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Grand Traverse Overall Supply Superfund Site Greilickville, Michigan February 2008

Record of Decision

Grand Traverse Overall Supply
RECORD OF DECISION
ACRONYM LIST

AFS:	Addendum to Feasibility Study
ARAR:	Applicable or Relevant and Appropriate Requirement
ASGSCs	Acceptable Soil Gas Screening Concentrations
bgs:	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
Cfm	cubic feet per minute
COC	Contaminants of Concern
COPEC	Contaminants of potential ecological concern
1,2 DCE:	Dichloroethene
ERT	Environmental Response Team
FS:	Feasibility Study
GSIC:	Groundwater/Surface Water Interface Criteria
GSIPC:	Groundwater/Surface Water Interface Protection Criteria
GTOS	Grand Traverse Overall Supply Superfund Site
HHRA	Human Health Risk Assessment
HI	Hazard Index
MDEQ:	Michigan Department of Environmental Quality
MDNR:	Michigan Department of Natural Resources
MW:	Monitoring Wells
NCP: Plan	National Oil and Hazardous Substances Pollution Contingency

NPL:	National Priorities List
O&M:	Operation & Maintenance
Part 201:	Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended
PCE:	Tetrachloroethene
ppm:	parts per million
PRG	Preliminary Remediation goals
RAOs:	Remedial Action Objectives
RD:	Remedial Design
RI:	Remedial Investigation
ROD:	Record of Decision
ROI:	Radius of Influence
SB:	Soil Borings
SI	Site Inspection
SLERA	Screening Level Ecological Risk Assessment
SVE:	Soil Vapor Extraction
TCA:	Trichloroethane
TCE:	Trichloroethylene
TDS	Total Dissolved Solids
U.S. EPA:	United States Environmental Protection Agency
ug/kg	microgram per kiligram
VOCs:	Volatile Organic Compounds

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Grand Traverse Overall Supply Superfund Site

PART 1: THE DECLARATION

Site Name and Location

The Grand Traverse Overall Supply Superfund Site (Site) is located at 10753 East Cherry Bend Road, Greilickville, Michigan, which is situated approximately 1 ½ miles north of the city limits of Traverse City, Michigan. The property is comprised of approximately two acres. The United States Environmental Protection Agency (U. S. EPA) Identification Number is MID079300125.

Statement of Basis and Purpose

In this Record of Decision (ROD), U.S. EPA is selecting a remedial action for the Site in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended and, to the extent practicable, with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (in accordance with CERCLA Section 121(a)). The decisions herein are based on the Administrative Record for this Site. Occasional references are made to specific documents in the Administrative Record where the information is too voluminous to be provided here. The Michigan Department of Environmental Quality (MDEQ), which is the support agency for this project, has indicated its concurrence with U.S. EPA's decision for this project. The concurrence letter from the State of Michigan will be included in Appendix C of this ROD upon receipt. U. S. EPA's Superfund program is the source of cleanup monies, i.e., the cleanup is fund-financed.

Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

The major components of the selected remedy include the following remedial activities:

1. Limited action with excavation of any soil contamination remaining on site that exceeds the preliminary remediation goals following the time critical removal action that was authorized by an action memorandum dated September 4, 2007.

2. Institutional controls restricting groundwater use and land use. Institutional controls may include negotiation of restrictive covenants for property and groundwater contaminated by site-related contaminants, working with local municipalities to draft and implement zoning ordinances, working with the public health department or agencies to draft and implement appropriate health regulations, or similar controls.

3. Groundwater extraction, treatment, and discharge with a contingency for groundwater in situ treatment if necessary.

4. Continued operation of the Soil Vapor Extraction system that is currently operating at the Norris Elementary School pursuant to an action memorandum dated August 10, 2005. The Agency will also develop and implement a non-intrusive vapor monitoring program to assure there are no other vapor issues associated with the soil and groundwater contamination for this site.

The selected remedy is site wide in scope and addresses all contaminated media; i.e. soil, groundwater and vapor at the site.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e. reduces the toxicity, mobility, or volume of hazardous substances, pollutants or contaminants through treatment).

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statuary review will be conducted within five years after initiation of the remedy action to ensure that the remedy is or will be protective of human health and the environment.

ROD Data Certification Checklist

The following information is included in the Decision Summary Section of this ROD.

The chemicals of concern and their concentration levels;

Baseline risks represented by the chemicals of concern;

Cleanup levels established for the chemicals of concern and the bases for these levels;

How source materials constituting principal threats are addressed;

Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD;

Potential land and groundwater use that will be available at the site as a result of the selected remedy;

Estimated capital, annual operation and maintenance, total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected; and

Key factors that led to selecting the remedy, i.e. how the remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria.

Additional information is also included in the Administrative Record for the site. (See attached index in Appendix D of the ROD).

Authorizing Signature

Richard C Karl — 3-3-08

Richard C. Karl, Director — Date
Superfund Division

PART 2: THE DECISION SUMMARY

Site Name, Location, and Brief Description

The Grand Traverse Overall Supply Site is an old dry cleaning and laundering operation located in Greilickville, Michigan, approximately 1 ½ miles north of the city limits of Traverse City, Michigan. The 2 acre site is in the SE ¼ of section 28, T28N, R11W, Elmwood Township, Leelanau County, located just west of Highway M-22, on the north side of Cherry Bend Road and south of Cedar Creek. The U. S. EPA Identification Number is MID0717418559. (Figure 1 in Appendix A).

The U.S. EPA is the lead agency for this project. The State of Michigan represented by the MDEQ, which is the support agency for this project, has indicated its concurrence with U.S EPA's decision for this project. The concurrence letter from the U. S. EPA will be included with the ROD upon receipt. U. S. EPA's Superfund program is the source of cleanup monies, i.e., the cleanup is Fund-financed.

Site History and Enforcement Activities

Grand Traverse Overall Supply Company (GTOS) performed commercial laundering for industrial clothing. The laundry facility began operations in the early 1950's. A dry cleaning facility was added in 1968. Until December 1977, laundry wastes and process waters from dry cleaning operations were discharged to Cedar Creek, to a dry well, or to a series of discharge lagoons. In addition, some dry-cleaning and laundry wastewaters were managed in a series of trenches and sumps in the floor of the on-site building. The company began discharging its laundry and dry cleaning wastes to the sanitary sewer system in December 1977, and cooling water was also diverted to the sanitary sewer beginning in 1978. Dry cleaning operations at the facility were discontinued in 1987.

In April 1978, trace amounts of tetrachloroethene (PCE), trichloroethene (TCE), and 1, 2 dichloroethene (1, 2 DCE) were detected in the drinking water supply well of the Norris Elementary school, located immediately east of the GTOS site. The Michigan Department of Public Health condemned the school well water consumption and conducted sampling of additional wells in the area. The sampling program confirmed the contamination of 10 drinking water wells in the area. The GTOS site was considered the likely source of the contamination.

Remedial action was taken by GTOS under the Michigan Department of Natural Resources (MDNR) supervision from 1978 to 1980. This included replacing contaminated drinking water wells with new wells that extended into a deeper uncontaminated semi-confined aquifer, and excavating the on site dry well. In addition the company also closed the waste water discharge lagoons.

The MDNR also conducted a hydro geologic investigation at the site and surrounding area and issued a report of the investigation, in February 1981. The report concluded that the GTOS site had been the source of the TCE, PCE and 1, 2 DCE contamination of the shallow aquifer in the area.

The site was placed on the National Priority List (NPL) in September 1983 because of groundwater contamination.

The U. S. EPA conducted a two stage Remedial Investigation (RI). Stage 1 began in November 1989 and was completed in February 1990; Stage 2 was completed in November 1990. As part of these efforts the U.S. EPA collected 67 soil samples on site at various depths, six sediment samples were collected from near by Cedar Creek, 3 surface water samples were also collected from Cedar Creek. The U.S. EPA also installed and collected samples from 22 monitoring wells both on site and off site. Generally, samples collected showed only trace amounts PCE, TCE and 1, 2 DCE.

The U. S. EPA issued a No Action Record of Decision in February 1992. Although the U. S. EPA determined that conditions at the GTOS site did not warrant further remedial action, the U.S. EPA agreed to continue to monitor the groundwater for a period of twelve months. At the conclusion of the twelve month period, the U.S. EPA did not see any increase in contaminants associated with this GTOS site.

In connection with a proposal to sell the property in 1995, the State of Michigan required the prospective purchaser to perform a Baseline Environmental Assessment. (The proposed sale was subsequently converted to a lease.). The assessment collected 10 soil borings placed inside the Site building and 2 samples were collected from the on site sumps inside the Site building. TCE was detected in very high levels in the soils under the building (450 – 110,000 micrograms per kilogram) and TCE and 1,2 DCE were also detected in the sump samples (35,000 – 990,000 micrograms per liter).

In 2001 and 2002, MDEQ conducted some additional investigation work at the Site. The MDEQ sampled monitoring wells around where the discharge lagoons use to be located. The results of this sampling indicate that the wells around the old lagoon area remain clean. There were no contaminants of concern detected in this area. Also, as part of the effort, the State of Michigan installed temporary monitoring wells along the path that groundwater flows to Grand Traverse Bay. These temporary wells indicated the presence of PCE and TCE. The highest levels detected were around 16,000 micrograms per liter. This information was shared with the U. S. EPA. After the U.S. EPA's review of this information, it was determined that additional sampling work was needed to determine the nature and extent of the newly identified groundwater plume.

The remedial and removal programs of the U. S. EPA embarked on a joint venture to collect soil/groundwater samples under the Site building to better characterize the newly identified source area, perform vapor intrusion sampling in and around the property building, and install permanent additional monitoring wells to determine the extent of the new plume identified by the State of Michigan.

In addition, vapor intrusion sampling was conducted and completed by U. S. EPA Environmental Response Team (ERT). This sampling indicated a problem both under and within the Site property building with vapors. After the sampling results became available, the industrial laundry company that leased the Site ceased its operations and moved out of the building. Thereafter, the Site building was vacant and no further business operations were conducted on site.

The U. S. EPA collected soil samples and groundwater samples from under the Site building floor in 2005. The primary area of soil contamination surrounds and appears to be related to the trenches and sumps in the floor of the building. Groundwater samples collected from under the building consisted primarily of PCE and TCE (Ranging from 1100 micrograms per liter to 14 micrograms per liter). One soil sample collected from under the building showed an elevated level (190,000 micrograms per kilogram) of PCE. This would indicate the presence of pure product. Based on the data collected under the Site building, it is estimated that contamination is generally present from just below the ground surface down to the groundwater table. The groundwater table is approximately 10 feet below ground surface.

The U.S. EPA's monitoring well installation and sampling program was completed in 2005 (See Figure 2 for groundwater monitoring well locations). The findings from this sampling effort indicated that there was a groundwater plume of contamination including PCE, TCE and others that stretches from under the on site building to the Grand Traverse Bay.

Because of the groundwater findings, the U. S. EPA removal program initiated additional vapor intrusion sampling at the Norris School. The results of the sampling indicated that there was no vapor issues within the school building however, elevated levels of contaminant vapors were found under the school building. The U.S. EPA Removal Program installed a soil vapor extraction (SVE) system under the school building pursuant to an action memorandum dated August 10, 2005, to pull vapors out so that there was no risk of them entering the school. This system is currently being operated and maintained by the MDEQ until July 1, 2008 when their O&M contract expires.

The community raised a concern about possible vapor intrusion at the West Bay Covenant Church. The Church is located directly across the street from the Site. The church runs a preschool center in the basement. Although the highest concentrations of contaminants in the groundwater plume associated with the GTOS site did not flow under the church property, the Removal program agreed to conduct a soil vapor intrusion study at the church. A vapor intrusion study was conducted on the church property in 2006. The results of the study indicated that there were no vapor intrusion issues at the church.

The United States commenced litigation in 1995 against the owner and operator of the Site for recovery of past costs that had been incurred by the government in connection with the Site. A consent decree was entered by the court in July 1997 that settled the litigation and resulted in a monetary recovery by the United States. In May 2005, U.S. EPA issued a general notice letter regarding more recent response activities at the Site to the current owner of the Site, and in October 2007, U.S. EPA issued general notice letters to the current owner of the Site and several past owners or operators of the Site.

Community Participation

The Site Investigation and Feasibility Study Report, Proposed Plan and other relevant documents for the Site were made available to the public on or before November 2007. These documents can be found in the Site Repository at the Traverse Area District Library. The availability of these documents and date of the public meeting was published in The Traverse City Record Eagle on November 21, 2007 and in the Leelanau Enterprise on November 22, 2007. A public comment period was held from November 29, 2007 to December 30, 2007. In addition, a public meeting was held on November 29, 2007 to present the Proposed Plan to the general public. At this meeting, the U.S. EPA and the MDEQ answered questions and solicited comments on U.S. EPA's proposed cleanup alternatives. The response to the comments received during the comment period is included in Appendix E the Responsiveness Summary section of this ROD.

Scope and Role of Response Action

The remedy selected in this ROD is intended to be the final site-wide response action for this site and addresses a principal threat at the site through the removal and/or treatment of groundwater and soils contaminated with high concentrations of highly mobile solvents as well as continue the operation of an SVE system at the Norris Elementary School. The selected remedy will be implemented under remedial authority pursuant to section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and 40 CFR 300.430 et. seq..

The following is the planned sequence of the major components of the selected remedy:

Plan to implement Institutional Controls Restricting Groundwater Use and Land Use;

Excavation and Off-site Disposal of Highly Contaminated Soils left on site following the time critical removal action;

The construction and operation of a groundwater pump and treat system;

Contingency for Enhanced In-situ Bioremediation (if necessary); and

Evaluation of known and unknown vapor intrusion issues which include continued operation of the SVE system operating at the Norris Elementary School and the evaluation of other site related vapor intrusion issues.

Site Characteristics

Geology

The regional geology of Leelanau County consists of unconsolidated glacial and post-glacial deposits of Quaternary Age originating from the Lake Michigan Lobe of the Wisconsin glaciation. The unconsolidated glacial drift deposits near the GTOS site are approximately 200 feet thick and are underlain by the Ellsworth Shale of Devonian Age. In general, the Ellsworth Shale consists of greenish gray shale intercalated with some limestone and dolomite. According to the Quaternary Geology Map of Michigan, the surficial Quaternary deposits in the vicinity of the site consist primarily of pale brown to pale reddish brown, fine to medium grained lacustrine sand, often including beds or lenses of fine grained gravel, and occasionally including intercalated lacustrine clay. Quartz is the primary mineral that makes up the sand; however, a variety of igneous and metamorphic minerals are present in the gravel. The typical thickness for this deposit is between 3 feet and 90 feet.

According to the Site Inspection report, the site stratigraphy consists of dark brown organic soil with varying amounts of sand and decaying plant material underlain by a heterogeneous assortment of stratified sand and gravel. The upper portion of the sand and gravel unit consists mostly of poorly-graded, medium-grained sand with a greater occurrence of well graded medium sand and well graded fine gravel with increasing depth.

Underlying the sand and gravel layer is a continuous clay/clay-marl layer. Trace sand and silt were observed in this clay/clay-marl layer. The density of the clay/clay-marl layer was noted as varying between soft and firm and the plasticity varied from medium to high. Laminated, fine-grained clayey sand and silty sand lenses were also interbedded within this layer. Underlying the clay/clay-marl layer is a poorly-graded fine to medium sand with occasional lenses of discontinuous well-graded sand and gravel.

Hydrogeology

Two primary hydrological units have been identified at the GTOS site: (1) a shallow, unconfined aquifer and (2) a lower drinking water aquifer. The shallow aquifer is currently impacted. Each aquifer is discussed below.

Shallow Aquifer

The uppermost groundwater unit is unconfined and exists from 4 to 6 feet below ground surface (bgs) up to 12 to 16 feet bgs. The aquifer media that make up the unconfined aquifer consist of near-surface mixed sand and gravel deposits. The groundwater in the shallow aquifer flows in an easterly direction and discharges to Grand Traverse Bay. The shallow groundwater may also discharge to Cedar Creek; however, potentiometric evidence is inconclusive. Shallow groundwater may also be discharging to Harbor West Marina. The lower boundary of the uppermost unconfined aquifer at the GTOS site coincides with thin, continuous clay and clay-marl layers found at depths of 40 feet to 60 feet bgs. Composition and thickness vary throughout the GTOS site.

Lower Aquifer

The lower aquifer consists of saturated, permeable sand layers below the clay/clay-marl interval. Limited information is available on this lower aquifer. However, based on the distribution of dissolved-phase groundwater contaminants detected during the SI, the underlying saturated sand layers do not appear to be fully connected with the upper unconfined aquifer. According to area residential water well logs, a relatively thick layer consisting of predominantly clay is located at a depth of approximately 80 feet bgs to 120 feet bgs. All area residential water wells are screened in sand and gravel deposits below this clay layer. In all cases, the residential water wells screened beneath this lower clay zone exhibit flowing artesian conditions, which indicates that an upward vertical hydraulic gradient exists between the lower drinking water aquifer and the shallow unconfined aquifer at the GTOS site.

Current and Potential Future Site and Resource Uses

The site property is comprised of approximately 2 acres and is bordered by a school and residential property. Most of the area is served by the Traverse City municipal water supply system that draws water from Grand Traverse Bay. There are still some residents north of the Site that have private water supply wells and are not able to hook into the city water supply system.

Based upon current zoning, nearby land use and dialogue with county officials, the anticipated future land use is residential use.

Summary of Site Risks

The purpose of the site baseline risk assessment is to determine applicable exposure pathways and target cleanup criteria for the site. An exposure pathway is the route that a contaminant takes from a source to a receptor and describes a unique mechanism by which the receptor may be potentially exposed to contaminant agents at or originating from the site.

U.S. EPA conducted a human health risk assessment (HHRA) and screening level ecological risk assessment (SLERA) for the GTOS site to assess risks to human health and the environment in the absence of remedial actions and to support the decision on the need for site remediation. Standard EPA risk assessment guidance documents were followed during the baseline risk assessments. This section presents a summary of the human health and screening level ecological risk assessments prepared by U.S. EPA.

Human Health Risk Assessment

This HHRA evaluated both current and future human health risks based on existing (baseline) conditions, that is, in the absence of any remedial action or institutional controls. The results of the HHRA provided the U.S. EPA with information concerning the necessity for remedial action and the selection of remedial alternatives.

The GTOS site is a former commercial dry-cleaning facility. Past operations at the site indicate chemicals used for dry cleaning have resulted in soil and groundwater contaminated with PCE and its breakdown products (TCE, DCE and vinyl chloride).

Investigations have determined that a source of groundwater contamination exists on site and that contaminated groundwater has migrated off-site into Grand Traverse Bay. The U.S. EPA conducted the HHRA to evaluate potential risks from the source area and the groundwater plume associated with the GTOS site.

Data Evaluation and Identification of Chemicals of Potential Concern: The results of past investigations and the historic use of PCE at the site indicate VOC's are the primary chemicals of concern (COCs). PCE and its biodegradation products (TCE, DCE and vinyl Chloride) are the main COCs.

Exposure Assessment: Potential receptors identified in the HHRA include future on-site receptors at the GTOS site and current and future off-site receptors. Future on-site receptors include people who may use the GTOS property in the future. Off-site receptors include current and future residents and school occupants, industrial workers, construction workers, and recreational users, including a fisherman at Grand Traverse Bay. The HHRA identified potential complete exposure pathways based on potential exposure to soil and groundwater for on-site receptors, and to groundwater and surface water for off-site receptors.

Risk Characterization. EPA generally considers cancer risks within 10-6 to 10-4 to be within the risk management range. EPA generally does not consider action necessary when cancer risks are less than 10-6 and the noncancer hazard index (HI) is less than 1. Tables 7A and 7B in Appendix B summarize the potential cancer risks and noncancer HIs for both the onsite and off site receptors evaluated in the HHRA.

The HHRA identified risk drivers as chemicals that pose a cancer risk greater than 1 x 10-6 and a HI greater than 1. For the on-site receptors, PCE and TCE were the risk drivers identified in soil and soil gas. Risk drivers identified in groundwater for the on-site receptors included PCE, TCE, vinyl chloride, cis-1,2-dichloroethene (DCE) and 1,1,2 trichloroethane (1,1,2 TCA) . PCE, TCE, and cis-1, 2-DCE contributed the most to the risk from groundwater exposure for the on-site receptors. Risk drivers in groundwater for the off-site receptors included PCE, TCE, vinyl chloride, and cis-1, 2-DCE. Risk estimates indicate recreational users and fishermen are not at risk from COPCs in surface water.

The cancer risk and HI estimates presented in this HHRA are very conservative (health protective) for several reasons, and only represent a hypothetical scenario to be used for risk management decisions. For example, in order to evaluate potential risks from the most contaminated portion of the aquifer, this HHRA used chemical concentrations detected in the center of the VOC plume. Currently, residential wells draw groundwater from the deeper uncontaminated portion of the aquifer. It is unlikely that future residents or businesses will construct new drinking water wells in the shallow contaminated aquifer. In addition, this HHRA used vapor intrusion models to estimate exposures from vapor intrusion. The vapor intrusion models also use very conservative assumptions and inputs to estimate exposure. Indoor air investigations conducted under MDEQ guidance concluded that visitors, school staff, or children at Norris Elementary School are not currently at risk from vapor intrusion into the indoor air of buildings

A summary of all of the Human Health risk calculations and evaluations can be reviewed in the Human Health Risk Assessment document in the Administrative Record.

Screening Level Ecological Risk Assessment

Contaminants of potential ecological concern (COPEC) were selected based on the results of previous investigations conducted within the last decade (1997 to present) and contaminants expected based on past operations at the GTOS site. A contaminant was identified as a COPEC if it was detected at a concentration above the detection limit at least once in samples collected during previous site investigations. Based on site investigations and historical operations at the site, the COPECs were determined to be acetone, 1,1-DCE, PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride According to the SLERA, potential ecological receptors at the GTOS site included plants, as well as small birds and mammals associated with residential areas, such as robins and squirrels. Nearby water bodies support semi-aquatic mammals such as mink, and semi-aquatic birds such as herons. Aquatic plants, fish, and invertebrates living in Cedar Lake, Cedar Creek, and Grand Traverse Bay were also potentially exposed receptors.
Based on an evaluation of the available information, the SLERA concluded that the likelihood was low that ecological risks were underestimated. Therefore, sufficient information existed to conclude that ecological risks are negligible at the GTOS site and no further work was needed.

A summary of all of the Ecological risk calculations and evaluations can be reviewed in the Ecological Risk Screening document that is part of the Administrative Record for this Site.

The response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Remedial Action Objectives

As specified in the NCP, Remedial Action Objectives (RAOs) should be specified for COCs, exposure routes and receptors, and preliminary remediation goals (PRG). RAOs for soil, groundwater and vapor pathways associated with contaminated soils and groundwater including Norris Elementary School are discussed below.

RAOs for Soil

COCs detected in soil at the GTOS site include PCE and TCE. On-site soil contamination is present in the area under and possibly at the northern perimeter of the GTOS building. Current and potential future land uses of the GTOS site include commercial, residential, and industrial. Therefore, actual and potential receptors identified at this time include residents, site workers, and trespassers. Receptors could be exposed to contamination in soil through direct contact with or ingestion of soil. Soil also may act as a source of VOCs released to outdoor or indoor air and to groundwater. Soil contamination leaching to groundwater ultimately discharges to Grand Traverse Bay through groundwater or could be consumed under future land-use scenarios.

It is assumed that contamination in soil will be addressed as a removal action under U.S. EPA's removal program. However, if soil contamination is not addressed completely under the removal program or if residual contamination is left behind after a removal action has been conducted a soil component will be required as part of this ROD.

Based on actions taken to date and given the assumptions described above, the following RAOs have been developed for soil associated with the GTOS site:

• Prevent direct contact with or ingestion of soil containing PCE and TCE at concentrations that exceed applicable Part 201 criteria of 88,000 micrograms per kilogram (μg/kg) PCE and 500,000 μg/kg TCE for all potential receptors

• Prevent further leaching of PCE and TCE from soil to groundwater at concentrations above Part 201 Residential and Commercial Drinking Water Protection criteria of 100 μg/kg PCE and 100 μg/kg TCE.

• Prevent further leaching of PCE and TCE from soil to groundwater and ultimately migrating to surface water at concentrations above Part 201 GSIC of 900 μg/kg PCE and 4,000 μg/kg TCE. The PRGs for cleanup of soil that are most stringent would need to be achieved. Therefore, the PRGs for cleanup of soil are 100 μg/kg PCE and 100 μg/kg TCE.

RAOs for Groundwater

COCs detected in groundwater at the GTOS site include PCE, TCE, cis-1, 2-DCE, vinyl chloride, and 1, 1, 2-TCA (See Figure 3 Groundwater Isoconcentration contour map). Shallow groundwater at the site primarily flows east and discharges to Grand Traverse Bay. The shallow aquifer in the area of the site is classified as a Class IIB aquifer using the "Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy," (June 1988a). Class IIB groundwater

(1) can be obtained in sufficient quantity to meet the minimum needs of an average family;

(2) contains total dissolved solids (TDS) of less than 10,000 milligrams per liter (mg/L); and (3) is of a ability that can be used without treatment or that can be treated using methods reasonably employed by public water systems. The beneficial use of the shallow aquifer is drinking water.

Based on actions taken to date, the following RAOs have been developed for groundwater associated with the GTOS site:

• Prevent ingestion of groundwater that contains PCE; TCE; cis-1,2-DCE; vinyl chloride; and 1,1,2-TCA at concentrations that exceed MCLs, nonzero MCLGs, and Part 201 Residential and Commercial Drinking Water Protection criteria of 5 µg/L PCE; 5 µg/L TCE; 70 µg/L cis-1,2-DCE; 2 µg/L vinyl chloride; and 3 µg/L 1,1,2-TCA

• Protect surface water from PCE; TCE; cis-1, 2-DCE; vinyl chloride; and 1, 1, 2-TCA transported by groundwater in accordance with Part 201 criteria of 45 µg/L PCE; 200 µg/L TCE; 620 µg/L cis-1,2-DCE; 15 µg/L vinyl chloride; and 330 µg/L 1,1,2-TCA

• Restore the shallow aquifer to its highest level of beneficial use to the extent practicable within a timeframe that is reasonable The PRGs for the cleanup of groundwater that are most stringent would need to be achieved. Therefore, the PRGs for cleanup of groundwater are 5 µg/L PCE; 5 µg/L TCE; 70 µg/L cis-1,2-DCE; 2 µg/L vinyl chloride; and 3 µg/L 1,1,2-TCA.

RAO for Vapor

COCs detected in soil vapor under the Norris Elementary School include several VOCs, include PCE, TCE, trans-1, 2-DCE, and cis-1, 2-DCE. Potential receptors identified at Norris School include school children, teachers, administrators, and other workers present in the school. Additional receptors may be present in the surrounding area within this pathway. Receptors, both known and unknown could be exposed through inhalation of COCs present in vapor intruding into the air from sources in the soil and groundwater. The following RAOs have been developed for the COCs present in the vapors.

• Identify and prevent the presence of COCs in the soil vapor at the facility that exceed the site specific screening levels in soil gas developed by ATSDR, MDCH (see Figure 4 in Appendix A for Site Specific Decision Matrix previously established for Norris School) and the MDEQ's Acceptable Soil Gas Screening Concentrations (ASGSCs) in MDEQ's Part 201.

• Prevent the inhalation of COCs in indoor air that exceed site specific criteria developed by the ATSDR and MDCH as well as MDEQ's Acceptable Indoor Air Concentrations.

The MDEQ's ASGSCs will be utilized as a part of the soil vapor monitoring program to evaluate the groundwater volatilization to indoor air pathway for areas affected by the groundwater plume.

Summary and Description of Site Remedial Alternative

Evaluations and analyses conducted during the FS phase provided mechanisms for the development, screening and detailed evaluation of remedial alternatives based on the results of the Site Investigation (SI) work. The U. S. EPA identified and screened a variety of remedial measures for soil and groundwater contamination. An FS addendum was also developed to provide for the development and screening for the continued operation of the current SVE system operating at the Norris School building. For a complete description of contaminant areas remedial measures and remedial alternative, please consult the FS and other supporting documents.

Summary of Soil Alternative

Each of the soil alternatives is described below and was assembled to accommodate different scenarios regarding a possible removal action of the source material. The alternatives were developed to allow U.S. EPA flexibility based on the outcome of the removal action at the GTOS site. A summary table (Table 1) of the alternative described below can be found in Appendix B.

Soil Alternative 1: No Action

The no action alternative provides a reference to evaluate other alternatives. Under Soil Alternative 1, no action would be taken to remediate soil at the GTOS site under a remedial action. Under the no action alternative, soil would either be addressed as a removal action under the removal program and all source material and soils would be removed that exceeded the cleanup goals of 100 μg/kg for PCE and TCE, or contaminant levels would remain similar to the concentrations reported in the SI report. Under this alternative, no additional soil would be excavated or treated. There is no cost associated with this alternative.

Soil Alternative 2: Limited Action

Two versions of Soil Alternative 2 were developed to satisfy two potential cleanup scenarios. Each version of Alternative 2 is described below.

Soil Alternative 2A: Limited Action with Excavation

Soil Alternative 2A assumes that a removal action is conducted at the site to address the contamination in soil under and near the building, but that it does not achieve cleanup levels in certain areas. Instead, it leaves residual contamination that could be a continued source of groundwater contamination. Soil Alternative 2A also assumes that the building is demolished and additional soil containing residual contamination would be excavated. Soil Alternative 2A consists of selective excavation to address residual contamination in the unsaturated zone at concentrations greater than 100 μg/kg for both PCE and TCE. Soil Alternative 2A includes an evaluation of the effectiveness of the soil removal action and identification of zones of residual soil contamination. Soil Alternative 2A assumes that 10 percent of the originally estimated area of source contamination would require additional excavation. Based on the limited data and estimates of extent of contamination in the SI report, it is assumed that approximately 380 cubic yards of soil with residual contamination would be required to be excavated and disposed of. Soil Alternative 2A also assumes that the most contaminated soils were excavated during the removal action;

therefore, none of the estimated 380 cubic yards would be considered characteristically hazardous. Site preparation associated with this alternative would include clearing and grubbing, identifying and protecting monitoring wells (to the extent possible) located in the area of excavation, and establishing a decontamination area and a site support zone. Temporary fencing would be constructed before excavation begins to secure the work area and limit access in and out of the work zone. During implementation, surveying would be necessary to ensure that backfill is placed to proper elevations. Air monitoring and dust suppression would also be necessary during implementation. After remedial activities are completed, the temporary fence would be taken down and filled areas seeded. No institutional controls or O&M requirements are associated with this alternative because this alternative assumes that soil would be remediated to the most protective cleanup criteria.

Temporary governmental and proprietary controls, as well as informational devices to ensure future land use is compatible with the remedial action, would also be used in this alternative. The estimated capital cost is $205,000. The present worth cost $0. The construction cost is estimated at $172,000.

Soil Alternative 2B: Limited Action with Soil Vapor Extraction

Soil Alternative 2B assumes that a removal action is conducted at the site to address the contamination in soil under and near the building, but that it does not achieve cleanup levels in certain areas. Instead, it leaves residual contamination beneath or near the building that could be a continued source of groundwater contamination. Soil Alternative 2B assumes that the building is not demolished.

Soil Alternative 2B consists of a SVE system to address residual contamination in the unsaturated zone at concentrations greater than 100 µg/kg for both TCE and PCE. Soil Alternative 2B includes an evaluation of the effectiveness of the removal action and identification of zones of residual contaminated soil. Soil Alternative 2B could also include asphalt capping in combination with SVE to reduce infiltration if areas of residual contaminated soil are located outside of the GTOS building. Since Soil Alternative 2B assumes that the GTOS building is still in place, and residual contaminated soil would not be excavated, and the SVE points would be installed through the slab or surrounding the building. The installed SVE system at Norris Elementary School was used to guide SVE assumptions. A conservative estimate for the GTOS site is to assume a 50-foot radius of influence (ROI) for the SVE points. As such, a 50-foot ROI has been assumed for the GTOS site, and SVE points are assumed to be spaced no more than 80 feet apart to provide for some overlap. Given these assumptions, it is expected that no more than two SVE points would be required at a total extraction rate of 100 cubic feet per minute (cfm). Approximately 800 feet of 2 inch pipe and 200 feet of 4 inch pipe are assumed to be required to connect the new SVE points to the existing SVE piping and treatment system.

Extracted vapors would be transported to the existing treatment building located between the GTOS building and Norris Elementary School and treated with GAC using the existing system before they are discharged to the atmosphere. Periodic soil sampling would be conducted to evaluate the effectiveness of the SVE system in meeting soil target cleanup goals. In addition, periodic air sampling would be conducted to ensure that air emissions meet applicable requirements. Similar in situ SVE remedies are typically completed within 1 to 5 years. Due to the uncertainty associated with this alternative, the cost estimate assumed that the SVE system would be operational for a 5-year period. Temporary fencing would be used to restrict site access during remedy implementation. Because it is not known where the residual contaminated soil will exist, a conceptual layout of this alternative cannot be shown at this time. Temporary governmental and proprietary controls, as well as informational devices to ensure future land use is compatible with the remedial action, would also be used in this alternative. The estimated capital cost is $90,800. The annual O&M cost $34,000. The present worth cost is $140,300. The time to achieve RAOs is estimated to be 5 years.

Soil Alternative 3: Demolition and Excavation

Soil Alternative 3 provides an option for the scenario where a removal action is not conducted and the existing GTOS building would be demolished as part of the final remedy. In addition to the building, the floor slab would be removed, contaminated soil underlying the building would be excavated and disposed of off site, and site restoration would take place. Although a combination of MIP, soil gas samples, and soil samples for laboratory analysis was collected throughout the building, the total number of soil samples collected for laboratory analysis is limited. Laboratory analytical results show that contaminant concentrations in soil at three of the four sampling locations inside the GTOS building exceed the cleanup objectives at depths up to 9 feet bgs. This alternative assumes that soil in the areas underneath the GTOS building need to be removed from below the slab to the water table (about 10 feet bgs). Additional investigative samples will be collected to further delineate the extent of contaminated soil and obtain waste characterization information for disposal of the soil.

The first step in this alternative would be demolition of the existing structure at the GTOS site. The entire structure, including the floor slab, would be removed. All debris from the structure would be disposed of as construction debris unless ACM or lead is present. Wipe samples would be collected from floor slab debris to evaluate whether the slab has been contaminated. Disposal methods for the slab debris would be identified once laboratory analytical results for floor samples are received. The cost estimate assumes that all debris can be disposed of as construction debris. The footprint of the structure itself is approximately 17,500 square feet. The northern half of the building is one story, and a portion of the southern half of the building is two stories. Once the building and the floor slab are removed, additional subsurface samples can be collected using a direct-push Geoprobe unit to further delineate the extent of contamination. Existing laboratory analytical results represent the central portion of the GTOS building.

Additional samples would be collected in the northern and southern portions of the facility. Excavation of soil would begin once the extent of the contamination is delineated. The site would be sectioned using a grid system, and each grid would be excavated to a depth that would depend on laboratory analytical results and existing data. Existing data indicate that certain portions of the site would be excavated to at least 9 feet bgs. Confirmatory samples would be collected in accordance with the MDNR "Verification of Soil Remediation" guidance document (MDNR 1994) to ensure that the cleanup objective of 100 µg/kg for PCE and TCE in soil has been met. Further excavation would be required if confirmatory samples indicate that VOC concentrations in soil still exceed the cleanup objectives. This process would be repeated until cleanup objectives for soil are met or groundwater is encountered. Excavated soil would be loaded into trucks for disposal off site. It is currently unknown whether site soil will need to be disposed of as a nonhazardous or hazardous waste. Waste characterization samples would therefore need to be collected from the soil to identify the proper means of disposal. The cost estimate assumes that 10 percent of the excavated soil would be disposed of as a characteristically hazardous waste. A volume of about 104,000 cubic feet or about 3,800 cubic yards of contaminated soil at the site exceeds soil cleanup criteria and would require remediation to meet all soil RAOs. This estimate is based on the previous SI report prepared by Weston, an area of about 10,400 square feet, and the average depth to groundwater of 10 feet.

Site preparation associated with this alternative would include clearing and grubbing, identifying and protecting monitoring wells (to the extent possible) located in the area of excavation, and establishing a decontamination area and a site support zone. Temporary fencing would be constructed before excavation begins to secure the work area and limit access in and out of the work zone. During implementation, surveying would be necessary to ensure that backfill is placed to proper elevations. Air monitoring and dust suppression would also be necessary during implementation. After remedial activities are completed, the temporary fence would be taken down and filled areas seeded. No institutional controls or O&M requirements are associated with this soil alternative because this alternative assumes that soil would be remediated to the most protective cleanup criteria.

This option is no longer being considered because the U.S. EPA removal program is currently demolishing the building and digging up the source area located under the building.

Soil Alternative 4: No Demolition and SVE

Soil Alternative 4 provides an option for the scenario where a removal action does not occur and the GTOS building is not demolished as part of the final remedy. Under this scenario, soil beneath the building would not be accessible; thus, in situ SVE would be used to remove VOCs from vadose zone soil beneath the GTOS building. A vacuum would be applied to the soil to induce the controlled flow of air and remove VOCs from the soil. Pilot studies may be needed to obtain the information necessary to design and configure the system. This information would be used to evaluate extraction system details such as ROI, gas flow rates, optimal applied vacuum, and contaminant mass removal rates. Data requirements for the final design would include the depth and areal extent of contamination, the concentration of the contaminants, depth to the water table, and soil type and properties, such as structure, texture, permeability, and moisture content. During full-scale operation, in situ SVE would likely be run continuously at first and then intermittently (pulsed operation) once the extracted mass removal rate has reached an asymptotic level. This pulsed operation could increase the cost effectiveness of the system by facilitating extraction of higher concentrations of contaminants. As indicated in the SI report, the highest concentrations of VOCs detected in soil include PCE at up to 190,000 μg/kg and TCE at up to 1,500 μg/kg.

Based on the soil boring log for boring GT-VAS-25 (near the northern end of the GTOS building), it is expected that subsurface material beneath the GTOS building consists of predominantly sand with some gravel or fill material. The water table beneath the building is at about 10 feet bgs. The SVE points would be drilled through the concrete floor slab because the source material is the contaminated soil under the GTOS building. Although drilling through concrete would make installing the points slightly more difficult, leaving the concrete slab in place would prevent infiltration (reducing soil moisture) and would act as a surface barrier to prevent or minimize short circuiting.

In lieu of site-specific pilot test information, assumptions were used to conceptually develop this alternative and provide a basis for the associated cost estimate. Typically, it can be difficult to achieve an ROI much greater than the depth of the SVE well because of short-circuiting to the ground when SVE wells are shallow (15 feet or less) and the subsurface consists of predominantly sand. The ROI can be larger if a surface cover is installed (such as asphalt or plastic). Rainfall and soil moisture can also reduce the ROI, but can generally be overcome with enough flow velocity and head. It would be important to make sure the well points are tightly sealed at the surface to maximize the ROI. This alternative is based on the scenario where the GTOS building is still in place and the SVE points would be installed through the slab. Therefore, it is expected that the ROI would be greater than the 10 foot depth of the SVE well. ROIs of up to 150 feet have been achieved at similar sites. The installed SVE system at the Norris Elementary School was used to guide SVE assumptions. A conservative estimate for the GTOS site is to assume a 50-foot ROI. As such, a 50-foot ROI has been assumed for the GTOS site, and SVE points are assumed to be spaced no more than 80 feet apart to provide for some overlap. Given these assumptions, it is expected that no more than five SVE points would be required to be installed extracting at a total rate of 250 cfm. Approximately 800 feet of 2-inch piping and 200 feet of 4-inch piping would be required to connect the new SVE points into the existing SVE piping and treatment system.

Extracted vapors would be transported to the existing treatment building located between the GTOS building and Norris Elementary School and treated using the existing system before they are discharged to the atmosphere. Periodic soil sampling would be conducted to evaluate the effectiveness of the SVE system in meeting soil target cleanup goals. In addition, periodic air sampling would be conducted to ensure that air emissions meet applicable requirements. Similar in situ SVE remedies are typically completed within 1 to 5 years. Due to the uncertainty associated with this alternative, the cost estimate assumed that the SVE system would be operational for a 15-year period. The institutional controls described in Section 5.1.2 would also be components of Soil Alternative 4. Temporary governmental and proprietary controls would be needed to ensure that intrusive activities are not conducted in the area where contaminated soil remains. In addition, temporary fencing would be needed to ensure that public access to the SVE system components is limited.

This option is also no longer being considered because the U.S. EPA Removal program is demolishing the building and this will not allow for SVE.

Summary of Groundwater Remedial Alternatives

Each of the groundwater alternatives is described below. The alternatives for groundwater were developed to accommodate different scenarios for the effectiveness of the removal action of the source material. In addition, the alternatives for groundwater are based on a phased approach, where the active remediation alternative is presented as a baseline that could be expanded or scaled back, depending on groundwater monitoring results after the source material is cleaned up. A summary table (Table 2) of the alternative described below can be found in Appendix B.

Groundwater Alternative 1: No Action

The no action alternative provides a reference for the evaluation of other alternatives. Under Groundwater Alternative 1, no action would be taken to remediate groundwater at the GTOS site. Only natural dilution and attenuation processes would bring about changes in contaminant concentrations in the groundwater. There is no cost associated with the No Action remedy.

Groundwater Alternative 2: Limited Action with Contingency for Active Remediation

Groundwater Alternative 2 consists of a combination of institutional controls and an increased level of groundwater monitoring at the site. This alternative also includes a contingency for active groundwater remediation. Active groundwater remediation would include some combination of pump and treat or in situ treatment. Currently, residents near the site do not obtain drinking water from the shallow contaminated aquifer. Institutional controls, such as a prohibition on well drilling, would be required to minimize the possibility that residents would install private water wells in the shallow aquifer. Groundwater monitoring would be conducted to evaluate the effectiveness of the removal of the contamination source in soil at the site and to assess the ability of natural processes to reduce contaminant levels in the shallow aquifer. If groundwater monitoring showed that the contaminant plume is not stable or shrinking, active groundwater remediation may be initiated at that time.

Groundwater would be monitored quarterly for the first five years and semi-annually for the remaining 25 years to establish seasonal baseline contaminant concentrations and to evaluate changes in concentrations over time. This information would be used to (1) evaluate the impact of removing contamination in soil on the groundwater contaminant plume, (2) evaluate whether contaminant concentrations are decreasing over time as a result of natural processes, and (3) determine whether “active” groundwater remedial activities are required. The estimated capital cost is $17,400. The present worth cost is $225,000. There would be no construction time frame for this remedy. The time to achieve RAOs is approximately 30 years.

Groundwater Alternative 3: Groundwater Extraction, Treatment, and Discharge with Contingency for In Situ Treatment

Under Groundwater Alternative 3, groundwater would be removed from the shallow aquifer by a network of extraction wells, pumped through an air stripper treatment system, and discharged to either the POTW or to Cedar Creek. The discharge will comply with all substantive provisions of ARARs related to the discharge of treated groundwater to the POTW or to Cedar Creek. These requirements will be identified during the design in consultation with the POTW for discharges to the POTW or the MDEQ if discharge is to the creek. This alternative includes a contingency to use in situ biological or chemical treatment to supplement the pump and treat system, depending upon the results of the pilot test expected to be conducted by U.S. EPA’s removal program. The institutional controls and quarterly groundwater monitoring would also be components of this alternative.

The estimated capital cost is $494,400. The annual O&M costs are estimated at $228,000. The present work cost is $225,000. The construction time frame is 6 months. The time to achieve RAOs is estimated to be 6 to 30 years.

SUMMARY OF NORRIS ELEMENTARY SCHOOL ALTERNATIVES

During the development of the FS, the Norris Elementary School alternatives were evaluated to address the vapor intrusion pathway at the school. However, the vapor intrusion pathway for this site is not limited to the school property; other areas affected by potential vapor issues will continue to be evaluated and are discussed below. There were two options specifically discussed during the public comment period as it relates to RAOs associated with the Norris Elementary School. Each of the two Norris Elementary School alternatives is described below.

Norris Elementary School Alternative 1: No Action

The no action alternative provides a reference to evaluate other alternatives. Under Norris Elementary School Alternative 1, operation of the existing SVE system would not continue, and no action would be taken to prevent vapors from entering the school building.

Norris Elementary School Alternative 2: Continued operation of the existing SVE system

Alternative 2 assumes that the existing SVE system that prevents vapors from entering the Norris Elementary School would continue to be operated until concentrations are established below the sub-slab residential ASGSCs in MDEQ's Part 201.

Norris Elementary School Alternative 2 consists of an existing SVE system that currently mitigates vapors that may be affecting the school building. The current SVE treatment system at Norris Elementary School has been constructed in a 40-foot-long enclosed and insulated shipping container. The interior of the shipping container includes a 10,000-watt electric heater with thermostat, an exhaust fan with thermostat, and four EXP lights with dual entry on/off switches. The existing system consists of 12 2-inch vapor extraction in fluent lines. Each influent line contains a 4-inch ball valve for control of air and water influent, a vacuum gauge quick–disconnect, and an Amteck/Rotron in-line flow meter for visual monitoring. The system also consists of a SES DV-30004 Vapor Carbon vessel and 850-gallon polyethylene storage tank. Additional information on the existing system can be found in the Operation and Maintenance Manual prepared by Schrader Environmental Services (Schrader), Inc. (Schrader 2006).

Extracted vapors would continue to be transported to the existing treatment building located between the GTOS building and Norris Elementary School and treated with the existing granular activated carbon (GAC) before they are discharged to the atmosphere. The length of time the system would remain operational is unknown and depends on factors such as the effectiveness of the removal and remedial actions and whether the Norris Elementary School building remains in use. An operational period of 5 years was assumed for cost estimating. Additional costs would be necessary if the existing system needed to be expanded or modified. Temporary governmental and proprietary controls, as well as informational devices to ensure future land use is compatible with the remedial action, would also be used in this alternative. The estimated capital cost is $0 because the system is already in place. The annual O&M cost is estimated to be $78,200. The present worth cost is $320,000. The time to achieve RAOs is estimated to be 5 years.

Change to the Preferred Remedy

During the development of the ROD, MDEQ requested that the Agency include the continued assessment of the vapor pathway to assure protection of human health and the environment. The following activity has been added to the selected remedy:

Other Area Affected by Potential Vapor Issues

The MDEQ raised concerns regarding vapor issues associated with other structures in the area of the soil contamination and the groundwater plume. Under the U.S. EPA Removal Program, U. S. EPA has conducted vapor studies in areas of concern. Based on initial sampling results, elevated levels of vapors associated with the contaminants of concern have not been detected. The Agency will establish a monitoring program to continue to evaluate the potential soil and groundwater volatilization to indoor air pathway for other areas considered affected by the groundwater plume. Specific details of the monitoring program will be developed during the remedial design process. The monitoring program will incorporate the use of non- intrusive sampling procedures. The Agency, in consult with the MDEQ, will maintain the ability to modify the monitoring program based upon sampling results. Based on past costs for this type of sampling event, the estimated cost is approximately $35,000 per event.

The continued assessment of the vapor pathway will be conducted to assure protection of human health and the environment. If it is determined that vapor is or becomes an issue, the Agency will determine a need for action in consultation with the MDEQ.

Comparative Analysis of Alternatives

The alternatives were compared to determine the relative performance of the alternatives with respect to the following nine evaluation criteria.

1. **Overall Protection of Human Health and the Environment**: This criterion is used to evaluate whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs):** This criterion is used to evaluate whether the alternative meets federal and state environmental statutes, regulation, and other requirements that pertain to the site or whether a waiver is justified.

3. **Long-term Effectiveness and Permanence**: This criterion considers whether an alternative permanently maintains protection of human health and the environment, and the effectiveness of such protection.

4. **Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment**: This criterion is used to evaluate whether a particular treatment reduces the harmful effects of principle contaminants; their ability to move in the environment; and the amount of contamination present.

5. **Short-term Effectiveness**: This criterion considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6. **Implementability**: This criterion is used to consider the technical and administrative feasibility of implementing the alternative, such as relative availability of goods and services.

7. **Cost**: This criterion is used to estimate capital and operation and maintenance costs, as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today’s dollars.

8. **Support Agency Acceptance**: The USEPA is the lead agency for this project and the MDEQ is the support agency. The MDEQ supports the selected remedy.

9. **Community Acceptance**: This criterion evaluates the public comments. This ROD includes a responsiveness summary that presents public comments and the USEPA responses to those comments. Acceptance of the recommended alternative was evaluated after the public comment period. The community supports the selected remedy.

COMPARATIVE EVALUATION OF REMEDIAL ALTERNATIVES

This section compares the remedial alternatives for soil, groundwater and Norris Elementary School with each other based on the nine evaluation criteria described above. Table's 1 and 2 in Appendix B summarize the comparative evaluations of the alternatives for soil and groundwater. Because there are only two alternative evaluated for the Norris Elementary School no table is necessary.

COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES

The soil alternatives are compared below based on the nine evaluation criteria.

Overall Protection of Human Health and the Environment

Soil Alternatives 2A and 3 would be most protective of human health and the environment because contaminated soil at or above the cleanup levels would be removed and soil verification samples would be collected to evaluate the effectiveness of the removal. Soil Alternatives 2A and 3 would likely restore soil to unrestricted uses. Soil Alternatives 2B and 4 would rely on institutional controls and treatment using SVE to be protective of human health and the environment. Soil Alternative 1 would not provide any protection of human health or the environment.

Compliance with ARARs

Soil Alternatives 2A and 3 would comply with all cleanup and disposal standards: contaminated soil at or above target cleanup levels would be removed and disposed of off site. Soil Alternatives 2B and 4 would comply with all cleanup, treatment, and air emission requirements; contaminants in the soil would be transferred to vapor and treated with GAC. Soil Alternative 1 would not comply with state or federal ARARs.

Long-Term Effectiveness and Permanence

Soil Alternatives 2A and 3 would leave the lowest magnitude of residual risks because contaminated soil would be actively and permanently removed from the area using excavation. Some degree of residual risks would remain under Soil Alternatives 2B and 4 until the contaminated soil is remediated to concentrations below target cleanup levels.

Soil Alternative 2B is expected to take less time to remediate contaminated soils because Soil Alternative 2B assumes only residual contaminated soils at lower concentrations remain in the soil while Soil Alternative 4 assumes all contaminated soils remain, including those at higher concentrations and potentially hazardous concentrations. Soil Alternative 1 would leave the greatest magnitude of residual risks because no soil treatment would be undertaken and no monitoring would be implemented.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

Toxic substances in the soil would be transferred to vapor and treated on GAC under Soil Alternatives 2B and 4, reducing the total mass of VOCs. Toxic hazardous substances would not be destroyed through soil treatment under Soil Alternatives 2A and 3, and the total mass of VOCs would not be reduced; however, the contaminated soil would be removed and disposed of at an appropriate facility. Under Soil Alternative 1, any reductions in the toxicity of contaminants would not be monitored, and the mass of VOCs would be reduced only by natural attenuation processes. The mobility of VOCs would be reduced by the SVE treatment system and the transfer to vapor phase and treatment with GAC under Soil Alternatives 2B and 4. The mobility of VOCs would not be reduced under Soil Alternatives 1, 2A, or 3. The volume of contaminated soil would be reduced under Soil Alternatives 2B and 4. The volume of contaminated soil would not be reduced under Soil Alternatives 2A and 3; however, the contaminated soil would be removed and disposed of at an appropriate facility. The volume of contaminated soil would not be reduced under Soil Alternative 1.

Short-Term Effectiveness

Except for Soil Alternative 1, all the soil alternatives would pose little short-term risk to the community, with the exception of increased construction traffic and activities associated with any building demolition; excavation, transportation, and disposal of contaminated soils; or installation of SVE systems. In addition, air monitoring would be part of Soil Alternatives 2A and 3 to control short-term risks to the workers or community during excavation. Soil Alternatives 2B and 4 have the potential to present some degree of short-term risk to the community and workers by the release of VOCs to the atmosphere if the system malfunctions. However, the risk would be eliminated once the system was restored. Limited data exist and remedy time frames have been estimated with some degree of uncertainty, especially for length of treatment. Soil Alternative 1 would not involve any action; therefore, no time would be required for its implementation. Soil Alternative 2A would require about 4 months to implement; however, this time could increase, depending on the amount of residual contaminated soil that remains. Soil Alternative 2B would require about 4 months to implement and 5 years for soil treatment. Soil Alternative 3 would require about 4 months to implement; however, this time could increase, depending on the actual extent of soil contamination encountered. Soil Alternative 4 would require about 5 months to implement and 15 years for soil treatment.

Implementability

Soil Alternative 1 would be technically easiest to implement because it would require no action. Soil Alternative 2A would be the next technically easiest to implement because it would require excavation of residual contaminated soils and verification sampling. Soil Alternatives 3 would be the next technically easiest to implement because it would require demolition of an existing structure and excavation of contaminated soil. Soil Alternatives 2A and 3 assume a borrow source for backfill material is readily available. Alternatives 2B and 4 would be the most difficult to implement technically because additional data and pilot tests would be needed to properly design any of the SVE systems. Soil Alternative 1 would be the administratively easiest alternative to implement because it would require no action. Soil Alternatives 2B and 4 would require that institutional controls be implemented at the site and possible surrounding properties. In addition, Soil Alternatives 3 and 4 would be more difficult to implement administratively because numerous access agreements would be needed and because permits or their substantive requirements would have to be satisfied for building demolition and air emissions.

Cost

The present worth costs for the five soil alternatives, from highest to lowest, are as follows: (1) Soil Alternative 3–$1,200,000; (2) Soil Alternative 4–$800,000; (3) Soil Alternative 2B–$260,000; (4) Soil Alternative 2A–$210,000; and (5) Soil Alternative 1–$0.

State Acceptance

The MDEQ is the support agency for this project. The State Agency is in support of a soil alternative to address on site concerns.

Community Acceptance

Community acceptance of the soil alternatives was evaluated after the public comment period. The community is supportive of a soil alternative.

COMPARATIVE ANALYSIS OF GROUNDWATER ALTERNATIVES

The groundwater alternatives are compared below based on the nine criteria.

Overall Protection of Human Health and the Environment

Groundwater Alternative 1 would not provide any protection of human health or the environment. Groundwater Alternative 2 would rely on institutional controls and groundwater monitoring to be protective of human health and the environment; however, Groundwater Alternative 2 includes a contingency for implementing active remediation if monitoring indicates that the plume is not attenuating in a reasonable timeframe.

Groundwater Alternative 3 would provide a moderate to high degree of protectiveness and likely would restore the aquifer to beneficial uses because contaminated groundwater would be extracted from the aquifer and treated with an air stripper. Groundwater Alternative 3 also includes a contingency for in situ treatment at the source area to provide additional treatment of the contaminated groundwater.

Compliance with ARARs

Groundwater Alternative 1 would not comply with state or federal ARARs. Groundwater Alternative 2 might comply with drinking water ARARs if monitoring shows that concentrations of VOCs are being naturally reduced over time or the contingency of active remediation is implemented at the source and monitoring shows that VOC concentrations are decreasing. Groundwater Alternative 3 would comply with all cleanup, treatment, and discharge standards.

Long-Term Effectiveness and Permanence

Groundwater Alternative 3 would leave the lowest magnitude of residual risks because contaminated groundwater would undergo extraction and treatment using an air stripper. In addition, Groundwater Alternative 3 could include in situ treatment at the source area to decrease residual risks even more. Under Groundwater Alternative 3, residual risks would be reduced over time, and groundwater monitoring would be conducted to assess the magnitude of these risks. In situ treatment could be implemented to further reduce residual risks, if necessary. Residual risks would remain under Groundwater Alternative 2, but groundwater monitoring would be conducted to assess the magnitude of these risks. In addition, the active remediation contingency could be implemented under Groundwater Alternative 2 to help reduce residual risks if natural processes alone are not effective. Groundwater Alternative 1 would leave the greatest magnitude of residual risks because no groundwater treatment would be undertaken and no monitoring would be implemented.

Groundwater Alternatives 2 and 3 would provide similar controls, including institutional and engineering controls and groundwater monitoring. Groundwater Alternative 2 also includes a contingency for active remediation through activation of Groundwater Alternative 3.

Groundwater Alternative 3 relies on extraction and ex situ treatment but also includes a contingency for in situ treatment at the source area.

Under Groundwater Alternative 1, groundwater monitoring would not be implemented to evaluate the effectiveness of natural attenuation of hazardous substances.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

Under Groundwater Alternative 3, toxic hazardous substances would be destroyed through groundwater extraction and treatment as well as in situ treatment, if implemented. Under Groundwater Alternative 3, the total mass of VOCs would be reduced through groundwater extraction and treatment. Toxic and hazardous substances would be degraded through natural attenuation processes under Groundwater Alternative 2 or would be destroyed if the contingency for active remediation is implemented. Under Groundwater Alternative 1, the total mass of VOCs would be reduced only by natural attenuation processes. Furthermore, any reductions in the toxicity of contaminants would not be monitored under Groundwater Alternative 1. The mobility of VOCs would be reduced by the groundwater extraction system under

Groundwater Alternative 3, which would prevent the plume from migrating. The mobility of VOCs would not be significantly reduced under Groundwater Alternative 2 unless the groundwater treatment contingency of active remediation was implemented. The mobility of VOCs would not be reduced under Groundwater Alternative 1. Under Groundwater Alternatives 2 and 3, groundwater monitoring would be conducted to assess the magnitude of contaminant migration. The volume of contaminated groundwater would be reduced under Groundwater Alternative 3 but would not be reduced under Groundwater Alternative 1 or Groundwater Alternative 2 unless the active remediation contingency is implemented.

Short-Term Effectiveness

Except for Groundwater Alternative 1, all the groundwater alternatives would provide for institutional controls that would help protect property owners from ingestion of contaminated groundwater. Groundwater Alternatives 2 and 3 have the potential to present some degree of short-term exposure to workers and the community during installation of additional monitoring or extraction wells. Groundwater Alternatives 2 and 3 present low degrees of short-term risks and impacts associated with increased construction traffic and site activities during well installation. Groundwater Alternative 3 has the potential to present some degree of short-term risk to the community and workers as a result of potential exposure to contaminated groundwater through spills or leaks from the extraction and treatment system or system malfunction.
Limited data exist and remedy time frames have been estimated with some degree of uncertainty, especially for length of treatment. Groundwater Alternative 1 would not involve any action; therefore, no time would be required for its implementation. Groundwater Alternative 2 would require about 2 months to implement and 30 years for groundwater monitoring. Groundwater monitoring data would be required to evaluate whether the contingency of active remediation associated with this alternative would be implemented; no timeframe has been estimated for the contingency of active remediation because the need for initiating and actual scope of the contingency is unknown. Groundwater Alternative 3 would require about 6 months to implement and 30 years for groundwater treatment and monitoring. The cleanup period for Groundwater Alternative 3 could be reduced if the contingency of in situ treatment is implemented; no timeframe has been estimated for the contingency of in situ treatment because the need for initiating and the actual scope of the contingency is unknown.

Implementability

Groundwater Alternative 1 would require no action. Groundwater Alternative 2 would be the next easiest to technically implement because it would require only monitoring well installation and groundwater monitoring (unless active remediation is implemented). Groundwater Alternative 3 would be the most difficult to implement technically because additional data, including pump tests, would be needed to properly design the treatment system. In addition, the discharge of treated groundwater to Cedar Creek may be somewhat difficult to implement, depending on the actual volume of effluent.

Groundwater Alternatives 2 and 3 would require that institutional controls be placed on numerous properties at and near the site. In addition, Groundwater Alternative 3 would be more difficult to implement administratively because numerous access agreements would be needed and because permits or their substantive requirements would have to be satisfied for air emissions or groundwater discharge.

Cost

Contingencies were included with Alternatives 2 and 3 because of the uncertainty associated with the feasibility of remediating the aquifer. The cost estimates presented in the FS do not include contingent actions. Therefore, the cost estimates for the groundwater alternatives presented in the FS report could be lower than actual remediation costs if contingent actions are implemented. The present worth costs for the three groundwater alternatives, from highest to lowest, are as follows:

(1) Groundwater Alternative 3–$1,800,000; (2) Groundwater Alternative 2–$470,000; and (3) Groundwater Alternative 1–$0.

State Acceptance

The MDEQ is the support agency for this project. The State Agency is in support of a groundwater alternative to address on site concerns.

Community Acceptance

Community acceptance of the soil alternatives was evaluated after the public comment period. The community is supportive of a groundwater alternative.

COMPARATIVE ANALYSIS OF NORRIS ELEMENTARY SCHOOL ALTERNATIVES

The FS conducted for this site addressed alternatives for the vapor intrusion pathway at the Norris Elementary School. This comparative analysis addresses the vapor pathway of Norris School; however, the Agency is aware of other structures that the vapor pathways associated with the soil and groundwater plume could affect. The Agency in consultation with MDEQ will develop and implement a monitoring program for the continued evaluation of these structures.

The Norris Elementary School alternatives are compared below based on the nine criteria.

Overall Protection of Human Health and the Environment

Norris Elementary School Alternative 2 would be most protective of human health and the environment because it would rely on institutional controls and treatment using SVE to be protective of human health and the environment. Contaminated vapors would be extracted and prevented from entering the school building. Norris Elementary School Alternative 1 would not provide any protection of human health or the environment.

Compliance with Applicable or Relevant and Appropriate Requirements

Norris Elementary School Alternative 2 would comply with all cleanup, treatment, and air emission requirements; contaminants would be transferred to vapor and treated with granular activated carbon (GAC). Norris Elementary School Alternative 1 would not comply with state or federal ARARs.

Long-term Effectiveness and Permanence

Norris Elementary School Alternative 2 would leave the lowest magnitude of residual risks because contaminated vapors would be actively and permanently removed using the existing SVE system. Norris Elementary School Alternative 1 would leave the greatest magnitude of residual risks because no vapor treatment would be undertaken and no monitoring would be implemented.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

Toxic substances in groundwater would be transferred to vapor and treated on GAC under Norris Elementary School Alternative 2, reducing the total mass of VOCs. Under Norris Elementary School Alternative 1, any reductions in the toxicity of contaminants would not be monitored, and the mass of VOCs would be reduced only by natural attenuation processes. The mobility of VOCs would be reduced by the existing SVE system and the transfer to vapor phase and treatment with GAC under Norris Elementary School Alternative 2. The mobility of VOCs would not be reduced under Norris Elementary School Alternative 1. The volume of contaminated vapors would be reduced under Norris Elementary School Alternative 2. The volume of contaminated vapors would not be reduced under Norris Elementary School Alternative 1.

Short-Term Effectiveness

Norris Elementary School Alternative 2 would pose little short-term risk to the community, except for the potential of the release of VOCs to the atmosphere if the current SVE system malfunctions. However, the risk would be eliminated once the system was restored. Norris Elementary School Alternative 1 would pose risk to the community because contaminated vapors would be allowed to infiltrate into the school building. Norris Elementary School Alternative 1 would not involve any action; therefore, no time would be required for its implementation. Norris Elementary School Alternative 2 would also require no time to implement, as the system is already operational; however, this alternative would require 5 years for vapor treatment. This time could decrease based on implementation of the removal and remedial actions and whether the Norris School building remains in use.

Implementability

Both Norris Elementary School Alternatives 1 and 2 would be technically and administratively easy to implement because Alternative 1 would require no action and Alternative 2 is already in place and operational.

Cost

The present-worth costs for the two Norris Elementary School alternatives, from highest to lowest, are as follows: (1) Norris Elementary School Alternative 2–$350,000, and (2) Norris Elementary School Alternative 1–$0.

State Acceptance

The MDEQ is the support agency for this project. The State Agency is in support of an operational alternative for the Norris School. In addition, the MDEQ is also in support of the Agency implementing a vapor monitoring program.

Community Acceptance

Community acceptance of the Norris School alternatives was evaluated after the public comment period. The community is supportive of an operational alternative for the Norris School.

Selected Remedy

Summary of the Rationale for the Selected Remedy

The goal of this remedial action is to restore the land as necessary to allow its reuse and to restore the ground water to its beneficial use, which is, at the Grand Traverse Overall Supply site, a potential future drinking water source. Based on information obtained during the SI and on a careful analysis of all remedial alternatives, the U.S. EPA believes that the selected remedy will achieve this goal. It may become apparent during implementation or monitoring of the remedy, that contaminant levels have ceased to decline and are remaining constant at levels higher than the cleanup level over some portion of the contaminated plume. In such a case, the performance standards and/or the remedy may be reevaluated.

The selected remedy will include groundwater treatment during which the treatment technology's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. To ensure that cleanup levels continue to be maintained, the aquifer will be regularly monitored in those areas where treatment has ceased.

U.S. EPA believes the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria. The decisive factors that led to selecting the remedy include 1) the high level of protectiveness in a relatively short time frame, 2) the high level of compliance with ARARs, 3) the excellent long-term effectiveness while mitigating potential risks posed during implementation, 4) the high level of supporting agency and community acceptance, and 5) the reasonable present worth cost.

Description of the Selected Remedy

The selected remedy is alternative 2A for soils, alternative 3 for groundwater and Alternative 2 for Norris Elementary School. Because of discussions with MDEQ during the development of the ROD, the Agency is also including the development and implementation of a non intrusive vapor monitoring program to assure there are no vapor issues associated with the soil and groundwater contamination. These alternatives include the following remedial components:

- Residual Soil Excavation and Off-site Disposal

- The operation of a groundwater pump and treat system with a contingency for in situ treatment should that be necessary.

- Continued operation of the SVE system at Norris Elementary School for the control of vapors under the school building

- The continued assessment of the vapor pathway to assure protection of human health and the environment. If it is determined that vapor is or becomes an issue, the Agency in consultation with MDEQ, will determine the need for additional remedial actions.

- Institutional Controls Restricting Groundwater Use and Land Use

The selected remedy provides a step-wise approach for the implementation of only those remedial components that are necessary to achieve soil and groundwater cleanup levels in a reasonable period of time, i.e., approximately 30 years from the start of the remedial action at the site. Source materials constituting principal threat wastes at the site include highly contaminated soils and reservoir for contamination migration to groundwater at the site. The removal program is implementing a building demolition project with the excavation of contaminated soils located under the building. These contaminated soils are causing the groundwater degradation moving off site. The soil alternative the remedial program has selected will be implemented if additional soil excavation is required following confirmatory sampling by the removal program. A groundwater pump and treat system will be installed to treat contaminated groundwater.

Final details of soil remediation alternatives will be determined during the remedial design. This will include additional soil characterization prior to excavation. For all site excavation activities perimeter air monitoring will be conducted in compliance with the regulations established by Michigan's Air Pollution Control Rules (PA 451, Part 55) and the Clean Air Act to assure protection of human health and the environment.

For groundwater, Alternative 3 will be implemented to return groundwater to unrestricted use, i.e., drinking water standards of the Safe Drinking Water Act and Michigan's Part 201 standards. Figure 5 in Appendix A shows the conceptual plan for the pump and treat system Final details of the remedial design including number of pumping wells, depth and location of the pumping wells and discharge of treated groundwater will be determined during the remedial design.

Due to the venting of contaminated groundwater to Grand Traverse Bay, visual monitoring of the beach area near the Harbor West Marina Condominiums will be conducted to ensure no puddles of contaminated groundwater are forming on the beach. If puddles are identified then sampling of the puddles will be completed as a part of the groundwater monitoring program.

Also as part of the selected remedy, the Agency will establish a monitoring program to evaluate the potential groundwater volatilization to indoor air for areas considered affected by the groundwater plume. The specific details of the monitoring program will be developed during the remedial design process. The monitoring program will incorporate the use of non-intrusive sampling procedures and the ability to modify the monitoring program based upon sample results collected. The Agency, in consultation with the MDEQ will maintain the ability to modify the monitoring program based upon sample results collected.

The remedy may change somewhat as a result of the remedial design and construction processes. Changes to the remedy described in the ROD will be documented using a technical memorandum in the Administrative Record file, an Explanation of Significant Differences (ESD), or ROD amendment, as appropriate.

Institutional Controls

The selected remedy includes the development and implementation of institutional controls to restrict groundwater use and land use on the Grand Traverse Overall Supply site and in areas where site-related contaminants have migrated, until drinking water standards and soil cleanup levels are achieved. In addition, an institutional controls plan will be drafted during the remedial design for the site. The institutional controls are needed to prevent direct contact with or ingestion of soil and groundwater contaminated by site-related contaminants.

Summary of the Estimated Remedy Costs

The overall present worth cost for the selected remedy is estimated to cost $2,300,000. The major capital and O&M cost elements for the selected remedy are presented in Tables 3, 4 and 5 of Appendix B of this ROD. The information in this cost estimate table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Expected Outcomes of the Selected Remedy

The expected outcomes of the Selected Remedy include unrestricted use of groundwater and light industrial/residential use of the land within 30 years from the start of the remedial action when cleanup levels are achieved. Exposure to soil will be controlled through excavation and off-site disposal and institutional controls. Soil cleanup levels are the contaminant levels provided by the Michigan's Part 201 necessary for the protection of groundwater. Exposure to groundwater will be controlled through treatment and institutional controls. Groundwater cleanup levels are the drinking water standards of the Safe Drinking Water Act and Michigan's Part 201.

Statutory Determinations

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy will protect human health and the environment through the removal of contaminated soil. The selected remedy will also pump and treat groundwater contamination through an air stripper to achieve State and Federal drinking water standards in a reasonable period of time.

Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy of soil removal, groundwater pump and treat and continued operation of the Norris Elementary School SVE system will comply with all ARARs. The

ARARs are presented below and the Chemical, Location, and Action-Specific ARARs include the following:

- State of Michigan's Part 201 cleanup criteria

- State of Michigan's Air Pollution Control Rules

- Safe Drinking Water Act MCLs (40 CFR Part 141), which specify acceptable concentration levels in ground water; and

- Clean Air Act requirements for emissions from air sparging and soil vapor extraction units.

- Part 111, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended;

- Part 115, Solid Waste Management of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended;

- Resource Conservation and Recovery Act, 1976 PA 94-580, as amended, Subparts C and D.

- Part 31, Water Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended: Part 1 and 4, Groundwater to Surface Water Discharge.

The selected remedy will comply with ARARs by the treatment of groundwater to meet the acceptable concentrations pursuant to Part 201 of the NREPA. Specifically, the cleanup of contaminated groundwater will meet drinking water standards and the Groundwater to Surface Water Interface (GSI) criteria established in Part 201. The point of compliance for the GSI criteria will be located along Grand Traverse Bay and Cedar Creek. Existing monitoring wells along Grand Traverse Bay and Cedar Creek will be included in the monitoring program. The removal of contaminated soils will meet generic residential cleanup criteria protective of groundwater as a drinking water source, would result in compliance with chemical-specific ARARs. The selected remedy will also comply with other ARARs that are applicable to the actual operation of the SVE system currently operating at the Norris School, including the Michigan Air Pollution Control Rules (PA 451, Part 55) and fugitive dust control requirements (40 CFR 51). If on-site excavation activities are conducted, appropriate perimeter air monitoring will be conducted. Table 6 in Appendix B provides a summary of potential ARARs for the site.

Cost-Effectiveness

U. S. EPA has determined that the selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness.” (NCP §300.430(f) (1) (ii) (D)). This was accomplished by evaluating the “overall effectiveness” of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness).

Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent.

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

U.S. EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA has determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering State and community acceptance.

The selected remedy addresses source materials constituting principal threats at the site, achieving significant reductions in solvent concentrations in soil and ground water and will effectively reduce the mobility of and potential for exposure to contaminants remaining on-site. The selected remedy does not present short-term risks significantly different from the other treatment alternatives. There are no special implementability issues that set the selected remedy apart from any of the other alternatives evaluated, other than the requirement for pilot testing.

Preference for Treatment as a Principal Element

By treating the contaminated groundwater through a pump and treat system with air stripping, the selected remedy addresses principal threats posed by the site through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

Documentation of Significant Changes from Preferred Alternative of Proposed Plan

There were no significant changes in the selected remedy from the preferred alternative in the proposed plan.

PART 3: RESPONSIVENESS SUMMARY

Stakeholder Issues and Lead Agency Responses

The Agency received over 75 comments during the public comment period. All the comments were in support of our proposed remedy. One area of concern that was raised in a majority of the comments involves the discharge of treated groundwater from the groundwater extraction system. There are two options for discharge of the treated groundwater: Discharge to Cedar Creek or Discharge to the local POTW. Initial discussions with the POTW indicated that the POTW will not accept discharges from groundwater treatment facilities on a long term basis. The pretreatment coordinator at the Traverse City WWTP indicated that the POTW does not believe that a municipal wastewater treatment facility is well suited to handle the types of contaminants typically found in contaminated groundwater and that the POTW did not have the capacity to handle the waste. The POTW does consider application for temporary discharges due to an emergency situation, during drawdown tests or during the period of time that an NPDES permit is being pursued. Because of public concern about discharge to Cedar Creek additional review for discharge options will take place during the design phase of the project.

During the development of the ROD, MDEQ requested that the Agency include the continued assessment of the vapor pathway to assure protection of human health and the environment. The Agency will establish a monitoring program to continue to evaluate the potential soil and groundwater volatilization to indoor air pathway for other areas considered affected by the site. Specific details of the monitoring program will be developed during the remedial design process. The monitoring program will incorporate the use of non- intrusive sampling procedures.

All comments received are included in Appendix E.

Technical and Legal Issues

There are no technical and legal issues as necessary.