown varying concentrations of heavy metals such as copper, antimony, arsenic, cadmium, barium and zinc. These metals were not stated to have been detected above acceptable U.S. EPA concentrations, only that their concentration in the tailings is higher in some cases than in background soils. While background metal concentrations are sometimes used as a guide for reasonable cleanup levels, this situation is rather unique. Since a large majority of the copper was removed from the tailings physically by crushing rather than chemically, the other metals in the mine tailings have not been concentrated by processing. They represent natural metal abundances in the rock, and in many areas not covered by glacial sediments, are the source material for soil formation."

The resident summarizes the health risks and finds them subchronic hazards. Regarding EPA's proposed plan to cover certain areas, the resident states, "This plan appears to place a higher degree of emphasis on logistics and feasibility than on actual risk. The tailing piles along Lake Superior which may be a subchronic hazard are to be left uncovered due to the unlikelihood of keeping them covered due to Lake Superior's washing action. The Quincy slag piles are to be left uncovered because of the significant amount of regrading necessary to cover them successfully. On the other hand the slag in Hubbell which does not represent any risk whatsoever based on the U.S. EPA criteria

is proposed to be covered for a cost of $117,000 because it is convenient to do so.

"The risks are just not great enough to justify a $7.3 million price tag to cover convenient possible sources of subchronic hazard. In addition the covering of undisputed nonhazardous slag amounts to a beautification project which the people of Houghton County are best suited to decide."

RESPONSE: The potential risks posed by various tailings deposits are weighed against the feasibility of performing a remedial action. If the remedial action is considered not technically feasible, not cost-effective, or as possibly creating more problems than are resolved, it is not recommended. Such is the case for choosing not to provide a soil cover along Lake Superior or at Quincy Mill. It should be noted that the slag pile and "beach" at Hubbell do present a human health risk, and thus require a remedial action.

3.1.1(g)
COMMENT: Several residents ask why the EPA proposed the cleanup plan when they understand EPA's reports to find that no hazardous conditions will be corrected by the plan. One resident states that "the EPA project manager admitted that few soil samples were actually used to ascertain the presence and concentrations of polynuclear aromatic hydrocarbons, arsenic, antimony, chromium, copper, manganese, and vanadium. . . . Even the air sample data does not support the existence of a problem, even though the proposed plan is designed to deal with airborne contaminants." Two other residents point to data from the EPA's report (citing pages 5 and 6) indicating that the air samples, bird study, cancer study, and study of slag piles all showed no threat to human health or the environment posed by the site, and that the sediment studies were, at worst, inconclusive on the effects on fish or groundwater.

RESPONSE: The number of samples collected at each of the sites to characterize the contaminant content of the tailings was based on the assumed relative homogeneity of tailings materials and an adequate number of samples to assess, statistically if necessary, the presence of metals and inorganics in the stampsands. The air sampling data and subsequent risk assessment to human health do not suggest that there may be a problem from wind-blown tailings to human health. Lastly, whereas we cannot say that the tailings have contributed a distinct threat to animal populations in the area, studies are showing that some aspects of the environment and food chain have been adversely affected.

3.1.1(h)
COMMENT: "[T]he EPA is attempting to justify its recommendations on the basis of adverse environmental impact. When the EPA's own documents are reviewed, the information shows that the statements of the EPA in the Proposed Plan relating to the environment are

not supported by the EPA's own experts! The designation of Torch Lake as a Superfund site was made in error."

RESPONSE: See response to 3.1.1. (g).

3.1.1(i)
COMMENT: "I believe that the EPA was drawn into this project by overzealous efforts through the slanting of very limited information in order to have the site declared a 'Superfund' site. It is unfortunate that many areas of the Keweenaw Peninsula will bear the stigma of incorrectly and wrongly being declared a highly polluted site."

RESPONSE: Torch Lake site was proposed for inclusion on the National Priorities List (NPL) in October of 1984 and placed on the NPL in June 1986. The inclusion of the Torch Lake site was based on the results of the Hazard Ranking System, which scored the Torch Lake site at 46.82 due to the toxicity/persistence of contaminants in the tailings, potential release into the groundwater and surface water, and potential impacts to the nearby residents.

3.1.1(j)
COMMENT: A resident questions the severity of the dust from stampsands, stating that the sand banks are dusty only on a few windy, dry days in the summer. "Winds must be at least 25-30 mph and from only a certain direction. EPA didn't even test for this."

RESPONSE: The EPA study did include a few air samples. However, the emphasis of the study was placed on characterizing the source of contamination itself. It was observed in many instances, though, that tailings dust covered many outdoor and indoor areas away from the tailings (OU I). Also, during the dry summer months, wind across Torch Lake is often sufficient to raise large clouds of dust. Attachment A to the OU I RI Report (Donohue 1990), a memorandum from the Michigan Department of Natural Resources (MDNR), states that prevailing winds do, in fact, blow sufficiently in the spring and summer to raise dust levels from tailings. Finally, motor vehicle traffic over the tailings also creates large dust clouds.

While it is true only very limited air monitoring was conducted in OU I at Torch Lake, the concentration of chemicals in the air can be modeled from the concentrations in the soil and the emissions of respirable particulate matter (PM_{10}) to the air. PM_{10} is that portion of the particulate matter, or dust, in the air that is less than 10 microns in diameter. Particles in this size range are most likely to cause harm because they can be inhaled into the lungs. These PM_{10} particles are emitted along with larger particles, but they are too small to be visible and may be emitted even when larger particles are not and on days when it is not particularly windy. The models used to predict the concentrations of PM_{10} at Torch Lake used appropriate wind speed data for the Michigan/Wisconsin area for calculating

emissions. The model calculates an annual average PM_{10} concentration in order to calculate the annual average concentration of contaminants in air.

3.1.1(k)
COMMENT: A resident points out that EPA studies suggest that a "No Action" alternative is acceptable and asks if EPA can "guarantee that remediated tailings will be more environmentally beneficial" or will produce less leaching.

RESPONSE: The selected remedy would reduce the release of contaminants from the tailings into the lakes. The soil cover with vegetation over tailings and subsequent reduction of contaminant loading into the lakes would be environmentally beneficial. The selected remedy also may reduce the leaching of contaminants into the groundwater and lakes.

3.1.1(l)
COMMENT: "The alleged adverse environmental impact as stated by the U.S. EPA is based upon faulty and unsupported interpretations and conclusions and accordingly the recommended alternatives will not correct the nonexistent adverse environmental impact and is therefore not scientifically supported."

RESPONSE: U.S. EPA has conducted many scientific studies to determine the adverse environmental impact at the site. Such studies include the biotoxicity test, fish reproduction study, bald eagle/bird study, wetland analysis, and ecological assessment. The results of all of these studies were used to determine the overall adverse impact to the environment. The biotoxicity test conducted by U.S. EPA on the Torch Lake sediment has concluded that " .. the vast majority of the sediments in Torch Lake are toxic and not able to support a normal benthic community." The selected remedy should improve the condition of sediment by reducing the release of contaminants from the tailings.

3.1.1(m)
COMMENT: "The proposed plan is flawed both on a technical basis and on any reasonable economic basis. This is certainly not a valid use of Superfund monies."

RESPONSE: U.S. EPA does not agree with this comment. The Proposed Plan is based on the scientific studies conducted by U.S. EPA in accordance with the NCP. The Feasibility Study's evaluation of alternatives included a cost analysis, and it was determined that it is cost-effective to carry out the remedial action.

3.1.1(n)
COMMENT: A local professor of forest soils expresses concerns about the research leading to the proposed remedy.

"First, the Soil Conservation Service labeled their plan as preliminary yet the Donohue plan treats it as final. Frankly, if

this is the only detail of the plan, you're asking people to buy into something that clearly lacks substance for decision making. It's not much more than a guess that success will be at hand when four or six inches of soil will be added and some undisclosed types of plants will be planted, mulched, fertilized and irrigated. Other than the depth of the soil to be added, specifics are lacking. The Feasibility Study did indicate that some trials will have to be planted to identify acceptable plants. But in making such a recommendation, Donohue seemed to ignore the fact that UOP did a great deal of work in the 70's on planting trials. Donohue also placed high research priority on the nutrient content of subsequent vegetation when some estimates of heavy metal uptake could be made from the literature or current vegetation could have been tested. Aren't these the types of information that are needed to properly evaluate plans and options?"

RESPONSE: The Torch Lake Feasibility Study (FS) recognizes that the Soil Conservation Service plan was preliminary. The FS states that the soil cover and vegetation alternative will require further evaluation and trial studies to determine the most effective vegetative cover and nutrient needs to establish that cover. The intent of the FS is to show the mitigative effects of this remedial option for the tailings materials. U.S. EPA will consider all available information, including that generated by UOP during the remedial design.

3.1.1(o)
COMMENT: One resident notes that the judgment of high risk was based originally on suspected groundwater problems, but that all wells in the area have been found to meet drinking water standards. He asks what evidence justifies the proposed plan's cost to achieve no or very small beneficial changes.

RESPONSE: The suspected groundwater problems at Torch Lake are based on sampling results from monitoring wells located in the tailings. Based on testing to date, groundwater beneath the tailings is not affected. No groundwater monitoring was performed in OU III. U.S. EPA's selected remedy is based on the human health risk due to ingestion of tailings and slag and additional adverse impact to the environment. The groundwater problem at the site will be discussed in OU II.

3.1.1(p)
COMMENT: A local group disagrees with leaving Site 4 out of the revegetation plan. They note that EPA's reasoning--that waves and water currents of Lake Superior will retard or destroy remedial action--is not true. "The stampsands at the North Entry run back from the lake several hundred yards. There is a pronounced drop-off several feet high running immediately along the shoreline; back of that drop-off, waves and water would have no effect on revegetation."

RESPONSE: U.S. EPA will conduct more study at the Location 4 tailings in OU III during the Remedial Design to determine whether there is any stagnant area. If such stagnant areas are

found and it is determined to be technically practicable, the area will be included in the area to be covered with soil and vegetation under this ROD.

3.1.1(q)
COMMENT: One resident finds the proposed plan inconsistent: deed restrictions are to be sought once the seeding occurs, but the drawing (page 13 of the proposed plan fact sheet) shows children playing on the soil cover.

RESPONSE: The deed restrictions that will be sought will not limit the use or development of those areas where a vegetation cap is placed over the tailing piles. Rather, the deed restrictions that will be sought would require that after any development of the property, any exposed tailings be covered over and re-vegetated.

3.1.1(r)
COMMENT: The administration of Michigan Technological University (MTU) states that it is in general scientific agreement with Geraghty & Miller's technical review of the proposed plan, which found "serious technical errors, inconsistencies and shortcomings," and requests EPA to address these comments. Further, MTU expresses concerns about the quality of the human health and environmental risk assessment process. "It is this risk assessment process which is responsible for driving the selection of some type of remedy other than a 'No Action' alternative. If this process is flawed and based upon faulty techniques and assumptions, as has been indicated by Geraghty & Miller, then the justification of the expenditure of additional millions of dollars in funds for remediation of Torch Lake becomes indefensible. Such an action would then become an aesthetic renovation exercise which is entirely inconsistent with the aims of the CERCLA program and the NCP. The university administration expects the U.S. EPA to respond in considerable detail to support and justify the existing human health and environmental risk assessments because of their critical role in driving a remedy selection at this site."

RESPONSE: Please see the responses to all comments in section 3.3.5 for the responses to Geraghty & Miller's technical comments on the baseline risk assessment for Torch Lake OU I. The techniques and assumptions used in the risk assessment are in accordance with U.S. EPA guidance as documented in the references provided.

3.1.2 Health Concerns

3.1.2(a)
COMMENT: Several residents believe further study should be done on cancer and health problems in the area. One notes that the area was a "cancer hot spot" about 20 years ago. Since this was attributed to arsenic from the copper smelters, it is likely arsenic is still present in the slag and can work up the food

chain to fish or humans. Another resident states that the area has a high rate of cancer in young children and asks if a study was made on this issue.

RESPONSE: There is a higher than normal crude rate of both cancer incidence and mortality in Houghton County. However, when age-adjusted, neither of these rates are significantly different than other areas of Michigan or Michigan as a whole. The cancer rate data are monitored closely by the Western Upper Peninsula Public Health District, and evidence suggests that the higher crude cancer rate is greatly influenced by a higher than normal percentage of the population being age 65 or above.

An earlier review of cancer death records over a period from 1970 to 1981 by the Michigan Department of Public Health showed that all but stomach cancer was at or below the State average for age-adjusted cancer mortality. Stomach cancer in this locale may be higher because of the predominantly Scandinavian descent of the population. It has been shown from previous studies that Scandinavians have an apparently higher incidence of stomach cancer than other population groups.

The arsenic concentrations detected in tailings and/or slag at Torch Lake OU I and OU III were included in the risk assessment and any estimated risks attributable to arsenic are clearly documented. Arsenic concentrations in fish were estimated in the risk assessment for OU II. The risk assessment indicates that, if there is a high rate of childhood cancer in the Torch Lake area, it is not likely to be the result of contaminants present in the tailings.

3.1.2(b)
COMMENT: Several residents comment that if there is any chance of an increased cancer risk from the tailings and slag, then some action must be taken. A Wellness Coordinator at a local hospital comments, "I'm fighting a losing battle if our environment itself is one big health hazard."

RESPONSE: The estimated cancer risks calculated in the risk assessments are conservative estimates of the number of incremental cancer cases likely to occur due to human exposure to contaminants at Torch Lake. For a risk of 1 incremental cancer case in one million (1×10^{-6}), we would expect that among one million people eating contaminated site tailings for their entire life, one person may get cancer caused by contaminants in the tailings. The significance of the risks estimated for Torch Lake are evaluated by the U.S. EPA in making risk management decisions and are not necessarily a prediction of actual observable incidents of cancer.

3.1.2(c)
COMMENT: A local physician notes that the number of cancer cases in the community is "a normal cancer rate when it's age adjusted." Further, he states that the local medical community has not been able to demonstrate any increased health risk in the Torch

Lake area over the past 30 or 40 years. He concludes, "You don't know that the cessation of that sewage dumping into Torch Lake, for instance, several years ago may have contributed to the problem and may be a lessening, not an enlarging problem. So I question your data." Other residents similarly note the community's 90 years of exposure to the tailings without identifiable problems to health or the environment.

RESPONSE: The estimated risks for Torch Lake residents (current and future) are based on contaminants detected in the tailings and slag. The analytical data were validated by the U.S. EPA and considered of acceptable quality for risk assessment. U.S. EPA has no information on whether concentrations, and therefore risks, may be increasing or decreasing, based on the cessation of sewage dumping, or any other activity.

The current cancer rate in the community may or may not reflect possible risks from exposure to contaminants at Torch Lake. Since the estimated incremental cancer risks due to contamination at Torch Lake range from less than 1 in ten million (1×10^{-7}) to about 1 in 10,000 (1×10^{-4}), it would be unlikely for these risks to noticeably affect the local cancer rate. Again, U.S. EPA uses risk assessments to make risk management decisions, particularly to assist in determining whether remedial action is warranted at a site, not to characterize a population's occurrence of cancer.

3.1.2(d)

COMMENT: A local nurse comments that even though the potential risk of cancer is within an acceptable range, she feels any health risk is unacceptable. "I have seen first-hand the end results of constant low exposure to toxins or contaminants. . . . I don't want to find out forty years from now that living on the shores of Torch Lake was the indirect cause of an unhealthy state for my family or me." She also expresses concern that since Lake Linden-Hubbell School is on the shores of Torch Lake and behind a tailings pile, children playing outdoors at school are constantly exposed to contaminants.

RESPONSE: The U.S. EPA agrees that it is important to protect the public from unacceptable risks. However, it is the duty of risk managers within the U.S. EPA to assess estimated risks and determine whether they fall within an acceptable range, since it is impossible to avoid all risks and impractical to appropriate limited resources to attempt to mitigate risks which are within an acceptable range and which pose no environmental threat. The National Contingency Plan defines acceptable exposure levels for known or suspected carcinogens as concentration levels that represent an upper bound lifetime cancer risk to an individual of between 1 in 10,000 (1×10^{-4}) and 1 in one million (1×10^{-6}) (40 CFR 300.430(e)(2)). The tailing piles along the Torch Lake fall within the acceptable risk range of the U.S. EPA.

3.1.2(e)

COMMENT: A resident comments that a Western Upper Peninsula Health Department physician stated there is a higher-than-normal rate of lung disorders in the area.

RESPONSE: The Western Upper Peninsula Health Department physician wrote to U.S. EPA and indicated that over the past 20 years, his department had received phone calls from residents with chronic lung disease (i.e., asthma). The residents complained that their symptoms worsened when the tailings dust in Lake Linden and Tamarack was blowing around in high winds. The health agencies have no data to support a higher incidence of lung disorders in the area. The tailings in Lake Linden and Tamarack are small particle size and more likely to be airborne in high wind conditions. The number of complaints has lessened considerably in the last few years, as revegetation projects have decreased the amount of barren areas in the tailings deposits.

3.1.2(f)
COMMENT: A resident comments that signs should be posted at all areas included in the May 1992 Proposed Plan and Lake Linden's camping area, beach, and park to warn of the real or assumed health risks. Additionally, he feels these areas should be restricted from future recreational use or development and that future buyers of the properties for residential use be notified of the possible health risks.

RESPONSE: Since the tailing piles along Torch lake do not generally present an unacceptable health risk and the selected remedy would reduce the potential exposure of tailings to humans, U.S. EPA believes that it is not necessary to post the signs at the tailings piles, beach, or park.

3.1.2(g)
COMMENT: "My grandfathers, my father, many of my uncles, my brother and I all worked for local mining companies. They all lived long healthy lives. Working in the mines, mills and smelters did not shorten any of their lives. . . . The idea that a brief exposure to stampsand or poor rock is hazardous to your health is ludicrous."

RESPONSE: The estimated risks for exposure to contaminants at Torch Lake do not imply that any health effects will occur to any individual, but rather estimate the likelihood of health effects occurring to an individual within an exposed population as a result of regular exposure over a lifetime. Thus, the fact that a group of individuals suffered no ill effects from extended exposure to tailings does not imply that adverse effects could not occur from exposures or that the risk estimates are inaccurate. Again, U.S. EPA primarily depends on a risk assessment to assist in determining an appropriate course of action at a site.

3.1.2(h)

COMMENT: "As a person who makes his living indirectly and sometimes directly from the mining/minerals industry, I am especially concerned about the impact of mining on the environment and the public perception of this impact. Consequently, the development of scientific data on the stampsand and slag and the presentation of the data in an objective manner by the EPA is a real service. This is particularly true in an arena where often supposition and confusion creates a false perception of the facts for the general public. I was pleased to see that the results showed that there was virtually no health threat from the stampsands and only a slightly higher risk from the slag--and then only if the material was ingested or inhaled."

RESPONSE: U.S. EPA agrees with this comment.

3.1.2(i)
COMMENT: A local professor states that the EPA's studies demonstrate both actual and potential human carcinogenic and non-carcinogenic health risks. "Though developed by making very conservative assumptions, the health risks appear to be a fair and balanced assessment of the site. This is particularly the case if one considers that these risks were developed from a rather limited (for the area concerned) number of sample sites. It seems unlikely to me that those sites sampled also happened to be the most heavily contaminated ones. Given the well documented heterogeneity of the various sand and slag deposits, it would seem highly probable that higher levels of contamination are present but not included in the sampling regimen, and consequently, in the human health hazard calculations."

RESPONSE: The sampling regimen was based upon a necessary assumption of overly homogeneity of the tailings, especially in OU I. Although a statistical analysis was not completed, we have confidence in the statistical representation of the RI study results. There is a level of uncertainty, however, that indicates that, as stated in the comment, the most heavily contaminated sites may have not been characterized.

3.1.3 Environmental Concerns

3.1.3(a)
COMMENT: A local group expresses concern that the chemical and physical characteristics of the tailings have prevented plant communities from developing, leached into the surface water and sediments, destroyed natural habitats along the lake shore, and resulted in a loss of bird and animal populations.

RESPONSE: It is true that the harsh physical and chemical environment posed by the tailings generally retards the development of natural plant communities on them. This is due to the abrasiveness of blowing sands, hot and drought conditions in summer, and a lack of nutrient-retaining capability. In addition, where tailings were deposited, the natural plant communities were buried and destroyed. Sediments in the lake bottom

have also retarded or eliminated natural aquatic communities from developing. In general, however, there is no documentation of a loss of bird and/or other animal populations in the area attributable to the tailings.

3.1.3(b)
COMMENT: "[A] serious attempt must be made to determine completely if the eagles are being affected by stampsand runoff."

RESPONSE: A study completed by the U.S. Fish and Wildlife Service in 1991 made the following conclusions:

- Bald eagles feed on aquatic species associated with the Torch Lake ecosystem.
- The short-term reproductive biology of bald eagles nesting within the Torch Lake ecosystem appears normal.
- The effect of copper on long-term productivity of bald eagles is unclear.
- The Portage River eagle nest has a poor reproductive history based on long-term data. Interpretation of the effects of copper on productivity is difficult, since poor productivity in eagles nesting near the Great Lakes has been associated with organochlorine and PCB contamination.

3.1.3(c)
COMMENT: A group is concerned by residents who say there is no environmental problem: "The cleanup of the Torch Lake Superfund site is an absolutely essential action." A resident states that the health of the Great Lakes ecosystem is more important than financial considerations. Another notes that even if EPA takes no action, the state, because of its own environmental standards, may be required to undertake an even more rigorous and expensive plan.

RESPONSE: U.S. EPA agrees with this commenter about the importance of the health of Great Lake ecosystem. Since Torch Lake site is also on the Act 307 Site of State of Michigan Environmental Contamination Priority List, the State of Michigan has the authority to take independent action for this site.

3.1.3(d)
COMMENT: A resident comments that although the known direct human health hazards appear to be acceptable, the effects on nearby aquatic and terrestrial ecosystems appear to be great. "All the ecosystem parts, humans included, are and will continue to be damaged by this environmental degradation until it is fully ameliorated. The revegetation of tailings and slag is a good first step in containing airborne contamination and accelerating the employment of natural processes in the clean-up efforts."

RESPONSE: U.S. EPA agrees with this comment.

inhalation. The contaminant migration pathway leading to groundwater is a concern, but not a primary motive.

Accordingly, the soil cover and vegetation alternative was chosen to reduce the release of contaminants into the environment by preventing the air settling and erosion process. The selected remedy would also mitigate the ingestion pathways by removing the exposure pathway between humans and tailings. In addition, a soil cover will serve to likely retard the overall flow of water infiltration into the tailings and reduce erosion via overland flow into the lake. By placing soils with a vegetative cover over the tailings, the tailing/soil cover interface will provide a retarding zone for water movement into the soil. This may occur as the finer-textured soil particles (clays, fine silts) either clog pores in the tailings or provide a hysteretic impediment between the finer-grained soil and the coarser-grained stampsands. The commenter notes that root channels and insect/annelid/and mammal burrows will open channels for water to infiltrate rapidly into the tailings. This is true; however, the volume of water passing through these channels is far less than the amount that could infiltrate if no soil cover is in place.

Lastly, the sampling strategy employed for the RI of OU I and OU III is indeed scientifically and statistically defensible as per the criteria established by William Mendenhall in The Design and Analysis of Experiments (Duxbury Press, 1968) and Snedecor and Cochran in Statistical Methods (7th Edition, Iowa State University Press, 1980). The number of samples is limited by the funds available for the study. In addition, the logistics and magnitude of performing a RI/FS for an area as large as was investigated for this site are complex and the time to perform the study is quite short.

3.1.4(h)
COMMENT: Several residents ask where the soil to cover the tailings will come from. One group and several individuals request EPA to obtain the fill soil in an environmentally responsible manner. Another resident recommends that an environmental impact statement be done on the soil acquisition process. Other residents ask that the plan not destroy one site by "strip-mining" its topsoil just to remediate another. MTU comments, "The proposed transport of hundreds of thousands of cubic yards of soil from the Trap Rock River Valley to the Torch Lake site will not be without negative environmental impacts in the source area. . . ."

RESPONSE: The concern of several residents about obtaining soil from a borrow source is valid. The soil needed to cover the tailings as proposed by U.S. EPA would come from source areas with abundant supplies of soil which can be used for the tailings. During the remedial design, U.S. EPA will attempt to ensure that the excavation of top soil will not create adverse environmental effects to the source area. The preliminary investigation conducted by the U.S. Soil Conservation Service

RESPONSE: The proposed soil cover and vegetation alternative presented by the proposed plan would not be implemented where there is currently existing and living vegetation. It would be redundant and not cost-effective to do so.

3.1.4(c)
COMMENT: MTU comments that in many areas, such as Point Mills, Grosse Point, and Isle Royale, the stampsands were not subject to regrinding and secondary copper processing and are therefore coarser. They state that these coarser sands do not produce dust except when disturbed by human activity, such as vehicular traffic or grading activities.

RESPONSE: This comment is noted and generally agreed with. However, substantial dust generation from vehicular traffic was noted during the time of the RI study, especially at Isle Royale. Further, as noted in the ROD, these tailing piles do not present an unacceptable human health risk.

3.1.4(d)
COMMENT: A resident comments that the topsoil of Trap Rock Valley is a finer-grained than the stampsand, so wonders if it will make an effective covering. Another resident is concerned that local subsoil used to cover the stampsands will not be an anchor against wind erosion because it is nearly barren and "will require considerable fertilizer and humus to get it to grow grass and hold water."

RESPONSE: Finer-grained soil to be used for the soil cover is preferred over sandy soils for its moisture-holding capabilities and its effect on slowing infiltration of water into the tailings subsoil. If subsoils from a borrow source are part of the cover, depending upon the chemical and physical makeup of the soil, it is recognized that additional fertilization and stabilizing requirements would be necessary.

3.1.4(e)
COMMENT: A local group comments that covering the sands with soil is likely to increase the risk to the environment. "Erosion at shorelines (which after these many years are basically stabilized and not a problem) will increase and contain new, unidentified fines and silt from the added topsoil. Leaching of subsurface minerals will increase, not decrease, due to moisture retention and long-term action caused by the organic, vegetative mat on the surface." Another resident asks if the presence of humic acids and added fertilizers will contribute to greater leaching of copper arsenic from the stampsands.

RESPONSE: Soils covering the stampsands will be stabilized by vegetation and, likely, rip-rap at the shoreline. As such, erosion would be expected to be minimal. Water retained in the soil cover will, in effect, reduce the amount of water moving through the stampsands.

Soil amendments such as fertilizers may be added without increasing copper or arsenic solubility. Nitrogen and phosphate fertilizers can serve to minimize humic acid solubility and maintain higher pH levels. This would be the case with the addition of calcium nitrate and calcium phosphate fertilizers.

3.1.4(f)
COMMENT: A resident comments that a friend's doctoral research involved trying to grow plants on the stampsand where the Hubbell water treatment lagoons are located. "The only time he got anything to stick was to put down a water barrier below two feet of topsoil, water constantly (since the barrier followed the natural slope) and attend church daily. The topsoil eventually washed into the lake or dried up and blew away. He spent four years and a pile of money on an area the size of a football field!"

RESPONSE: Soils added as cover to the stampsands should resist erosion if properly stabilized by soil nets, mulches, and other control techniques. EPA recognizes that establishing a stable vegetative community in these areas will require testing and evaluation to find the optimum native floral mix which will provide the quickest and possible vegetative establishment and successional development.

3.1.4(g)
COMMENT: A professor of forest soils is concerned about the lack of ecological evaluation of the plan, especially since the plan did not mention that the proposed action could cause a problem where none exists now.

"[W]eathering of mineral material in the absence of vegetation is very slow. There are studies on soil formation to back this up. Initial stages of soil formation, once plants and plant materials (mulch) are added, are marked by a lowering of soil pH due to the addition of organic acids. Studies of soil development on glacial outwash, dunes and volcanic mudflows have shown pH to drop from near 8.0 to as low as 5.0 in a relatively short period (40 years). In contrast, the stampsands that have been around for 100 years have relatively high pH. Such a drop in pH of the stampsands would result in increased weathering of mineral material and greater mobility of the metals you mention in your report. These would be available to plants or could potentially leach to the groundwater (the lake) if cation exchange capacity is low. Low soil pH will depress cation exchange capacity. Fertilization and subsequent soil processes such as nitrification will also reduce pH, lowering the soils ability to retain these cations. If the levels of these metals are indeed higher in stampsands than natural soil (your sample size was too small be scientifically respectable), increased leaching could create a problem in the waters of the community.

"Further complicating the situation, infiltration and percolation rates of these soils will probably increase, particularly on the finer textured sands, causing more water to leach through them.

Naturally, leaching in the summer would be lower because of evapotranspiration but leaching during the dormant period, particularly during snowmelt (which is extensive in the area), would likely be far greater because of the abandoned root channels of plants and the activities of burrowing micro- and mesofauna.

"These are just the obvious ecological issues that should have been considered in your plan. There was only brief mention of soil biogeochemical processes in the Donohue report but not specifically in relation to the proposed plan. Likewise, the Life Systems report in volume 33 discussed the past and current situation with no evaluation of the effects of the proposed plan. It seems that with over 3.2M spent, some small studies could have been established where the tailings have already been covered with vegetation. Life Systems pointed to these areas as examples of potential success but ignored the fact that this was the perfect opportunity to evaluate the consequences of the proposed plan. Instead, the feasibility study seemed to place inordinate emphasis on the physical factors of containment, wind erosion and cost and paid no attention to the inevitable processes involved with creating these new ecosystems. The point of this is that such information should have been evaluated in developing the plan and evaluating options, not just the costs of establishing vegetation and workers health. It's astonishing that an environmental agency would ignore the potential ecological impacts of the proposed plan in a way similar to the industry that generated the waste; you're simply not considering all the costs.

"To be fair to the public, you must clearly and concisely explain that there is potential risk to cause environmental damage through your preferred plan. By your own measures, the health risks are low enough that no action is possible. It is also apparent that the plan has not been thoroughly developed or peer reviewed by competent individuals. It is unconscionable that you could ask the community, including governments, property owners, lending institutions, businesses and educational institutions to sacrifice their financial viability for what can hardly be called a guaranteed environmentally viable prescription for action."

RESPONSE: This comment contains valid information which was duly considered during the development of RI/FS reports. The processes of natural ecosystem development, including the weathering and development of soils, were very much a major part of the remedial alternative selection considerations. The objective of the FS is to determine a remedial alternative that, among other factors, protects human health and the environment.

As this commentator is likely aware, soil evolutionary and soil biological processes are extremely complex. These processes cannot be completely understood and, thus, no guarantees can necessarily be assured. In assessing remedial alternatives, the major pathways of human exposure to contaminants must be considered. For OU I and OU III at Torch Lake, these avenues are primarily through ingestion (inadvertent, not purposeful) and

inhalation. The contaminant migration pathway leading to groundwater is a concern, but not a primary motive.

Accordingly, the soil cover and vegetation alternative was chosen to reduce the release of contaminants into the environment by preventing the air settling and erosion process. The selected remedy would also mitigate the ingestion pathways by removing the exposure pathway between humans and tailings. In addition, a soil cover will serve to likely retard the overall flow of water infiltration into the tailings and reduce erosion via overland flow into the lake. By placing soils with a vegetative cover over the tailings, the tailing/soil cover interface will provide a retarding zone for water movement into the soil. This may occur as the finer-textured soil particles (clays, fine silts) either clog pores in the tailings or provide a hysteretic impediment between the finer-grained soil and the coarser-grained stampsands. The commenter notes that root channels and insect/annelid/and mammal burrows will open channels for water to infiltrate rapidly into the tailings. This is true; however, the volume of water passing through these channels is far less than the amount that could infiltrate if no soil cover is in place.

Lastly, the sampling strategy employed for the RI of OU I and OU III is indeed scientifically and statistically defensible as per the criteria established by William Mendenhall in The Design and Analysis of Experiments (Duxbury Press, 1968) and Snedecor and Cochran in Statistical Methods (7th Edition, Iowa State University Press, 1980). The number of samples is limited by the funds available for the study. In addition, the logistics and magnitude of performing a RI/FS for an area as large as was investigated for this site are complex and the time to perform the study is quite short.

3.1.4(h)
COMMENT: Several residents ask where the soil to cover the tailings will come from. One group and several individuals request EPA to obtain the fill soil in an environmentally responsible manner. Another resident recommends that an environmental impact statement be done on the soil acquisition process. Other residents ask that the plan not destroy one site by "strip-mining" its topsoil just to remediate another. MTU comments, "The proposed transport of hundreds of thousands of cubic yards of soil from the Trap Rock River Valley to the Torch Lake site will not be without negative environmental impacts in the source area. . . ."

RESPONSE: The concern of several residents about obtaining soil from a borrow source is valid. The soil needed to cover the tailings as proposed by U.S. EPA would come from source areas with abundant supplies of soil which can be used for the tailings. During the remedial design, U.S. EPA will attempt to ensure that the excavation of top soil will not create adverse environmental effects to the source area. The preliminary investigation conducted by the U.S. Soil Conservation Service

located at Hancock indicated that the top soil for the selected remedy can be excavated from the valley of Trap Rock river without generating any adverse environmental impacts in the source area.

3.1.4(i)
COMMENT: A local group and an individual resident request that revegetation work be done according to the best current practices of restoration ecology. They suggest at a minimum that the replanting include only native plant species and use organic fertilizers. They suggest contacting the Society for Ecological Restoration for assistance.

RESPONSE: The U.S. EPA shares the concern of local citizens that vegetation of the tailings be completed using the best current practices of restoration ecology. Currently, the U.S. Soil Conservation Service (SCS) located at Hancock is conducting a treatability study to determine the types of vegetation and fertilizer for the effective implementation of soil cover with vegetation. The remedial design will incorporate the results of SCS's study and other information from the public. The Society for Ecological Restoration can be contacted for technical assistance, if necessary.

3.1.4(j)
COMMENT: Regarding vegetation alternatives, MTU comments on EPA's reliance on the U.S. Department of Agriculture Soil Conservation Service (SCS). "The techniques employed by SCS are typically based upon the practice of agriculture and agronomy which permeates their selection of a vegetation community and the subsequent management of it to produce a plant cover for a critical area. Such a remedy requires the introduction of off-site soil cover and establishment of a plant community which is at best an approximation of a cultivated grassy field lacking in species diversity. The MTU administration questions the wholesale application of this vegetation concept to the stampsands deposits, and raises additional considerations which need to be addressed in any vegetation solution for the stampsand areas."

"The techniques employed by the USDA SCS require soil introduction, specialized seeding, fertilization, mulching and irrigation to develop a satisfactory plant cover on a critical area. This methodology is labor intensive and expensive while not assuring acceptable results if some component of the support system fails to be maintained at optimum levels at the appropriate time. It is a shotgun approach which does not consider variations in sand and/or slag consistency, physical variations in sites or habitat, local biota and soil microflora as well as the degree of site exposure to the elements. Before significant funds are expended on this type introduction effort, the MTU administration urges the U.S. EPA to have these factors thoroughly evaluated by agency ecologists.

"In this evaluation, concepts should be explored which are fundamental to ecosystem development. For example, what provi-

sion will be made for species diversity and successional processes in the vegetation effort? Are the sites to be maintained on a permanent basis as grassy fields or are the plant communities going to be allowed to develop into the type of native communities typical of this area of Michigan? If a native community is to be developed in this area, why is there a need for the grassland/legume stage? What provision is going to be made for native species to pioneer in these areas and expand their range by normal biological propagation without the expensive intervention of man?

"Depending upon the species which are allowed to colonize these waste areas, there may or may not be a need for supplemental irrigation. Obviously, a more stable vegetation community is created if the component species are not dependent upon artificial irrigation for survival. Plant ecologists have known for decades that there are some plants which are morphologically adapted to water stress and conservation. Other species incorporate morphological and physiological dioxide in the atmosphere. An example of this type of physiological mechanism with ecological implications for a plant species is the Hatch-Slack pathway of photosynthetic carbon fixation found in many pioneer plants. This type of physiological ecology is largely overlooked by the application of agronomy to critical area vegetation. The MTU administration anticipates that the U.S. EPA will avail itself of the existing data in the botanical literature which pertains to the suitability of species for introduction to these stampsand areas, if such exogenous introduction of plant species is even considered advisable.

"The USDA SCS protocols direct the vegetation effort towards high viability seed stocks which are relatively free of weed seeds and which can be subsequently inoculated with appropriate symbiotic bacterial microflora, in the case of legume seed. This approach assures that diversity is lost in the resulting plant community and as a result, ecological stability. This approach also maximizes cost for seed and inoculum as well as introducing additional seed handling procedures. The MTU administration believes that the entire concept of seeding and application is in need of review and revision. If the resulting plant community is to be maintained as essentially an agricultural mono-culture, the USDA SCS techniques are applicable. If, however, the resulting plant community is to be a diversified successional community which is allowed to develop through the normal stages of old field maturation into a climax community, the USDA SCS methodology is not the most effective way to accomplish this. To the extent that additional seeding is necessary beyond the normal native plant colonization process, other seed sources should also be considered.

"Consultants for the MTU administration have made limited inquiries into the availability of alternatives to the USDA SCS approach to seeding these stampsand areas. Grain harvests in the upper Midwest growing regions are typically processed a centrally located elevators which receive field-run grain harvests by the

train load. One of the processing steps employed by these receiving elevator operations is to winnow these grains to remove plant debris, insects and weed seeds from the harvest product. Many of the weed seeds which are present in this field run grain are exactly the types of pioneering plants which have had to endure water and temperature stress under the growing conditions found in the grain fields. For example, seeds from this weed source are available in box car loads at a cost of $40 per ton FOB, Mitchell, South Dakota. Even with less than 1% germination of the weed seeds in this mixture, which is highly unlikely, the generous application of this seed source to the surface of the stamp- sands will immediately and simultaneously introduce organic materials to the sands, provide mulching and assure a diversity of species fully capable of surviving in a stressed environment.

"The MTU administration believes that successful and cost-effective vegetation programs are complex undertakings which require an understanding of the factors considered above plus many additional considerations which are not discussed herein. They certainly are more than the simple application of agriculture/agronomy principles to these stampsand areas."

MTU attaches as documentation two articles: Gillis, A. M. Bringing back the land: Ecologists evaluate reclamation success on western coal lands. Bio Science. 41:68-71; Perry, D. A., M. P. Amaranthus, J. G. Borchers, S. L. Borchers, and R. E. Brainerd. Bootstrapping in ecosystems: Internal interactions largely determine productivity and stability in biological systems with strong positive feedback. Bio Science. 39:230-237.

"As a final consideration under the heading of vegetation management, the U.S. EPA proposed plan for the Torch Lake Site and the associated supporting documentation provide very little insight into the ultimate land use for those areas to be subject to remediation. It is fundamentally important in the establishment of a plant community that this vegetation be consistent with the future plans for these land areas. If housing development is to be allowed with some form of deed restriction, residential improvements and landscaping are to be considered. However, if the area is to be allowed to attain a wild natural state to support a diversified plant community which includes a population of native animals and birds, a very different vegetation plan is needed. Neither of these options are optimized by utilization of a standard USDA SCS protocol for critical area vegetation. The MTU administration anticipates a substantial review of these vegetation issues by the U.S. EPA in their response to this document."

RESPONSE: Some excellent comments are made regarding the establishment of a successful vegetative community over the tailings. Before implementing a remedial action plan for OU I and OU III, trial studies would be conducted to determine the most successful seeding plan for the area which would require the least input. Contrary to the statements made in this

comment regarding soil scientists and agronomists with the USDA-SCS being limited to establishing monocultures, soil scientists and agronomists have provided leading research and practice of implementing biodiversity in ecological restorations to reestablish environmentally sound and stable systems.

The goals of the soil cover and vegetation plan will be to establish a natural plant community in areas which are now not currently vegetated. To assure this, local seed stock will likely be most successful. While it is recognized that variations exist in the tailings, creating diverse micro-environments, the variation is too subtle and too magnanimous to define and subsequently manage. In such a case, it would be best to give the vegetative community a start and let nature eventually determine the most successful community of vegetation to develop for each area of tailings.

To assure success, however, the establishment of a vegetative cover will require artificial mulching, irrigation, and fertilization to at least establish a stabilizing plant community over the soils. The continued advice from MTU biologists, ecologists, and foresters, and also from agronomists and local citizens, will continue to be welcomed by U.S. EPA in establishing the best vegetative cover.

3.1.4(k)
COMMENT: A local professor supports the proposed soil covering and vegetation plan as proposed by the USDA Soil Conservation Service. "Their delineation of the sands by texture and presence or absence of existing vegetation is a realistic way to address the diverse nature of the sites. In addition, the use of soils from presently marginal or unusable donor sites and the creation of valuable wetland habitats at those sites also seem to be very cost effective and beneficial for the area."

RESPONSE: EPA welcomes such support as provided in this comment and will seek advice from the community to assure successful implementation of the plan.

3.1.5 Fish, Water Recreation, and Water Quality Concerns

3.1.5(a)
COMMENT: One resident hopes the soil cover and vegetation will protect the water of Portage Lake from further contamination.

RESPONSE: One of the objectives of the soil cover and vegetation plan will be to reduce contaminant migration into the lakes by reducing water infiltration and eliminating wind-borne contaminant migration. This, however, will not necessarily stop pollutant release to the lakes, as there are other sources of possible contamination into the Keweenaw Waterway.

3.1.5(b)

COMMENT: One resident states that he has long used Torch Lake for boating, fishing, and swimming, and finds no reason for the lake to be on the Superfund list. Another comments that many of the researchers from MTU who did the studies on Torch Lake fish regularly fished in the lake and ate the fish.

RESPONSE: EPA has no reason to question the comment, and believes that Torch Lake supports a viable sports fishery. EPA believes that there is some uncertainty regarding the degree to which the maximum capacity of the Torch Lake fishery has been achieved in light of contamination by stampsands and tailings.

3.1.5(c)
COMMENT: One resident notes that the OU I RI report found that Torch Lake water is not directly contaminated with heavy metals and that metals do not leach into the water in significant concentrations.

RESPONSE: Although this comment is not necessarily a conclusion of the OU I RI report, this statement cannot be refuted.

3.1.5(d)
COMMENT: A few residents comment that the populations of sager and walleye have decreased substantially in the past 30 years and ask what the relationship is to the contamination problems.

RESPONSE: The decrease of sager in Torch Lake has been attributed to the clearing of the lake water from mostly turbid and opaque during the mining and smelting period (MDNR, 1990). No official decline of walleye populations has been noted. Overall, there appears to be little or no link between fish population declines and contaminant presence.

3.1.5(e)
COMMENT: Two residents cite confusion about the tumors or tumor-like lesions on Torch Lake fish. One questions MDNR's statements that the growths are caused by a virus, not by pollution, and states that studies attempting to demonstrate the presence of viruses in Torch Lake fish have not been successful. The other says the fish tumors have been gone since 1988 and fish caught now do not appear to be affected.

RESPONSE: Studies concerning tumor-like lesions on Torch Lake fish (sager and walleye) were generally inconclusive as to the derivation or cause of the tumors (MDNR, 1990). The MDNR study, completed in 1988, stated that tumors in older, larger fish may or may not be similar to background frequencies and that additional studies may be needed.

EPA does not perform routine monitoring of tumors or tumor-like lesions in Torch Lake fish. Specific surveys for and studies of tumors known to be produced by chemical contamination are required to establish a relationship between their occurrence in fish populations and the chemistry of the lakes which they

inhabit. These types of studies were not performed as part of site characterization for the Torch Lake Superfund site.

3.1.5(f)
COMMENT: Noting that it was tumors in fish that initiated all the concern about Torch Lake, two residents suggest completing the fish tumor study to resolve the question of whether there is an unacceptable level of tumors in the lake's fish. One adds, "The issue of tumors in fish would remove the last question about the safety of Torch Lake for recreational purposes such as boating, swimming, fishing, and consumption of fish."

RESPONSE: EPA accepts the results of the fish monitoring conducted by the MDNR in July 1989, which indicated that there are no tumor problems in Torch Lake fish. If the MDNR recommends that the Michigan Department of Public Health remove Torch Lake from the list of advisories against fish consumption, U.S. EPA is willing to concur with such a recommendation. However, it should be noted that the Torch Lake site was not placed on the NPL (or Superfund List) in 1986 because of fish tumor problems. The Torch Lake site was placed on the NPL due to the toxicity/persistence of contaminants in the tailings, potential releases into the groundwater and surface water, and potential impacts to the nearby residents.

3.1.5(g)
COMMENT: MTU supports the technical comments of the Geraghty & Miller comment document regarding the lake ecosystem "because we believe that the U.S. EPA concerns regarding the aquatic habitat in Torch Lake are over-reactive and unsupported by the existing data base." MTU urges EPA to review carefully all data pertaining to the lake ecosystem.

Reviewing the history of lesions found in walleye and sager fishes, MTU states that in retrospect, the Michigan Department of Public Health's fish consumption advisory and the International Joint Commission's designation of Torch Lake as a Great Lakes Area of Concern had "an unnecessary and detrimental impact on the Torch Lake area with no demonstrable protection of the health of the human population." MTU notes that fish caught in recent years do not display the tumors. "[I]t may be technically impossible to accurately and conclusively determine what was the actual situation which created the fish cancer problem during the relevant time period. It is entirely possible that the problem, whatever it may have been, has corrected itself through some natural means during the passage [of] time."

Regarding EPA's concern that stampsands and high copper concentrations in Torch Lake sediment have a negative effect on the macro-invertebrates in the lake bottom, MTU notes that walleye caught recently in Torch Lake exceed the state record for this species. MTU concludes that walleye, a predatory fish near the top of the food chain in a lake ecosystem, appear to have adapted successfully to the stampsands and copper-containing sediments.

Therefore, MTU states that "there is a significant gap in the biological data base pertaining to Torch Lake which must be corrected before serious consideration can be given to any type of remediation of this ecosystem. Indeed, undertaking what is thought to be a corrective action in the lake without sufficient data and understanding of the system may well result in the production of major damage to an established biological community which has successfully adapted to the current conditions in the lake. In other words, nobody has conclusively demonstrated that there is a major problem with the biota of this lake, even considering the scarcity of benthic macro-invertebrates, so it is entirely possible that it may not be necessary to fix it."

MTU refers to comments prepared by Geraghty & Miller stating that localized problems in Torch Lake sediments may be the result of much more recent industrial activity than the activity that deposited the stampsand. "We are opposed to any wholesale attempt to address sediment contamination sites without additional data and detailed evaluation of the consequences of re-suspending major volumes of lake sediments in an effort to recover contamination residues. The U.S. EPA is very willing to impose deed restrictions on land areas to prevent human exposure to potential contamination. This concept is also applicable to lake sediments which are commonly thought by limnologists to be sinks for contaminants which find their way into the water mass, by whatever means. Current lake water chemistry suggests that this is exactly what is happening in these areas."

"Clearly, significant and essential data gaps exist which prevent a full current understanding of what is actually happening biologically in this lake system. Almost all of the positions taken by the U.S. EPA related to the biota of the lake are based upon speculation, faulty research and an incomplete data base. None of the existing information is adequate to justify any type of remediation in the lake system, as conceptualized in OU II planning."

RESPONSE: EPA agrees that it may be technically impossible to determine accurately and conclusively the nature of the cause of the historical fish cancer problem in Torch Lake. EPA does not have sufficient information to conclude that the historical fish cancer problem in Torch Lake has corrected itself by natural means.

EPA has reviewed data on Torch Lake that were available at the time site characterization was performed, and has concluded that the lake system is complex, and some areas are more severely impacted than others by stampsands and tailings contamination. Areas of Torch Lake apparently remain relatively unaffected by this contamination, and these areas support populations of fish and other aquatic organisms. The complex waterway which includes Torch Lake allows free migration of larger fish from as far away as Lake Superior and Keewenaw Bay. Therefore, it is not unexpected that large fish and fish free of tumors will be caught in Torch Lake. These occurrences are not sufficient to

discount completely the existence of impacts on the aquatic ecosystem in Torch Lake from stampsands and tailings contamination.

EPA does not believe that walleye populations are maintained on a food base that consists solely of macroinvertebrates. Areas of the bottom of Torch Lake that have not been covered by stampsands and tailings may support macroinvertebrate communities. The extent of these areas has not been established. Walleye, when young, may feed in these areas. As they grow older, they are likely to shift to a higher trophic position in the Torch Lake food web, where they would be expected to feed on a mixture of large and small fish of various species. On the basis of these assumptions, EPA does not agree that there are data to support MTU's speculation that walleye have "adapted successfully" to the stampsands and copper-containing sediments.

EPA believes that sufficient information has been collected to justify the proposed remediation without achieving a full and complete understanding of what is happening biologically in this lake system.

3.1.5(h)
COMMENT: MTU submitted the following comments on water quality concerns and EPA's investigation of OU II.

"The entire water quality issue for Torch Lake is in need of review and revision because of fundamental flaws and oversights which were incorporated into the U.S. EPA current understanding of this resource. The Torch Lake system has four major tributaries, of which the Trap Rock River is by far the largest, contributing approximately 57% of the total lake water volume annually according to MDNR data. As is stated in the Geraghty & Miller comment document, past studies of the flow to Torch Lake from this single tributary indicate that Torch Lake receives a loading of approximately two tons of dissolved copper on an annual basis. Any evaluation of the copper budget of Torch Lake which does not take into account this background loading from primarily natural geological sources is flawed. The use of water from Gogebic Lake which is some 60 miles distant from the Houghton/Hancock area provides an entirely inappropriate background reference point for consideration of the Torch Lake system because it provides no latitude for the naturally occurring copper contributions to Torch Lake water which are largely absent from the input to Gogebic Lake. . . ."

MTU states that copper and associated metals occur naturally in local geology. "These native features of the region require accurate and appropriate evaluations to place these dissolved metal concentrations in their proper perspective as a normal aspect of the water chemistry of the Torch Lake system. It may never be possible to completely eliminate certain heavy metals from flowing into Torch Lake for geological reasons which neither the U.S. EPA nor any other interest will be able to control in any practical way."

"The U.S. EPA has also expressed concerns regarding the possible 'hot spot' in Torch Lake east of the former Calumet & Hecla smelter at Hubbell. A further concern relates to arsenic in groundwater at the north end of the lake. Neither of these concerns has been adequately investigated to determine the origins of the alleged problems. The Hubbell problem may well be the result of more recent industrial releases not related to the copper mining stampsand deposits at all. It should be noted that this is one of the areas in which a successful drum removal activity was completed by the identified Potentially Responsible Parties for the Torch Lake Site. The designation of the area as a 'hot spot' by the agency in itself categorizes this site as a localized phenomenon in need of specific definition. In like fashion, the arsenic issue at the north end of the lake needs to be evaluated in terms of the history of wastewater treatment practices and associated historical problems which occurred during the periods of operation of treatment facilities at the north end of the lake."

MTU states that EPA's investigations show that the leaching of heavy metals, including arsenic, from stampsands into groundwater and lake water was at an extremely low level. "The MTU administration recommends that the U.S. EPA review their position on lake and groundwater chemistry with the added perspective that background loading and alternative sources for metals contamination exist in the areas of concern and should be appropriately considered. Given this perspective, the necessity and desirability for an Operable Unit II activity becomes highly questionable. Application of CERCLA to a situation of this nature is based almost entirely upon speculation and inappropriate evaluation of existing data which is inconsistent with the intent of the CERCLA program and the NCP. Abandonment of the plan for Operable Unit II in favor of a 'no action' alternative is the cost effective and reasonable way to address the issues represented by surface and groundwater quality."

RESPONSE: Whereas water quality may or may not be an issue at Torch Lake, it is not necessarily a concern of the OU I and OU III remedial action. Torch Lake surface water quality and groundwater are subjects of the OU II RI. No conclusions of actions for further remedial activities have been determined for OU II at this time.

3.1.6 Tourism, Keweenaw National Historical Park, and History

3.1.6(a)
COMMENT: Several residents express concern that EPA action could slow down or adversely affect the formation of the proposed Keweenaw National Historical Park. A number of others are concerned that covering the tailings and rock piles would obliterate some of the historical attractions that bring tourists to the area. One resident comments, "It would be a shame to cover up and hide this heritage which helps to distinguish the 'Copper Country' from other areas in the upper Midwest."

RESPONSE: Since the selected remedy includes no action at the Quincy Smelter area which is proposed as a National Historical Park, U.S. EPA's action will not adversely affect the formation of the proposed Keweenaw National Historical Park. Even after U.S. EPA's action, there will be enough tailings, slag, or rock piles in this area to be shown as historical attractions.

3.1.6(b)
COMMENT: One resident suggests that the desire to establish a national park is not reason enough to leave hazardous wastes uncovered. Another comments that even if EPA took no action, there would be no way to keep potential park visitors from finding out about the EPA's concern and investigation.

RESPONSE: Once developed as a National Park, U.S. EPA has determined that the risk to park visitors from potential inhalation and ingestion of slag particles is considered acceptable.

3.1.6(c)
COMMENT: A resident comments that it is not necessary to have the actual tailings available for view in the proposed national park. "I believe pictures of these areas and visible remediation will allow people to 'imagine' the process and also recognize the 'error' in the random dumping of this waste material."

RESPONSE: See Response to 3.1.6 (a) & (b)

3.1.6(d)
COMMENT: "If the risks to human health along with other impacts are the same for the slag piles location in the Quincy Smelter area (Location 6), what line of reasoning would lead you to exclude this site 'based on the assumption that this area will be developed as part of a National Historic Park.' The same ecological and moral criteria which lead you to make your recommendation in the instance of the other sites are suspended in the case of this site? . . . . What does establishing a national park have to do with addressing a potential public health risk?"

RESPONSE: The risk assessment for the tailings generally assumes that these areas will be developed as residential areas in the future. Once developed as a residential area, the frequency of residents being exposed to the tailings will be high. However, if the area, such as Quincy Smelter (Location 6) in OU III, is developed as a National Park, the frequency of exposure of site visitors and park caretakers would be lower than the residential scenario. Since the risk to the park visitors is acceptable and there is likely no adverse environmental risk from the slag at Quincy Smelter area, U.S. EPA excludes this area based on the assumption that this area will be developed as part of a National Park. 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.

3.1.6(e)

COMMENT: A resident comments that the cleanup would improve the area for tourism by removing unsightly debris from the waterfront.

RESPONSE: U.S. EPA agrees with this comment.

3.1.6(f)
COMMENT: MTU comments that the history of the copper mining industry is a unique cultural resource which must be protected for future generations. MTU supports the local community's efforts to establish a national historic park in the area.

"Designation of areas within the proposed park district as CERCLA sites is entirely inconsistent with these development plans. The MTU administration expects the full cooperation of the U.S. EPA in supporting the creation of a historic park district as part of the necessary activities required to control any alleged contamination on the lands to be incorporated into the park district."

MTU states that the full extent of the historical legacy in the area has not yet been discovered or evaluated. Because of this concern, MTU urges EPA to insert considerations into the Proposed Plan which "clearly recognize the legitimacy" of these historical resources. "We recommend further that the U.S. EPA establish a defined protocol for the protection of these remarkable resources whenever they are encountered in any remediation activity."

MTU also notes that the remediation activities planned for OU I and OU II may have an impact on sites designated by the Michigan Secretary of State for inclusion on the state and national historic registers. (In an appendix MTU attaches a copy of the register list for towns near Torch Lake.) "We expect the U.S. EPA in their response to these public comments to clearly identify those steps which will be taken to preserve and protect these historic treasures during agency activities. As an example, the Calumet and Hecla/Quincy Reclaiming Sand Dredge located [on Highway] M-26 [along] Torch Lake in Osceola Township is a singularly unique resource from the mining period which is clearly in an area that concerns the U.S. EPA. The agency should not fail to discuss those steps which will be taken to assure that this historic resource is not damaged in any way."

MTU invites EPA and other interested parties to use the university's archives and historical records to identify and catalog historical sites. "Our institution is prepared to serve as a repository of documentation and data derived by efforts to identify and protect the historical site and/or artifacts of the copper mining industry during any remediation activities."

RESPONSE: By law, U.S. EPA is required to consider all applicable or relevant and appropriate requirements (ARARs) in selecting and implementing the remedial action. National Historic Preservation Act and Historic Sites, Buildings and Antiquities Act are some of the ARARs to be considered for this site. During the implementation of the remedy, U.S. EPA will work with

the MDNR, local townships, and necessary agencies to protect the historically valuable resources. In addition, based on the development of certain areas as a Historical Park, the U.S. EPA has excluded those areas from the selected remedy.

3.1.7 Uses of Stampsands for Winter Roads and Road-Building

3.1.7(a)
COMMENT: A number of residents point out that the stampsands are used as an abrasive in place of salt to cover icy, local roads in winter, avoiding the damage caused by salt. One adds, "The mortality of the car wrecks that will come out of not having adequate abrasive on those roads every winter will far exceed by many multiples any mortality that will come out of the stampsands of Torch Lake."

RESPONSE: U.S. EPA will allow the use of stampsands in Grosse Point as road-friction material.

3.1.7(b)
COMMENT: A number of residents comment that the road commission's use of the stampsands saves tax dollars. One states that the negative economic impact on the road commission and local taxpayers far outweighs the benefits of the proposed remedy.

RESPONSE: See response to 3.1.7(a)

3.1.7(c)
COMMENT: A few residents comment that if the sands pose enough of a risk to spend $7.2 million to cover, then their use by the road commission and for other industrial purposes should be eliminated. One states, "If there is a health hazard in stampsand, it doesn't matter where it is, and it must all be covered. Conversely, if some doesn't need to be covered, then none needs to be covered."

RESPONSE: The tailing pile that is used as a source for road sanding does not present an unacceptable health risk to humans, and by removing the material from the waterway such spreading does not present a danger to the environment. The tailings pile located in Grosse Point, which is currently being used by the Houghton County Road Commission to spread on the road as a road-friction material, does not pose unacceptable risk to the human health. Based on the scenario of current residents inhaling and ingesting tailings, the cancer risk was estimated as 3 additional cases in 100,000 people (3×10^{-5}). The Hazard Quotient, the noncancer risk, was estimated as 1.0 for copper. These risks were considered as acceptable by U.S. EPA. (However, the adverse impacts of the tailings to the environment due to the continuous release of its contaminants into the lake is considered as unacceptable.)

U.S. EPA considers the possible health risk that could occur when the tailings are used for road-friction material to be

insignificant. Tailings spread on a road during the wet conditions of winter are unlikely to resuspend. It is more likely that the particles would be transported to the sides of roads during snowmelt/runoff conditions or by passing traffic. Therefore, the tailings would likely accumulate on the sides along the roads and became mixed with existing soil. Exposure to humans could then occur either by ingestion or inhalation due to the presence of these tailings. It is believed that either route would be insignificant. Similarly, there is little concern for environmental populations. Tailings along a road are not likely to be blown into the lake.

Because of these acceptable risks to human health of the Grosse Point tailings pile and its insignificant risk to human health and the environment once spread on the road, U.S. EPA decided to exclude Grosse Point tailing (Location 10 in OU III, 50 acres) from being covered with soil and vegetation under this ROD. However, due to the adverse environmental impacts of tailings, U.S. EPA requires that the Houghton County Road Commission observe the following procedures while this area is being used:

1) The area should be covered with enough soil to prevent the release of tailings to the air and lake;
2) Excavation should stop at seven (7) feet above the water table. This portion must subsequently be covered with soil or soil and vegetation.
3) Once the entire area is excavated to seven (7) feet above the water table, it must be covered with soil and vegetation pursuant to this ROD.

3.1.7(d)
COMMENT: Several residents comment that the stampsands are used to make concrete blocks and in road-building materials. They would like to see these uses continue. One notes that the stampsands used in building roads are permanently buried in the process; another states that the Michigan State Highway Department has a specification for bituminous pavement in Copper Country, which utilizes the stampsands in place of other aggregate or sand. Another asks for an evaluation of the long-term safety of these practices.

RESPONSE: See response to 3.1.7(a) and 3.1.7(e).

3.1.7(e)
COMMENT: A resident comments that many "do-it-yourselfers" use stampsand at little or no cost for household concrete and mortaring jobs, especially for walks and driveways. He states that the stampsand is excellent for these uses because it packs well and forms a smooth, level, and nearly dust-free surface when stabilized by traffic.

RESPONSE: U.S. EPA can not and will not "police" every individuals use of the stampsands for "do-it-yourself" purposes. As previously noted, the human health risk from most of the stampsands is within U.S EPA's acceptable range, and therefore use of

such stampsands by individuals would not present an unacceptable health risk. Further, the removal of the stampsands from an area where it causes an adverse environmental impact would not be inconsistent with the remedy selected by U.S. EPA for this site. For those stampsand piles that may present a unacceptable human health risk due to ingestion of the stampsand, use of the stampsands in such a way that would bind the stampsand to other material (i.e., household concrete) would reduce the risk of ingestion of the stampsand. However, use of such stampsands that would not result in the binding of the material (i.e., in a sandbox), is not recommended by U.S. EPA as this would not reduce the health risk from the ingestion of the stampsand.

3.1.7(f)
COMMENT: One resident suggests that existing businesses on or using stampsand be allowed to continue if the business agrees to revegetate and reclaim the area it uses upon completion of business activity.

RESPONSE: U.S. EPA agrees with this comment but the owner/operator of an existing business also should use dust control measures such as water spray during excavation and other activities to reduce the release of dust into the air.

3.1.7(g)
COMMENT: MTU states that it shares the Houghton County Road Commission's concerns about using stampsand as winter roadway abrasive and for sub-base fill material in highway construction. "The marginal character of the outcomes of the risk assessment process associated with the development of OU I and OU III fail to provide adequate reason or basis to deny this county agency the use of the stampsand resource for this very necessary safety function in our locality."

"The U.S. EPA and the MDNR both indicated in their public comments at the Lake Linden information meeting of June 25, 1992, that they did not have enough data to make a determination as to whether the use of stampsand for roadway skid control would be acceptable based upon health and environmental risks which may be associated with roadway application of this material." In this evaluation, MTU asks EPA to consider the need for this type of abrasive, the increased costs and negative impacts of alternative abrasive, and the facts that stampsands used on the roads will result in "substantial adulteration and dispersion of any toxic or otherwise hazardous constituent in the sand" and that the sands are fractured rocks of local origin that are comparable in chemistry and background levels of metals to native rock not used in mining operations.

MTU notes that the County Road Commission intends to develop the site of the sands they use using methods that will address the concerns of dust containment, exposure control and site vegetation. "The MTU administration urges the U.S. EPA to revise their remediation planning for these stampsands to incorporate the utilization of this resource as a roadway abrasive by the county,

considering the paucity of information which would argue against this established practice of resource development."

MTU states that use of stampsand as filler in road construction is consistent with EPA's goals for the remediation program, since the sand will be covered and not exposed to the surface where it might be carried by wind or precipitation or ingested by humans.

MTU states that if the Road Commission could not use the stampsands and could not afford the more-expensive alternatives, the consequences may include "preventable traffic accidents, property damage, unnecessary injury and loss of life which may significantly exceed any values derived from theoretical health and risk assessments based upon the chemistry of these native rock-based materials."

MTU asks EPA to review this aspect of local community planning and accept this stampsand utilization program as "a central part of the Proposed Plan for the Torch Lake site."

RESPONSE: See response to 3.1.7(a) and (e)

3.1.8 Suggestions for Changes or Additions to the Proposed Plan

3.1.8(a)
COMMENT: Several residents ask EPA to consider covering the rest of the sands that were not proposed to be covered. Three are concerned about the stampsands near or within the new Houghton sewage treatment plant, pointing out that there are residences nearby. One would like the slag piles removed from Hubbell.

RESPONSE: EPA proposes to cover stampsands in the Torch Lake Superfund site which present a potential environmental threat. The stampsands upon which the Portage Lake Water Authority (PLWA) will build a water treatment plant are proposed to be covered and vegetated by the PLWA. Removal of the slag piles at Hubbell was considered and deemed not cost-effective in the Torch Lake OU I/OU III FS.

3.1.8(b)
COMMENT: A resident comments that blowing stampsands are a nuisance in Hubbell and Lake Linden but not necessarily in other areas. He suggests covering the sands only in areas where there is a problem with wind-borne sand.

RESPONSE: Wind-borne stampsands are but one of the environmental hazards presented by the existence of the sands in their current status. Therefore, it is practical to cover the stampsands at all of the proposed locations where the stampsands present a threat to the environment.

3.1.8(c)
COMMENT: A resident comments that the dust problem should be dealt with locally. "I further believe the attention that has

been generated by the EPA study and public comment provides an opportunity for those affected by dust problems from the stampsands to identify a source of revenue to have these problems resolved while the interest is high and the threat of EPA enforced sanctions is present."

RESPONSE: U.S. EPA can not complete an investigation that finds unacceptable environmental harm and/or human health risk, and walk away from the site for it to be dealt with by local government. However, as can been seen in the ROD, U.S. EPA is willing to cooperate with local governments and indeed has limited the areas that will be addressed by the selected remedy based on actions that local government has pledged to take.

3.1.8(d)
COMMENT: A resident asks that the Michigan Smelter site be removed from the list of areas for remediation since the slag is similar to the Quincy Smelter site, which EPA did not include in the remediation plan. The resident notes that the Michigan Smelter slag is of the coarse, aggregate type that does not become airborne.

RESPONSE: U.S. EPA has proposed a "No Action" alternative for the slag at Quincy Smelter because this area was included as part of a Historical National Park. Once developed as a National Park, the risk to human health was considered as acceptable due to the less frequent exposure. If the Quincy Smelter site is not developed as a National Park in the future, deed restrictions will be sought to prevent the development of residences. (The risk to human health under the residential development scenario at the Quincy Smelter site was considered as unacceptable). The Michigan Smelter site, however, was not proposed as potential Historical Park. The risk assessment with the residential scenario indicates that the potential risk from contaminants at the Michigan Smelter site was unacceptable to the U.S. EPA. It also should be noted that most of materials at the Michigan Smelter site are tailings.

3.1.8(e)
COMMENT: A resident suggests covering the stampsands with woodchips or a mixture of woodchips, chopped foliage, and soil. He states that an area of sands at Gross Point where brush was dumped 15 years ago is now revegetated. "The goal should be to cover the areas with trees rather than grass since these will be more effective in lowering wind velocity near the ground and represent the natural terminal growth for this land." Additional benefits he cites are the lighter weight of wood chips to transport by truck, the need to thin local woods, and the opportunity for local jobs.

RESPONSE: This comment presents a reasonable remedial alternative that warrants consideration in the remedial design plan.

3.1.8(f)

COMMENT: "I think there should be no cover-up with soil. Who knows how long the soil will soak up the pollutants. Also, the pollutants could penetrate the soil. I also think that the whole mess should be cleaned up, not just covered up."

RESPONSE: The soil cover would not act to absorb pollutants, but would provide a base for nutrient holding for plant establishment. To remove the tailings themselves is not technically, economically, or logistically feasible.

3.1.8(g)
COMMENT: A local group asks EPA to include the revegetation of Site 4 (OU III) above the high-water mark. The group believes that visitors, especially children, to the Stanton Township Park at North Entry would run a significant risk from the dust particles. "Moreover, it is reasonable to assume that visitors to any of the OU III sites would be less likely to be aware of the contamination problem than residents. Thus, they would probably use less caution and run a higher risk of being exposed."

RESPONSE: See response to comment 3.1.1(p).

3.1.8(h)
COMMENT: A local group asks EPA to include some form of remediation for Sites 11 and 12 (OU III) "to ensure conformity with the International Joint Commission's ongoing effort to have Lake Superior designated a Zero Discharge Demonstration Zone and with the government commitments made in the Lake Superior Binational Program to correct impairments to the environment of the Superior watershed." The group suggests first considering the revegetation of Sites 11 and 12. "If this isn't feasible, then the beach tailings should be excavated and disposed of off-site, as in Alternative S4."

RESPONSE: It would be technically impracticable to remediate the tailings that constitute the beaches along sites 11 and 12 either by covering them or removing them due to the action of Lake Superior. Tailings located above the high water lines may be considered for remediation; however, to determine the area of tailings to be covered at these locations, further design studies would be required.

3.1.8(i)
COMMENT: One resident states that the soil covering should be approximately two feet, rather than the 6-12 inches proposed, at least on his property. He uses his property to train horses and believes the horses will tear through the 6-12 inches of soil in a few months. He also suggests that a two-foot soil layer would hold up better to normal wear. Another resident comments that covered areas should be protected from human-caused erosion, such as from recreational vehicles.

RESPONSE: To provide 2 feet of soil covering would raise the cost of remediation several times (reasonably estimated as a 2- to 8-fold increase in costs). To single out one property for

special consideration cannot be done, as other properties would then expect and demand extra or special soil coverage. However, more studies will be conducted during the preparation of the Remedial Design of the selected remedy to determine the scope of soil cover. If any area is determined to require more than 6-12 inches of cover soil based on human health or environmental threats, such area would be evaluated and considered on a case-by-case basis. Provisions will be included in the remedial action plan, however, to minimize accelerated erosion of soils, rip-rap near waters, and fencing and deed restrictions to minimize human disturbance while establishing a vegetative cover.

3.1.8(j)
COMMENT: A local homeowners' association for homes located just east and north of the Point Mills stampsand deposit requests that any plan for covering or using Point Mills stampsand adjacent to or under their private access road provide an equally convenient access road at no cost to the homeowners.

RESPONSE: EPA will not impede any access roads leading to residences which are near stampsand locations and will coordinate with the community to minimize impact.

3.1.8(k)
COMMENT: Noting that the water and sewage authority is providing some cover of the sands already, a resident suggests a scaled-down vegetation program and assisting the water and sewage unit's program over an extended period of time. The resident suggests this could be done without the expenditure of such a large sum of money as EPA's plan proposes.

RESPONSE: This comment has merit and may be considered more closely in the remedial action plan and design.

3.1.8(l)
COMMENT: A local group requests that the effort to stabilize Torch Lake sands include local input and take into consideration local desires for land use. A resident asks EPA to consider whether the plan by local community and business leaders for development and environmental remediation of the Isle Royale Sands area would meet EPA's minimum requirements for environmental remediation. If so, he asks EPA to classify Isle Royale Sands as a separate operable unit and allow the local leaders to proceed with their plan, including the creation of a 3.5-acre wetlands area.

RESPONSE: U.S. EPA decided to exclude the portion of Isle Royale tailings which is designated by the City of Houghton to be developed as a residential area. However, if this area is not developed as a residential area by the local township within five years after the date that the Remedial Design is submitted, then the soil cover with vegetation under this ROD should be implemented.

3.1.8(m)
COMMENT: MTU comments that EPA should consider "the alternative of using soil stabilizers and tackifiers to control dust generation in exposed fine sand deposits. This type of dust treatment protocol has been in use on roads and waste ground areas for several decades with consistent success." MTU adds that a wide variety of agents are available for this use, the cost is modest in comparison with trucking in soil, and no specialized equipment or operator training is required. These materials could be applied on an as-needed basis during the dry summer months when the dust is a problem.

RESPONSE: The use of soil stabilizers and tackifiers to reduce or eliminate wind-blown stampsand problems has great merit and may be due further consideration by EPA. Soil tackifiers may reduce wind and water erosion, and minimize physical abrasion which retards vegetative development. The tackifier agents, as stated in the comment, can then provide a nutrient-holding capacity as they decompose, helping to establish a plant community. Such an application could be tested during field trials of the remedial cover design.

Cooperation with local sewage authorities could enhance the remedial action many times while possibly lowering the cost of the remedial action.

3.1.8(n)
COMMENT: MTU comments that periodic application of soil tackifiers, combined with local programs of sewage sludge application and mulching with logging residues "can produce, over a reasonable time, a soil substrate which would support pioneer plant species which are capable of survival in this habitat. This alternative is further supported by the observation that there is very little technical sophistication which is required to make this approach work. . . . EPA ecologists should inspect the Point Mills stampsand deposits to understand the potential of this approach. Small pioneer plant communities, including both herbaceous and woody species, have already become established in this sand mass where domestic refuse was previously discarded or trucked-in tree stumps were burned in past seasons. While not advocating the discard of domestic wastes on the stampsands, these small islands of growth clearly indicate a potential for vegetation of the stampsands areas which has not been fully explored by the U.S. EPA Proposed Plan for the Torch Lake site."

RESPONSE: See response to comment 3.18(m).

3.1.8(o)
COMMENT: MTU comments that the Portage Lake Water and Sewage Authority's program of applying liquid sludge to the Mason stampsand has shown "consistent success in establishing vegetation communities on previously barren sand deposits." MTU includes in its appendix a November 1991 report by the Portage Lake Water and Sewage Authority, "Program for Effective Residuals Management." MTU supports the Authority's efforts to use waste-

water treatment sludge to develop vegetation on the Mason sands and later, the Isle Royale sands. "A significant portion of the stampsand deposits in the Mason and Isle Royale locations will be effectively and permanently addressed" by the Authority's sludge program.

"Consultants to the MTU administration believe that the use of soil tackifier application on dust-generating areas combined with seeding of pioneer plant seed stock/mulch mixture (such as produced by grain elevator winnowings) should be used in conjunction with the . . . sludge cake to establish a stable and diversified vegetation community on the nutrient-poor stampsand deposits which would then be free to undergo natural successional processes. This sludge/sludge cake application process may also be expanded with the contribution of treated sewage from rural areas, sludge deliveries for other . . . sources in the upper peninsula of Michigan and application of agriculture/logging wastes, if available. Composting operations may also be considered for stampsand areas during periods of appropriate seasonal weather conditions. This approach may completely eliminate the need for trucking in soil from the Trap Rock River Valley to remediate the Mason and Isle Royale stampsand deposits. This would eliminate the expense of CERCLA-driven soils excavation and placement of these stampsands while also allowing local wastewater treatment activities to address any dusting and exposure problems which remain a concern of the U.S. EPA within the same time frame as outlined in the agency proposed plan document.

"There is substantial literature available to the scientific community which deals with the vegetation of waste areas as part of a sewage sludge application program. . . . without the necessity of expensive soil excavation and trucking from remote areas to the site." MTU attaches as an example of a "simple," successful Michigan program, an article entitled Aesthetic Renovation, by J. W. Campbell (Borchardt, J. A., W. J. Redman, G. E. Jones, and R. T. Sprague, eds. n.d. Sludge and its ultimate disposal. Ann Arbor: Ann Arbor Science Publishers. 137-146).

MTU cites the comments of Mary Tuisku, Mayor of the City of Hancock, that the Torch Lake site represents an opportunity for EPA to establish a "new dimension" in the CERCLA program. "We urge the agency to incorporate and encourage local planning and participation in the remediation of any demonstrable environmental problems in the Torch Lake area while understanding that the monitoring and oversight functions of the U.S. EPA will remain in place."

RESPONSE: U.S. EPA recognizes the Portage Lake Water and Sewage Authority's program of applying liquid sludge to the Mason stampsand and its subsequent success in establishing vegetation communities. During the development of the Remedial Design, U.S. EPA will consider and evaluate the use of liquid sludge in establishing successful vegetation in the tailings. If the use of liquid sludge is determined as effective to accomplish the goal of this ROD within the specified time frame, U.S. EPA will

use the liquid sludge or mix it with cover soil to vegetate the tailings. See also response to comment 3.1.8(m).

3.1.8(p)
COMMENT: MTU notes that an informal coalition of communities in the county have recognized the need for action to address some of concerns cited in the EPA's investigations. MTU states that local plans are already in place or are under development to correct many of these problems and that other problems have corrected themselves and do not need further attention. "Indiscriminate unilateral action by a regulatory agency operating with limited data and without sensitivity to the cultural aspects of the region may well do much more harm than good in addressing the Torch Lake site while not materially improving the health and welfare of the inhabitants and ecosystems of the area in any demonstrable way."

MTU states that removal of drummed wastes was justified, but most of the other action EPA proposes "represents over-reaction and inappropriate application" of the CERCLA program. "In the review of public comments regarding this site, the MTU administration urges the U.S. EPA to undertake a major review of their justifications for remediation planning, incorporate local planning options and down-size their actions in this region to reasonable and cost-effective actions which will actually have some demonstrable benefits. At the same time, the agency has before it an opportunity to enhance the effectiveness of the CERCLA program by the inclusion of local input into the remediation and restoration process at a level which has heretofore not been evident in the Superfund program."

RESPONSE: As can be seen by comparing the modification of the selected remedy with what was initially proposed, U.S. EPA has taken into consideration the concerns of local government and has accepted many of their ideas for addressing the contamination at the site.

3.1.8(q)
COMMENT: A local professor states that recent public meetings with EPA have clarified many of the community's concerns and produced several ideas on ways to accomplish the remediation. He suggests that any action on the site incorporate as much flexibility for local involvement as possible. He suggests that EPA develop a creative partnership with the community to remediate the deposits. In addition, he suggests three actions: (1) allow private and public development of stampsands if the developers agree to remediate them to EPA specifications; (2) work with local banks to develop assurances of site safety for housing loans; (3) allow the Houghton County Road Commission to continue to use stampsand for winter sanding and assist them in remediation of their site, once closed.

RESPONSE: U.S. EPA agrees that U.S. EPA should develop a creative partnership with the community to implement the selected remedy. The recommended remedy described in the Proposed

Plan was modified based on the comments and inputs of the community. Such modifications include the housing development plan, currently operating business plan, the Road Commission's sand and sewage plan, and the National Park Plan. U.S. EPA will continuously communicate with local communities during the Remedial Design and Remedial Action to incorporate as much local involvement as possible.

3.1.9 Confusion or Disagreement Over Operable Unit Concept

3.1.9(a)
COMMENT: Several residents express concern that the proposed plan did not address water problems: water quality, cleaning the lake bottom, or tumors in the fish. One sees OU I and III as having an effect on life within the Torch Lake and Portage Lake system and sees the final goal of cleanup as restoring the edibility of the fish and restoring the lakes to recreational uses.

RESPONSE: As stated in the FS report, an objective of the soil cover and vegetation remedial alternative is to reduce migration of stampsands into the lake, thereby limiting the contributions of OU I or OU III tailings in impairing lake water quality. Problems and/or contaminated sediments in Torch Lake will be addressed as part of the OU II plans.

3.1.9(b)
COMMENT: A local group comments that the proposed plan is "an unacceptable manner in which to present the alternatives, since OU I, the stampsands portion of OU III, and OU II are interrelated parcels, and the OU distinction is an administrative, rather than physical one.

"One of the major reasons given for the preferred alternative with regards to OU I is that contaminations from stampsand runoff is partially responsible for the barren bottom ecosystem of Torch Lake. Given this fact, it would seem that declaring a preferred method for dealing with surface sands, which are in fact contiguous with the submerged sands in OU II, would be premature."

RESPONSE: U.S. EPA agrees that the surface sands are contiguous with the submerged tailings in OU II and physical distinction of OUs is not possible. However, since the potential remedial alternatives that can be considered and evaluated are different for OU I/III and OU II, it is not necessary to wait for the proposed remedy of OU II. The selected remedy for OU I/III would not interfere with any additional study or remedial action for OU II.

3.1.9(c)
COMMENT: Several residents, in commenting on the proposed plan for OU I and III, recommend that the lake bottom and water be cleaned up, too. A local group finds that there are "hot spots"

within Torch Lake and urges EPA to continue with the feasibility study on the lake.

RESPONSE: The lake bottom and water will be addressed in OU II.

3.1.9(d)
COMMENT: A resident notes that community leaders have asked for the "No Action" alternative and for Torch Lake to be taken off the Superfund list. She comments that it would not be possible to remove the site from the Superfund list when feasibility studies still need to be completed on OU II and states a concern that without the OU II studies, there is not yet enough information to evaluate the whole picture.

RESPONSE: U.S. EPA agrees that the RI/FS for OU II must be completed in addition to any required remedy in order to initiate the Superfund delisting process.

3.1.10 Credibility of EPA and Superfund Legislation

3.1.10(a)
COMMENT: One resident is concerned about the confusion in terminology when EPA uses the word "tailings," which has negative connotations, to refer to tailings, slag, "poor rock" (unprocessed ore), and stampsands. "And when we start confusing apples and grapefruit, we've got a problem with the credibility of the EPA people."

RESPONSE: Regardless of whether the mine and copper-processing waste products deposited in and around Torch Lake and Houghton County in general are called stampsand, or tailings, or slag, differentiation of the materials and their contaminant characterization is valid.

3.1.10(b)
COMMENT: "None of the knowledgeable people I know in the area were contacted by the EPA during the project. A great deal of information and good advice could have been obtained if an effort had been made to contact former mining company employees."

RESPONSE: Numerous people were interviewed and extensive records reviewed in developing background information for the Torch Lake RI/FS. Unfortunately, not all people could be contacted based on limited time and funding.

3.1.10(c)
COMMENT: A local physician comments, "I have to admire your peer engineering, but your peer engineering and your data have to be put in the crucible of society's priorities. And dealing with the federal government that makes me throw grandma out of the hospital before she's ready to go home on a regular basis, we have very little reason to trust the federal government in anything they do, at least in our medical community."

RESPONSE: Under CERCLA, the U.S. EPA is required by law to investigate areas of contamination and determine if remedial action is necessary at such areas to address harm to the environment or human health. The U.S. EPA can not decide to take or not take an action at a site based on whether or not the agency is liked by the local community.

3.1.10(d)
COMMENT: "The EPA, because of the way the statutes are written, cannot be up-front with this community on the subject of who's going to pay. I think that's a flaw in the legislation because it allows EPA to hide behind the common misconception that's popular throughout our area that this is a Superfund site and, therefore, Superfund money . . . from someplace else is going to be used to clean it up."

RESPONSE: U.S. EPA will initially request those companies that generated the tailing piles to conduct the selected remedial action. If these companies choose not to undertake the remedial action, U.S. EPA plans to use Superfund money to clean up the site. Upon the expenditure of money from the Superfund, the U.S. EPA may seek to recover these expenditures from the generators of the tailing piles. The U.S. EPA will not seek to file an action for the recovery of money from individual landowners or municipalities.

3.1.10(e)
COMMENT: "The site was erroneously listed in the first place. I challenge the EPA to document in detail their specific designation justification backed up by their own law and rules."

RESPONSE: The U.S. EPA conducted a Hazard Ranking scoring of the site in 1984. Based on this scoring, the location of the site within the Great Lakes (an area of concern), and the fish advisory that was placed by the State of Michigan, the site was included on the National Priorities List. A copy of the Hazard Ranking System scoring is available in the administrative record.

3.1.10(f)
COMMENT: Several residents comment that the remedy appeared to have been proposed primarily in order to justify the $2 million cost of the study. After questioning the analysis of site data, one resident comments, "If this is one of the country's most serious environmental problems, perhaps we don't need an EPA."

RESPONSE: U.S. EPA's decision was not made to justify the $2 million cost of the investigation. Its decision is based on the risk to the environment and human health. U.S. EPA did not indicate that Torch Lake site is one of the country's most serious environmental sites.

3.1.10(g)
COMMENT: MTU states that the health risk assessment process "has consistently been a source of major problems in the entire CERCLA

program." MTU attaches in its appendix a General Accounting Office report dated August 1991, entitled "Superfund: Public Health Assessments Incomplete and of Questionable Value."

"Comparison of the findings of the GAO document and the comments of Geraghty & Miller regarding the specific documentation of health impacts and risk at the Torch Lake site suggest that the agency may have encountered some of the same problems locally that the U.S. EPA has been consistently hampered with at other CERCLA sites randomly selected on a national level. The MTU administration respectfully wishes to bring to the attention of the U.S. EPA that agency actions in the past have not been free of errors and inappropriate actions. We have similar concerns with regard to this case in Houghton County. Prior to moving to a Record of Decision . . . , careful consideration must be given to past agency experience wherein faulty actions were undertaken based upon useless, inadequate or erroneous assessments of human health and environmental risk which were not subject to essential independent technical review to identify their shortcomings. The MTU administration believes that the potential for another mistake of this nature exists at Torch Lake and urges the agency to evaluate their proposed actions in this light.

RESPONSE: The U.S. EPA is continually re-evaluating itself in light of actions at other sites and updates its guidance to meet changes that are validated. The remedial action that has been selected for this site was done so after a careful review of applicable guidance, a review of comments received, and based on information as to the effect on the environment and human health at the site.

3.1.11 Cost of Remedy

3.1.11(a)
COMMENT: Many residents question whether the low risk level justifies the $7.2 million cost of the proposed remedy. They characterize the remedy as "diamond-studded," "an affront to fiscal common sense," and "throwing money at the situation." Another adds, "Superfund money is not allowed to be spent on curing a nuisance or preforming a beautification program."

RESPONSE: It is true that Superfund money may not be spent to cure a nuisance or perform a beautification program. However, money can, and must be, spent to correct unacceptable human health risk and environmental threat. At the present site, the tailing piles have destroyed the natural shoreline of Torch Lake and the Keweenaw Waterway, destroyed the habitat for plants and animals and contributed to the contamination of the sediment in Torch Lake and the Keweenaw Waterway.

3.1.11(b)
COMMENT: Several residents ask if the effectiveness of the remedy justifies the cost. One group comments, "The U.S. EPA's recommended alternatives constitute an unnecessary and unwarrant-

ed proposed expenditure of funds that will not eliminate any human health risk or eliminate any alleged adverse environmental impact."

RESPONSE: The U.S. EPA believes that the proposed remedy will not only help to begin the restoration of the natural habitat areas in OU I and III that were destroyed by the disposal of tailings, but will also reduce the environmental impact to Torch Lake and the Keweenaw Waterway, and reduce human health risk.

3.1.11(c)
COMMENT: A local economist questions the cost, using two methodologies.

"One criterion which many advocate for use in assessing toxic waste proposals is widespread population exposures. Another is cost-effectiveness. Houghton County has a population of approximately 36,000. The population in or near Operable Unit I is probably 3,000. The populations in or near Locations 1, 3, 5, 7, 9, and 10 of Operable Unit III is probably 3,000--the bulk of Houghton's population is quite distant from Location 5, as are the students at Michigan Technological University residence halls, most of whom are in the area for only 9 months of the year, 5 of which are during the snow season when the tailings are buried under ice and snow. If one divides the present value of the cost of the plan by the target population which would be 'helped' by the plan, one discovers that the plan has a present cost of $1,200 per person. If one refines the population estimates to identify people who actually live or work near enough the tailings to actually come into contact with airborne contaminants, the number probably falls to about 1,000 people. This leads to a present cost of $7,200 per person. A further refinement which raises the actual cost of the program by including Houghton County Road Commission's cost of finding a substitute abrasive for the Point Mills stampsand to use on icy roads, and which adjusts for other dislocations, interruptions of transportation and recreation, and anticipated complications in actually implementing the plan raise the present cost to more than $12,000 per person.

"Whichever number is used, a legitimate question to ask is whether this plan is the best possible use of society's scarce resources. The answer is clearly negative. Buying nicotine patches for six high school girls who smoke would undoubtedly yield a greater reduction in incidence of cancer than would this $7.2+ million plan."

RESPONSE: U.S. EPA does not believe that one can justify not taking a remedial action based on placing a price tag on a human life or the environment.

3.1.11(d)
COMMENT: Many residents question the cost of the remedy in terms of the community's priorities. They state that the community would suffer more harm from the economic and social distress the

remedy would cause than from the risks from the stampsands and slag.

RESPONSE: U.S. EPA is not planning on seeking recovery of the cost of the remedy from individual or municipality taxpayers.

3.1.11(e)
COMMENT: Several residents note that the local governments have been working on ways to reduce dust from the stampsands. They ask if the proposed plan's cost is justified when part of the problem will be solved anyway.

RESPONSE: Due to the present and anticipated actions of local government, U.S. EPA has modified the original proposed plan to exclude areas that the local governments have stated that they are planning to address.

3.1.11(f)
COMMENT: One resident and a local group state that the cost is acceptable in order to get the contaminated areas cleaned up, even if some of the costs eventually fall to the taxpayers.

RESPONSE: U.S. EPA is not planning on seeking recovery of expenditures from individual or municipality taxpayers.

3.1.11(g)
COMMENT: Two residents and another local group state that the $7.2 million estimate is too low for the work proposed. Citing the experience of former mining companies and municipalities attempting to revegetate parts of the stampsands, the group states that difficulties in placement, stabilization, and irrigation of the topsoil will drive up the costs and require repeated coverings and seedings.

RESPONSE: The estimated cost for the soil cover and vegetation remedial alternative is an estimate based on cost quotations provided by contractors local to Houghton County and from assessing best restoration practices. Based on the experience of several organizations around Houghton County, their knowledge may be extremely valuable for cost containment and success of the remedial strategy.

3.1.11(h)
COMMENT: One resident suggests several ways to manage the cleanup costs: use prison labor to spread the topsoil; give landowners a property-tax abatement, since the land cannot be used to build housing; impose a tax on all products that include copper to compensate for the environmental cost of copper mining.

RESPONSE: The suggestions, such as a property-tax abatement and a tax on all products that include copper, are matters that are beyond the U.S. EPA's authority to implement as these are state issues. The use of forced prison labor is illegal. Further, the land can be used to develop housing, as long as upon the

completion of the construction, any tailings that are exposed are covered up and the area revegetated.

3.1.12 Social and Economic Costs of Remedy

3.1.12(a)
COMMENT: Several residents warn that the proposed action would injure the local business climate by labeling the area's waterways as "another Love Canal." Fewer businesses--and fewer jobs--would be attracted to the area.

RESPONSE: It is not the intent of the U.S. EPA to "stigmatize" an area. However, the purpose of the U.S. EPA is remedy waste disposal that presents a risk to human health and/or the environment. It is believed that by implementing this remedy, the result will be a benefit to the surrounding community as the existing destruction of the shoreline is corrected.

3.1.12(b)
COMMENT: One resident states that the remedy is likely to cause divisiveness in the community and the ensuing legal action will erode the residents'' trust in government. A local group comments that the proposed remedy would "plunge this struggling area into decades of acrimonious legal battles over who is responsible and who should pay when none today had anything to do with original mining or milling."

RESPONSE: As stated, the U.S. EPA will either use money from the Superfund or seek to have the generators of the tailing piles pay for the selected remedy. Pursuant to policy and at its enforcement discretion, U.S. EPA is not planning on filing an action against individuals or municipalities. Further, the U.S. EPA will seek access agreements and deed restrictions from those individuals whose property it needs to access in order to implement the remedy. Such agreements would also contain a covenant not to sue, whereby the U.S. EPA would agree not to seek recovery of its expenditures for the signatory and contribution protection. While the U.S. EPA cannot control the actions of third parties from whom it may seek to obtain reimbursement of its expenditures, it is hoped that the agreement will preclude most, if not all, litigation by third parties against individual property owners and municipalities.

3.1.12(c)
COMMENT: One resident states that to determine the true cost of the plan to the area's economy, expected legal fees should be considered in addition to site remediation expenditures. He notes that the ratio of legal fees to remediation costs has been high in other Superfund sites.

RESPONSE: See response to comment 3.1.12(b). Further, U.S. EPA's legal fees are a small part of its expenditures at Superfund sites.

3.1.12(d)
COMMENT: A few residents state that the amount of money the businesses and property owners would be asked to contribute to the cleanup would likely bankrupt them, thereby contributing to the area's economic and unemployment problems.

RESPONSE: U.S. EPA is not planning on filing any action against businesses and property owners for reimbursement of expenditures incurred at the site. See response to comment 3.1.12(b).

3.1.12(e)
COMMENT: A resident who owns a business that uses local sands to make concrete block comments that the proposed remedy would force his company to close and terminate all employees. The specific consequences he details are: (1) soil cover on the Isle Royale Sands would totally restrict the company's operational and storage capacity and prevent its future growth; (2) a decision suggesting that Isle Royale Sands tailings are hazardous would imply that the company's products are hazardous; (3) any decision other than "No Action" will prevent the company from borrowing money for any capital improvements; (4) the proposed remedy would prohibit the company from developing a residential parcel; (5) the remedy would prevent future developers or homeowners from obtaining financing and would destroy the value of both residential and industrial property; and (6) any decision other than "No Action" would prevent the company from obtaining liability insurance.

RESPONSE: Due to the comments received, the U.S. EPA has modified the proposed plan to exclude the area on the Isle Royale tailings pile that is presently owned and used by an ongoing business. The health risk from the tailings on the Isle Royal Sands is within the acceptable range, as is the non-carcinogenic index. As previously noted, development can occur on the tailings pile, so long as after the completion of construction, exposed tailing piles are covered over and vegetated. The only other restriction that U.S. EPA will seek to impose on the ongoing business on the Isle Royale Sands would be to implement a dust control program to limit the blowing of sands off-site into the waterway.

3.1.12(f)
COMMENT: A number of residents and the MTU administration state concerns about the proposed plan's effect on the area's growth, attractiveness to prospective residents and college faculty and students, property values, and the availability of mortgages. MTU adds that because there is no relief provided for this impact, "the actions of the U.S. EPA representatives in the Houghton/Hancock area themselves impose a negative economic/environmental impact which was never the intent of Congress when this program was developed."

RESPONSE: The intent of Congress in establishing the Superfund program was for the U.S. EPA to remedy areas that pose an unacceptable human health risk and/or environmental harm to the

area. It would seem that restoring the destroyed shoreline to beneficial use by the community would be a positive impact, not a negative one.

3.1.12(g)
COMMENT: A resident questions the issue some people have raised about the availability of bank loans if Torch Lake remains a Superfund site. She comments that she knows two individuals who recently have received loans to buy homes on stampsand. "It concerns me that this has suddenly been used as a threat to undermine the EPA remediation proposal."

RESPONSE: Federal law does not address the issue of availability of bank loans in areas that border or are on Superfund sites. Recent guidance has made it clear that U.S. EPA does not consider banks that lend money for the purchase of property, and retain a security interest in the property, as PRPs unless the bank takes an active role in the operation of the property (i.e., the running of a landfill). It is hoped that this guidance document, and local and state pressure that can be brought to bear on banks, would prevent the problem of the unavailability of bank loans.

3.1.12(h)
COMMENT: A local geologist comments that some of the stampsands and slags have higher levels of native copper, which makes them potentially economic copper reserves. He refers to a study done by MTU's Institute of Mineral Research done for the U.S. Bureau of Mines in the 1960s. "I think this potential should also be taken into consideration before any steps are recommended or taken regarding the stampsands and the slags."

RESPONSE: During the FS, the possibility of using the stampsands as a resource for copper and other mineral production was thoroughly investigated. Unfortunately, a removal process is not profitable nor feasible for implementation by U.S. EPA at this time.

3.1.12(i)
COMMENT: A few residents suggest that the five-year cleanup plan has the potential for creating jobs for local residents. One asked for some details: how many jobs there would be, for how long, what levels of experience would be needed, and what the pay and benefits likely would be.

RESPONSE: The implementation of the remedial action plan may involve local contractors, although U.S. EPA cannot guarantee this to occur.

3.1.12(j)
COMMENT: A resident comments that the financial benefits of the proposed remedy to the area are minimal. "Money will be spent that has no lasting impact on the area other than to leave yet another hole in the ground. The few truckers involved will do well but the economy will not be improved."

RESPONSE: The CERCLA program was not established and is not based on the financial benefit that will result to an area by the conducting of a remedial action. U.S. EPA does not know what will be the job and economic impact of the selected remedy for the area.

3.1.12(k)
COMMENT: A group comments that EPA has assessed the problem of the eroding stampsands and now provides a way local governments can correct this problem and possibly develop the area so it is an asset to the community.

RESPONSE: The law requires that U.S. EPA should conduct the necessary actions for the site where the risk to humans and the environment is not acceptable. U.S. EPA cannot just finish the investigation and leave it to the local township to correct the problems. U.S. EPA will, however, work with the local community to incorporate their concerns.

3.1.13 **Liability of Community, Local Governments**

3.1.13(a)
COMMENT: Many residents express concern that the local residents, in the end, will have to pay the cost of cleanup. One calls herself a "taxpayer and a PRP.

RESPONSE: As previously noted, the U.S. EPA is planning on funding the remediation of the site either by using money from the Superfund or by seeking reimbursement from the generators of the tailing piles. Under the Superfund law, in addition to those who arranged for the disposal of the waste material, generators and/or transporters of the material, the past and present owner of the site can be held liable for expenditures incurred at the site. However, pursuant to its policy and enforcement discretion, U.S. EPA is not planning on filing any action for the recovery of money against any present property owner. The U.S. EPA will be seeking access agreements from those individuals, municipalities, and businesses that own areas on the tailing pile to which access is needed to conduct the remedy. Such agreements would provide that in exchange for access and deed restrictions, that require that if the tailings are exposed during construction, upon the completion of construction, the tailings will be covered over and revegetated, the U.S. EPA will agree not to sue the signatory for the expenditures that the U.S. EPA incurred at the site. In addition, the agreement would grant the signatory with contribution protection as provided by Section 113 of CERCLA. While U.S. EPA cannot control the actions of third parties, and thus if the U.S. EPA seeks reimbursement of its expenditures from the generators of the tailing piles, it is possible that these companies may seek to file an action, called a contribution action, against individual property owners, municipalities and businesses, the grant of contribution protection should be a defense to such actions.

3.1.13(b)
COMMENT: One resident states that he does not understand what a PRP is, but because he bought a piece of property, he believes he is a PRP and is responsible for cleanup costs.

RESPONSE: Under CERCLA, the past and present owner of the site, the company or individual who arranged for disposal of material in question, usually the generator of the material, and the transporter of the material, if the transporter picks the disposal area, are potentially liable for costs incurred in investigating and remediating a Superfund site. As previously noted, however, pursuant to U.S. EPA policy and at its enforcement discretion, U.S. EPA will not seek reimbursement of expenditures from individual property owners.

3.1.13(c)
COMMENT: "The communities, County, small businesses, and in the end, residents, will pay the exorbitant price that you are recommending."

RESPONSE: See response to comment 3.1.13(a).

3.1.13(d)
COMMENT: "I understand that if municipalities and small private landowners and business owners grant the EPA access to their property they will be immune to third party lawsuits. This would eliminate the possibility of Universal Oil Products filing suits against these entities. This . . . information forms a large basis for my decision [to support the proposed plan]."

RESPONSE: See response to comments 3.1.13(a) and (b).

3.1.13(e)
COMMENT: A resident states that Hamel Creek, which starts in the Calumet-Laurium area, is polluting Torch Lake. He comments that most of the financial responsibility should be with Calumet and Laurium.

RESPONSE: Hamel Creek was not identified as a contributor to the pollution of Torch Lake within the scope of this investigation. The creek was not sampled or considered because it was not recognized as a contaminant source. If U.S. EPA seeks reimbursement of the expenditures that it incurs at the site during the remediation of the site, it would seek such reimbursement from the generators of the tailing piles.

3.1.13(f)
COMMENT: "The nature of the Superfund is to instigate litigation to recover cleanup costs from past site users and even current land owners who are not responsible for the environmental problems. This could lead to direct action against local units of government that are already financially overburdened, as well as crippling defense costs to innocent private and corporate parties."

RESPONSE: The purpose of Superfund is to remedy harm to human health and the environment even if the Superfund program must expend its own money to accomplish this goal. U.S. EPA is prepared to use the money from the Superfund, if necessary, to remediate this site and is not planning on instigating litigation against current land owners of the site for reimbursement of any funds that are expended.

3.1.13(g)
COMMENT: Noting that news articles have quoted EPA as saying that local units of government will not be assessed the costs of remediation, a resident asks if this means that EPA cannot assess the costs or might not.

RESPONSE: Under the law, U.S. EPA could seek recovery of its expenditures from the present owners of the site. However, pursuant to its policy and at its enforcement discretion, U.S. EPA is not planning on filing any actions for reimbursement of the expenditures that it incurs at the site against the present land owners of the site, be the land owners individuals, companies or governmental units.

3.1.13(h)
COMMENT: "Virtually every governmental unit affected has requested the 'No Action' alternative. In view of the fact that the local elected officials have to answer daily to the needs, demands, and safety of Keweenaw residents, who is the EPA trying to protect?"

RESPONSE: The U.S. EPA is seeking to protect all the residents in the Torch Lake site as well as the environment.

3.1.13(i)
COMMENT: Several residents state that the community leaders who are urging EPA to abandon its plans for the Torch Lake site do not speak for them. One resident comments, "There is a strong contingent of concerned people who want to see a positive solution to cleaning up the mining mess. I hope they have written you, but even if the anti-EPA letters outnumber those favoring your plan, please remember that you have an important responsibility to protect the interests of the environment and future generations of people--not narrow business or political interests."

RESPONSE: For the many reasons outlined in this responsiveness summary and the ROD, U.S. EPA agrees that action needs to be taken at the site.

3.1.13(j)
COMMENT: One resident comments that much of the opposition to the EPA plan has come from people outside the Torch Lake area. (He lists Lake Linden, Hubbell, and Tamarack City as examples of the "outside" communities.) He notes that the specifics of funding and accountability seem to be the greatest area of concern.

RESPONSE: See response to comments 3.1.13(a), (b) and (i).

3.1.13(k)
COMMENT: A local professor comments that payment for the remediation should come entirely from EPA Superfund monies. "By and large, the local units of government and small businesses lack the funds for such a project and the generators of the stampsands have long since gone out of business. It would also seem appropriate that federal funds be used because as a nation we benefitted greatly from the copper mining that took place here in the Copper Country and as beneficiaries we should also assume the liabilities."

RESPONSE: As stated, U.S. EPA would only seek reimbursement of its expenditures from the generators of the tailing piles. If necessary, U.S. EPA will use money from the Superfund to pay for the remediation at the site.

3.1.14 PRP Financial Responsibility

3.1.14(a)
COMMENT: Several residents and a local group state that the strongest objections to EPA's proposed plan have come from those who are responsible for the pollution and from local governments who are afraid they will be responsible for cleanup costs. One resident added that PRP efforts "represent a concern for their own financial situation, not a concern for the physical and economic health of our area." A group notes, "If our local officials were truly responsible, they would remove the stigma of our being a Superfund site by vigorously supporting a cleanup plan--not by pretending these stampsand wastelands are somehow an asset to our communities."

RESPONSE: U.S. EPA agrees with this comment and would only seek recovery of expenditures from the generators of the tailing piles.

3.1.14(b)
COMMENT: Several residents state that the polluters or the U.S. government as a whole should pay for the cleanup, not taxpayers, local government, or local property-owners.

RESPONSE: U.S. EPA agrees with this comment, and these are the parties from whom U.S. EPA would seek to recover the expenditures. If necessary, however, U.S. EPA would expend the money from the Superfund with no recovery.

3.1.14(c)
COMMENT: A local group comments that the mining companies and their corporate successors should pay for the cleanup and that local units of government and private citizens should be indemnified from bearing the cleanup cost.

RESPONSE: U.S. EPA agrees with this comment. However, the only recourse for indemnification of local units of government or private citizens would be for these parties to file actions against the generators.

3.1.14(d)
COMMENT: One resident suggests that PRPs, in addition to paying the cost of remediation, should also be required to compensate for any loss to current landowners who are not PRPs.

RESPONSE: Such an action is not covered by the Superfund statute but would have to be a private litigation action under state law.

3.1.14(e)
COMMENT: One resident comments that when Universal Oil Products bought land from Calumet and Hector Mining Co., they did not also "buy the mess that goes along with it."

RESPONSE: Under the Superfund law, liability for a site often does run with who is the current owner of the company that disposed of the waste material.

3.1.14(f)
COMMENT: One resident suggests that the heirs of those who owned the Calumet and Hector Mining Company and other companies that caused the Torch Lake site contamination should be responsible for paying the cleanup costs.

RESPONSE: U.S. EPA agrees with this comment.

3.1.14(g)
COMMENT: "If they exist, the business who mined the copper should assume the majority of the cost as they are the ones who profited from the environmental degradation. And society in general (taxpayers) should pay for a good part of the costs, for it was us who profited by receiving copper-bearing products at prices that did not (and probably still don't) reflect all of the 'real' costs."

RESPONSE: As stated, if the generators of the tailing piles will not conduct the remediation selected, U.S. EPA would conduct the remediation with money from the Superfund. U.S. EPA may seek recovery of its expenditures from the generators of the tailing piles and not from the local citizenship.

3.1.15 Hold an Additional Meeting, Postpone Implementation

3.1.15(a)
COMMENT: One resident requests an additional meeting in the Torch Lake area, since this is where the people most affected by the problem live.

RESPONSE: The proposed plan meeting was held in Hancock since the room there provides the best space and acoustics. A second meeting, sponsored by a local citizens group, to which the U.S. EPA and the State were invited, was held in Lake Linden. No additional meetings are planned at this time.

3.1.15(b)
COMMENT: One resident asks that implementation of the plan be postponed until further information can be obtained on whether sufficient health hazards exist to justify the remedy's cost.

RESPONSE: At this time, the U.S. EPA is not planning on delaying implementation of the remedy since the major basis for the remedy is the environmental harm and not the risk to human health.

3.1.15(c)
COMMENT: A local group requests that EPA delay a decision on OU I and III until the alternatives for OU II are presented. The group also asks that the relationship between preferred alternatives for dealing with the stampsands on the shores of Torch Lake and the lake bottom (OU II) be clearly spelled out.

RESPONSE: The OU II RI is complete; however, an FS has not yet been completed. The recommended remedial alternative for OU I involving establishing a soil cover with vegetation establishment is meant principally to restore the destroyed shoreline. Secondarily, covering the stampsands with soil will reduce the redistribution of fine stampsand particles into the lake and prevent human exposure to the stampsands.

3.1.16 Support Proposed Plan

3.1.16(a)
COMMENT: Three residents who commented at the May 12, 1992, public meeting and letters from 51 residents support the EPA's plan as proposed.

RESPONSE: See response to comment 3.1.13(i).

3.1.17 Oppose Proposed Plan/Take No Action

3.1.17(a)
COMMENT: Seven residents who commented at the May 12, 1992, public meeting and letters from 63 residents oppose the proposed plan or request the no-action alternative.

RESPONSE: See response to comment 3.1.13(i).

3.2 Summary of Comments from Elected Government Officials

3.2.1

Russell Erkkila
Calumet Village President
on behalf of Calumet Village Council

COMMENT: The Calumet Village Council goes on record recommending acceptance of the No-Action alternative for the Torch Lake site.

RESPONSE: See response to comment 3..1.13(i).

3.2.2
Mary Tuisku
Mayor, City of Hancock

COMMENT: The mayor writes that the City of Hancock is a member of the Portage Lake Water & Sewage Authority, which recently bought property on the Isle Royale Sands to construct a new sewage treatment plant. She understands that now EPA expects the City's residents to pay for part of the remedial costs for the Isle Royale Sands. "If our people are required to pay, a tremendous hardship will be placed on them to the point that the basic human need for sanitary waste disposal will almost become a luxury."

The mayor notes that communities are getting less federal and state money and are having trouble delivering basic services to residents. She concludes, "The people of the Keweenaw Peninsula cannot afford to help fund this attempt to partially remedy a very low environmental risk problem. Millions of dollars have already been spent on this evaluation. On behalf of the residents of Hancock, I ask you to end this project and end the spending of our residents' money."

RESPONSE: Based on comments received, the U.S. EPA is exempting from the areas to be remediated that portion of the Isle Royale tailing on which the Portage Lake Water and Sewage Authority is planning to construct a new sewage treatment plant since the construction will fulfill the goals of the remediation plan. To date, the U.S. EPA has only expended Superfund money during the investigation of the site and has not been spending the residents' money. Further, as previously noted, the U.S. EPA is not planning to seek reimbursement of the expenditures that it has incurred at the site from the local citizenship.

3.2.3
Raymond C. Kestner
City Manager
City of Houghton

COMMENT: The Houghton City Council urges EPA to adopt the "No Action" alternative for the Torch Lake Superfund site. The City also requests EPA to remove the site from the Superfund list.

The City thanks EPA for "establishing the fact that mining wastes in the local area are not a threat to the public health and environment we enjoy." The City states that continued EPA action

"will definitely affect our local environment, however. The City believes that the "Superfund" label implies that hazardous waste exists that is detrimental to public health and the environment and this will have a detrimental effect on the local economy.

The City recognizes the problem some residents experience from blowing stampsand, but explains that several local projects on the mining sand deposits will result in covering the sands. "Two areas of sand deposits in Torch Lake have been partially covered by sewage treatment lagoons and topsoil and seed adjacent to those lagoons. This action was taken as a part of the Torch Lake area sewage treatment project in the 1970s. . . . The Portage Lake Water and Sewage Authority has for many years been applying its sludge from the wastewater treatment process to the Mason sands at Torch Lake and a vegetation growth has been successful as a result of that sludge disposal. Therefore the blowing sand from the Mason sands has been significantly decreased."

Mr. Kestner explains that the Portage Lake Water and Sewage Authority recently purchased 75 acres of the Isle Royale stampsands in the City. The Authority plans to use 50 acres as a sewage treatment facility that would result in covering the sands with lagoons, sludge, buildings, roads, and landscaping, as has been done at the Mason sands.

"The balance of the land purchased by the Portage Lake Water and Sewage Authority, approximately 25 acres will be deeded to the City of Houghton and developed along with the adjacent 25 acres owned by the City of Houghton as a recreational and residential area. Canals will be excavated into the sand area connecting to Portage Lake to provide additional water frontage for recreational and residential development. Sands that remain after the excavation for the canals will be entirely covered with a two foot layer of topsoil and seeded. Included within this 50-acre development area are the City of Houghton municipal well field and 5 acres dedicated for wetland development. The total development is scheduled to be complete by the fall of 1996 (4 years hence).

"The City of Houghton development of the Isle Royale Sands will take place on the northwest portion of the sands. The Portage Lake Water and Sewage Authority development will take place on the southeast portion of the sands. The 75+ acres between these two development are owned primarily by one private enterprise who has plans to develop the entire area. A portion of this area will continue to be used as an industrial site and will be adjacent to the Portage Lake Water and Sewage Authority wastewater treatment plant site. The balance of this area will be developed in conjunction with the City of Houghton's development as residential/recreational property. . . .

"As a result of the proposed development on the Isle Royale stampsands, the City of Houghton expects the entire residential and recreational sands area to be covered, and therefore, there

shall be no blowing sand experienced from this area. The City shall enforce this action by Ordinance. . . .

"We urge you not to allow some blowing sand and a Michigan Technological University graduate student's work result in a Superfund label for Houghton County, Michigan, an area which has been enjoyed by residents and visitors alike throughout the time, before, during and after the copper mining boom in the local area."

RESPONSE: The portion of the Isle Royale tailings which is designated as the area to be developed for residential use will be excluded from the area to be covered with soil and vegetation under this ROD. However, if this area is not developed as a residential area within five years, the selected remedy should be implemented in this area. The portion of Isle Royale tailings which is being developed as a sewage treatment plant will be excluded from the area to be covered with soil and vegetation under this ROD. The delisting of a site from the NPL is done by U.S. EPA Headquarters in Washington D.C.

3.2.4
James B. Manderfield
County Highway Engineer
on behalf of the Board of County Road Commissioners, Houghton County

COMMENT: "The Houghton County Board of Road Commissioners goes on record strongly opposing the plan to eliminate the availability of stampsand as a public resource used extensively as a winter road abrasive and road building construction commodity in Houghton County, Michigan. This administrative board has been very sensitive to environmental issues and can find no plausible reason why stampsand deposits in the Keweenaw Peninsula should be covered over and made useless when there has been absolutely no proof that these materials are harmful to humans or the environment of our pristine area."

Mr. Manderfield explains that the stampsand deposits are used extensively as a road abrasive for five months of the year. "This man-made resource, by coincidence, falls within a desirable range of specifications found nowhere in natural occurrence." He describes the qualities of the stamp- sand that make it the most economical material in the area for use as a road abrasive and as a sub-base in road building. Its use also avoids the environmental problems of chloride as a road abrasive. He estimates that eliminating the use of stampsand would cost $15 to $20 million over the next 30 years.

The road commission has purchased a source of stampsand for future use that is Site 10 of OU III. The commission "intends to manage that site responsibly, by removing only amounts that are excessive, without disturbing the Portage Waterway, and eventually covering up the remaining material with heavy, vegetation-supporting soils. Our site, and others, are being presently

managed and considered for development resulting in the slow elimination of exposure to the environment, as economic conditions will allow, even if the EPA doesn't intercede."

In a second letter, the road commission states its opposition to EPA's proposal to cover and vegetate the Grosse-Point area no. 10 stampsands of which it is the majority owner. "These particular stampsand deposits are composed of large particles which never become airborne in winds of 40 to 50 mph or more as observed by residents adjacent to the site and to even cover them temporarily for aesthetic reasons would cause a contamination of the material making a large quantity of the sand unsuitable for winter use."

"The Houghton County Road Commission does presently have a plan which will eventually cover the residual deposits, when excavation is completed. This plan is dependent upon the marketability and value comparison of the site for either road building materials or residential development when an initial Phase I use plan is completed."

"It is proposed to cover the sands gradually, as is already begun, by depositing material from routine ditch cleaning operations on the site either spread out or stockpiled, whichever is appropriate at the time. . .

"To eliminate the economical use of the Houghton County Road Commission sand deposits would create a severe hardship on Houghton County taxpayers who would much prefer their resources be spent on paving on 300 plus miles of dusty, unpaved roads which emit many tons of particulate into the air each summer.

"As another realistic alternative to a Phase I excavation and development plan, . . . quite possibly the additional sand available by excavating the site further may be more economically advantageous to the Road Commission.

"The Phase II development . . . would excavate a smaller area to slightly above the lake level and then could or could not be covered and vegetated depending on whether a yet further excavation below lake level might be desirable with a resultant wetland or reclaimed lake area realized by the entire operation.

"At this point in time, if there is no urgent, justifiable reason for covering up these sand resource deposits, the Road Commission would prefer that future options be left open for consideration.

"Quite possibly, the original goal of removing the sand deposits from Portage Lake might be realized in part by the economical recycling of a harmless, inert man-made resource, instead of adding further to an unsightly hole in the ground, elsewhere in Houghton County."

RESPONSE: U.S. EPA agrees with this commenter and has determined to exclude the portion of Grosse Point tailings which is

designated by the Houghton County Road Commission for road friction material from being covered with soil and vegetation under this ROD. However, the tailings area should be covered with enough soils to prevent the release of tailings into the air and the lake. The area excavated seven feet above water table should either be covered with enough soils or covered with soil and vegetation. After this area is excavated seven feet above water table, the area should be covered with soil and vegetation. See response to comment 3.1.7.(c) for more detailed information.

3.2.5
Gerald Perreault
Commissioner, County of Houghton
and Chairman, Houghton County Board of Public Works

COMMENT: In oral testimony, Mr. Perreault expresses concern that the County may be asked to pay part of the cleanup cost. He says that the County accepted ownership of the sands several years ago in order to solve problems at the same time: a place for sewage lagoons, which would cover some of the sands; and by providing irrigation systems, stopping some of the air pollution by the sands. Mr. Perreault is concerned that the County is now identified as a PRP because it owns this property.

Mr. Perreault would like EPA to consider the County's efforts at solving the problem of blowing sands. He asks, "Is it really wise to spend $7.2 million the way you are suggesting?" He is concerned about the expenses involved in removing the barrels and suggests that local contractors could have done the job for less money.

In a subsequent letter, Mr. Perreault conveys the County and Department of Public Works' recommendation of "No Action" for the Torch Lake site, for the following reasons:

"1. An earlier study done by the Michigan DNR and your study have found 'the human health risks are within the U.S. EPA's acceptable range.'

"2. Through the use of gates and natural barriers, human access to the tailings has been curtailed in the past few years.

"3. Much of the tailings are currently being utilized by various parties such as the county, for progressive projects resulting in significant areas of the tailings being covered already. We anticipate that this will continue in the future.

"The Lake Linden and Tamarack City tailing sands are being used by us for sewage lagoons. A recent inflow/infiltration study indicated that future needs may require that we build another lagoon. Requiring coverage of the tailings could add significantly to these costs.

"4. We would instead suggest that the EPA and others support projects that will accomplish covering the tailings on a less costly basis. Examples abound. The Village of Lake Linden has covered a significant portion of their tailings and built a park there. The Michigan Department of Public Health has monitored the water in the area a number of times and has found no health hazard, permitting public swimming in the area. Further they have plans for a nine hole golf course that could accomplish the same objectives as yours.

"The Houghton County Road Commission uses the Point Mills sand for road construction and winter sandings. The winter sanding has saved the lives of many county residents. Our winters are difficult and not having the sands could be costly financially, but more importantly in terms of human lives.

"Tailing sand is also used for the highway access road at our airport to solve winter ice problems.

"We are considering using the Tamarack sands for composting of materials such as leaves, branches, etc. This could add to the humus base to encourage vegetation on the tailings."

Mr. Perreault adds that Houghton County did not cause any pollution but took ownership of the tailing sands to help local communities. The County is concerned about being named a PRP and believes it was improperly named in the recent drum removal. This action "took extensive efforts to reach an agreement with the other parties to ensure that the costs were addressed without any major taxpayer involvement."

If the EPA's intention is only to require access to County lands but not name the County as a PRP, Mr. Perreault requests the EPA to guarantee this in writing to alleviate the County's financial concerns.

The county is also concerned about future development of the area if it remains a Superfund site. "Taking no action on the tailings and recognizing no health hazard could remove the negative image of such a designation. Houghton County would be willing to seek various EDC, DNR, and other grants to accomplish the same goal of covering the sands via local solutions to the problems. Local leaders working with the mining interests should accomplish this at considerable savings."

RESPONSE: As noted, most of the tailing piles do not present a risk to human health but do present a threat to the environment, either from destruction of natural habitat or contamination to water bodies. Based on the comments received, the U.S. EPA has modified its proposed plan to exclude areas from the selected remedy that are being addressed by local government and/or individuals. As previously noted, the U.S. EPA is not planning

to seek reimbursement of the expenditures that it has incurred at the site for the local citizenship or municipalities.

3.2.6
Jackie A. Niemi
Chairman
Houghton County Board of Commissioners

COMMENT: The Houghton County Board of Commissioners urges EPA to select the "No Action" option, for all the reasons mentioned by Gerald Perreault and the Houghton County board of Public Works in his letter of June 24, 1992.

RESPONSE: See response to comment 3.2.5.

3.2.7
Roberta Niemi
Chairperson
Houghton/Keweenaw Soil and Water Conservation District

COMMENT: The Houghton/Keweenaw Soil Conservation District supports placing soil on the Torch Lake (OU I) stampsands. "This approach seems to be both the most economically feasible and it seems to have the highest probability of stabilization success."

Ms. Niemi conveys the Board's concern about the third-party liability issue and any other costs. Current landowners and users need to be protected and informed about these "'harassment' suits instigated by the financially accountable named parties who were 'active' in the actual mining process."

RESPONSE: As previously noted, the U.S. EPA is not planning on filing actions for reimbursement of expenditures that it has incurred at the site against individual property owners or municipalities. Rather, the U.S. EPA will seek to have the generators of the tailings conduct the remediation, or do the remediation with funds from the Superfund. If U.S. EPA seeks reimbursement of its expenditures, it will seek this from the generators of the tailings. Also, in order to conduct the remedy, access will be needed to the parcels of land on which the tailings are located. The U.S. EPA will request that parties grant them access and place deed restrictions on the property. In return, the U.S. EPA will grant to the signatories a covenant not to sue the signatory for costs incurred by the U.S. EPA at the site. In addition, the U.S. EPA will grant the signatories contribution protection as provided by Section 113 of CERCLA. This should provide the signatory with a defense to a contribution action filed by third parties.

3.2.8
Nancy Pintar
Chairperson
Keweenaw County Board of Commissioners

COMMENT: The Keweenaw County Board of Commissioners strongly opposes EPA's proposed plan. "It is our contention that this is a bottomless hole to keep pouring money in and to what avail. We have not seen any results of studies that would warrant such action. Quite to the contrary, Houghton has a beach, Torch Lake area has a beautiful park, etc., and none of these areas seem to pose a problem according to the DNR. Although we are concerned about the environment, we do not agree with the current EPA proposal."

RESPONSE: The investigation conducted by U.S. EPA indicates that the tailings at the site have been and continuously are causing adverse environmental effects. U.S. EPA believes that the selected remedy is cost-effective and would reduce these adverse environmental effects.

3.2.9
Vernon R. Jolly
Village President
Village of Lake Linden

COMMENT: The Village of Lake Linden expresses general approval of EPA's proposed plan. "We feel that covering and vegetation (Alternate T2) is the most practical solution to the existing problem. We do, however, go on record at this time stating the Village of Lake Linden and its constituents refuse to be held liable for any costs incurred in this project."

RESPONSE: As previously noted, the U.S. EPA is not planning on seeking reimbursement of its expenditures at the site from local government units or the citizenship. Nor will U.S. EPA approach these entities and request that they conduct the selected remedy.

3.2.10
Dennis Christian
Superintendent, Lake Linden-Hubbell Public Schools
on behalf of the Lake Linden-Hubbell School District

COMMENT: The Lake Linden-Hubbell School District requests that the public comment period be extended from July 1 to September 1, 1992. The School District states two reasons for this request. First, comments made at the public meeting and subsequent news coverage demonstrated misconceptions about the remediation proposal and fears of possible liability litigation threatened by one of the PRPs. Second, the School District has a Michigan Area of Concern Public Involvement Project grant to increase public awareness and participation in the remedial action planning process. During the grant term, from March 1 through August 31, the School District is hosting three public information meetings, providing free narrated boat tours from Houghton to Lake Linden for over 300 residents, establishing a self-guided tour, and coordinating student classroom projects. Extending the public comment period would allow more time for the public to be educat-

ed through these projects and to better express their opinions about the proposed plan.

In a second letter, Mr. Christian requests EPA's participation in a second public meeting to further discuss the proposed plan. He states that PRP "threats of litigation" have led the public, local municipalities, the road commission, private land owners, and small businesses to believe they will be held liable for cleanup costs, either directly by the EPA or indirectly through litigation. "We believe that another public meeting prior to the close of the comment period is essential to resolve the confusion among both the general public and the above-mentioned parties concerning the EPA's plan, how it would impact the various parties concerned, and how they could be protected from third party litigation."

The School District would like to host the public meeting as part of the activities under its Michigan DNR grant to increase public awareness and involvement in the Torch Lake site.

RESPONSE: U.S. EPA extended the public comment period until July 13, 1992 and attended the meeting hosted by Lake Linden-Hubbell School District in June.

3.2.11
Frank J. Musich
Mayor, Village of Laurium
on behalf of the Laurium Village Council

COMMENT: The Laurium Village Council goes on record recommending acceptance of the No-Action alternative for the Torch Lake site.

RESPONSE: See response to comment 3.1.13(i).

3.2.12
C. Robert Baillod
Chairman, Portage Lake Water and Sewage Authority
Hancock

COMMENT: Based on information in EPA's reports, the Portage Lake Water and Sewage Authority concludes that "the stampsand deposits pose no meaningful risk either to human health or to the environment." The Authority states that EPA's proposed plan is not justifiable as a remedial action under Superfund and urges EPA to select the "No Action" alternative.

The Authority describes its program of revegetating stampsands, carried out over the past 25 years in cooperation with the Quincy Mining Co. and its successors. The Authority regularly applies digested biomass residuals produced in its treatment processes in an effort to build a sand/humus layer capable of retaining moisture, resisting wind erosion, and supporting a permanent vegetative cover. "This has resulted in 30% to 80% vegetative cover in areas to which the biomass residuals have been consistently applied."

"Presently, the Authority is in the midst of a significant land relocation and expansion project. The Authority owns 78 acres of the Isle Royale Stampsands and is building a new $12 million state-of-the-art wastewater treatment plant on that site. That project will feature an improved system of processing and dewatering biomass residuals for use in supporting vegetation. In connection with the new plant project, the Authority has developed a Program for Effective Residuals Management (PERM) built upon use of the biomass residuals to develop and support vegetation on the Mason Stampsands, Isle Royale Stampsands, or natural soil."

The Authority makes the following critique of EPA's study proposed plan:

"1. Despite the Authority's significant involvement in protecting water quality in the Keweenaw Waterway, and prominent work on development of tailings vegetation, neither EPA nor its contractors ever officially contacted the Authority or officially requested information on our tailings vegetation program. As a result, EPA is apparently not aware of the Authority's Program for Effective Residuals Management (PERM) plan. . . . . The Authority believes that this plan can play a key role in EPA and/or local efforts to develop vegetation on the stampsand deposits." The Authority attaches a copy of the PERM plan, dated November 25, 1991.

"2. Modern environmental engineering practice should emphasize holistic, integrated, air-water-land approaches to analyzing and solving environmental problems. The separation of the surficial problems of Operating Unit I and Operating Unit III from the aquatic and groundwater considerations of Operating Unit II is not logical.

"3. The report does not adequately discuss thousands of tons of stampsand that the Houghton County Road Commission has spread for skid control on Houghton County Roads during the past few years. This material remains along the shoulders of many roadways. How does any risk from this material compare to the perceived risk from the stampsand deposits of OU III?

"4. The report does not adequately discuss the adverse environmental impacts caused by excavating the huge amount of soil necessary to cover the stampsand deposits."

The Authority also critiques specifically the assessment of cancer risk and the toxicity index:

"1. The assessment did not consider the natural risk and toxicity resulting from natural background concentrations of copper, arsenic, chromium and other elements in soils. This omission overestimates the significance of the risk and toxicity from these metals in the stampsands.

"2. The risk and toxicity from airborne particulate was based on application of an uncalibrated model to the stampsand areas. A realistic estimate of airborne particulate concentration requires that the model be calibrated for the local stampsand conditions by comparing model predictions with actual measurements of airborne particulate. (Although a few measurements of airborne particulate concentrations were made, these were not used in model calibration.) We suspect that the model overestimated the airborne risk for the OU III stampsands because [of] the wide range of particle size and predominance of coarse particles in the OU III sands. Once the surficial fines are removed, the coarse particles seem to effectively prevent further release of fine particulate.

"3. The EPA analysis grossly overestimates the risk and toxicity from copper.

"Table 2-6 of the February 3, 1992, Life Systems Report conservatively estimates the Recommended Daily Human Intake (RDI) of copper at 1.5 mg/day. This is about equal to the 1.59 mg/day resulting from the ingestion of 100 mg/day of stampsand. Based on this, copper should have been eliminated as a chemical of concern.

"Even if copper is viewed as a legitimate chemical of concern, its risk is estimated as if it existed as Cu(I) and/or Cu(II). The copper analysis failed to distinguish between metallic copper, Cu(O), and oxidized copper species. The significance of this failure is that metallic copper is much less bioavailable than ionized copper, and assuming all the copper to be bioavailable greatly overestimates the risk to humans and other organisms. (See "Metal Bioavailability in Env. Sci. & Technol., July, 1992.) Geological evidence (Dr. William Rose, Professor of Geology at Michigan Tech) suggests that only about 60 mg/kg of copper in mineral rock exists as Cu(I) or Cu(II). This means that more than 90% of the copper in the stampsands would be in the form of the relatively unavailable metallic copper. The Michigan Copper District is one of the only areas in the world in which native metallic copper was mined.

"4. The EPA risk assessment grossly overestimates the risk from chromium. The analyses for chromium failed to distinguish between Cr(+3) and Cr(+6). In nature, chromium exists primarily as Cr(+3). However, the risk assessment assumed that all chromium in the stampsands exists as the much more toxic Cr(+6).

"5. The EPA estimates of intake of stampsand by human ingestion failed to recognize that the stampsand is covered by snow for about five months per year. The substantial snow cover would prevent any ingestion by humans for five months per year. Thus the estimates of intake by ingestion should all

be reduced by 5/12 or 42%. This will significantly reduce the estimated toxicity indices."

Although the Authority supports a "No Action" alternative by EPA, it does support local action to develop the economic and environmental potential of the stampsand areas and is eager to cooperate with local governments to undertake this development.

RESPONSE: Based on the human health risk assessment and ecological risk assessment, U.S. EPA concluded that tailings and slag pile located at the Torch Lake site pose unacceptable risk to the environment and to human health. See response to comment 3.1.1(a) for human and environment risk. Due to the adverse environmental impacts and potential human health risk, U.S. EPA believes that the selected remedial action is necessary at this site.

See response to comment 3.1.8.(o) for the use of liquid sludge in supporting vegetation.

The following are the responses for the comments about the Proposed Plan:

1. See response to comment 3.1.8.(o) for Effective Residuals Management plan.

2. See response to comment 3.1.9.(b) for the operable unit approach.

3. See response to comment 3.1.7.(c) for Grosse Point tailings to be used as road-friction material by the Houghton County Road Commission.

4. See response to comment 3.1.4(h) for the adverse environmental risk due to the soil cover excavation.

The following are the responses for the comments about the risk assessment:

1. The risk assessment evaluated total risk from the tailings/slag, without reference to background. We agree that the inorganic constituents of tailings are naturally-occurring materials but the concentrations of contaminants in tailings may lead to an increased risk, whether or not concentrations in background soil would also contribute to risk. How the risks from natural background concentrations of chemicals in soil are integrated into the decision-making process is a risk management decision, and is not within the scope of this risk assessment. U.S. EPA acknowledges that background concentrations pose a risk and that the risk from tailings in OU I only slightly exceeds the background risk for some contaminants.

2. EPA agrees that there are several uncertainties introduced into the risk assessment by the use of modeling to estimate

air concentrations of respirable particulate matter less than 10 microns in diameter (PM_{10}). These uncertainties are discussed in the risk assessment documents and are more likely to result in an overestimate than an underestimate of risk.

Since PM_{10} data were unavailable for specific areas of concern, the model was not calibrated for local conditions. At OU III Locations 2, 6 and 8, particle size was estimated to be large and these areas were considered to be nonerodible. Other locations at OU III were evaluated using the particle size distribution for OU I sectors. As stated in the risk assessment, this approach does introduce considerable uncertainty.

3. The safe and adequate daily intake of copper for an adult recommended by the National Research Council ranges from 1.5 to 3 mg/day (NRC 1989). It is important to note that the NRC recommendation is for total copper intake. The average daily adult diet provides about 1 mg of copper per day (NRC 1989). Thus, the intake of copper from tailings should be adjusted accordingly, and an intake of 1.59 mg/day from the tailings would cause total copper intake to exceed the conservative recommended dose.

   The issue of bioavailability is important and has been addressed in the risk assessment. McKinney and Rogers (1992) point out that further research is necessary on the bioavailability of metals and the data available are inadequate to assess the toxicokinetic properties of many environmental species. The speciation of copper in the tailings was not determined. The risk assessment assumes 100% bioavailability and states that this assumption is likely to lead to an overestimate of risk, but the magnitude of the overestimate is unknown.

4. Chromium exists in the natural environment in two main valence states, trivalent and hexavalent. There is a constant interchange between the two states and the predominant state depends upon numerous environmental variables, including pH of the soil. Since it is not known whether the chromium in the tailings is predominantly trivalent or hexavalent, the conservative assumption that all chromium is in the hexavalent state is most appropriate. This assumption does introduce uncertainty into the risk assessment and may result in an overestimate of risk.

5. Residential exposures to soil include ingestion of indoor dust and dirt as well as outdoor exposures. The U.S. EPA guidance (U.S. EPA 1991, Section 2.2, p. 6) states that there is no accepted method for determining the relative contribution of each medium to total soil ingestion. Therefore, according to the guidance, year-round exposure to soil, without accounting for snow cover, is assumed.

See response to comment to 3.3.5(d) for more detail information.

See response to comment 3.1.4(h) for potential environmental impacts of topsoil excavation.

3.2.13
Michael D. Lydon
Clerk, Torch Lake Township
on behalf of Torch Lake Township Board

COMMENT: The Torch Lake Township Board thanks the EPA for evaluating the potential environmental and health risks of the Torch Lake site.

The Board intends to develop property on the Hubbell lake front for development into a community recreation area and believes that the proposed action in options S3 and T2 would enhance this effort. In addition, "all the Operable Units warrant the reclamation efforts you have defined in your proposal. The introduction of a layer of biomass and vegetation is all that is required to restore the areas to a state useful, if not at least tolerable, to the communities they surround."

However, the Board expresses concern about the possibility of protracted litigation. "We feel it is sad that Superfund law, as applied, must at first determine a moral fault and a financial liability before a sound environmental restoration program can be engaged. It seems to defy the intent of the law. If ever there was a situation where the costs of an environmental action should be born by the federal government as a whole, then the Torch Lake Superfund site is a prime example. We feel this is the reason for the existence of a 'Superfund' approach to environmental problems. The proposed remedial actions are simply beyond the financial capacities of those affected."

"If your only option in pursuing alternatives T2 and S3 is to initiate legal proceedings against PRPs to recover the costs involved, then please forgo any action at all, close the books of inquiry on the Torch Lake site, and allow us to get on with our lives. We feel the future of Torch Lake will be better served when its destiny is in the hands of the local residents."

RESPONSE: As previously noted, the U.S. EPA will first see if the generators of the tailing piles are willing to conduct the remedy. If not, the U.S. EPA will conduct the remedy using money from the Superfund. If U.S. EPA decides to seek recovery of the money that it spends at the site, it will seek it from the generators of the tailing piles and not from the local community.

3.2.14
Albert Perreault
Chairman
Torch Lake Area Sewage Authority

COMMENT: The Torch Lake Area Sewage Authority thanks EPA for its evaluation of the environmental and health risks of Torch Lake and recommends that EPA select the "No Action" alternative. The Board also "highly recommend[s] the Michigan DNR work with local units to fund and revegetate with a Composting Grant."

RESPONSE: Based on the comments received, the U.S. EPA has modified its proposed remedy. The modification includes the exclusion of that area that the Torch Lake Area Sewage Authority is planning on developing as a sewage treatment plant.

3.2.15
Written document entitled "General Comments of the Community Regarding EPA's Proposed Remedy," signed by local government officials, private businesses, and citizens

COMMENT: The commenters urge EPA to select the "No Action" alternative and remove Torch Lake from the Superfund list. They thank EPA for investigating and evaluating the potential health and environmental effects of copper mining residues. They conclude from EPA's studies that the residues do not pose a significant health or environmental risk (citing to page 11 of the EPA proposed plan) and find the proposed remedy to be "inappropriate overkill."

The commenters state five reasons for opposing EPA's proposed plan. First, the remedy would reduce property values and interfere with the continued economic growth of the community. They believe the Superfund label will have a negative effect on property values, on lending institutions' willingness to grant loans, on tourism generally and specifically for the proposed Keweenaw National Historic Park, and on local university and college enrollments. Additionally, they believe that property owners and businesses will become embroiled in litigation following Superfund remediation, and possibly in civil personal injury suits, as well.

Second, the commenters find the proposed soil and vegetation cap "unnecessary and grossly excessive." They state that taking out existing vegetation and driving heavy machinery in the areas to be covered would be counter to the purpose of reducing dust. They also are concerned that the remedy would present "significant restrictions" on the sale and development of property by residents and the business community.

Third, the commenters state that the remedy would obliterate evidence of the region's mining history and shows lack of respect for historic preservation. "We believe that our unique history is an asset, not an eyesore."

Fourth, the commenters state that the remedy shows inadequate consideration of the cost and its effects on the community. They state that Superfund law requires EPA to recover the cost back from the community and that the liable parties include the owners of contaminated property, as well as those responsible for

generating and disposing of the hazardous waste. They believe that EPA's offer of de minimis settlements in exchange for access agreements "will actually create divisiveness in the community, pitting homeowners against the businesses which provide their livelihoods." Further, they state that EPA's $7.2 million estimate is not adequate for the scope of work proposed.

Fifth, the commenters find that EPA has not given enough consideration to local programs that are already addressing many of EPA's concerns. They list (1) Portage Lake Water and Sewage Authority's sludge-spreading and revegetation of stampsands; (2) the City of Houghton's plans to develop a residential community and canals on a large portion of the Isle Royale sands; (3) the City of Hancock's waterfront plan, which calls for residential, commercial, and recreational development; and (4) the plans for turning old mining ruins into a national park. The commenters offer to work with EPA to find other such solutions that can be carried out on a local or state level "for those limited areas where blowing sand is a concern."

RESPONSE: 1. The Superfund label that the community fears has already been in place for the past four years. The selected remedy by the U.S. EPA will reduce the tailing piles effects on the environment and human health, and therefore, hopefully, would have a positive effect on the community. Further, recent regulation on lender liability should reduce lending institutions' concerns on granting loans. Also, as previously noted, the U.S. EPA is not planning on filing any actions against property owners or businesses for the recovery of money expended during the study or remediation of the site.

2. The selected remedy does not propose to remove existing vegetation on the tailing piles but rather to vegetate those areas that are barren or only partially vegetated. Further, as previously mentioned, the only restriction that would be placed on the future development of the property would be that, upon completion of the planned development, any exposed tailing pile be re-covered and vegetated.

3. In conducting the remedy to restore the destroyed shoreline and damaged environment and to reduce human health risks, the U.S. EPA will comply with the National Historic Preservation Act.

4. As previously noted, U.S. EPA will not seek reimbursement of costs incurred from the community.

5. As can be seen from the selected remedy, the U.S. EPA has greatly modified the proposed plan based on comments that it has received from the community.

3.3 Summary of Comments from Universal Oil Products Inc.

Universal Oil Products Inc. (UOP) submitted several volumes of comments and supporting documentation. Most of the following comments are quoted directly or paraphrased in detail from these documents.

3.3.1 CERCLA Violations and Inconsistencies

3.3.1(a)
COMMENT: Gaines Gwathmey III from Paul, Weiss, Rifkind, Wharton & Garrison, legal counsel for Universal Oil Products (UOP), writes regarding "certain serious violations (both substantive and procedural) of the Comprehensive Environmental Response Compensation and Liability Act" in the proposed remedial plan.

Counsel states that the Remedial Investigation/Feasibility Study and Administrative Record for Operable Units I and III demonstrate:

"1. Even using the very conservative method of assessing cancer risks that EPA employs, there is no meaningful cancer risk arising from conditions at the Torch Lake site. EPA acknowledges that these risks are not sufficient to justify any action.

"2. Residents in the Torch Lake area do not display any adverse health effects related to the area's environment.

"3. Torch Lake is a healthy and productive fishery and is safe in terms of water quality for all recreational uses. MDNR studies of the Lake's fish population show it to be among the cleanest of all inland lakes evaluated in Michigan. A study of 455 fish in 1988 showed no abnormalities at all.

"4. Stampsands do not have any significant potential for leaching copper and other metals to groundwater. Slag is immobile and stable. Neither material is adversely affecting water quality in the Lake.

"5. Studies of eagles and gulls in the area show that the birds have suffered no adverse impact on wildlife.[sic]

"6. There is no significant transportation by either rain or wind of materials either from the stampsands areas or the slag areas into the Lake."

Counsel states that the proposed plan does not rely on the above findings and that EPA "has ignored most of the data and mischaracterized the rest."

"Region 5's principal rationale for the plan is that certain bottom dwelling organisms do not thrive in the sandy bottom areas of Torch Lake and that this constitutes an environmental loss. The upper food chain--fish, birds, and other wildlife--do not show any harm from this alleged condition. The same argument could be made with respect to every manifestation of man's

presence on earth. Civilization has altered our environment in numerous ways; every change cannot possibly justify corrective action under CERCLA. Moreover, the remedy--control of wind blown sands--is demonstrated by studies in the record to be unnecessary and of no possible beneficial impact."

Counsel states that EPA "has unnecessarily stigmatized the entire area as a toxic waste site, thereby injuring it in both economic and recreational terms."

Counsel quotes from a statement made on a radio talk show by an EPA official on May 24, 1992, during the public comment period. "The official stated that EPA was prepared to issue covenants not to sue to all municipal PRPs and landowner PRPs, and presumably give them contribution protection as well, in exchange for only access to the sites in question." Counsel states that EPA representatives have repeated this information since the radio broadcast.

Counsel states that this action violates the language and spirit of CERCLA. "First, a message has been clearly delivered to certain PRPs . . . that, if they cooperate, no cost recovery will be required of them." Counsel states that this is an attempt to manipulate the CERCLA process and suppress opposition to the proposed plan.

"In addition, Region 5 apparently does not even deem worthy of consideration the issue of whether it is fair and equitable to unilaterally assign all PRP liability to three corporations. Region 5's message here is equally clear: Corporate PRPs are deep pockets to be exploited, irrespective of CERCLA requirements that the costs of remedial action be equitably shared among PRPs and that allocation issues be addressed after remedy selection. This is bias, plain and simple."

Counsel concludes, "For reasons we believe can only be an institutional bias against 'no action' remedies, Region 5 is insisting upon a capping and vegetation remedy that will cost many millions of dollars."

RESPONSE: Contrary to UOP's assertion, the U.S. EPA considered all of the information set forth in its comment in evaluating whether or not remedial action was appropriate for this site. Further, while the identification of an area as being on the NPL does appear to have some adverse effects, so does the disposal of waste material that destroys the natural shoreline of the area and harms the surrounding waterways. Further, one of the successors to the generators of the tailing piles, UOP, informed the general public that if the U.S. EPA chose a remedy for this site other than No Action and sought to recover money expended at the site from UOP, then UOP would be "forced" to file third-party actions against the others. The filing of such third-party action is, of course, a matter for UOP's decision. However, the result of this statement was that the local citizens rightly wanted to know what was the position of the U.S.

EPA. They were informed that it is U.S. EPA's policy not to sue individual landowners who were not involved in the generation or release of the material in question, if they would grant the U.S. EPA access to the site and agree to institutional controls (i.e., deed restrictions), if any, that were needed for the site. In response to questions from the general public, the U.S. EPA informed them that based on this policy, and at its enforcement discretion, U.S. EPA would not seek reimbursement of its expenditures from them. U.S. EPA does not believe that it is unfair or biased to seek recovery of money expended from those parties that are responsible for the generation or release of the material in question, while seeking to protect those who had no role in the generation or disposal of the material in question. CERCLA does not require that all potentially liable parties share equally in the cost of the remedy for the site. Site-specific factors such as volume of material contributed to the site and the role in generating, transporting, or operating the site are all to be considered in determining if a party is a major or de minimis party at the site in question. To impose the law as UOP believes it should be would be to do so without regard for the site-specific factors present at this site.

3.3.1(b)
COMMENT: A UOP representative contends that EPA's proposed plan violates CERCLA, and says that EPA has ignored most of the data and mischaracterized the rest in a transparent attempt to justify a proposed remedy that requires 1,000 acres of stampsands and slag to be covered with topsoil and vegetation at an estimated cost of $7.2 million. According to the representative, the Administrative Record demonstrates that this proposed remedy violates CERCLA. There are no unacceptable health risks presented by Torch Lake; accordingly, the proposed plan is unjustifiable. The representative requests EPA to explain their position is light of the following comments:

1. EPA states in the proposed plan that the cancer risks produce numbers in EPA's acceptable range.

2. Studies of Torch Lake area residents reveal no abnormal instances of carcinogenic or noncarcinogenic illness.

3. EPA's estimates of cancer risks, which it in fact found acceptable, were based upon unrealistic and overly conservative assumptions and were calculated in a manner that is inconsistent with EPA guidance documents.

4. These unrealistic assumptions, when combined in EPA's risk calculations, improperly magnify risks by many times. The Torch Lake risk assessments fail to conform to the February 26, 1992 "Guidance on Risk Characterization for Risk Managers."

5. EPA's assertion that copper in stampsands and slag produces non-carcinogenic "subchronic hazard index of more than 1.0 for children living near the slag pile beach in Hubbell" is

wrong. The risk assessments ignore the fact that the hazard index in not a valid indicator of non-carcinogenic risk significance at the site (OU I risk assessment at 5-5; OU III risk assessment at 5-16). "EPA improperly calculated in the risk assessments a 'reference dose' (RFD) for estimating toxic effects of .037 mg/kg of body weight per day. However, in the same paragraph, EPA concluded that copper, which is an essential nutrient, has a 'relatively low oral toxicity to humans and intakes of up to .5 mg/kg/day (35 mg/day for an adult) are not expected to cause adverse effects (NAS 1989)' (OU I risk assessment at 4-14). In fact, the estimated daily intake of copper on which EPA based its assertion of a hazard index transgression is significantly less than the recommended safe and adequate range of dietary copper intake for adults (i.e., 1.5 to 3 mg/day). Subcommittee on the Tenth Edition on the RDAs, Nation Research Council, Recommended Dietary Allowances (10th ed. 1989) (Appendix at Exhibit I).

The representative states that Torch Lake is a healthy and productive environment; accordingly, the Proposed Plan is unjustifiable. The Proposed Plan and the FS also assert that the soil cover and vegetation remedy is necessary to protect the environment, but no data in the administrative record supports the Proposed Plan's conclusion that tailings and slag, unless covered by soil and vegetation, degrade the environment in any meaningful way. The only accurate statements in the FS and Proposed Plan relate to the fact that the presence of tailings and slag have altered Torch Lake's natural state. This alone cannot justify a remedy under CERCLA, and in any event, the proposed remedy does nothing to address that circumstance. The record shows that there is almost no transportation by rain or wind of stampsands or slag into Torch Lake.

"We challenge EPA to articulate a single circumstance in which scientific data show that a soil and vegetation remedy is likely to ameliorate harm to wildlife. While it is true that growing grasses on tailings and slag could be seen by some as a laudable beautification project for the Upper Peninsula, it is in no way appropriate to mandate such a project under CERCLA.

"Also, we challenge EPA to articulate, based upon scientific data in the record, a single way in which the proposed remedy will alleviate scientifically established carcinogenic and non-carcinogenic health risks which are unacceptable according to EPA criteria.

"Finally, we challenge EPA to articulate, based upon scientific data in the record, any meaningful benefit from its proposed soil and vegetation remedy that will not also be accomplished by no action."

RESPONSE: U.S. EPA collected the contaminant data from tailings, slag, residential soil, background soil, surface water, groundwater, sediment, and air. All of these data were used and

integrated to characterize the nature and extent of contamination at the site. Information developed during the human health risk assessment and ecological impact assessment, along with the fish monitoring data, bio-assay test, reproduction study, animal study, and wetland study, were used to determine the potential impact of these tailings and slag on the environment and human health. Based on this comprehensive assessment of the site, U.S. EPA believes that the selected remedy is necessary at the site due to the unacceptable environmental impact and human health. The modified remedy based on public comment reduces the area of tailings to be covered with soil and vegetation under this ROD. The total area to be remediated is approximately 670 acres. The estimated Present Net Worth for this selected remedy is $ 6.1 million.

The following are the more specific responses to the comment:

1. As stated in the Proposed Plan, the cancer risks due to the potential inhalation and ingestion of most of the tailings fall in the range which U.S. EPA generally considers as acceptable. Only one tailing pile (Michigan Smelter) located in OU III was estimated to pose a cancer risk of 2 additional cases in 10,000 people (2×10^{-4}), which is considered to be unacceptable by U.S. EPA.

2. See response to comment 3.1.1(a) for unacceptable cancer risk.

3. See response to comment 3.1.1(d) for conservative assumptions for risk calculations.

4. As suggested by the U.S. EPA guidance, U.S. EPA used conservative exposure assumptions to estimate the risk.

5. The recommended safe and adequate daily intake of copper ranges from 1.5 to 3 mg/day for adults and 0.7 to 1.5 mg/day for children (age 1 to 6) (NRC 1989). The adult range (1.5 to 3 mg/day) is equivalent to 2.1×10^{-2} to 4.3×10^{-2} mg/kg-day, assuming an adult body weight of 70 kg. The reference dose (RfD) of 4×10^{-2}, used in the risk assessment, is a conservative estimate of the daily intake at which noncarcinogenic adverse effects are not expected to occur. This value appears to be appropriate, based on the NRC recommendation. The risk assessment clearly states that the adverse effect associated with the calculated Hazard Quotient is gastrointestinal irritation. In addition, it is important to note that the NRC recommendation is for total copper intake. The average daily adult diet provides about 1 mg of copper per day (NRC 1989). Thus, estimates of the total daily intake of copper should include intake from food.

   The daily intake upon which the subchronic Hazard Quotient of 5.0 for a hypothetical future child resident was based

at Location 6 in Torch Lake OU III is 0.18 mg/kg/day (p. A4-86 of the OU III risk assessment). This is equivalent to an intake of 2.7 mg/day for a 15 kg child. This value is obviously greater than the safe and adequate range recommended for children of this age group (0.7 to 1.5 mg/day).

See responses to comments 3.1.1(a) and 3.3.8 for the adverse environment impacts by the tailings.

Plant survival and growth on tailings are impaired by a combination of chemical and nonchemical stresses, including poor water retention, extreme temperature fluctuation, low organic content, and presence of toxic substances. Animal populations are likely to avoid tailings 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. U.S. EPA believes that the fully vegetated tailings would provide a better place for the residential and migratory animals to live than the current barren and unvegetated sandy tailings.

As indicated in response to comment 3.1.1.(a), the unacceptable cancer risk (Location 5 in OU III) and non-cancer risk (Hubbell slag in OU I, and Location 1, 3, 5 and 8 in OU III) was estimated due to the potential ingestion of tailings or slag by current or future residents. The selected remedy of a soil cover with vegetation would reduce the exposure route of ingestion and thus reduce the human health risk.

The selected remedy of a soil cover with vegetation would reduce the release of contaminants into the lake. The selected remedy will also retard the potential ingestion exposure to reduce human health risk. These benefits to the environment and human health can not be accomplished by the No Action alternative.

3.3.1(c)
COMMENT: An UOP representative contends that the inappropriateness of the Proposed Plan is demonstrated by other RODs where the No Action remedy was selected. The representative requests that EPA explain why selecting the no action alternative at Torch Lake would be significantly less protective of human health or the environment than it is at each site where it has been selected, but, at least, at each of the following specific sites:

1. Cecil Lindsey Site, Arkansas R06-86/009. This 5.2-acre site, located in the 10-year floodplain, received wastes for salvage and disposal from the early 1970's to 1980. The northern part of the site was used as a municipal dump; the site reportedly was used for the disposal of industrial wastes; and EPA enforcement files suggest the possibility of a substantial volume of waste at the site. Inorganic and volatile organic contamination in on-site soils exceeds background levels; on-site groundwater consistently exceeds background levels for inorganics; and off-site surface

water and sediment samples contain some of the same inorganics found in on-site soil samples. For example, in some on-site materials lead levels were measured at 93 to 1392 parts per million ("ppm") with a mean value of 367 ppm. and lead levels from two on-site road fill samples were 4190 and 4860 ppm. Lead levels in background with a mean value of 6.3 ppm. Inhalation of airborne particulate containing lead at the maximum concentrations found in on-site soils and other materials would exceed occupational standards for a continuous 8-hour exposure over a forty year period. The potential for the off-site migration of contaminants exists. Other than the removal of on-site drums containing hazardous substances, EPA selected the no action alternative with site access restrictions, the installation of two monitoring wells and one year of groundwater monitoring.

2. Highland Acid Pits, Texas R06-87/021. This site, 16 miles east of Houston, lies within the 10-year floodplain, has subsided 2.4 feet since 1964 and is bordered on two sides by the San Jacinto River. During the 1950's, the site received unknown quantities of industrial waste sludge believed to be spent sulfuric wastes form a refinery process. The primary groundwater contaminants are VOCs and heavy metals. These contaminants are present in an underlying shallow aquifer and have penetrated the region between this aquifer and a lower, middle aquifer. The ROD notes that the middle aquifer could become contaminated. Chromium has been detected in the San Jacinto River and/or other surface waters. EPA selected the no action alternative with long-term groundwater and surface water monitoring.

3. Westline, Pennsylvania R03-90/086. This site, completely surrounded by the Allegheny National Forest and situated along the Kinuza Creek, was the location of a chemical plant that deposited tar material containing phenolic compounds and polynuclear aromatic hydrocarbons ("PAHs") into on-site lagoons and small canals, allowing the material to migrate downhill toward the creek. In 1983, EPA conducted an immediate removal of 2,000 tons of tar and contaminated soil. Although a 1986 ROD required the excavation and off-site incineration and disposal of an additional 2,340 tons of tar and contaminated soil, it did not address another estimated 4,000 tons of tar. EPA subsequently determined, based on an updated risk assessment using more recent risk criteria for PAHs, that the remaining tar and soil fail to pose a potential carcinogenic risk greater than the range of acceptable risks found a other superfund remediation requirements. As part of the no action alternative, the site will be monitored and reviewed again in five years.

4. M&T DeLias Landfill, New Jersey R02-90/108. This 132-acre site included a 39-acre area that was used as a landfill. A shopping mall exists on 30 acres of the former landfill.

Landfill gas is generated at the site, and elevated VOC levels have been detected. Although EPA identified a potential human health risk from groundwater contamination under a future use scenario, EPA chose the no action alternative without even evaluating any remedial action alternatives. EPA transferred responsibility for the site to New Jersey with recommendations for the implementation of environmental controls including, inter alia, restricting possible future use of on-site groundwater, surface and groundwater monitoring, and periodic indoor and outdoor air monitoring.

RESPONSE: The decision as to what if any remedial action should be taken at a site is based on U.S. EPA data and site-specific information. The conclusions of what action has been taken at other sites is not relevant to the selection of a remedy at the particular site in question.

3.3.1(d)
COMMENT: An UOP representative contends that EPA unlawfully biased the community during the Public Comment Period.

"At the May 12, 1992 public meeting, a number of area residents and municipal representatives opposed EPA's Proposed Plan as a waste of funds. Some landowners also expressed fears of potential CERCLA liability as potentially responsible parties (PRPs).

"On May 24, 1992, an EPA employee appearing in a radio interview stated that EPA would release all landowners and municipalities and give them protection against contribution claims, all without any monetary settlement, in exchange for access to various locations within the Torch Lake site. The EPA employee stated that EPA would only seek monetary recovery from corporate PRPs.

"Putting aside EPA's lack of authority to make such a commitment at this time, the bias that these statements reflect is both inappropriate and disturbing. Currying political favor without regard to law is a further demonstration of EPA's arbitrary and capricious conduct. We know of no precedent for such conduct.

"We challenge EPA to explain how, under CERCLA, its representatives lawfully can attempt to influence public opinion in support of a proposed plan by proffering (during the comment period) to certain PRPs covenants not to sue and contribution protection.

"We further challenge EPA to explain the basis for its conclusion that it can lawfully make determinations as to covenants not to sue and contribution protection prior to issuance of the Record of Decision and any meetings with the PRPs in question."

RESPONSE: As previously noted, U.S. EPA responded to questions regarding potential liability at the site due to UOP's comment that it would file third-party actions if any alternative other than "No Action" was selected for this site. U.S. EPA informed the public that it is the policy of the U.S. EPA not to file

actions against individual landowners who were not involved in the generation or release of the material in question. Such a decision, though not to UOP's liking, is clearly within U.S. EPA's enforcement discretion. Rather than trying to influence public opinion to support the plan, U.S. EPA was providing individuals with information regarding liability as it is required to do at public meetings. U.S. EPA fails to see how informing individuals of the truth is biased or unfair, or how stating that it would seek recovery of money expended from those who generated or disposed the material in question is arbitrary and capricious conduct. It is not surprising that UOP does not like the result, but U.S. EPA is within its authority to determine who, if anyone, it will seek reimbursement from, and who it would seek to protect from liability. To seek reimbursement from those who generated the material in question, and to seek to protect those who had no role in the generation, disposal or release of the material is hardly biased or arbitrary, but rather is a consideration of site-specific factors in determining who, if anyone, is potentially liable for a particular site. Lastly, the decision as to granting covenants not to sue and contribution protection are not dependent on the issuance of a Record of Decision or a meeting with UOP. See Section 9622 of CERCLA which does not put a time limit on when and only when the U.S. EPA can make a determination as to enforcement strategy for a particular site.

3.3.2 Technical Problems with/Feasibility of Proposed Plan

3.3.2(a)
COMMENT: Sam Dickinson, a forester and an UOP representative, contends that Alternative T2 - Donohue Investigation - Appendix E-4, USDA-SCS Report - treatments needed in partially vegetated areas is much too vague. The representative would like to know what will happen to the vegetation on the site, if any vegetation will be retained, and the reasons for considering 2 inches of topsoil where there is partial vegetation and 6 inches on non-vegetated areas as an upper limit. The representative would also like to know if certain partially vegetated areas will be designated to be treated, and others to be left alone.

"In fully vegetated areas it is hard to visualize any work being needed. If they are classified fully vegetated, they should have a 'healthy and stable vegetative cover' of 85% or over coverage and need very little, if any treatment."

The representative concludes, "The above mentioned citations and observations indicate that Alternative T2 and S3 cannot be justified based on need and predictable results."

RESPONSE: In a fully vegetated area, U.S. EPA will conduct either no action or small-scale maintenance work. In a partially vegetated area, a minimum of three inches of cover soil would be used to vegetate the area.

3.3.2(b)
COMMENT: Sam Dickinson, a forester and an UOP representative, comments that the dust control costs seem excessive. He suggests rather than use only water to control dust, which lasts a very short time, a dust retardant should be utilized. One that was and still is used at the mining operations is ligninsulfonate. It is a bi-product of the pulp and paper industry, binds the soil particles together much longer than plain water, and is relatively inexpensive.

RESPONSE: The use of a dust retardant would obviously be more effective and efficient for dust control while implementing a soil cover with vegetation. U.S. EPA will consider this comment during the remedial design.

3.3.2(c)
COMMENT: Sam Dickinson, a forester and an UOP representative, states: "In the EPA Proposed Plan, page 9, Tailing Alternative T2-Soil cover, Vegetation, the type of vegetation to be used is shown as 'appropriate vegetation.' In the Donohue RI 2.5.2.2 options for tailings capped c) "deep rooted vegetation would not grow well in tailing . . .' This might mean woody plans or legumes. In 4.3.2.1 of this investigation, '. . . appropriate native plant species,' is mentioned. In appendix D, the same investigation, D.1.3., 'Deep rooted vegetation which may threaten capping systems should be avoided,' is stated. Certainly any vegetative cover must offer maximum protection to the site, of which sod forming grasses must be an integral part. However, native grasses are slower to stabilize a site than many introduced species. Should the plants be limited to growth in the soil cap, they would be unduly susceptible to drought conditions and permanent damage by fire. If legumes are not used, the vegetative cover will be less diverse and require the addition of much more nitrogen fertilizer. This could cause pollution problems in Torch Lake. Experience has shown that once the adverse condition existing on such a site has been mitigated, native and other vegetation will seed into such an area (Dickinson, Sam, 1975, Revegetation of Taconite Tailing) and (Donovan et al., 1976, Vegetative Stabilization of Mineral Waste Heaps, page 153). such invasion of non-deeded plants can be expected to breach the cap unless they refuse to send roots into the stamp sands. There is little indication that roots will not extend into the stamp sands and in so doing may transport the heavy metal and chemicals into their foliage.

"In selecting the proper soil for capping it would be important not to use soil that could aggravate the present condition. Soil that is high in silt or clay and moved by earth movers can easily become compacted into dense slow permeable layers (Vogel, W.G. 1981, A Guide to Revegetating Coal Minesoils in Eastern U.S.). This type of soil should not be moved when wet. Acid soils must also be avoided as they could cause the liberation of heavy metals in the stamp sands.

"The above mentioned citations and observations indicate that Alternative T2 and S3 cannot be justified based on need and predictable results.

"The representative also included quotes from the 1983 Bureau of Mines research report entitled, 'Reclamation of Tailing Basins Resulting From Copper Nickel Milling,' sections 5.2.2.2 Peat and Topsoil, page 132; Section 5.3.1., page 135; Section 5.4.1, page 138; and Section 5.4.2, page 139. In addition, the representative included information from a paper entitled 'Possible Treatments as Alternatives to Topsoil Replacement on Surface Mine Sites,' by Linda Alderdice, et al., page 354."

RESPONSE: This comment provides valid technical facts which must be considered in the remedial design. These technical considerations are within the bounds of a feasible approach for establishing soil cover and vegetation. It is expected, in the remedial design, that native species will invade the established areas of soil cover and that a climax vegetative community will prevail after a few years. Providing a soil cover with a stabilizing vegetative cover will facilitate the more expedient nutrient base and establishment of an organic nutrient cycling system. This is necessary as the current stampsands do not have an effective nutrient supplying capacity.

Regardless of how a vegetative cover becomes established, some cover will require intensive management, whether a monoculturally planted species or ideally multicultural species, to stabilize to the extent possible a successful cover. The management scheme for establishing the soil and vegetative cover will require innovative thinking and steadfast scientific principles. Details of how the soil and vegetative cover will be established will be developed in the remedial design. It is anticipated that the design and its implementation will require the skills and knowledge of local scientists and engineers.

Regarding clays and silts in the cover soil, efforts to minimize compaction are essential and will be duly considered for the remedial design. Clay and silt in the cover soil will purposely retard water movement through the soil and into the stampsands. Eventually though, roots will inevitably penetrate the soil cover and grow into the stampsands. Metal contaminants may be uptaken. These metals will, if taken up by plants, become imbedded in a stable biomass that will develop on the site over time.

3.3.2(d)
COMMENT: Sam Dickinson, a forester and a UOP representative, inspected OU I of the Torch Lake site, and comments on the following:

"When covered with herbaceous vegetation, the large area comprising T2 and S3 would be at risk of fire when the vegetation is in a cured condition. Should such a fire be very hot and the soil cover dry, it would cause great harm to the plant roots. If the

plant roots are confined to the soil layer, the roots would be especially subject to damage. Any heavy rains that followed such a fire could not only cause erosion problems, but could also carry nutrients and other chemical residues in the ashes into Torch Lake."

RESPONSE: This comment is duly noted and accepted.

3.3.2(e)
COMMENT: Sam Dickinson, a forester and an UOP representative, inspected OU I of the Torch Lake site, and comments on the following:

"The Hubbell slag pile is very steep sided and there has been considerable undercutting of the pile by wave action. It would not be possible to retain soil cover on the steep slopes with their present configuration. On portions of the pile both trees and herbaceous plants were noted growing directly in the slag."

RESPONSE: The steep sides of the Hubbell slag pile are taken into account in the feasibility study and are not proposed for soil cover. While some trees and herbaceous plants are growing directly in the slag, it is a very slow and laborious establishment of vegetation at this site.

3.3.2(f)
COMMENT: Sam Dickinson, a forester and an UOP representative, inspected OU I of the Torch Lake site, and comments on the following:

"North of the Hubbell slag pile is a beach area covered with granular slag. Part of this area has a steep bank of granular slag extending down to the waters edge. This bank is about six feet in height, is at the angle of repose and would not hold soil placed on it unless reshaped. Even then wave action would be a problem."

RESPONSE: It is agreed that the angle at which the slope of the slag "beach" enters the water is too steep to accept a feasible soil cover.

3.3.3 Wetlands

3.3.3(a)
COMMENT: Sam Dickinson, a forester and an UOP representative, inspected OU I of the Torch Lake Site, and comments on the following:

"A sizeable wetland was found on the Tamarack site. It is located northeast of the Water Treatment Facility and appears to be located on stamp sands. I believe it is important to determine if the wetland is in fact located on stamp sands. It contained cattails, sedges, rushes and speckled alder. Turtles

and red-wing black birds were noted in this wetland. Since much has been made of the loss of wetlands, this one seems important."

RESPONSE: If such a wetland has been found on tailings, it cannot and will not be covered or affected in any way.

3.3.4 Fish Consumption Advisory

3.3.4 (a)
COMMENT: An UOP representative would like to know why the fish advisory has not been lifted by the MDPH.

"A review of literature surrounding the issuance of the walleye and sager fish consumption advisory in Torch Lake has revealed the following:

"1. The issuance of a voluntary fish advisory was initiated by the Michigan Department of Public Health in 1983 based on apparent evidences of abnormal tumors in walleye and sager discover in the lake in the 1970s; no other fish species were suspect.

2. The fish advisory was issued as a precaution, and was not connected with a known or suspected human health risk associated with consuming any known contaminants within these fish.

3. Fish tumors were only found in very old sager and walleyes, many of the tumors were common to these species throughout their range in North America, and many tumors observed may have been caused by viruses or bacteria.

4. The exact cause of any abnormal incidence of tumors in Torch Lake fish has never been determined, but bioassays of the sediments in Torch Lake have found that significant levels of carcinogens are absent from the lake sediment.

5. Recent follow-up fish tumor studies conducted on numerous fish have found that abnormal incidences of tumors no longer exist in the Torch Lake/Portage Lake fishery.

6. Numerous leaching studies on the stamp sands indicate that very little metal is likely to be released to the lake water; this has been substantiated with tests on the lake water itself.

7. Flesh samples analyzed by the MDNR from fish collected in Torch Lake revealed that these fish are amongst the cleanest of all inland lakes tested in the program.

8. The MDPH has apparently delayed lifting the fish advisory until the underwater drums had been characterized; these drums have subsequently been characterized, removed, and disposed.

9. Torch Lake water is safe for other uses, such as swimming.

10. Torch Lake continues to have a diverse, healthy population of fish and plant life, indicating that Torch Lake is of very good quality, and neither the lake water nor the sediments are toxic to fish."

"From this review, it is evident that the basis of the fish advisory for walleye and sager no longer exists, and all other known issues that could be causing the delay of lifting the advisory have been resolved. Based on data that have been collected over the past six years, the MDNR has repeatedly recommended to the MDPH that this fish advisory be rescinded. These requests have been met with no success. It is unknown as to why the fish advisory has not been lifted by the MDPH to date."

RESPONSE: The MDPH has indicated that the reasons for delay in lifting the advisory has been the uncertainty associated with possible new developments coming from various U.S. EPA investigation under the Superfund program. Since the investigation at Torch Lake has been completed, MDPH indicated that they will review all investigation data collected by U.S. EPA, including the underwater drum removal report, hot-spot sediment data and other fish data before developing the 1993 fish advisory update.

U.S. EPA accepts the results of MDNR's fish monitoring report, which indicated that fish collected from Torch Lake contain no abnormal tumors. U.S. EPA does not object to the delisting of Torch Lake fish consumption advisory by MDPH.

3.3.5 Torch Lake OU I Baseline Risk Assessment

3.3.5(a)
COMMENT: Geraghty & Miller, an engineering consultant representing UOP, questions the toxicity threshold assumption for carcinogenic risks in the Torch Lake OU I Baseline Risk Assessment. The baseline risk assessment states that 1×10^{-6} is the level of concern for excess lifetime cancer risks. EPA guidance recommends that 1×10^{-4} be used as an action level for most sites.

RESPONSE: The baseline risk assessment states that "cancer risks of 1×10^{-6} [1 additional case in one million people] or lower are considered to be so small that they are of no practical concern." This statement is consistent with current EPA guidance (U.S. EPA 1991c). The guidance states: ".. an appropriate point of departure for remediation of carcinogenic risk is a concentration that corresponds to a risk of [1×10^{-6}] ... When the current or future baseline cancer risk for a medium is within the range of [1×10^{-6} to 1×10^{-4}], a decision about whether or not to take action is a site-specific determination." See response to comment 3.1.1(a) for cancer and non-cancer risk assessment.

3.3.5(b)
COMMENT: Geraghty & Miller comments on the natural background risks in the Torch Lake OU I Baseline Risk Assessment. The risk assessment failed to consider background sources of inorganic contaminants when drawing conclusions regarding the significance of risk from these contaminants.

RESPONSE: This risk assessment evaluates risks to human populations from tailings on the western shore of Torch Lake. We agree that the inorganic constituents of tailings are naturally occurring materials and the concentrations of these calculated for Torch Lake populations apply whether or not background soils concentrations of some contaminants would also contribute to risk. U.S. EPA recognizes that the ambient background conditions at the site contributes to the risk, but that there is some increased risk above background from exposure to the tailings.

3.3.5(c)
COMMENT: Geraghty & Miller comments on the constitution of a slag pile in the Torch Lake OU I Baseline Risk Assessment. The risk assessment did not consider that most of the slag pile is not ingestible when evaluating risk from ingestion of this material.

RESPONSE: We agree that most of the slag pile is not ingestible. Nevertheless, based on observation, there is sufficient crushed slag and slag dust on and near the pile to provide many times the daily intake of slag estimated by the risk assessment.

3.3.5(d)
COMMENT: Geraghty & Miller comments on the periods of exposure in the Torch Lake OU I Baseline Risk Assessment. Estimates of exposure frequency and duration are unrealistically high and do not agree with current EPA recommended assumptions.

RESPONSE: The exposure frequency (365 days per year) and exposure durations (70 years) estimated for current residents are based on site-specific information. Many residents in the Torch Lake area apparently have grown up in the area and lived there all their lives. Some residents rarely take vacations and remain in the area all year. Therefore, these values are used to calculate reasonable maximum exposures. Current U.S. EPA guidance (1991a) allows for site-specific information to take precedence over recommended default values.

For the consideration of site-specific factors such as snow cover, U.S. EPA also followed the allowed assumptions in the guidance. For the inhalation route of tailings, U.S. EPA corrected the emission rate by 59 percent to incorporate the snow-covered days at the site. For the ingestion route, a constant year-round exposure was assumed because there is no widely accepted method for determining the relative contribution of each medium (i.e., soil vs. dust) to these daily totals, and the effect of climatic variations (e.g., snow cover) on these

values has yet to be determined. (See page 6 of "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure factors, Interim Final, OSWER Directive: 9285.6-03, March 25, 1991.")

Even if the risk assessment uses the local weather condition by decreasing the number of exposure days by 59 percent, it would decrease the risk slightly. It would not, however, change our remedial action since the remedial action at this site is being taken primarily to protect the environment.

The assumption that lagoon workers work about 36 weeks per year is based on information provided by the Torch Lake Area Sewage Authority. This assumption is not necessarily inconsistent with the 149 days of snow cover each year, since the snow cover may not be continuous and workers may work at the lagoons when there is some snow on the ground.

We agree that 84 days per year is the appropriate exposure frequency for sludge spreaders. The HIF calculations are based on that assumption. The values in Tables 3-6 and 3-7 for exposure frequency are typographical errors. The HIF values in the tables are correct, assuming an exposure frequency of 84 days per year.

3.3.5(e)
COMMENT: Geraghty & Miller comments on the validity of copper reference doses in the Torch Lake OU I Baseline Risk Assessment. The Reference Dose (RfD) used for copper is not an EPA-accepted toxicity value.

RESPONSE: The Health Effects Assessment Summary Tables (HEAST (U.S. EPA, 1991b) list the maximum contaminant level goals (MCLG) for copper in drinking water of 1.3 mg/L in the oral RfD column, with a note that the Drinking Water Criteria Document considered the toxicity data inadequate to calculate an RfD. Nevertheless, the data were adequate to calculate the MCLG, based on human data on gastrointestinal effects. The U.S. EPA guidance permits derivation of toxicity values if data are available (Risk Assessment Guidance for Superfund. Volume I. Human Evaluation Manual (Part A) Interim Final, U.S. EPA, 1989). Based on the inclusion of the MCLG in HEAST, we derived an appropriate RfD for copper, understanding that using this value provides an estimate of the gastrointestinal effects which might occur to human populations ingesting copper at the concentration in the Torch Lake tailings.

3.3.5(f)
COMMENT: Geraghty & Miller comments on the soil ingestion rates in the Torch Lake OU I Baseline Risk Assessment. The soil ingestion rates used in the risk assessment are too high. The soil ingestion rate used for residents does not account for snow cover days and the rate for workers is also overly conservative.

RESPONSE: Residential exposures to soil include ingestion of indoor dust and dirt as well as outdoor exposures. The EPA guidance (U.S. EPA, 1991a) states that there is no accepted method for determining the relative contribution of each medium to total soil ingestion. Therefore, according to the guidance, year-round exposure to soil, without accounting for snow cover, is assumed. See response to comment 3.3.5(d) for soil ingestion rate.

A soil ingestion rate of 50 mg per day is the rate assumed by EPA (U.S. EPA 1991a) for a "typical" workplace, which is an indoor commercial (office) or industrial (factory) setting and is not appropriate for the outdoor work performed by sludge spreaders and lagoon workers. The rate of 480 mg per day is suggested for outdoor work which entails direct contact with [illegible] such as landscaping or construction. Since the lagoon [illegible]ers do have direct contact with the tailings, this is a conservative, but appropriate, rate for this population. The sludge spreader is assumed to have much less direct contact with the tailings than the lagoon worker, but greater contact than an indoor worker. Thus, the soil ingestion rate of 100 mg per day is assumed.

3.3.5(g)
COMMENT: Geraghty & Miller comments on the air inhalation rates in the Torch Lake OU I Baseline Risk Assessment. The air inhalation rates assumed for children are too high and do not follow the guidance.

RESPONSE: We agree that the inhalation rate assumed for children (1.9 m^3 per hour) is overly conservative and that an average breathing rate for children, both residents and campers, would be about 1 m^3 per hour. However, using the average breathing rate of 1 m^3 per hour, the estimated risks to children would be approximately the same.

3.3.5(h)
COMMENT: Geraghty & Miller comments on the use of non-detects in risk determination in the Torch Lake OU I Baseline Risk Assessment. Exposure point concentrations for PAHs in the slag were inappropriate, since non-detect ("U") values were used to calculate there concentrations.

RESPONSE: We agree that "U" values were included in the calculation of exposure point concentrations for PAHs in the slag pile and slag beach samples. These are conservative estimates of PAH concentration in this medium and lead to conservative estimates of risk from PAHs in slag. In tailing samples, "U" values for PAHs were not included in the exposure point concentrations. (Risk Assessment Guidance for Superfund. Volume I. Human Evaluation Manual (Part A) Interim Final, U.S. EPA, 1989).

3.3.5(i)
COMMENT: Geraghty & Miller comments on the total chromium vs. hexavalent chromium in the Torch Lake OU I Baseline Risk Assess-

ment. It is inappropriate to assume that all chromium detected in the tailings is in the hexavalent state.

RESPONSE: Chromium exists in the natural environment in two main valence states, trivalent and hexavalent. There is a constant interchange between the two states and the predominant state depends upon numerous environmental variables, including pH of the soil. Since it is not known whether the chromium in the tailings is predominantly trivalent or hexavalent, the conservative assumption that all chromium is in the hexavalent state is most appropriate.

3.3.6 Remedial Investigation (RI)

3.3.6(a)
COMMENT:

RI-2: OU I, PAGES 4-3 AND 4-4

"The analytical results of composite surface soil samples from nine residential yards and the Lake Linden football field are noted here. These soil samples were collected to determine if contaminates from the tailing had impacted the surface soils due to fugitive dust deposition or runoff and erosion. The comparison summary of the tailings and soil chemistry as reported in the RI stated that 'In general, semivolatile organic compound levels (most of which are polynuclear aromatic hydrocarbons) were orders of magnitude higher in soil samples than in tailing samples. Arsenic, chromium and copper concentrations are generally similar in soil samples and tailing samples. The highest level of lead measured was detected in a soil sample...There was no pattern of distribution which suggested impact of tailings-derived compounds to residential soils.'

"These data indicate that the background soil samples in the immediate area are extremely significant in that they emphasize the following issues:

1. The stamp sands do not significantly contribute to the contamination of surface soils through air or surface runoff erosion pathways; and,

2. Calculated human health risks associated with these background soils are equal to or greater than the risk associated with the stamp sands in the area (Donohue, 1992a).

"Although these conclusions are reached within the RI report, they are not used in other reports that use the RI as a database for information. Most notably, the Risk Assessments and the Environmental Assessment ignore these data in establishing the significance of human health and environmental risks on the site. Why were these data not used in these documents?"

RESPONSE: The Remedial Investigation Report for OU I discusses the presence of semi-volatile organic compounds and lead concentrations in the residential soils in the communities adjacent to Torch Lake. While these compounds do present elevated risks above background levels, they have been determined to not be associated with the tailings or stamp sands. Their presence does not obviate the hazard or risk presented to human populations by the stampsand deposits.

The U.S. EPA has determined that the level of organic compounds and lead found in the residential soil does not pose a significant threat to human health.

For other inorganics, arsenic, cadmium, chromium, and copper were found in the tailings at higher concentrations than residential soils. (See table 1 of ROD)

See response to comment 3.3.7(f) for background soil data in the risk assessment.

3.3.6(b)
COMMENT:

RI-3: OU I, Page 5-1, Paragraph 5

"It is mentioned here that the significance of contaminate migration by infiltration, runoff, or erosion routes is limited by the persistence and mobility characteristics of the contaminants. All data presented thereafter regarding the contaminants of concern establish and reinforce the fact that the chemicals of concern at Torch Lake are relatively immobile (USDI, 1991A; USDI, 1991b; USMB, 1991; Rose et al., 1986), thus supporting the conclusion that the significance of potential migration of contaminants through these pathways is substantially reduced. Although the data supporting this conclusion are presented here, the conclusion itself is not clearly presented. What is the USEPA's assessment of the wealth of evidence that demonstrated limited mobility within the tailings material?"

RESPONSE: Contaminants (metals and semi-volatile organic compounds) found in the stampsands of Torch Lake are basically strongly adsorbed to the tailings particles. Given the body of evidence from studies performed by the U.S. Bureau of Mines, it is only logical to acknowledge this fact. Contaminant transport mechanisms in the stampsands of Torch Lake will largely (and likely) occur with transport of the stampsand particles themselves, either with very small micelles, or with wind- or runoff-borne transport of larger particles.

3.3.6(c)
COMMENT:

RI-4: OU III, Page 1-9, Paragraph 2

"The definition of slag given here is incorrect, and appears to refer to slag production as it occurs in the iron refining process, not the copper refining process. Slag produced in the native copper refining process basically consists of the lower density molten rock that is produced when the copper-bearing rock is brought to the melting point (Gates, 1969). USEPA is asked to clarify their interpretations of the definition of slag."

RESPONSE: EPA's definition of slag is consistent with that of Webster's Dictionary: "the fused refuse or dross separated from a metal in the process of smelting." In the case of slag materials at Torch Lake, whether massive or granular in nature, their origin is from the smelting process and they are the hardened refuse of molten materials.

3.3.6(d)
COMMENT:

RI-5: OU III, Page 1-10, Paragraph 3

"OU I includes the primary contaminant sources of surface tailings and drum contents in the primary study area, on the western shore of Torch Lake.

Several months prior to the time that the RI for OU III had been completed, all underwater and on-land drums subject to removal under a USEPA Administrative Order on Consent were removed, overpacked, and securely staged awaiting disposal. These drums were subsequently taken off-site and properly disposed (G&M, 1992a). Drum contents were therefore no longer a contaminant source at that time. We recommend that this statement be revised to acknowledge the removal of these drums."

RESPONSE: At the initiation of the Torch Lake RI/FS, OU I as it was defined did include on-land drums on the tailings in the primary study area. It is recognized and mentioned on page 1-8, first paragraph, of the OU III RI report that drums were removed.

3.3.6(e)
COMMENT:

RI-6: OU III, Page 4-1, Paragraph 2

"It is stated here that a concentration is reported as elevated if the average was 'significantly greater' that the background soils average. It is unknown as to how the significance of the difference was determined. Please clarify."

RESPONSE: The use of the term "significantly" does not imply statistical significance. It may have been better stated as "notably" or "numerically."

3.3.6(f)

COMMENT:

RI-7: OU III, Page 5-1, Paragraph 3

"The author states here that the quantification of the air migration pathway was not part of the scope of the RI. Alternate air migration studies have been performed, however, that concludes that the airborne transport of heavy metals to Torch Lake is volumetrically insignificant, and that the dust clouds have become less of a problem each year due to the natural revegetation of the stamp sands (Rose et al., 1986; MDNR, 1987). Why was this information omitted?"

RESPONSE: The reason why the quantification of the air migration pathway was not included in the scope of the RI was that the cost associated with measurement of wind speed/direction and year-round sampling period was estimated as very high. The air monitoring was conducted by the MDNR for a month to determine the release of air-borne contaminants from tailing piles. Air quality modelling was used to determine the amount of contaminants released from tailing piles and used in the risk assessment.

3.3.7 Risk Assessment (RA) - OU I AND OU III

The following comments pertain to the Baseline Risk Assessments (RAs) for Operable Unit I (Life Systems, 1991) and Operable Unit III (Life Systems, 1992a). Many comments relating to the risk assessment conducted for OU I also relate to the risk assessment for OU III because many of the methods and assumptions used are the same. Comments are designated as "RA-X" where X represents the comment number. All comments are referenced to operable unit, location in the document reviewed, or general subject.

3.3.7(a)
COMMENT:

RA-6: OU I, Page 2-6, Bullet 4

"It is stated here that any chemical that is essential to human nutrition was eliminated. This is not what was done, however. Estimated maximum daily intakes of several select compounds were instead compared to recommended daily intakes (RDIs) for adults. If the estimated daily intake of the essential nutrient did not exceed the RDI of that nutrient, the element was not considered a potential chemical of concern on the site.

"Although Appendix 1 of the RA report does contain this screening process, this screening was not observed for the essential nutrients of copper and chromium. The estimated daily intakes of copper and chromium from OU I based upon the maximum level of

these compounds found in slag or tailing at all OU I locations are 1.28 mg/day for copper and 0.0649 for chromium. These maximum values are both below their respective recommended daily allowance ranges for copper (up to 3.0 mg/day) and chromium (up to 0.2 mg/day) (Ivy & Elmer 1986; RDA subcommittee 1989).

"Using the screening tool as intended, therefore, eliminates copper and chromium as a potential contaminant of concern for OU I. The appropriate elimination of copper as a chemical of concern in turn eliminates all hypothetical calculated risks associated with copper on the site that were originally estimated using an unrealistically conservative reference dose for copper that was not based on an EPA-accepted toxicity value.

"Why were copper and chromium, two essential nutrients, included as contaminants of concern when the screening process identified would indicate their removal for consideration?"

RESPONSE: Copper was retained as a contaminant of potential concern because the maximum daily intake of copper at OU I (1.28 mg/day) added to the average daily intake from an adult diet (about 1 mg/day (NRC, 1989)) exceeds the conservative recommended safe and adequate intake for adults (1.5 mg/day).

Chromium exists in nature in two main valence states, trivalent and hexavalent. Only trivalent chromium is an essential nutrient (NRC, 1989), and the predominant valence state of chromium in tailings is not known. Since hexavalent chromium is more toxic than the trivalent form, it is appropriate to make the conservative assumption that the chromium present in tailings is hexavalent. Therefore, chromium was not included as a contaminant of potential concern based on nutritional essentiality.

3.3.7(b)
COMMENT:

RA-7: OU I, Page 12-6, Bottom Paragraph

"It is stated here that all detected PAHs were retained as chemicals of concern because of their relationship to the site. However, sampling of backyards in the area during the Remedial Investigation found that although these areas were determined to be unaffected by the site, PAHs were generally found here at levels that were one order of magnitude greater than in samples of tailings (Donohue, 1990).

"These PAHs were determined to most likely have emanated from the wood burning practices commonly employed to heat homes in the area (Donohue, 1992a). This corresponds to Geraghty & Miller's independent assessment of the probable source for PAHs found at the site G&M, 1992B).

"A risk assessment was performed by USEPA contractors on these backyard soils in the area, and increased cancer risks ranged from 1×10^{-5} to 2×10^{-4} for adults and from 5×10^{-6} to 1×10^{-4} for children (Donohue, 1992). The maximum calculated risks from these backyard soils (that have not been impacted by the tailings, slag, or other material associated with the site) are greater than or equal to the risks associated with all study areas within OU I and OU III. Therefore, lands adjacent to the site that have not been impacted by the site present the same range of cancer risks that are associated with material on the site. This is of great importance when establishing the significance of the risks calculated for the site materials. Not only are the risks posed by on-site materials generally within the range considered acceptable to the USEPA, they are within the range of risks posed by exposures to people's soil in the backyard of their homes. The significance of any increased cancer risks posed from the site materials is therefore greatly reduced. The USEPA is asked to consider this important comparative information about background levels of this material to properly assess the statistical and toxicological significance of the contamination as is recommended in USEPA Risk Assessment Guidance (USEPA, 1989b)."

RESPONSE: As stated in the OU I risk assessment, various forms of creosote were used to treat the tailings deposited at Torch Lake. Creosote contains a variety of PAHs and therefore PAHs detected in the tailings may be assumed to be site-related. There are many additional possible sources for PAHs, and the PAHs detected in backyard soils may come from other sources.

EPA recognizes that risks from exposure to soils in several backyards at Torch Lake equal risks from exposure to the tailings. Nevertheless, this does not diminish the significance of risk from the tailings. U.S. EPA recognizes that the risk of this site is not significantly above background and most of the tailing piles fall in the risk range which is generally considered as acceptable. (It also should be noted that one tailings pile in OU I and 5 tailings piles in OU III exceeded the acceptable cancer and noncancer risk criteria of U.S. EPA, respectively). This action is being taken to protect the environment and human health.

3.3.7(c)
COMMENT:

RA 10: OU I, Page 3-16, Paragraph 2

"Worker exposure frequencies were not consistent among information reported in the text and tables of the report. For example, the 36 week exposure period for lagoon workers is not consistent with the 149 days of snow cover per year. A more appropriate assumption would be 31 weeks of exposure for lagoon workers. Similarly, the exposure frequency for sludge spreaders is 84 days/year in the text, 108 days/yr in Table 3-6, and 180 days/yr on Table 3-7. The most appropriate assumption

appears to be the 84 days/yr as discussed in the text. The USEPA is asked to provide data to support the selection of these exposure frequencies."

RESPONSE: See response to comment 3.3.5(d).

3.3.7(d)
COMMENT:

RA-12, OU I, Page 3-18, Bottom Paragraph

"The baseline risk assessment makes the assumption that 60% of the material ingested in the Hubbell area are from the slag pile and slag beach. In order to ingest these materials in this ratio, one would have to spend 60% of their time (30% slag pile and 30% slag beach) on the slag areas; this appears to be an unrealistic assumption, and there is no rationale for this relative area of slag pile and slag beach as compared to other more frequented areas (e.g., backyards, playgrounds, parks, etc.). Compounding this exposure scenario is the assumption that all slag material is in a form that can actually be ingested. A more realistic conservative assumption would be that 10% of the soils ingested in the Hubbell area (5% slag pile and 5% slag beach) come from these areas. It is requested that the USEPA explain the basis for these assumptions and to comment on the preceding evaluation of this risk scenario."

RESPONSE: Assuming that about 30% of exposure is from the slag pile and 30% from the slag beach, this is a conservative, but not unreasonable, assumption for an individual whose backyard abuts these areas. This exposure includes not only the time the individual spends outdoors at the areas, but also the dirt from these areas that is tracked into the home and that adheres to hands and clothing.

We agree that most of the slag pile is not ingestible. Nevertheless, there is sufficient crushed slag and slag dust on and near the pile to provide many times the daily intake of slag estimated by the risk assessment and to allow the material to adhere to shoes, hands and clothing.

3.3.7(e)
COMMENT:

RA-14: OU I, Pages 7-2 and 7-4

"The summary of the calculated human health risks presented here should be accompanied by a sufficient explanation of the significance of these calculated risks. It is stated here that 1×10^{-6} (one in a million) is the level of concern for excess lifetime cancer risks. However, recent USEPA guidance on the role of the baseline risk assessment in Superfund remedy selection decisions (USEPA, 1991S) recommends that 1×10^{-4} (one in ten thousand) be used as an action level for most sites. This guidance states that:

Generally, where the baseline risk assessment indicated that a cumulative site risk to an individual using reasonable maximum exposure assumptions for either current or future land use exceeds the 1×10^{-4} lifetime excess cancer risk end of the risk range, action under CERCLA is generally warranted at the site. For sites where the cumulative site risk to individual based on reasonable maximum exposure for both current and future land use is less than 1×10^{-4}, action generally is not warranted, but may be warranted if a chemical specific standard that defines acceptable risk is violated or unless there are noncarcinogenic effects or an adverse environmental impact that warrants actions.

"Later in this same guidance it is stated that:

Furthermore, the upper boundary of the risk range is not a discrete line at 1×10^{-4}, although U.S. EPA generally uses 1×10^{-4} in making risk management decisions. A specific risk estimate around 1×10^{-4} may be considered acceptable if justified based on site-specific conditions, including any remaining uncertainties on the nature and extent of contamination and associated risks. Therefore, in certain cases EPA may consider risk estimates slightly greater than 1×10^{-4} to be protective.

"Carcinogenic risks reported in the baseline risk assessment report for OU I were all less than or equal to 1×10^{-4}, no chemical specific standards for the material found on the site were reported to be violated, noncarcinogenic risks associated with the site are not significant when background levels of inorganics are considered, and no adverse environmental impacts were identified. Furthermore, the summary of the uncertainties assessment of the baseline risk assessment report notes that "the risks derived for this site should be considered approximate and are more likely high than low." This extreme level of conservatism was further demonstrated in the re-calculation of risks (still using conservative USEPA Guidance Documents and assumptions) performed by Geraghty & Miller (G&M, 1992b). Therefore, even if the baseline risk assessment's values are not corrected, carcinogenic risks for the Torch Lake Operable Unit I are below the regulatory level of 1×10^{-4}. Thus, in agreement with current USEPA guidance, it is reasonable to conclude that current conditions at the operable unit are protective of human health (carcinogenic and noncarcinogenic risks) and do not warrant a remedial action, even when using the uncorrected and overly conservative USEPA baseline risk assessment values. The USEPA is asked to concur with the above assessment, or to give supporting information that demonstrates an unacceptable human health risk on the site that required remediation."

RESPONSE: See response to comments 3.3.5(a) and 3.3.5.(d). See response to comments 3.1.1(a) and 3.3.1(b) for environmental risk.

3.3.7(f)
COMMENT:

RA-15: OU I, Page A1-2, Item 2

"It is stated here that backyard soil samples collected by Donohue in 1989 are not part of the scope of the risk assessment. The reader is then referred to Section 1.0 of the report where it is explained that secondary sources of tailings exposure will not be evaluated. The backyard areas, however, have not been impacted by the tailings, and yet contain contaminants of concern that are generally equal to or greater than the levels found in the tailings (Donohue, 1990). Therefore, these backyard samples are not secondary sources of tailing exposure, but are instead a good base to establish adjacent background risk in areas near the tailings.

"The risks as calculated for the tailings and slag materials on the site all fall within the range of risk associated with these unaffected backyard samples. The calculated human health risks posed by the tailings are therefore not greater than what was found in the backyards of some homes on the immediate area. This comparison is extremely important in the establishment of the significant of risk posed by the stampsands and slag materials and the possible effectiveness (or ineffectiveness) of any remedial efforts to significantly reduce overall risk on the site. According to USEPA Guidance, the use of background information is important in establishing and comparing the toxicological and statistical significance of the risks posed by the site (USEPA, 1989b). The USEPA is requested to reassess the significance of the risk on the site given the knowledge of the presence of these natural and anthropogenic background materials."

RESPONSE: The risks from backyard soils are attributable almost exclusively to arsenic and PAHs. The presence of these chemicals in backyard soils does not diminish the risks from exposure to the tailings. In addition, risks from the tailings are attributable to a wider range of chemical substances which are found in higher concentrations in tailings than in residential soils. See response to comment 3.1.1(a) for environmental risk.

3.3.7(g)
COMMENT:

RA-16: OU III, Table 2-2

"This table presents the screening of the chemicals of concern that are also essential nutrients. If the estimated daily intake for the tailings did not exceed the adult Recommended Daily Intake (RDI) for these nutrients, they were eliminated as contaminants of concern. The screening process performed in this table, however, was flawed for the two essential nutrients of chromium and copper. The RDIs (and similar Recommended Dietary Allowances-RDAs) are often given in ranges of values if the quantitative human requirement is uncertain. The screening process used in the RA, however, utilized only the lower values within the suggested range, which breaches the purpose of this screen process: to eliminate essential nutrients as being

chemicals of concern if those nutrient loadings within the site material are clearly not harmful to human health. Listed below are the estimated daily intakes, RDI values are given in the RA, and the appropriate range of Safe and Adequate Daily Dietary Intakes (SADDI) as reported by the Subcommittee of the Tenth Edition of the RADs (RAD Subcommittee 1989) and in pharmaceutical literature (Ivy and Elmer 1986).

Chemical	Maximum Estimated Daily Intake (mg/day)	RDI in RA (mg/day)	Correct RDA/SADDI Range (mg/day)
Chromium	0.0745	0.05	0.05 - 0.2
Copper	1.59	1.5	1.5-3.0

"When comparing the maximum daily intakes from the site to the correct RDA/SADDI range, it is clear that copper and chromium should be eliminated as chemicals of concern. It must be noted that the daily intakes listed above represent estimates of intake using the maximum levels of copper and chromium found anywhere on the tailings and/slag from both OU I and OU III; all other areas will result in less than above-listed estimated intakes of these nutrients. Using these conservative maximum values, the exposure to these two essential nutrient "chemicals of concern" are less than what a consumer can get when taking an over the counter one-a-day vitamin and mineral supplement. The continued use of copper and chromium as a chemical of concern on the site is inappropriate, and any significant risks calculated for these materials in either tailings or slag are obviously flawed. The USEPA is asked to concur with the subject of the RDA/SADDI range being an appropriate screening methodology or to provide an explanation as to why this screening would be invalid."

RESPONSE: See response to comment 3.3.7(a). Using only the lower values of the range of recommended values is the more conservative approach adopted for the risk assessment.

3.3.7(h)
COMMENT:

RA-17: OU III, Page 5-14, Top Paragraph

"The maximum cancer risks for OU III are calculated to be 2×10^{-4} for adults and 1×10^{-5} for children in one location; these risks are due mostly to the presence of arsenic and beryllium. These two minerals are common to the area, however, and occur naturally in the vicinity of the site. In addition, the maximum cancer risks associated with soils in nine backyards that have not been impacted by the site are equal to the site maximum for adults, and are an order of magnitude larger than the site maximum for children. Once these background levels are noted, the range of increased cancer risk on the site (including all of OU I and OU III) clearly falls within an acceptable range.

According to USEPA Risk Guidance, the use of background information is necessary to distinguish site-related contamination from naturally occurring or other non-site related levels of chemicals (USEPA, 1989b). The USEPA is requested to reassess the significance of the cancer risks on the site given the knowledge of the presence of natural and anthropogenic background materials."

RESPONSE: See response to comments 3.3.5(b) and 3.3.7(f).

3.3.7(i)
COMMENT:

RA-18: OU III, Page 5-16, Paragraph 3

"The noncarcinogenic risk results presented here must be reconsidered after eliminating the essential nutrients of copper and chromium as contaminants of concern (see Comment RA-16). The USEPA is asked to reassess the non-carcinogenic risk for the site, or to provide sufficient support for the use of copper as a contaminant of concern on the site."

RESPONSE: See response to comment 3.3.7(g).

3.3.7(j)
COMMENT:

RA-19: OU III, First 4 Bullets

"In the summary of risk calculation uncertainties, it is stated that assumptions made in the risk assessment that are likely to overestimate risk include:

"o Ingestion rates for tailings for all exposed populations.
o Residents are assumed exposed for 70 years
o Contaminants in tailings are assumed fully bioavailable.
o Slope factors are assumed to equal the 95% confidence limit of the best estimate of the slope of the dose-response curve."

"This list, however, is missing some key elements that also significantly contribute to the overestimation of risk on the site. These include:

"o The maximum detected value (or upper 95th confidence limit) for each contaminant concentration is used as the exposure point concentration.

o Inadvertent soil ingestion rates for adults are estimated to range between 1 and 100 mg/day; however, a conservative continuous 100 mg/day rate is assumed in the calculation of risk for all solid media in the risk assessment.

o The overly conservative use of lower-end RDI values to retain copper and chromium as potential contaminants of

concern; the maximum estimated dosages for these essential nutrients in the tailings and slag are actually within appropriate RDA/SADDI ranges, and are below what is commonly available in an over the counter one-a-day vitamin and mineral supplement.

- The calculation and use of ultra-conservative RfD for copper in the absence of an EPA-approved RfD for this essential nutrient.

- The assumption that inhalation of outside soil sources are the same whether or not a receptor is inside or outside of a house or building.

- The assumption that all chromium is in the more toxic (and less common) hexavalent state.

- The assumption that all residents are exposed to site materials 365 days/yr; this assumption does not follow USEPA exposure assumption guidance.

- All background risks are ignored or assumed to be zero, leaving no bias of comparison to determine the significance of the calculated risk values.

"It is important to note that the net affect of the conservative assumptions used in the risk assessment process are multiplicative, not additive (Harris and Burmaster, 1992). For example, if an exposure duration assumption is conservatively estimated to be 20 times greater than the actual duration and the assumption of 100% bioavailability overestimates this trait by a factor of 30, the combination of these two factors alone results in an overestimate of 600 times (20 X 30) the actual risk. The use of multiple conservative assumptions therefore can easily result in the overestimation of actual risk by several orders of magnitude or more. Supporting USEPA guidance on human health and ecological risk assessments 'emphasizes that informed EPA risk assessors and managers need to be completely candid about confidence and uncertainties in describing risks and in explaining regulatory decisions' (USEPA, 1992d). This same risk guidance also states that 'it is essential that presenters not only communicate the results of the assessment by addressing each of the descriptors where appropriate, but they also communicate their confidence that these results portray a reasonable picture of the actual or projected exposures.' The USEPA is asked to acknowledge whether or not the above assumptions add a significant level of conservatism (and thus, quantitative overestimation) to the risk assessment process on this site."

RESPONSE:

1. Using the 95th UCL of the arithmetic mean introduces a degree of conservatism into the calculation, but is not likely to significantly overestimate risk.

2. Soil ingestion rates for all exposed populations are included in the risk assessment list of assumptions likely to lead to an overestimate of risk.

3. Conservative use of the lower end of the range of safe and adequate recommended intakes leads to inclusion of some chemicals (copper) as contaminants of potential concern. If the concentration of the chemical at the exposure point were lower than the RfD, there would be no cause for concern. As stated above, only trivalent chromium is an essential nutrient, and the predominant valence state of the chromium in the tailings is unknown.

4. See the response to comment 3.3.1(b).

5. It is not known whether all the assumptions used for the air pathway modeling overestimate or underestimate risk.

6. The U.S. EPA agrees.

7. This assumption is based on site-specific information provided by the U.S. EPA and is used instead of default values, based on EPA guidance (1989). U.S. EPA agrees that this assumption is conservative.

8. See response to comment 3.3.5(b) and 3.3.7(f).

The risk assessment also lists several other sources of uncertainty which may lead to an underestimate of risk or for which it is unknown whether the uncertainty leads to an underestimate or overestimate of risk. The risk assessment also specifically states that the total risk assessment is more likely to overestimate than underestimate risk.

Again, U.S. EPA looks at a point of departure of 1 in one million (1×10^{-6}) risk. MDNR also considers 1 in one million to be acceptable. Thus, U.S. EPA believes that even if the risk assessment is conservative, it is reasonable. U.S. EPA has stated earlier that the risk from most of the site falls within the range considered generally acceptable.

3.3.8 Ecological Assessment (EA)

The following comments pertain to the Ecological Assessment (also referred to as Environmental Assessment or EA) for Operable Unit I, II, and III (Life Systems, 1992b). Comments are designated as "EA-X" where X represents the comment number. All comments are referenced to location in the document reviewed or general subject.

3.3.8(a)
COMMENT:

EA-1: Page ES-2, Paragraph 2

"It is stated here that the 'residential locations are unlikely to have ecological significance and are likely to be exposed to releases from pollution sources other than tailings, which would complicate evaluation of ecological effects.' It is unclear what is meant by this statement. Some of the tailings areas themselves can be classified as residential areas, and if the residential areas are likely to be exposed to releases from other pollution sources, so are the tailings. Why are the residential areas singled out from the analysis of environmental damage, this precluding a meaningful ecological comparison between the tailings and the immediate surrounding area?"

RESPONSE: The referenced statement addresses the residential areas in urban environments where human activities make the land unsuitable for significant ecological resources, e.g., wildlife and endangered species. Undeveloped areas adjacent to residential neighborhoods in Houghton, Lake Linden and other incorporated areas in the Torch Lake Superfund site are not addressed by this statement.

3.3.8(b)
COMMENT:

EA-2: Page E-5, Paragraph 2

"It is stated here that buried and submerged drums in Torch Lake are a potential source of contaminants. Months prior to the release of the Ecological Assessment, an on-land and underwater drum location, removal, and disposal program was completed. Also, a comprehensive on-land test pit program conducted by USEPA contractors in the year prior to the release of this report revealed no buried drums or other signs of hazardous materials. This statement therefore appears to be invalid. Why were the results from the drum removal and test pit program not reflected in the EA report."

Geraghty & Miller also had the same comment regarding references to drums on page 2-5, Table 2-1 and page 3-1 paragraphs.

RESPONSE: At the time that the EA was conducted, the drum removal had not been conducted or agreed to. The statement was intended to refer to buried and submerged drums in Torch Lake as a potential historical source of contaminants. The U.S. EPA believes that the sentence could be revised to reflect this meaning and for purposes of the record, recognizes the comment as accurate.

3.3.8(c)
COMMENT:

EA-3: Page ES-5, Bottom Paragraph

"The author states here that:

Physical damage to terrestrial plant and animal communities resulted when tailings were dumped at locations throughout the Keweenaw Peninsula. Current use of heavy construction equipment at several OU III locations and development activities continue the action of this physical stress (e.g. substrate compaction, habitat destruction) on a local scale.

"The authors raise the valid point here that any construction activity undertaken can cause environmental change (or 'stress'), including residential use of properties, installation of a swimming beach, construction of a driveway, pouring a foundation for a house, mowing the lawn, etc. Is the USEPA suggesting here that all construction activities be halted in the site area to avoid the disturbance of the surrounding plant and animal community?"

RESPONSE: The USEPA is not suggesting that all construction activities be halted in the site area to avoid the disturbance of plant and animal communities. This comment refers specifically to the disturbance of tailings during uncontrolled removal by construction equipment for use of the material elsewhere. The disturbance caused by this activity does the following:

- Prevents accumulation of surface organic material and establishment of native vegetation.
- Encourages erosion of tailings and emission of fugitive dust.

Thus, operation of construction equipment on tailings deposits continues or accelerates adverse ecological impacts that were caused by the disposal of the tailing piles and reduces the effectiveness of natural remedial processes.

3.3.8(d)
COMMENT:

EA-4: Page ES-8

"The author states here that the tailings present 'relatively hostile conditions for revegetations and invasion by animals. Copper toxicity is a major reason for these conditions.' This statement is unsupported by the data found in the administrative record. To the contrary, a review of the data suggests that copper toxicity appears to play a very minor, if any, role in vegetation success. The USEPA Framework for Ecological Risk Assessment document clearly states that 'because the lack of standard methods for many of these [ecological risk assessment] analyses, professional judgement is an essential component of the evaluation. It is important to clearly explain the rationale for any analysis and assumptions,' (USEPA, 1992c). The USEPA is asked to provide site-specific support to the statement that copper toxicity is a major influence regarding plant and animal occupation of the tailings on this site."

RESPONSE: The basis of the statements referenced by the comment are provided in Section 6.2.2.1, which summarizes the professional judgment of scientists who have conducted studies of plant growth on copper tailings. EPA does not mean by the referenced statements that copper toxicity is the only reason that the tailings represent hostile conditions to the establishment of revegetation and invasion of animals. EPA believes simply that it is one of the more important reasons for the absence of plant and animal communities over large areas of tailings deposits.

3.3.8(e)
COMMENT:

EA-5: Page ES-8, Paragraph 3

"It is stated here that 'extremely high concentrations of lead and arsenic in submerged tailings near Hubbell are likely to enhance copper toxicity, so this area presents the greater risk to aquatic life in Torch Lake.' This statement is misleading in that it suggests that the tailings themselves are the source of this discrete 'hot spot'. Samples from this area have revealed concentrations of lead, arsenic, and copper that are outside of the range of levels found in any of the many OU I tailing samples collected. The source for this hot spot, therefore, can not be the tailings. It is important to note that the location of the Peninsula Copper Industries (PCI) outfall line directly corresponds to the location of the 'hot spot'' found in the sediment, and that this location was subject to several major uncontrolled contaminant releases from the PCI facility. USEPA is asked to provide a clarification here that the tailings are not the logical source for the elevated levels of heavy metals that are found at this location."

RESPONSE: While it is possible that the source of the "hot spot" is discharge or discharges from PCI, it is also possible that the source is from the tailings. The phrase in question here sought to avoid the allocation of blame and merely raised the fact of the existence of high concentrations of metals in the "hot spot."

3.3.8(f)
COMMENT:

EA-6: Page ES-9, Paragraph 1

"The author states here that the 'loss of plant and animal communities and retardation of ecological succession tailings represent the most significant impacts in the terrestrial environment.' Again, it must be noted that any construction activity (e.g., putting in a swimming beach, building a house, mowing the law) results in this type of environmental 'stress.'' Any type of apparent environmental 'stress' caused by change of any kind must therefore be tempered with the realization that many innocuous activities can cause the same type of 'stress' reported here.

"Also, the vast majority of tailings in OU I were placed in lake areas that were not part of terrestrial environment prior to the deposition of the tailings, and therefore the deposition of the tailings created a completely terrestrial environment as opposed to altering a current environment. Deposition of tailings in these areas would therefore result in no loss or displacement of terrestrial plant or animal communities.

"The USEPA is asked to concur with the above assessment that any construction activity caused the aforementioned environmental stress, and that the tailings deposited in Torch Lake did not displace any terrestrial plant or animal communities."

RESPONSE: The U.S. EPA does not concur entirely with the comment. The U.S. EPA agrees that some construction activities unrelated to this Superfund site may cause environmental stress. However, the deposition of tailings in OU I and OU III is considered by the U.S. EPA as an uncontrolled release, not an innocuous activity or construction activity planned and approved by the local community, state and other planning and permitting agencies. Potential impacts associated with construction activities on tailings are identified in the response to comment number 3.3.8(c).

Mining records cited in Section 1.2.2.1 of the Remedial Investigation Report (page 1-2, 4th paragraph) indicate that tailings were deposited on property around Torch Lake. It would be possible to consider that some displacement of terrestrial environment. Further, the altering of the environment by building a park, house or mowing the lawn, which has beneficial use to individuals and/or the community, is a vastly different effect to the environment than the disposal of tons of contaminated tailings that result in the destruction of plant and animal habitat.

3.3.8(g)
COMMENT:

EA-8: Page 3-1, Paragraph 2

"The author states here that the primary sources of contaminants on the site are copper ore tailings and smelter slag. What is the definition of 'primary sources of contaminants' and how was the determination of these two primary sources made?"

RESPONSE: The primary sources of contaminants are the materials which serve as the source of releases of contaminants to the environment at this Superfund site. This determination was made based on information provided in Section 1.2 of the Remedial Investigation Report.

3.3.8(h)
COMMENT:

EA-10: Page 3-6, Paragraph 2

Background surface water samples were collected from Lake Gogebic located in Gogebic and Ontonagan Counties, which received no copper tailings...

Background sediment samples were collected May 21 to 23, 1991 from Lake Gogebic.

"The collection of background sediment or surface samples from a lake that is located over 60 miles away in an area such as the Keweenaw Peninsula that varies in natural mineral content greatly from one discrete location to another is invalid. The natural main tributary for Torch Lake (the Trap Rock River), for example, contributes over two tons of dissolved copper into Torch Lake per year (Warburton, 1986). The USEPA is asked to provide justification as to why this distant lake with fundamentally different characteristics was used as background for these media."

RESPONSE: The U.S. EPA selected Lake Gogebic as the location for collecting background surface water and sediment samples, because this lake has not been impacted by disposed tailings.

3.3.8(i)
COMMENT:

EA-11: Page 3-12, Paragraph 6

To be site related, these chemicals (of concern) must occur at a concentration greater than is characteristic of the same environmental media at nearby locations which are not effected by the site. Most metal detected in site media occur naturally in the vicinity of the site due to their presence in geological material."

"Here the author correctly emphasizes the need for nearby background in this site area to the high presence of metals occurring naturally in the geology of the area. See Comment EA-10 above for the inappropriate selection of Lake Gogebic for sediment and surface water background samples."

RESPONSE: See response to comment number 3.3.8(h).

3.3.8(j)
COMMENT:

EA-12: Page 3-13, Paragraph 6

Historically, Torch Lake benthic communities were significantly impacted by physical destruction resulting from the discharge of tailings into the lake. This activity also contributed historically to elevated suspended solids and reduced light penetrations.

"It is unclear as to why any reference to these historical activities is mentioned other than to note that these activities no longer take place. It should be noted here for completeness

that depositions of the tailings into the lake ceased with the mining operations in the late 1960's, surface runoff and wind distribution of contaminants are not significant contributors to the lake (MDNR, 1987; Rose et al., 1986), and the water clarity has increased significantly on its own since the 1970's (MDNR, 1986). The USEPA is asked to acknowledge this information and to clarify that these historical activities are no longer occurring."

RESPONSE: The U.S. EPA acknowledges that deposition of tailings into the lake ceased in the late 1960s and that water clarity has increased significantly on its own since the 1970s. The bio-assay test conducted by U.S. EPA clearly indicates that severe degradation of benthic communities has resulted from the presence of toxic copper compounds. The contaminated sediment problem was attributed to the historically submerged tailings and the constant release of contaminants from the shoreline tailings.

3.3.8(k)
COMMENT:

EA-14: Page 3-16, Paragraph 2

"The author states here that several authors report that tailings lack suitable levels of organic material and nutrients needed for revegetation and retain water poorly. It is not mentioned here, however, that researchers referenced in the administrative record have had successes in vegetating similar tailing materials. Why were the successes not mentioned? The USEPA should present a balanced point of view on this matter."

RESPONSE: The fact that there have been some efforts to revegetate the tailings piles that have been somewhat successful does not alter the fact that the tailings piles lack nutrients and organic material and retain water poorly. U.S. EPA acknowledges that there have been some successful revegetation efforts.

3.3.8(l)
COMMENT:

EA-15: Page 1-4, Paragraph 4

"The author states here that:

The terrestrial plant communities in the vicinity of the site are important considerations in this assessment for several reasons. They are important ecological resources whose protection must be considered in remedial action decisions regarding cleanup of site contamination. They provide habitats for wildlife. They are the source of propagules which can potentially establish new plant communities on tailings deposits and other areas disturbed by mining operations.

"The designation of the terrestrial plant communities in the vicinity of the site as 'important ecological resources' is confusing. What is the meaning of this designation?

"The vast majority of the tailings in OU I were deposited in the lake, an area that had no terrestrial plant or animal communities initially. Did the USEPA consider that the original deposit of tailings in this area had no such negative impact on the terrestrial community, but rather created land mass?

The author correctly states on Page 8-1 in this same document that the 'extent of adverse impacts of contaminant releases and exposures to terrestrial organisms living in the areas surrounding the tailings is likely to be minimal.' In light of the observations presented above, the USEPA is asked to provide clarification as to why remedial actions are necessary on these tailings based on terrestrial impacts."

RESPONSE: The designation was based on professional judgment. It means that terrestrial plant communities provide habitat for wildlife and are a source of seeds that can potentially establish new plant communities on tailings deposits and other areas disturbed by mining operations. It does not apply to areas represented by tailings deposited in Torch Lake, but to terrestrial plant communities along the edge of Torch Lake and around tailings deposits in OU III.

3.3.8(m)
COMMENT:

EA-16: Page 4-2, Paragraph 4

"The author states here that the bald eagle and gulls may be exposed to contaminants in both surface water and tailings deposits through direct contact by food transfer. Information included in the Administrative Record states that extensive studies of both the bald eagle and gull populations on and near the site have been conducted, and have shown no adverse reproductive effects due to site conditions (USFWS, 1991). Also included in the results from this study are the following observations:

"o The Torch Lake pair of Bald Eagles produced a higher than expected number of young during the study period.

o Copper levels were not elevated in eagle eggs.

o Blood copper concentrations were not elevated in eaglets.

o Of the ten gull study locations referenced in the report, both the Herring Gulls and Ring-Billed Gulls observed in the Torch Lake study area had the <u>highest</u> egg hatching success rate of any locations."

"The USEPA Framework of Ecological Assessment document emphasized the importance of including a 'weight of evidence' discussion

within an EA that includes a discussion of the sufficiency and quality of the data, any corroborative information, and evidence of causality (USEPA, 1992C). Site-specific information on health of the bald eagles and gulls at Torch Lake fail to support the theory that significant exposure to these organisms are occurring. The actual observations of these species of birds in the Torch Lake area should be included in the EA in a clear manner to keep statements of possible exposure to contaminants in the area in proper context."

RESPONSE: The statement that bald eagles and gull populations feed on aquatic species associated with the Torch Lake ecosystem is a conclusion contained in the U.S. Fish and Wildlife Service report cited in the comment. This is the basis of the statement that there is a potential for exposure to contaminants by direct contact with contaminated surface water and sediment and by food chain transfer. The potential for exposure does not alter the accuracy of the studies on eagles. The other results of the study are presented in section 6.2.2.2 of the report.

3.3.8(n)
COMMENT:

EA-17: Pages 4-2, 4-17, and 4-18 (General)

"On these pages, the author presents a summary of the wetlands observations reported in a wetland study conducted by the USEPA (Helmer and Beltman, 1990). It is confusing as to why this summary is presented here, other than to confirm the fact that successful wetland areas have indeed developed over many areas of the tailings. This conclusion, however, is absent in the Ecological Assessment. The fact that successful establishment of wetlands are occurring in the area is lost in the summary, and should be presented with more clarity. What is the USEPA's assessment of the current status of the wetlands in this area, and does the current condition of the wetlands require remedial actions?"

RESPONSE: The U.S. EPA agrees that a summary of Helmer and Beltman's wetlands observations should be provided in the summary. Helmer and Beltman's study provides USEPA's assessment of the current status of wetlands in the Torch Lake area. The wetland investigation indicates that the natural wetland near Lake Linden, Boston Pond and Hubbell were affected by tailings. U.S. EPA does not expect to perform any remedial action at the Lake Linden wetland area because this wetland is located in the island apart from the Lake Linden tailings pile. Any remedial action at and around the Hubbell and Boston Pond wetland areas which are located in the tailings pile would be required to be implemented to enhance and protect the existing wetland areas. Wetland protection regulations are applicable requirements of the selected remedy. No remedial action will be conducted in the wetland areas located in the eastern,. southern, and southeastern portions of the Torch Lake.

3.3.8(o)
COMMENT:

EA-18: Page 4-17

"Statements that certain areas are 'problem area wetlands' here are misleading. The definition of a problem area wetland, which is not included in this report, can include areas that are fully successful man-made wetlands or wetlands on any sandy soil (Helmer and Beltman 1990). In essence, since many or all of the wetlands currently overlying the tailings did not exist in their current form prior to the deposition of the tailings and the tailings are a sandy material, all wetlands that overlay tailings, whether successfully thriving or not, may be defined here so as not to give the reader the impression that a 'problem area wetland' necessarily means that the wetlands are threatened in the area. How is the term defined in its use here?"

RESPONSE: A definition of a "problem area wetland" was provided in the third paragraph on page 4-17. The intent of the definition was similar to that provided by the commenter. The U.S. EPA agrees that the definition on page 4-17 could be clarified.

3.3.8(p)
COMMENT:

EA-19: Page 5-4, Paragraph 1

Ingestion of contaminated food is the primary exposure route of concern for resident eagles. Besides ingestion of contaminated food, dermal contact with and ingestion of tailings and contaminated surface water and inhalation of contaminated dust are like to represent significant exposure routes for gulls because they nest and reside in shoreline areas where tailings are located.

"The source of 'contaminated food' is not presented here, and it is left to the reader's imagination as to what the source of contaminated food is. Please define the source of contaminated food, and reference any study that expresses the extent of this contamination at Torch Lake.

"Also, the manner in which the paragraph is written may lead the reader to believe that these exposures are occurring at levels that are significantly effecting the gulls and eagles. The USEPA Framework of Ecological Assessment document emphasizes the importance of including a weight-of-evidence discussion within an EA that incorporates a discussion of the sufficiency and quality of the data, any corroborative information, and evidence of causality (USEPA, 1992c). As noted above, no studies have indicated that significant exposure is occurring. Statements included in the report regarding potential, hypothetical, or predicated effects on these species should be followed by the results of studies that actually have been completed and that find these bird to be unaffected at the site."

RESPONSE: The contaminated food of gulls and eagles is identified in the first two paragraphs of Section 5.1 on page 5-4. References from which the information was obtained are identified in those paragraphs. U.S. EPA agrees and recognizes that there does not appear to be an adverse reproductive effect on gulls or eagles that can be associated with exposure to copper in tailings.

3.3.8(q)
COMMENT:

EA-20: Page 6-2 and 6-4

Although no specific comparisons have been made between the fish communities of Torch Lake and Portage Lake and similar lakes in the region, it is likely that this community is as well developed as would be the case if tailings had not been introduced throughout the surface waters of the study area.

"This statement is speculation that is not backed by the results of any study known to be conducted in the study area, and is refuted by the observations of the Michigan Department of Natural Resources (MDNR). The MDNR has noted in a number of reports that an abundant fishery existed in Torch Lake even many years prior to the cessation of mining activities (MDNR, 1986), the plants and animals currently found in Torch Lake indicate a lake of very good quality, Torch Lake continues to provide a good fishery (MDNR, 1970; MDNR, 1986), and that the fish sampled in Torch Lake are among the cleanest tested in the state of Michigan (MDNR, 1989; MDNR, 1990). This statement should be revised to reflect these actual site conditions."

RESPONSE: The U.S. EPA agrees that the cited statement is speculative. The U.S. EPA has incorporated the other points made by the commenter in the document, e.g., last paragraph on page 6-4. The U.S. EPA believes that the quality of the fishery is good, but could be better if the habitat alterations caused by the deposition of tailings in Torch Lake had not occurred.

3.3.8(r)
COMMENT:

EA-21: Page 6-15, Paragraph 3

These [bald eagles] terminal avian predators face exposure to potentially high levels of copper and other contaminants in their food supply as a result of bioaccumulation and biomagnification.

"This statement is incorrect; copper is not subject to biomagnification. On Page ES-9 of this very report, the author correctly states that 'Bald eagles and other birds are not likely to be affected by the primary metals of concern at this site since the metals do not biomagnify in their food webs.' This contradiction within the report should be corrected.

"In addition, as stated in Comment EA-19, statements included in the report regarding potential, hypothetical, or predicted effects on these species should be followed by the results of studies that actually have been completed and that find these birds to be unaffected at the site."

"If this hypothetical biomagnification exposure is a justification for the proposed response action, the response should be reevaluated accordingly."

RESPONSE: The U.S. EPA agrees that the sentence cited in the comment could be corrected, and that other similar contradictions should be corrected. The potential for bioaccumulation and biomagnification to cause exposure of terminal avian predators to potentially high levels of copper and other contaminants has not been a justification for proposed response actions.

3.3.8(s)
COMMENT:

EA-22: Page 7-2, Paragraph 5

At least two wetlands occur on tailings deposits. These areas qualify as problem area wetlands (Helmer and Beltman, 1990). Most of the older wetlands along Torch Lake shores are in areas where tailings deposits do not occur.

"The conclusion of the wetland study appears to be inaccurately reported here. A review of the original study revealed that not two, but at least eight of the 12 wetlands areas documented in the report overlie tailings. The definition of an area as a 'problem area wetland' here without giving the appropriate definition of the term is misleading (see Comment EA-18). What is meant by the use of the term "problem area wetland" here, and what are the implications for the proposed remediation?"

RESPONSE: See responses to comments 3.3.8(n) and 3.3.8(o).

3.3.8(t)
COMMENT:

EA-23: Page 7-2, Paragraph 6

Failure of wetlands to develop on tailings appears to be a serious problem...The reasons for failure of wetland vegetation to become established along shoreline areas of Torch Lake have not been investigated, but substance and surface water toxicity are likely to be involved. Ionic copper is likely to be the toxic factor.

"The USEPA's own wetland study as referenced throughout this report documents numerous wetlands that have successfully developed over tailings, and at least eight of the 12 wetlands observed during the wetlands study directly overlie tailings

deposits (Helmer and Beltman, 1990). In contrast to what is reported in the Ecological Assessment, the authors of the original wetlands report state that they find that wetlands were developing over some tailings, and that extensive natural wetlands areas near the southern and southeastern portions of the lake do not appear to be affected by tailings deposits.

"Although wetlands are developing over the tailings, the Environmental Assessment suggests that substrate and surface water toxicity (further suggested to be copper) is a reason behind any lack of wetlands development. This statement is refuted by data collected during the wetlands study, and statements concerning hypothetical copper toxicity to wetlands vegetation at Torch Lake should be supported by the data, or should be qualified as hypothetical.

"The EA should be appropriately revised to reflect the USEPA's wetland study or a discussion of the basis for these comments should be provided."

RESPONSE: The U.S. EPA agrees that the cited sentence should be clarified. The wetlands study completed by Helmer and Beltman did not involve visits to all areas of the Torch Lake Superfund site. It focused on characterizing wetlands that could be identified and not on areas where wetlands did not occur. Since the cited sentence is referring to areas not addressed by Helmer and Beltman's study, the U.S. EPA does not believe that there is a contradiction. The areas addressed by the cited statement have not been studied in detail, and this point needs to be made in clarifying the sentences.

3.3.8(u)
COMMENT:

EA-24: Page 7-4, Paragraph 3

"The author states here that the limited benthic communities in Torch Lake" 'suggests the lake is below its full potential for supporting fish production. Plankton are assumed to provide a food base for a portion of the fish community in Torch and Portage Lakes.'

"This statement should be qualified with the actual results of studies that have shown that plankton/algae production in the lake is good and that the existence of the plants and animals (including the diverse fish population) present in Torch Lake clearly indicate a lake of very good quality (MDNR, 1970; MDNR, 1986; MDNR, 1987). Site specific data show that the fish population in Torch Lake is not significantly impacted by the limited benthic community within the lake."

RESPONSE: The statement makes an assumption to explain the presence of the existing fishery, since data on plankton/algae production in the lake are not available.

3.3.8(v)
COMMENT:

EA-25: Page 8-1, Paragraph 2

Reduction of productivity in fish populations, nutrient cycling and mineralization processes are possible secondary impacts in areas of degraded benthic communities.

This statement should be corroborated by site-specific data to assess the accuracy of this statement as suggested in USEPA Ecological Risk Assessment Guidance (USEPA, 1992c) (see Comment EA-24). The USEPA is asked to provide any site-specific data that supports this statement for Torch Lake."

RESPONSE: The statement addresses possible secondary impacts of degraded benthic communities, since site-specific data on these ecological characteristics are not available for the assessment.

3.3.8(w)
COMMENT:

EA-26: Page 8-1, Paragraph 3

Bald eagles may be adversely affected by direct and indirect exposure to contaminated media at the site, but insufficient information is available for this assessment to determine whether significant adverse effects are occurring in the resident population.

"This statement indicates that the author of the Environmental Assessment did not review all available data for the site. An extensive site specific bald eagle study was completed a full six months prior to the completion of the Environmental Assessment (USFWS 1991), and included the following work:

"o Aerial breeding surveys

o Egg yolk sampling and analysis

o Five months of ground monitoring of nests

o Observations of egg survival

o Identification of food habits

o Identification of foraging areas

o Banding of nestlings

o Three (3) eaglet blood sample collection and analysis events

o One (1) adult bald eagle blood sample collection and analysis event

- o Three (3) eaglet feather sample collection and analysis events"

"Conclusions regarding the above work included the following:

- "o The Torch Lake pair of Bald Eagles produced a higher than expected number of young during the study period.
- o Copper levels were not elevated in eagle eggs.
- o Blood copper concentration was not elevated in eaglets."

"The USEPA Framework for Ecological Assessment document emphasizes the importance of including a 'weight-of-evidence' discussion with an EA that includes a discussion of the sufficiency and quality of the data, any corroborative information, and evidence of causality (USEPA, 1992c). It is incorrect to simply state that there is sufficient information available on bald eagles without referring to the wealth of information that is available in this completed report. The data within this report clearly show that the site has had no significant observable impacts on the eagles. The conclusions regarding bald eagles as reported in the EA should be revised to include the actual findings of the study."

RESPONSE: The U.S. EPA agrees that the cited sentence is inconsistent with information provided elsewhere in the report on the results of the U.S. Fish and Wildlife Service bald eagle study. Section V of the ROD states that "Based on the analytical chemistry results for copper, there does not appear to be an adverse reproductive effect on gulls or eagles that can be associated with exposure to copper in the tailings."

3.3.9 Feasibility Study (FS)

The following comments pertain to the Feasibility Study (FS) for Operable Unit I and III (Donohue, 1992d). Comments are designated as "FS-X" where X represents the comment number. All comments are referenced to location in the document reviewed or general subject.

3.3.9(a)
COMMENT:

FS-1: Page 1-7, Top Paragraph

Arsenic was found in groundwater...at the north end of the lake, suggesting arsenic may be leaching into the ground water.

"Because this item is an OU II issue, it will not be commented on in detail here. From a brief review of the OU II RI, it appears that any arsenic concentrations found in the subject wells are most likely due to influences of the adjacent sewage lagoons or

natural background conditions. There was a wealth of data prepared during the RI process for OU I and OU III that have shown the mobility of all constituents of concern within the stampsands (including arsenic) to be extremely limited (USDI 1991a; USDI 1991b; USBM 1991; Rose et al., 1986). the significance of any contaminant migration from the tailings is lessened by the demonstrated lack of persistence and/or mobility of the organic and inorganic contaminants of concern; the Torch Lake tailings demonstrated little or no leachability during a measurable migration of inorganic compounds into the ground water (Donohue, 1992c). The source of any of these contaminants are therefore most likely from background or outside sources, not the tailings or slag on the site.

"The USEPA is requested to provide clarification as to the probable source(s) of any arsenic in the ground water."

RESPONSE: The nature of the comment is correct in that the source of the arsenic is unknown. It cannot be said definitely that the source is sewage sludge and not the tailings.

3.3.9(b)
COMMENT:

FS-2: Page 1-7, Paragraph 4

An apparent sediment "hot spot" is indicated by inorganic concentrations detected in samples collected at location SD09, offshore from the former Calumet and Hecla Smelter at Hubbell.

"Again, this statement is associated with OU II, but must be addressed at least briefly here. This statement is misleading in that it suggests that the tailing or the smelter are the logical sources of this discrete 'hot spot.' Samples from this area have revealed concentrations of lead, arsenic, and copper that are outside of the range of levels found in all of the OU I tailings samples collected. The source for this hot spot, therefore, is unlikely to be the tailings, but rather another outside source.

It should be noted that the location of the Peninsula Copper Industries (PCI) outfall line directly corresponds to the location of the 'hot spot' found in the sediment, and that this location was subject to several major uncontrolled contaminant releases from the PCI facility. The probable and improbable source(s) of the materials found here should be clarified here."

RESPONSE: See response to comment 3.3.8(e).

3.3.9(c)
COMMENT:

FS-3: Page 1-10, 4th Bullet

"It is stated here that any chemical that is essential to human nutrition for which the estimated maximum daily intake did not

exceed the required daily intake was eliminated. This statement is incorrect. Copper and chromium, two essential nutrients, were not evaluated for OU I and were inappropriately evaluated in OU III (see Comments RA-6 and RA-16). Copper and chromium should have been eliminated as chemicals of concern using this criterion, but were not properly screened. The FS should be revised appropriately and the Proposed Plan accordingly to reflect this significant change."

RESPONSE: See response to comment 3.3.7(a).

3.3.9(d)
COMMENT:

FS-4: Page 1-11, Paragraph 8

"The combined excess cancer risks for OU I are reported here (at a maximum of 1×10^{-4}), but the author does not mention that these cancer risks are within generally acceptable levels to the USEPA as stated in USEPA risk assessment guidance and in Section 300.430(e)(2) of the NCP (USEPA, 1991a; USEPA, 1990). In addition, the unnecessarily conservative assumptions and the failure to consider background risks (including those from adjacent backyard areas) overstate the significance of calculated risks presented here (see Risk Assessment comments for OU I and OU III). The consideration of all appropriate risk factors, including background, is essential in determining the toxicological and statistical significance of the risk at a site (USEPA, 1989b). This evaluation of the significance of risk must occur prior to selecting or evaluating possible remedial alternatives. The USEPA is requested to reconsider the evaluation of alternatives as performed in the FS in light of the background risks that are present on the site."

RESPONSE: U.S. EPA agrees that the combined excess cancer risks for OU I are within EPA's generally acceptable levels. This was mentioned in the Proposed Plan and will be mentioned in the ROD. See response to comments 3.3.7(b),and 3.3.7(f) for background risks.

3.3.9(e)
COMMENT:

FS-5: General, Noncarcinogenic Risks

"Throughout the FS Report, it is repeatedly stated that Hazard Index (HI) greater than one indicates a potential for chronic or subchronic noncarcinogenic health effects. This statement, which is used to provide partial justification to perform remedial action, is invalid for the Torch Lake site. Consistent with USEPA Risk Assessment Guidance (USEPA, 1989b), the USEPA Risk Assessments for both OU I and OU III explain clearly that the HI on this site is a screening tool only, and that because none of the chemicals of concern on the site affect the same target

tissues (organs and organ systems), only individual hazard quotients (HQs) that exceed one carry any potential significance.

"The FS and Proposed Plan should be revised to reflect this information."

RESPONSE: Please note in the footnotes of Tables 1-9 and 1-11 that compounds which are present with Hazard Quotients greater than 1.0 are highlighted. The Hazard Quotient for the slag pile/beach at Hubbell in OU I was estimated at 2.0 due to copper concentration. The Hazard Quotient for tailings in Location 1, 3, 4, 5, 8, and 12 were 4.0 (copper), 3.0 (copper), 2.0 (copper), 5.0 (copper and arsenic), 5.0 (copper), and 2.0 (copper).

3.3.9(f)
COMMENT:

FS-6: Page 1-13, Paragraph 1, 2, and 3

"The combined excess cancer risks for OU III are given here (at a maximum of 2 X 10^{-4}), but the author does not mention that these cancer risks are within generally acceptable levels to the USEPA, and that local backyard samples which were not affected by the site posed similar risks (see Comment RA-7). In addition, the unnecessarily conservative assumption and the nonconsideration of background risks overstate the significance of these calculated risks (see Ecological Assessment comments). USEPA guidance on human health and ecological risk assessments emphasizes that 'informed EPA risk assessors and managers need to be completely candid about confidence and uncertainties in describing risks and in explaining regulatory decisions,' and that [n]umerical risk assessments should always be accompanied by descriptive information carefully selected to ensure an objective and balanced characterization of risk in risk assessment reports and regulatory documents'' (USEPA, 1992d). The consideration of all these factors is essential prior to selecting or evaluating possible remedial alternatives. Why were the pertinent local backyard samples of material not mentioned in either risk assessment?"

RESPONSE: A risk of 2 additional cancer cases in 10,000 people (2 X 10^{-4}) is not within generally acceptable levels. Further, see responses to comments 3.3.7(b) and 3.3.9(d)

3.3.9(g)
COMMENT:

FS-7: Page 1-15, Paragraph 5

"It is stated here that loss of plant and animal communities on the tailings represent the most significant impact to the terrestrial impact. What is not considered, however, is that the vast majority of the tailings in OU I were deposited in Torch Lake, an area that historically had no terrestrial or animal communities. No terrestrial plant or animal communities were lost in these areas. The USEPA is requested to acknowledge that the majority

of the tailings on OU I did not significantly impact the terrestrial plant and animal communities."

RESPONSE: EPA acknowledges that for OU I existing terrestrial environments were not necessarily impacted; however, the new terrestrial landforms created are hostile to the continuance of the development of local flora and fauna. Many of the OU III sites were definitely impacted in a very negative manner regarding existing terrestrial environment. Further, though originally deposited in the lake, and resulting in the filling of approximately 20% of the lake, the disposal of the tailings destroyed the habitat that existed along the shoreline of the original lake and has now created a shoreline that is hostile to plants and animals.

3.3.9(h)
COMMENT:

FS-8: Page 1-15, Paragraph 6

"It is stated here the absence of wetlands in the area is one of the most significant impacts associated with the deposition of tailings into the lake. The USEPA's own wetland study that is referenced throughout the environmental assessment report documents numerous wetlands that have successfully developed over tailings, and at least eight of the 12 wetlands observed during the wetlands study directly overlie tailings deposits (Helmer and Beltman, 1990). In contrast to what is summarized here, the authors of the original wetlands report state that they did not find that wetlands were developing over some tailings deposits, and that extensive natural wetland areas near the southern and southeastern portions of the lake do not appear to be affected by tailings deposits.

"The USEPA is asked to acknowledge that wetlands are indeed developing over the tailings deposits, and is also asked to clarify how any of the remedial alternatives developed in the FS would significantly enhance the development of these wetlands."

RESPONSE: Many wetlands exist in the Torch Lake ecological community that were not recipients of tailings deposits. Naturally, these would remain unaffected. Some wetlands that are within the tailings areas are also adjacent to more natural lake side surroundings where they may receive nutrient enrichment and localized seedstock. The remedial action plan, consist with the Michigan Wetlands Protection Act (Michigan Public Act 203 of 1979), will not infringe upon or harm these wetlands.

3.3.9(i)
COMMENT:

FS-9: Page 1-15, Paragraph 6

"The author states here that the 'benthic community is an integral part of the base of a complex food web in lakes. A severely impacted benthic community would impact the entire food web.' Although this statement may be true in theory, the evidence collected on the site overwhelmingly indicates that the effect of the depleted benthic community in the immediate area is most likely marginal. Results of site-specific studies that have shown that plankton/algae production in the lake is good and the existence of the plants and animals (including the diverse fish population) present in Torch Lake clearly indicate a lake of very good quality (MDNR, 1970; MDNR, 1986; MDNR, 1987). Regardless of any associations between lower and higher life forms within the lake, these site specific data show that the fish population in Torch Lake is apparently not significantly impacted by the limited benthic community within the lake. This statement should be amended to reflect the actual data collected on the site."

RESPONSE: The FS report does reflect actual data about the lake's benthic community which has been severely degraded. A bio-assay test conducted in the sediment samples from Torch Lake indicates that lethal concentrations (LC_{50}s) for copper as the sole contaminant were calculated as 498 parts per million (ppm) with a 95 percent confidence range of 480 ppm to 520 ppm. Most of the sediment samples collected from Torch Lake and Keweenaw Waterway have higher copper concentration levels than LC_{50}s. The result of this sediment bio-assay test indicate that the vast majority of the sediments in Torch Lake are toxic and not able to support a normal benthic community.

3.3.9(j)
COMMENT:

FS-10: Page 1-16, Top Paragraph

"It is suggested here that contaminated surface water and sediment may be contributing to reduction in fish population in the lake. On the subject of surface water, the RI for OU I clearly states that Torch Lake surface water is not directly contaminated with heavy metals from the sediments. Furthermore, numerous studies have noted that an abundant fishery existed in Torch Lake even many years prior to the cessation of mining activities (MDNR, 1986), the plants and animals currently found in Torch Lake indicate a lake of very good quality, Torch Lake continues to provide a good fishery (MDNR, 1970; MDNR, 1986), and that the fish sampled in Torch Lake are amongst the cleanest tested in the state of Michigan (MDNR, 1989; MDNR, 1990). In addition, studies conducted by the U.S. Fish and Wildlife Service (USFWS) for the USEPA have found no significant impact in fish egg hatching success and no surface water toxicity to fish (USFWS, 1990; USEPA, 1991c).

"The USEPA is asked to produce the site data that supports the statement that fish population in Torch Lake have been reduced by surface water and sediment contamination."

RESPONSE: The U.S. Fish and Wildlife Service report cited in the report notes that delays in the hatching of perch eggs in Torch Lake could occur and be influenced by the contaminant concentrations of the sediments. U.S. EPA accepts the MDNR's assessment about the fish tumor problem. U.S. EPA also recognizes that the fish in Torch Lake are healthy. However, one problem that remains is the depletion of benthic communities. A severely impacted benthic community would impact the entire food web and provide below its full potential for supporting fish population. The fact remains that the benthic community is severely impacted with copper concentrations far exceeding the LC_{50} for the majority of samples obtained.

3.3.9(k)
COMMENT:

FS-11: Page 1-16, Paragraph 2

Bald eagles may be adversely affected by direct and indirect exposure to contaminated media at the site, but insufficient information is available for this assessment to determine whether significant adverse effects are occurring in the resident population.

"This is a quote from the Environmental Assessment that was commented on earlier (Comment EA-26)¦, but this comment bears repeating here. It is evident from this statement that the author of this statement did not perform a complete review of all data available. An extensive site specific bald eagle was completed a full six months prior to the completion of the Environmental Assessment (USFWS 1991), and included the following work:

"o Aerial breeding surveys

o Egg yolk sampling and analysis

o Five months of ground monitoring of nests

o Observations of egg survival

o Identification of food habits

o Identification of foraging areas

o Banding of nestlings

o Three (3) eaglet blood sample collection and analysis events

o One (1) adult bald eagle blood sample collection and analysis event

o Three (3) eaglet feather sample collection and analysis events"

"Conclusion regarding the above work included the following:

"o The Torch Lake pair of Bald Eagles produced a higher than expected number of young during the study period.

o Copper levels were not elevated in eagle eggs.

o Blood copper concentration was not elevated in eaglets.

"It is incorrect to simply state that there is insufficient information available on bald eagles without referring to the wealth of information that is available in this completed report. USEPA Framework for Ecological Risk Assessment suggests that all ecological risk conclusions be tempered with any evidence of casualty or site-specific corroborative information (USEPA, 1992c). The data within this report clearly show that the site has had no significant observable impacts on the eagles.

"The USEPA is asked to revise the FS to include this information."

RESPONSE: The summary of the 1990 U.S. Fish and Wildlife Service report states: "Productivity is often used as an indicator of environmental contamination since embryos are usually more sensitive to the effects of contaminants than adults. Study results indicate that the short-term reproductive biology of bald eagles and gulls nesting within the Torch Lake ecosystem appears normal, suggesting copper levels in eggs of these species are below toxic levels. The effects of copper on long-term productivity is unclear. Long-term productivity data (since 1981) on the Portage River eagle nest indicates a poor reproductive history. However, poor productivity in eagles nesting near the Great Lakes has been associated with organochlorine and PCB contamination, making interpretation of the effects of other contaminants such as copper more difficult. U.S. EPA believes that there does not appear to be an adverse reproductive effect on eagles that can be associated with exposure to copper in the tailings.

3.3.9(1)
COMMENT:

FS-12: Page 1-167, Paragraph 3

Plant and animal communities on tailings at the OU I and OU III locations, benthic communities, and shallow water areas devoid of wetland vegetation in Torch Lake are not expected to naturally recover in a reasonable time frame.

"It is true, however that many areas of tailings deposits are in areas that never had established plant or animal communities prior to the deposition of tailings, and the deposition of tailings have created new land masses. The use of the term "recover" for these areas is therefore inappropriate. Furthermore, many shallow water areas are establishing wetlands natural-

ly, and these have been well documented (Helmer and Beltman, 1990). The USEPA is asked to provide the basis for the statement that these areas are not expected to recover in a reasonable time frame, and to also explain how any proposed plan of action would effectively accelerate this process."

RESPONSE: It is correct to state that the term "recover" is relative, however, this term should be used in reference to the development of a natural plant community consistent with the prevailing flora in the area. It is expected that the soil cover and vegetation will enhance the establishment of a more normalized plant and animal population by bringing a better nutrient base, alleviating the hostile physical and chemical environment of the stampsands, and in reducing the shifting and migration of the stampsands, providing a more stable ground base.

3.3.9(m)
COMMENT:

FS-13: Page 1-16, Paragraph 6

"It is stated here that one consideration of the remediation approach is the high public visibility of the site. The USEPA is asked to provide an explanation as to why the public visibility of a site should influence remedial decisions under CERCLA.

"Note that if what is meant here is that public opinion regarding the proposed remedy for the site is expected to be considerable, the general sentiment displayed at the local public meetings for the introduction and discussion of the Proposed Plan was that the public had no interest in excessive remediation or additional publicity on the site."

RESPONSE: The consideration of high public visibility of the Torch Lake site was principally in regard to the high level of interest this site has held at the congressional level, and with the proposed National Historic Park proposed for this site. It was anticipated that this remedial selection may have a bearing on these considerations.

It should be noted that the public meeting held on May 12, 1992, is not the only public comment period, and that substantial opinion in favor of the proposed plan was received (as noted from the compiled comments herein).

3.3.9(n)
COMMENT:

FS-14: Page 1-17, Paragraph 6

"The author of the FS states here that the 'slag piles pose a physical threat because the loose, angular, and/or large material may pose physical hazards to receptors traversing on the slag.' This is not a CERCLA substances issue, nor are there any docu-

mented instances of injury despite the open nature of the site. The USEPA is asked to provide an explanation as to the significance of this 'physical hazard' threat, and the relevance of such a threat as a driving force for making remedial action decisions on a Superfund site."

RESPONSE: The "physical danger" on the slag piles, while not a CERCLA issue, is an ancillary but real thr :t posed by the existence of the slag piles. Whereas there may or may not be records of injuries at these sites, it would be negligent to deny that a very real potential for physical harm at these sites exists. U.S. EPA does not, however, consider physical hazard threats in determining whether an action is warranted at Superfund site.

3.3.9(o)
COMMENT:

FS-15: General, Human Health Risks

"Throughout the document it is suggested that the OU I and OU III tailings and slag exceed acceptable levels (e.g., Page 1-12, 2-2, 2-4, 2-6, 3-3, 4-8, 4-15, 4-28 and others). However, the USEPA has publicly confirmed that the human health risks are within acceptable levels (USEPA, 1992b). Furthermore, on Page 2-2 of the FS it is stated that '[b]ecause the human health risks for OU I and OU III are generally within the acceptable range for compliance with Federal ARARs, No Action is a feasible alternative.'

"In addition, even if a more stringent (e.g., Michigan Act 307 Type C) cancer risk level were assigned to this site, all risks associated with site material were found to be within the background range of risks calculated by USEPA contractors for exposure to backyard surface soils that were not impacted by the site(Donohue, 1992a). USEPA Guidance on Risk Assessment states that an analysis of background is necessary to distinguish site-related levels of chemicals (USEPA, 1989b).

"Why are health effects repeatedly reported as being potentially significant throughout the document when they were determined to be acceptable, and why are human health effects included as remedial objectives for the evaluation of remedial actions when it is clear that the risks are already within acceptable levels?"

RESPONSE: It is true to state that the risk from Torch Lake tailings to human health is generally within the acceptable range of U.S. EPA. However, the cancer risk from Michigan Smelter tailings in OU III and non-cancer risk from tailings in Locations 1, 3, 5, 8 are above the acceptable risk of U.S. EPA. One of goals of this remedial action is to reduce these unacceptable risks to the acceptable.

The health risks associated with backyard soils in the Torch Lake area are not indicative of background conditions. Backyard

soils are affected, in all likelihood, by deposition of hazardous chemicals unrelated to the tailings. To compare the health hazards of the tailings to the "backyard" soils would be analogous to comparing risks at one hazardous site to another potentially hazardous site. The contaminants found in the residential soils higher than in the tailings are mostly PAH compounds. These PAH compounds are not considered as contaminants significantly contributing to the resultant risk. Inorganic compounds such as arsenic, copper and antimony are the kind of compounds that drive most of these unacceptable risks. These inorganic compounds were found in the tailings and slag at much higher levels than in residential soil or background soil. (See Table 1 in the ROD.) Therefore, it is not true to state that "all risks associated with site material were found to be within the background range of risks calculated by EPA contractors for exposure to backyard surface soils that were not impacted by the site."

Michigan's Environmental Response Act (1982 PA 307), as amended, is an ARAR at the Torch Lake Superfund site. Act 307 requires cleanups protective of human health and the environment. Act 307 provides for three types of cleanup: type A, type B, and type C. In terms of human health, compliance with type A criteria shall be attained when the concentration of hazardous substances does not exceed background levels or method detection limits and compliance with type B criteria shall be attained when the concentration of a hazardous substance does not exceed a calculated level which would represent an increased cancer, or non-cancer, risk no greater than 1 in one million (1×10^{-6}).

A type C remedial action is site-specific. Basically a type C remedy involves containment of hazardous substances and elimination or minimization of potential exposure pathways, both in terms of human health and the environment. All remedial action must be protective of human health, safety and welfare, the environment, and natural resources, including potential migration of contaminants to groundwater and surface water. The selected remedial action at this site constitutes an interim response action under Act 307, as groundwater and surface water (Operable Unit II) are not being addressed by this Record of Decision.

3.3.9(p)
COMMENT:

FS-16: Page 2-6, Paragraph 3

"It is stated here that because of the large area of the tailings, fencing is impractical. What is the basis for this impracticality? If fencing of the tailings is impractical due to cost and implementation considerations, how can a soil cover and vegetation be considered practical or cost effective for this site when this action is far more costly and difficult to implement than fencing?"

RESPONSE: The impracticality of fencing stems from the likely feasibility of keeping people off the site (people do want access to the lake and open areas) and in that fencing will not stop redistribution of the tailings or stampsands by wind, thereby not eliminating the exposure pathway.

3.3.9(q)
COMMENT:

FS-17: General, Wind and Water Erosion

"Throughout the document, it is suggested that wind and water transport of the tailings present a significant threat to the environment (e.g., Page 1-9, 1-17, 2-4, 2-6, 2-8, 2-9, 3-3, 4-9, 4-28, etc.) However, studies have been performed by Michigan Technological University researchers on the significance of wind blown tailings on potential environmental impacts to the lake (Rose et al., 1986). These studies included the sampling of wind borne stamp sand dusts on a very windy day. It was estimated that the concentrations of airborne particles collected during this study were maximum values, and probably exceeded concentrations of typical dust clouds in the area by at least an order of magnitude. The studies concluded that the airborne transport of heavy metals to the lake is volumetrically insignificant, and that the dust clouds have become less of a problem each year due to the natural revegetation of the stamp sands (Rose et al., 1986; MDNR, 1987). Furthermore, the MDNR has concluded that the '[r]unoff from tailings is probably of even less significance than wind borne tailings. The coarse nature of the remaining tailings allows for rapid infiltration of groundwater and the tailings are gradually becoming revegetated' (MDNR, 1987). It can be concluded from these data (the only data on the significance of transport of tailings to the lake that are located in the administrative record) that the tailings do not present a significant threat to the environment through either wind or water erosion.

"The assumption that wind and water erosion represent a significant threat to the environment is the critical factor in the selection of a remedial action. The USEPA is asked to consider the existing data within the administrative record that shows no significant impact from these pathways. What defensible data is the USEPA relying on to support the critical assumption that wind and water erosion from the tailings are significant sources of tailings transport?"

RESPONSE: See response to comment 3.3.10(k). (Also, one of the risks cited in this study, as mentioned in this comment, that wind and erosion are not a major threats, is due to <u>re-vegetation</u> of the tailing piles, a process that the remedial action will accelerate.)

3.3.9(r)
COMMENT:

FS-18: Page 2-8, Top Paragraph

"It is stated here that '[v]egetation reduces erosion, either from rain or wind actions, and provides aesthetic value.' Researchers have concluded that wind and rain erosion are insignificant contributors to the lake (see Comment FS-20 above). In addition, the CERCLA program is set up to evaluate sites on the basis of the protection of human health and the environment, and is not the proper vehicle to use when wanting to solely improve the aesthetics of a site. The cost of this aesthetic improvement is estimated at $7.2 million. Please provide references in the law or the NCP which support such an expenditure regarding aesthetics."

RESPONSE: See response to comment 3.3.10(k). U.S. EPA did not use the aesthetic value as a sole vehicle to select the remedy. Rather, the aesthetic value is secondary result provided by the selected remedy.

3.3.9(s)
COMMENT:

FS-19: Page 2-9, Paragraph 3 and 4
"The arguments presented here that attempt to differentiate between the Quincy slag and the Hubbell slag are not well supported. The slag pile and slag beach at Hubbell will most certainly have to undergo extensive regrading preparation prior to covering. Furthermore, the large grain size of the material (particularly the slag pile) will most certainly allow any cap material to eventually flow into the intergranular spaces between the slag particles. This will eliminate the vegetation and soils cover and render the remedy ineffective as proposed. The USEPA is required to reexamine the Hubbell slag more thoroughly as to the implementability and cost issues regarding the soil cover on this material."

RESPONSE: The commenter is assuming that the soil cover over the slag materials will necessarily and completely "flow" into the pore spaces of the slag. This is true on a limited basis. U.S. EPA expects that the majority of a cover can and will be sustained and viable for maintaining a plant community. During the design, U.S. EPA will consider this commenter's concern.

3.3.9(t)
COMMENT:

FS-20: Page 4-7, Bottom Paragraph

The reproduction of Yellow Perch has been hampered by the continuous release of contaminants into Torch Lake.

"This statement is incorrect and is refuted by all of the known data collected throughout the RI process. The USEPA is requested to provide the basis for the above statement."

RESPONSE: The basis for this statement is in the 1990 U.S. Fish and Wildlife Service report on perch reproduction in Torch Lake.

3.3.9(u)
COMMENT:

FS-21: Page 4-7, Bottom Paragraph

Bald eagle nests have been identified at Torch Lake that may be threatened.

"This statement in this form is very misleading to a reader who has not taken the opportunity to review the administrative record. See Comment FS-11 above."

RESPONSE: See response to comment 3.3.9(k).

3.3.9(v)
COMMENT:

FS-22: Page 4-8, Bottom Paragraph

"For the evaluation of the No Action alternative, it is stated here that '[u]nder a no action scenario, all the risks to human health will continue to remain at current levels. RAOs [Remedial Action Objectives], therefore, will not be met by this alternative.' This statement is incorrect. The USEPA has publicly confirmed that the human health risks posed by the site are within acceptable levels (USEPA, 1992b). Furthermore, on Page 2-2 of the FS it is stated that '[b]ecause the human health risks for OU I and OU II are generally within the acceptable range for compliance with Federal ARARs, No Action is a feasible alternative.' It is therefore improper to state that the RAOs of the site will not be met by the No Action Alternative. [T]he USEPA is asked to identify the specific RAO which will not be satisfied by the No Action Alternative."

RESPONSE: Under the "No Action" alternative for this proposed remedial action, the destruction of the shoreline and habitat by the tailing would not be remedied. Further, the exposure pathway of human population to contaminants, regardless of the risk levels, would not be eliminated. Risk levels in the range of 1 cancer case in one million people (1×10^{-6}) to 1 case in 10,000 (1×10^{-4}) are within a range in which the EPA has the legal option of declaring a remedial action or not, depending on other site-specific circumstances, particularly the effect of the release on the environment. See response to comment 3.3.10 (k) for the 1 in one million (1×10^{-6}) point of departure.

3.3.9(w)
COMMENT:

FS-23: Page 4-8, Bottom Paragraph

The soil cover will significantly reduce the potential for direct inhalation and ingestion of the contaminants. This will reduce both cancer and non-cancer risks substantially below existing levels.

"This statement is misleading for two reasons. First, it has already been established that the direct inhalation and ingestion risks posed by site contaminants are already within acceptable levels (see Comment FS-15). Second, analysis of backyard soils in the area have revealed that the risks to residents in their own backyards that are not effected by the site materials present the same cancer risks as those posed by the site related materials (see Comment RA-7). The soil cover, therefore, would not be effective in significantly reducing the overall risk in the site area, and the implementation of the cover will pose additional short-term transportation risks in excess of those currently associated with the site. The USEPA is asked to consider the background backyard risks in establishing the significance of the site risks and the effectiveness of any proposed alternative to reduce overall risks."

RESPONSE: See response to comment 3.3.9 (o).

3.3.9(x)
COMMENT:

FS-24: Page 4-8, Bottom Paragraph

The soil cover will reduce future erosion of the tailings into the lake...Vegetation will preserve the soil cover which would eliminate the potential for future wind dispersion of contaminants into the lake and other sensitive areas.

"Researchers have established that these hypothetical erosion problems that the soil cover with vegetation are designed to correct do not exist on the site (MDNR, 1987; Rose et al., 1986) (see Comment FS-20). The USEPA is asked to provided defensible data that supports the hypotheses that continued erosion of the tailings is significantly impacting the terrestrial or aquatic environment."

RESPONSE: Observations of persistent and massive dust clouds generated from the tailings and erosion gullies and fans on the tailings are absolute evidence that erosion occurs from these tailings. The commenter is also likely aware of contaminant loading, a phenomenon that occurs over a period of time, not just during one moment or event in time. Accordingly, contaminant redistribution may cause a progressive recontamination of lake sediments and/or soils.

3.3.10 Proposed Plan (PP)

The following comments pertain to the Proposed Plan (PP) for Operable Unit I and III (USEPA, 1992a). Comments are designated

as "PP-X" where X represents the comment number. All comments are referred to location in the document reviewed or general subject.

3.3.10(a)
COMMENT:

PP-1: Page 4, Bottom Paragraph

"It should be mentioned here for completeness that backyard soils in the area that were not impacted by the site materials tended to have organic PAH concentrations an order of magnitude higher than that of the site materials (Donohue, 1990). The source of PAHs throughout the area most likely stems from the wood burning practices to heat homes in the area (G&M, 1992b; Donohue, 1992a), and not the mining industry."

RESPONSE: Section V of the ROD mentions that soil samples collected from the residential backyards contain higher organic PAH concentrations than samples from the tailings.

3.3.10(b)
COMMENT:

PP-2: Page 5, Paragraph 4

The conclusions drawn from these studies are that the absence of wetlands in shallow areas was caused by the piles of tailings and that the severely damaged ecosystem at the bottom of the lake is a result of contaminated sediments. Contaminants in the lake water may be affecting fish reproduction and population.

"Several issues raised here are misleading and require clarification. There are no known conclusions presented in the administrative record, including the wetlands study conducted by the USEPA, that indicates that there is a serious existing wetland problem associated with the tailings. Indeed, there are wetlands developing over some of the tailings that were deposited, and many of these wetlands may be created wetland areas that did not exist prior to the deposition of tailings. As far as the effect of the tailings on existing wetlands, the wetland study conducted by the USEPA only mentions that restoration or enhancement of these areas will be necessary if dredging or filling of wetland areas greater than 5 acres occurs here during the implementation of a remedial action (Helmer and Beltman, 1990). What does the USEPA see as the significant relevant relationship between the tailings and wetlands, and what is suggested to remedy the situation if it exists?

"The 'severely damaged ecosystem at the bottom of the lake' is apparently limited to the benthic community based on a number of site specific studies that are located in the administrative record, and the surface water is not toxic to fish (MDNR, 1970; MDNR, 1986; MDNR, 1987; MDNR, 1989; MDNR, 1990; USFWS, 1990). This statement should be qualified with the actual results of

studies that have shown that plankton/algae production in the lake is good and that the existence of the plants and animals (including the diverse fish population) present in Torch Lake clearly indicate a lake of very good quality (MDNR, 1970; MDNR, 1986; MDNR, 1987). The USEPA is asked to clarify and support exactly how any contaminants in Torch Lake water are adversely affecting the fish within the lake.

"In addition, research has shown that the tailings are not a continuing source of contaminant loading to the sediments (Rose et al., 1986; MDNR, 1987)(See Comment FS-17). The USEPA is asked to reconsider the appropriateness of their preferred remedy for the site based on this information, or to provide the data that supports the theory that the tailings are a significant continuing source of loading to the sediments."

RESPONSE: See response to comments 3.3.8(t), 3.3.8(v), and 3.3.9(q). See response to comment 3.3.8(n) for wetlands. See response to comment 3.3.10(k) for environmental risk.

3.3.10(c)
COMMENT:

PP-3: Page 5, Bottom Paragraph

"The author states here that:

If the [cancer] risk is less than one additional cancer case in 1 million, action is generally not required unless there is also environmental risk.

"The current USEPA risk guidance actually states that for sites where the cumulative site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 1 X 10^{-4} [one in 10,000], action generally is not warranted (USEPA, 1990a). This should be clarified here."

RESPONSE: The Proposed Plan stated in the bottom paragraph of page 5 that "When the cancer risk is between one additional cancer case in 10,000 people and 1 million people, action may be necessary depending on such site-specific factors as location and environmental impact." The sentence cited by this commenter meant that U.S. EPA can take remedial action based on environmental risk even though there is no human health risk.

See Response 3.1.1(a) for U.S. EPA's policy of baseline risk in remedy selection.

3.3.10(d)
COMMENT:

PP-4: Page 6, Paragraph 6

A subchronic hazard index of more than 1.0 exists for children currently living near the slag pile/beach in Hubbell. This

health risk is posed primarily by copper, which, although a beneficial nutrients at low doses, can cause nausea, vomiting, and diarrhea when ingested at higher doses.

"This statement contain misleading and erroneous information. First, both the OU I and OU III Risk Assessments state that the hazard index is not a valid indicator of noncarcinogenic risk significance on this site, only the individual chemical hazard quotients may be considered significant (see Comment FS-6). Second, copper is available in only small doses at the site, and even at the slag beach/slag areas are within the estimated Safe and Adequate Daily Dietary Intake (SADDI) for this essential nutrient (see Comment RA-16). The listing of individual adverse health effects for copper here will most likely mislead the reader by inferring that these health-threatening levels actually are present on the site when in fact the estimated dosages received by the tailings and slag are less than the dosage contained within an over the counter one-a-day vitamin and mineral supplement. The USEPA is asked to change this statement (and the assertion that harmful levels of copper exist at the site) on the basis of this new information."

RESPONSE: See responses to comments 3.3.9(e) and 3.3.7(g).

3.3.10(e)
COMMENT:

PP-5: Page 6, Paragraph 6

Rain water or winds carry tailings into the surface water or sediments.

"Researchers have established that there is not significant transfer to the lake via air or surface runoff (Rose et al., 1986; MDNR, 1987)(see Comment FS-17). The USEPA is asked to provide any data that show that there is a significant human health or environmental impact from rain water or wind erosion of the tailings."

RESPONSE: See responses to comments 3.3.9(q) and 3.3.10(k).

3.3.10(f)
COMMENT:

PP-6: Page 6, Paragraph 6

As discussed earlier, sediment contamination has had an adverse effect on the lake bottom ecosystem and may be affecting fish reproduction and population.

"The speculative statements given here regarding the effect of fish reproduction and population is contradicted by site-specific evidence. The USEPA is asked to provide the data that show the validity of this statement."

RESPONSE: See response to comments 3.3.8(v).

3.3.10(g)
COMMENT:

PP-7: Page 6, Paragraph 6

The tailings piles have destroyed natural habitats, such as wetlands, along the shore of and in Torch Lake and other area lakes, which in turn has resulted in a loss of migratory and resident animal populations.

"The USEPA studies have failed to show a significant loss in wetland in the area, and none of the studies in the administrative record have ever indicated that there has been a loss of migratory and resident animal populations. The USEPA is requested to produce the data to validate this statement in the Proposed Plan."

RESPONSE: See response to comments 3.3.8(t).

3.3.10(h)
COMMENT:

PP-8: Page 6, Paragraph 6

The remedial investigation for OU II indicates that arsenic from OU I tailings may leach into the ground water.

"It is unclear as to how this conclusion could be drawn after reviewing the evidence presented in the RI for OU II and the wealth of additional data available in the administrative record. The source of any arsenic in the ground water is unknown, and very well could be from natural arsenic deposits in the underlying aquifers or the wastewater treatment lagoons that are adjacent to most of the monitoring wells. Numerous leaching studies have demonstrated that the metals within the tailings are extremely immobile, and the RI for OU III states that the studies performed to detect migration of inorganic compounds from tailings materials through the soils and to the ground water system 'failed to detect measurable migration of inorganic compounds' (Donohue, 1992c). What, therefore, is the USEPA's basis for making the above statement?"

RESPONSE: See response to comment 3.3.9(a).

3.3.10(i)
COMMENT:

PP-9: Page 6, Paragraph 6

In short, the tailings on the waters edge continue to degrade the environment and are a continuing source of contamination to water bodies.

"This statement has been demonstrated to be false by the data collected by numerous researchers (see Comments PP-5 through PP-8), and the USEPA is asked to either provide supporting data or remove this statement form the Proposed Plan."

RESPONSE: See response to comment 3.3.10(k).

3.3.10(j)
COMMENT:

PP-10: Page 7, Paragraph 3

"It is stated here that a subchronic hazard index of more than 1.0 was calculated for many locations in area 3. As stated in Comment PP-4, it is stated in both the OU I and OU III Risk Assessments that the hazard index is not an appropriate indicator of potential noncarcinogenic risk significance on this site; only the hazard quotients associated with individual chemicals will indicate a potential risk. The segregation of hazard indices into associated hazard quotients on this site is consistent with USEPA risk guidance (USEPA, 1989b). The repeated referenced to exceedences of hazard indices in this document is misleading and should be clarified."

RESPONSE: See response to comment 3.3.9(e).

3.3.10(k)
COMMENT:

PP-11: Page 7, Bottom

U.S. EPA's primary goal related to the OU I and OU III tailings is to protect people from breathing and/or ingesting contaminated dust particles and/or tailings, and to minimize these contaminants (primarily metals and PAHs) from affecting the environment, including lake bottom ecosystems, wetlands, fish and bird populations, the groundwater, and the surface water and sediments in the lake.

"All of these goals are currently being met on the site under the No Action scenario:

"(1) The levels of human health risk at the site are within acceptable levels as specified in USEPA guidance (USEPA, 1991a) and the NCP, and this has been confirmed publicly by the USEPA (USEPA, 1992b). In addition, the levels of cancer risk on the site are within levels found in backyard areas that are not affected by the site. Remedial action is therefore not warranted on the basis of protection of human health.

(2) The continuing contribution of the tailings to the lake (and therefore to the surface water, sediments, lake bottom ecosystem, fish, and wetlands) has been found to be 'volumetrically insignificant' by the air pathway (Rose et

al., 1986), and is even less significant through the surface water runoff pathway (MDNR, 1987). There is, therefore, no significant continuous impact of the tailings on these aquatic systems.

(3) Studies of the bald eagle, ring-billed gull, and herring gull populations at Torch Lake have shown no adverse affects of the site on any of these species (USFWS, 1991).

(4) Numerous ground-water leaching studies conducted on the tailings around Torch Lake have demonstrated that the tailings are very difficult to leach (USDI, 1991a; USDI, 1991b; USBM, 1991; Rose et al., 1986) and studies of the ground water from the tailings into the ground water failed to detect any measurable migration of inorganic contaminants of concern from the tailings into the ground water (Donohue, 1992c)."

"If the USEPA has defensible data to the contrary, it should be provided. If no such data is available, the proposed plan should be revised."

RESPONSE: (1) The cancer risk due to the inhalation and ingestion of tailings by future adult residents at the Michigan Smelter (Location 5 of OU III) was estimated as 2 additional cases in 10,000 people (2×10^{-4}). The Hazard Quotient (non-cancer risk) of the Hubbell slag pile/beach, Locations 1, 3, 5, and 8 was estimated as 4.0, 4.0, 3.0, 5.0, and 5.0, respectively, primarily due to copper and/or arsenic. These risks are considered as unacceptable by U.S. EPA's risk policy. The selected remedy will protect human health from these unacceptable risks. In addition, although U.S. EPA generally considers the 1 in 10,000 to 1 in one million risk range in determining whether an action needs to be taken, once it is determined that action is appropriate U.S. EPA considers 1 in one million to be its point of departure in determining whether the remedy will be protective. U.S. EPA has selected 1 in one million as its protective cleanup level at numerous Superfund sites across the country.
(2) U.S. EPA believes that tailings on the shore of Torch Lake, Keweenaw Waterway and other lakes continually release contaminants to the water bodies. The release mechanisms include air migration, surface water runoff, erosion and groundwater leaching. Studies from the Upper Peninsula Resource Conservation and Development Project indicate that "Between 18 to 20 tons of the material is eroding annually from the sands and is deposited inland and in the water." It is easy to witness the generation of a huge dust storm from the tailings.

(3) U.S. EPA agrees that studies of the bald eagle, ring-billed gull, and herring gull populations at Torch Lake have shown no adverse affects of the site on any of these species.

(4) The results of the TCLP tests conducted by the MDNR indicate that the levels of cadmium, copper, and lead detected in

leachate of tailings were above the background level. Arsenic (25.2 µg/l), chromium (119 µg/l), copper (6,150 µg/l), and lead (30 µg/l) were detected in the monitoring wells located in OU I tailings. Arsenic, chromium, and lead were not detected in the background wells. Copper (48.4 µg/l) was detected in the background groundwater. For the surface water, arsenic (5.7 µg/l), copper (73.8 µg/l), and lead (41.1 µg/l) were detected, all of which are above the background level. The contaminant levels of arsenic, copper, lead, and mercury found in Torch Lake are above human health and aquatic life protection criteria under the Clean Water Act. The results of these groundwater and surface water analyses indicate that the contaminants from the tailings are migrating into the groundwater and the lakes.

3.3.10(l)
COMMENT:

PP-12: Page 8, Paragraph 5

"It is stated here that Alternative T2, the USEPA's Preferred Remedy, would 'reduce contaminants leaching to the groundwater.' This statement is incorrect and is not supported by the data. First, no studies have shown that there is a tailings leaching problem that can or should be remedied. Second, in the unlikely event that there was a leaching problem on the site, the USEPA's FS states on page 4-13 that Alternative T2 "cannot prevent future contamination of the ground water." In addition, the application of a similar cover on other tailings sites has shown no significant effect in controlling net drainage volume, and the application of a cover on this site (Dickinson, 1992). The USEPA is asked to explain the basis for this claim made in the Proposed Plan."

RESPONSE: See response to comment 3.3.10(k) for groundwater leaching. U.S. EPA agrees that the selected remedy would not significantly control the net drainage volume. The soil cover with vegetation, however, may reduce the infiltration rate of rainfall by diverting its flow.

3.3.10(m)
COMMENT:

PP-13: Page 8, Last Paragraph

"It is unclear as to why Location 8 is not considered for remediation, and many others were retained. The USEPA is asked to provide the rationale used in the selection of which areas to remediate, and which areas not to remediate."

RESPONSE: The proposed plan has excluded the slag/tailing pile at Location 8 of OU III because of the nature of the material and recent commercial activity. However, based on further assessment, it is determined that the slag/tailing pile is located outside of the commercial area and should be addressed under this ROD. Several homes are located around this

slag/tailing pile and the non-cancer risk was considered as unacceptable (the Hazard Quotient was estimated at 5.0 for copper). Partial regrading would be necessary to implement soil cover with vegetation.

3.3.10(n)
COMMENT:

PP-14: Page 9, Last Paragraph

"As stated earlier during comments for the FS, the arguments presented here that attempt to differentiate between the Quincy slag and the Hubbell slag are not adequately supported. The slag pile and slag beach at Hubbell will most certainly have to undergo extensive regrading preparation prior to covering. Furthermore, the large grain size of the material (particularly the slag pile) will most certainly allow any cap material to eventually flow into the intergranular spaces between the slag particles. This will render ineffective the vegetation and soil cover as proposed. The USEPA is requested to reexamine the Hubbell slag more thoroughly relative to the implementability of any soil cover on this material."

RESPONSE: See response to comment 3.3.9(s).

3.3.10(o)
COMMENT:

PP-15: Page 11, Item 1

"It is stated here that the No Action alternatives 'do not reduce the cancer or non-cancer risks, do not prevent contaminants from being transported by wind or water, and do not prevent ecological harm to the lake.' This statement is misleading; it has been confirmed that the cancer and non-cancer risks are already within both the USEPA's acceptable range (USEPA, 1992b) and the range of backyard background risks on the site (Donohue, 1992a), and significant transport of contaminants by wind and water is not occurring (Rose et al., 1986; MDNR, 1987). Simply stated, because this transfer is not occurring, there is no ongoing ecological harm to the lake occurring that one can prevent. The USEPA is asked to confirm that the site human health risks fall within an acceptable range, and to provide defensible data to support the claim that significant amounts of contaminants are being transferred by wind and water."

RESPONSE: See response comment to 3.3.10(k).

3.3.10(p)
COMMENT:

PP-16: Page 11, Item 3

"It is stated here that the No Action alternatives are 'not effective, because the existing risk remains.' Long-term risks

are currently at acceptable levels (USEPA, 1992b) and are within background risk ranges (Donohue, 1992a), however, thus minimizing the significance of remaining risks. In addition, the short-term risks posed by the implementation of the remedy may indeed outweigh the risks currently posed by the site (see Comment PP-17 below). The USEPA is requested to clarify as to why the human health risks for the site that were deemed to be within an acceptable range are driving remedy selection."

RESPONSE: See response to comment 3.3.10(k).

3.3.10(q)
COMMENT:

PP-17: Page 11, Item 4

"The USEPA states here that implementation of their preferred alternatives will pose 'minor adverse effects' to workers and nearby residents from dust. This is most likely a serious underestimation of the amount of nuisance dust that will be generated during the implementation of the soil cover remedies. It is estimated from the Feasibility Study (Donohue, 1992d) that in excess of 452,000 cubic yards of soil will be necessary to cover the sands under the USEPA's Preferred Alternatives. This amounts to over 30,000 truckloads of soil, which will substantially impact local traffic and commerce, cause damage to local roadways, create excessive dust redistribution, and pose transportation risks in excess of the human health risks associated with the site. The USEPA is requested to reconsider the short term impacts of this alternative based on this information."

RESPONSE: The short-term impacts of the proposed remedial action was one of the nine criteria used in evaluating the options. Although there will undoubtedly be increased traffic in the area during remedial action, U.S. EPA does not consider this impact to outweigh the benefit of revegetating the tailings. U.S. EPA will work with the community to determine the most appropriate truck routes and frequency and will comply with all local and State transportation rules.

3.3.10(r)
COMMENT:

PP-18: General Effectiveness of Soil Cover

"An independent review of the Proposed Plan and other supporting documentation by an outside expert with over 30 years of experience in the reclamation and vegetative stabilization of mineral wastes has detailed a number of questions regarding the necessity, implementability, and effectiveness of a soil cover on this site (Dickinson, 1992)(see Sam Dickinson's comments). Comments raised during this review included the following:

"o Plant roots that are confined to the soil layer as planned in the FS will be at great risk of total destruction in the event of a fire, drought, and other environmental issues;

o The use of soil may alter the present stable state of the tailings and cause the tailings to leach into the groundwater;

o The use of soil on similar sites failed to significantly impact the effectiveness of the vegetative cover;

o The use of vegetation did little to control net drainage volume (and mass of heavy metals lost) on similar sites.

"The expert concluded by saying that 'Alternative T2 and S3 [the USEPA Proposed Alternative] cannot be justified based on predictable results.'

"The evidence presented in the administrative record demonstrates that no action is justified in OU I and OU III under CERCLA. If some action is chosen for this site based on aesthetic improvements or dust control, it is evident that a soil amendment is neither necessary nor effective."

RESPONSE: The U.S. Soil Conservation Service has conducted a preliminary assessment to determine the effectiveness of soil cover with vegetation at the site. The assessment included the review of historical vegetation data from Michigan Technical University, site soil survey, vegetation data from other areas, and laboratory studies. The SCS has concluded that soil cover with vegetation will be effective at the Site with a proper maintenance program. Currently, the SCS is conducting a Treatability Study to determine the scope of remedial action such as the effective type and thickness of soil, the type of vegetation, and scope of maintenance program. Therefore, U.S. EPA is confident that soil cover with vegetation would be effective at this site. U.S. EPA will consider the above comments during the remedial design in order to design the most effective plan.

3.3.10(s)
COMMENT:

PP-19: Page 12, Paragraph 4

"The USEPA states here that their Preferred Remedy was chosen...

...based on the cancer risk to current and future residents from inhaling and ingesting tailings, the non-cancer risk from some of the tailings that exceed health standards, the adverse environmental impact of the tailings on Torch Lake and other water bodies, and the location of these contaminants within a Great Lakes 'Area of Concern.' In addition, the plan provides that best balance of the 9 evaluation criteria.

"(1) The cancer risk for humans is within the range considered acceptable by the USEPA, and is within the range of that found in area backyards not affected by the site. Why was cancer risk of an acceptable level cited as a reason for remediation?

(2) The vast majority of the non-cancer risks have been solely attributed to copper, and these risks have been shown to be calculated incorrectly. The estimated copper dosages received from even highest concentrations of slag and tailings on the site are still within the Recommended Daily Allowances for this essential nutrient. Why are non-carcinogenic risks being used to drive the remedy?

(3) Studies have shown that the loadings into Torch Lake from air and surface runoff of the stampsands are volumetrically insignificant (Rose et al., 1986; MDNR, 1987). Why are the protection of these waters used as a reason to take action on the tailings when the tailings are not a significant source?

(4) The location of these contaminants within the Great Lake Area of Concern should have no bearing on the decision to use or not use superfund monies to maintain the adequate protection of human health and the environment on this site. The reason the area was designated as an Area of Concern was due to the fish advisory posted for Torch Lake (MDNR, 1987), and the basis of this fish advisory no longer exists (see Appendix B). Why is the fact that the site is within a Great Lakes Area of Concern a driving force for the selection of the CERCLA remedy, and what provisions in the law or the NCP allow for consideration of the subjective environmental priority? An expenditure of limited funds to no avail will not advance the goal of protecting or improving the general quality of the Great Lakes.

(5) After a more thorough analysis of the data is performed, it is evident that the USEPA's preferred remedy provides a very poor balance of the 9 criteria, provides little or no benefit over No Action, is not cost effective, and is therefore not compliant with the NCP. The Evaluation of Alternatives report (G&M, 1992d) that was concurrently submitted with this Public Comment Document provides additional detail to this end. The USEPA is asked to reconsider the selection of their preferred alternative, and to select the No Action Alternative based on the new data and analysis presented within this comment document and the accompanying evaluation of alternatives document."

RESPONSE: See response to comment 3.3.10(k). Further, since Torch Lake feeds into Lake Superior and thus may transport some of its contaminated sediment into this Great Lake, the location of Torch Lake was a factor in the decision as to what remedial action should be taken at the site.

Further, this site is one of the International Joint Commission's (IJC's) 43 Areas of Concern (AOC) in the Great Lake Basin. The proposed remedy must consider the Great Lakes Water Quality Agreement as IJC's AOC delisting criteria.

U.S. EPA continues to believe that the selected alternative provides the best balance of the nine criteria in term of long-term effectiveness, short-term effectiveness, implementability, cost and State and community acceptance. U.S. EPA believes it is cost-effective since the eventual environmental benefit and effectiveness is proportional to its cost when compared to taking action that involves moving the tailings to other location. U.S. EPA has conducted the RI/FS and remedy selection according to the requirements of the NCP.

APPENDIX A

LOCATION OF INFORMATION REPOSITORIES

An information repository contains laws, work plans, community relations plans, technical reports, and other documents relevant to the investigation and cleanup of Superfund sites. The information repositories for the Torch Lake Superfund site have been set up at the following locations:

Lake Linden-Hubbell Public Library
610 Calumet
Lake Linden, Michigan 49945
(906) 296-0698

Portage Lake District Library
105 Huron
Houghton, Michigan 49931
(906) 482-4570

Administrative record repositories have been established at Portage Lake District Library in Houghton and at U.S. EPA's Region 5 office in Chicago. The administrative record contains all of the documents, reports, laboratory data, and other material the EPA relied upon in reaching a decision on the selection of the proposed plan.

REFERENCES

McKinney J, Rogers, Metal Bioavailability, EPA Workshop Identified Research Needs, Environ. Sci. Technol. 26(7):1298-1299, 1992.

National Research Council (NRC), Recommended Dietary Allowances, 10th edition, Washington, DC: National Academy Press, 1989.

U.S. Environmental Protection Agency (U.S. EPA), Office of Solid Waste and Emergency Response. Risk assessment guidance for Superfund. Volume I. Human health evaluation manual. Supplemental guidance: Standard default exposure factors. Interim final. Washington, DC: U.S. Environmental Protection Agency. OSWER directive 9285.6-03, 1991.

U.S. Environmental Protection Agency (U.S. EPA), Office of Emergency and Remedial Response. Risk assessment guidance for Superfund. Volume I. Human health evaluation manual (Part A). Interim final. Washington, DC: U.S. Environmental Protection Agency. EPA/540/1-89/002, 1989.