United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-92/201
June 1992

EPA

Superfund Record of Decision:

Electrovoice, MI

NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R05-92/201	2.	3. Recipient's Accession No.

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SUPERFUND RECORD OF DECISION
Electrovoice, MI
First Remedial Action - Final

5. Report Date
06/23/92

6.

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Washington, D.C. 20460

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800/000

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15. Supplementary Notes
PB93-964107

16. Abstract (Limit: 200 words)
The Electrovoice (EV) site is an active manufacturing facility for audio equipment in Buchanan, Michigan. Land use in the area is predominantly residential. McCoy Creek, the nearest surface waterbody, is located approximately 2,000 feet north of the facility. All residents are connected to the city water supply and city wells are located 4,000 feet west of the property. Electrovoice has been in operation at its present location since 1946. Current activities at the facility include painting, electroplating, assembly, die casting, and machining. The site contains a dry well area, where disposal of paint wastes occurred between 1964 to 1973; a fuel tank area, which stored no.6 fuel oil from 1946 to 1960; and a lagoon area, where disposal of electroplating wastewaters occurred from 1952 to 1962. In 1979, the state was notified of a release of plating waste into one of the lagoons, which prompted an inspection of the site. That same year, Electrovoice hired a contractor to remediate the two lagoons and install ground water monitoring wells onsite. In 1980, the north lagoon and its contents were removed, and the south lagoon was backfilled. However, no contaminated materials were removed from the south lagoon. Ground water monitoring conducted in 1980 revealed significant concentrations of VOCs and metals. The dry

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Electrovoice, MI
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Contaminated Media: soil, sludge, gw
Key Contaminants: VOCs (benzene, toluene, PCE, TCE, xylenes), organics (PAHs), metals (chromium)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 52
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

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Electrovoice, MI
First Remedial Action - Final

Abstract (Continued)

well area soils are the principal onsite threat because they are the source of the ground water contamination. This ROD addresses remediation of onsite ground water and soil as a final remedial action. A future ROD will address all offsite ground water contamination, which extends from the EV property boundary about one-half mile north to McCoy Creek. The primary contaminants of concern affecting the soil, sludge, and onsite ground water at the site are VOCs, including benzene, PCE, TCE, toluene, xylenes; other organics, including PAHs; and metals, including chromium.

The selected remedial action for this operable unit includes construction of a soil vapor extraction system (SVE), followed by excavation of 2,100 cubic yards of remaining sludge, offsite solidification, and landfilling of the sludge layer; collection and treatment of onsite contaminated ground water onsite using either granular or powdered activated carbon, air stripping, chemical oxidation/reduction or photolysis/oxidation; discharge to a POTW; and monitoring of off-property ground water. If, following these actions, the soils do not meet treatment standards, further remedial action consistent with RCRA closure will be taken, including installation of a hazardous waste cap over the lagoon area soils. An investigation of the potential existence of a lower aquifer in the area of the former dry well area will also be conducted. Deed restrictions for the property and surrounding properties will prohibit future installation of drinking water wells. The estimated present worth cost for this remedial action is $4,100,000, which includes an annual O&M cost of $330,000 for a 2- to 5-year operational period.

PERFORMANCE STANDARDS OR GOALS: Chemical-specific soil clean-up goals are based on state standards and include arsenic 0.4 ug/kg; benzene 20.0 ug/kg; PCE 14.0 ug/kg; TCE 60.0 ug/kg; toluene 16,000 ug/kg; and xylenes 6,000 ug/kg. Chemical-specific ground water clean-up goals are also based on state standards and include benzene 1.0 ug/l; TCE 3.00 ug/l; toluene 800.0 ug/l; xylenes 20.00 ug/l.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Electro-Voice Site
Buchanan, Michigan

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Electro-Voice, Inc. (EV), site developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based upon the contents of the Administrative Record for the EV site.

The State of Michigan concurs on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF SELECTED REMEDY

This operable unit is the first of two operable units for the site. The first operable unit addresses remediation of on-property groundwater and soil contamination by eliminating or reducing the risks posed by the site through treatment of the source of groundwater contamination, the dry well area soils, treatment of on-property groundwater, monitoring off-property groundwater, and engineering and institutional controls.

The major components of the selected remedy include:

* Evaluate and determine the existence of a separate lower aquifer and any impact the EV site may have on it.

* Deed restrictions on the EV property to prohibit installation of drinking water wells and prohibit construction in the lagoon area and dry well area if cleanup levels are not attained. Deed restrictions on properties under which the EV plume travels to prohibit installation of drinking water wells.

* Soil Vapor Extraction (SVE) for 2 to 5 years followed by excavation, solidification and landfilling of the dry well area sludge layer.

* If after treatment and excavation the dry well area soils do not meet the cleanup standards established pursuant to Michigan's Act 307 Type B criteria, U.S. EPA will consider further remedial action consistent with RCRA.

* Install and maintain a hazardous waste cap meeting the substantive requirements of Michigan's Act 64 over the lagoon area soils.

* Install and maintain a groundwater collection and treatment system capable of capturing all contaminated groundwater located beneath the EV property boundary. Groundwater will be actively remediated until it meets Michigan's Act 307 Type B cleanup standards.

* Discharge of treated groundwater will be to the Publicly Owned Treatment Works (POTW).

* Monitor off-property groundwater.

DECLARATION

The selected remedy for the first operable unit is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable given the limited scope of the action. Because this action does not constitute the final remedy for the site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed at the time of the final response action. Subsequent actions are planned to address fully the off-property groundwater at this site.

David A. Ullrich

for Valdas V. Adamkus
Regional Administrator
U.S. EPA - Region V

June 23, 1992
Date

RECORD OF DECISION

DECISION SUMMARY

ELECTRO-VOICE SITE

SOURCE CONTROL OPERABLE UNIT

BUCHANAN, MICHIGAN

Prepared By:

U.S. Environmental Protection Agency

Region V

Chicago, Illinois

June, 1992

TABLE OF CONTENTS

FIGURES AND TABLES

I. SITE LOCATION AND DESCRIPTION

Electro-Voice, Inc. ("EV"), is located at 600 Cecil Street in the City of Buchanan, Berrien County, Michigan, and is a manufacturer of audio equipment. Current activities at the facility include painting, electroplating, assembly, die casting and machining. EV has been in operation at its present location since 1946.

The site consists of the Electro-Voice building and parking area, a former dry well area where disposal of paint wastes occurred, a former lagoon area where disposal of electroplating wastewaters occurred, a former fuel tank area and a groundwater contaminant plume which extends from the EV property boundary one-half mile north to McCoy Creek. Groundwater contamination has been determined to extend from the Electro-Voice property to McCoy Creek, which is located approximately one-half mile north of the EV property (downgradient). See Figures 1 and 2.

The population of Buchanan in 1980 was approximately 5,142. The EV property is surrounded on three sides by residential homes and on the fourth side by an elementary school. All residents are connected to the city water supply. The city wells are located approximately 4,000 feet west of the EV property and are not considered to be threatened by the EV contaminant plume, as groundwater flow is to the north. The city water supply wells are screened from 20 to 44 feet below grade and are screened in the same aquifer in which the EV contaminant plume exists. The city's water supply is tested annually for volatile organic compounds (VOCs), and according to a city official, has never tested positive for VOCs.

McCoy Creek is the nearest surface water body and is located approximately 2,000 feet north of the EV facility. The Creek has an average depth of 2 feet, average width of 12 feet, and average velocity of 0.66 feet per second. McCoy Creek discharges into the St. Joseph River. Other surface water bodies in the vicinity of the EV property consist of ponds associated with gravel-pit operations, and several small unnamed lakes and ponds southeast of the property.

There are no rare or endangered species known to be resident at the EV site, nor are there species of special economic or recreational value for which the EV site serves as critical habitat. McCoy Creek is designated as a protected trout stream by the Michigan Department of Natural Resources ("MDNR"). Brown trout are stocked by MDNR at locations upstream from the City of Buchanan. There are no known wetlands in the immediate vicinity of the EV property.

The study area is covered with soils of the Oshtemo series. These soils are formed on glacial outwash plains and moraines and are described as well-drained sandy loams. Permeability is

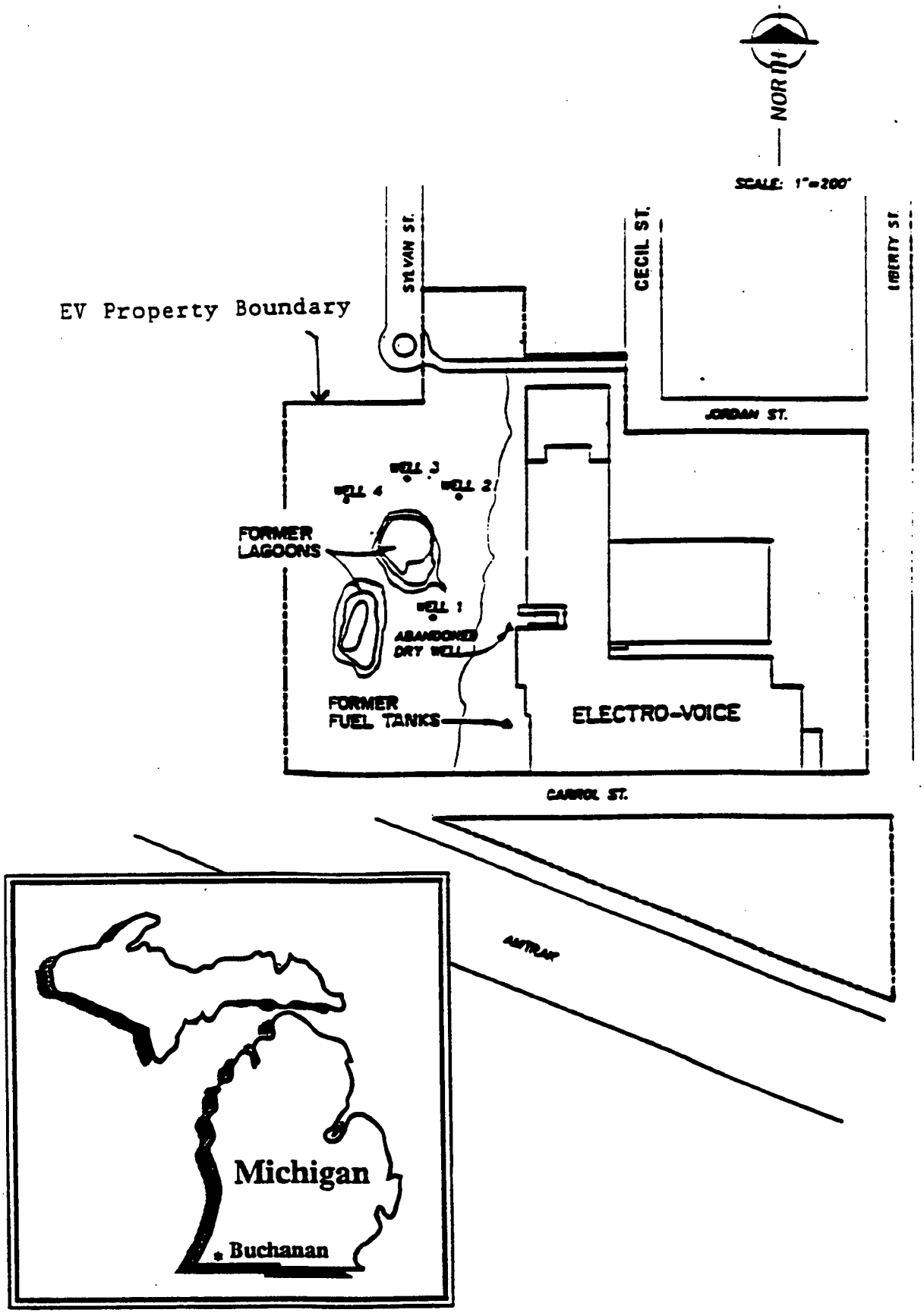

FIGURE 1
EV PROPERTY MAP

SOURCE: Figure 1-4, *Electro-Voice FS*, FTC&H Engineers & Scientists, 1-90.

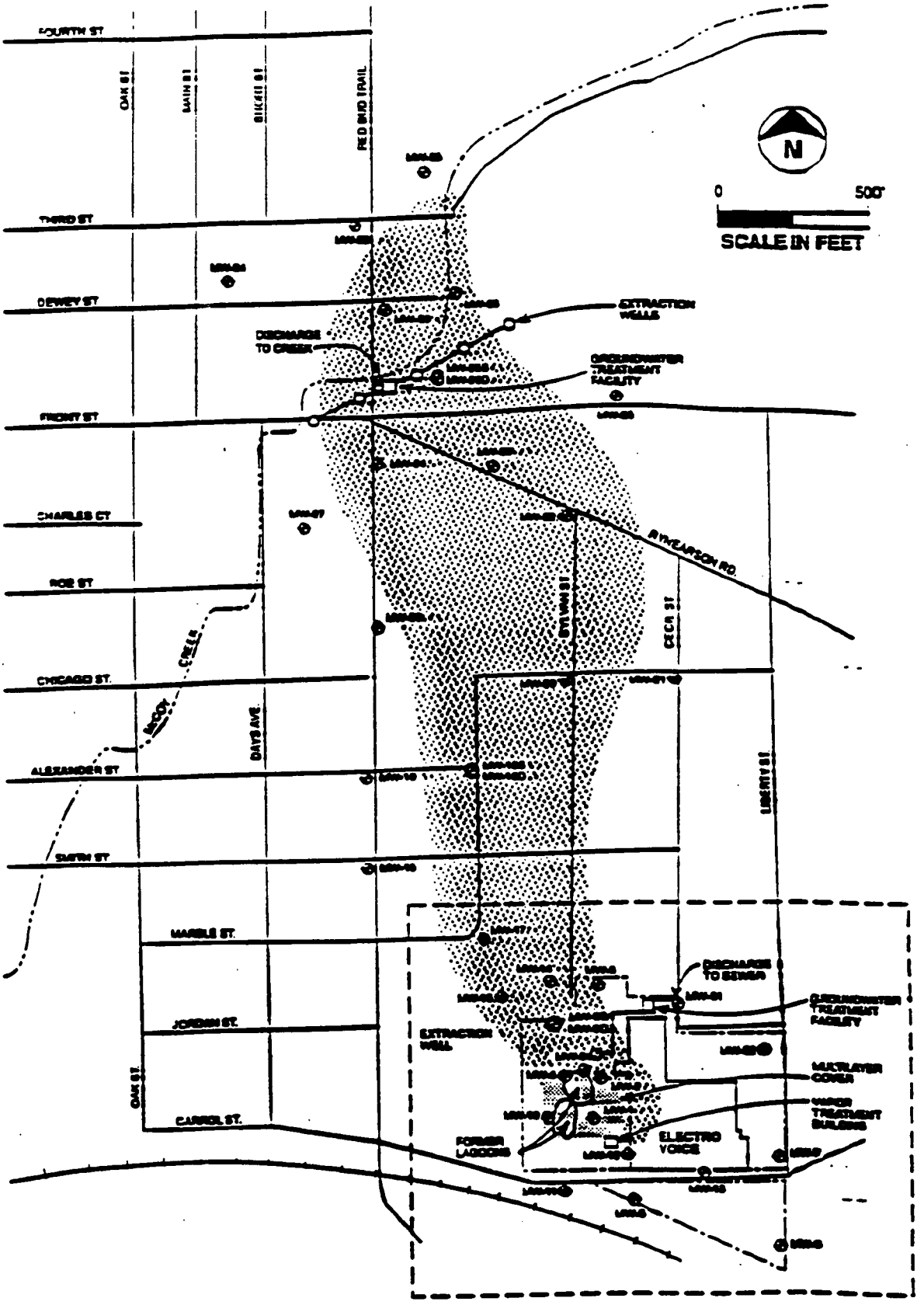

FIGURE 2
SITE MAP

moderately rapid in the upper part of the subsoil and very rapid in the lower part. The study area generally consists of two geological units: an outwash, sand and gravel unit, underlain by a clay-rich-till unit. The upper portion of the outwash unit is unsaturated and the lower portion comprises an unconfined aquifer. Drillers' logs of the region indicate that a lower-confined aquifer also exists in localized areas. In the areas where both aquifers exist, they are separated by a clay-rich-confining layer.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

In 1952, EV constructed two clay-lined lagoons (north and south) for disposal of liquid waste from the electroplating operation at the plant. The north lagoon was the primary discharge lagoon. The north lagoon was approximately 50 feet in diameter and 11 feet deep with very steep side slopes. EV discharged plating waste to the north lagoon from 1952 to 1962. Information supplied by plant personnel indicates that this lagoon was continuously filled with standing water. A 12-inch-diameter pipe served as an overflow to the south lagoon. The south lagoon was approximately 40 feet by 75 feet in area and 10 feet deep. Use of these lagoons was discontinued in 1962, due to the installation of a new wastewater treatment facility in the EV building.

With the installation of a new automated painting system in 1964, a dry well was installed for disposal of wastes produced during painting operations. The dry well consisted of a hole in the ground which was backfilled with gravel. A gravity drain pipe connected a sink inside the building to the dry well. The sink was used to clean equipment associated with the paint shop. Liquid waste disposal in the sink reportedly included cleaning solvents (toluene, xylene, 2-butanone (MEK) and chlorinated solvents) and residual paint used in the manufacturing operations. The dry well was reportedly in use from 1964 to 1973.

In 1973, a subsurface tank (20,000-gallon capacity) was installed immediately west of the dry well to collect discharge from the paint shop. In 1975, the subsurface tank was removed and replaced with an upright buried tank of similar capacity. The second tank was removed in 1983. An aboveground tank, with a capacity of 1,000 gallons, was placed near the dry well and was identified as the MEK tank. The MEK tank has also been removed from the site.

Two partially buried fuel-oil tanks were excavated and removed from the site during July 1987. These tanks had been onsite since 1930. EV used the tanks from 1946 to 1960 for storage of No. 6 fuel oil.

In March 1979, plating waste solution was released into the north lagoon as a result of a ruptured drain pipe. EV reported this incident to the MDNR, which began an investigation of the site shortly after the incident was reported. The MDNR requested a review of onsite plating waste treatment and conducted an inspection of the EV property in March 1979.

In 1979, EV hired a contractor to develop a program for removal and abandonment of the two lagoons. In January 1980, four groundwater monitoring wells were installed around the lagoons to determine if liquid waste had leaked from the lagoons, thereby contaminating groundwater in the area. Groundwater samples collected in January 1980 contained detectable concentrations of xylene, toluene and lead.

In September 1980, the north lagoon and its contents were removed. The area was then backfilled. The south lagoon was merely backfilled (no contaminated materials were removed) and leveled to the natural surface topography of the area.

On July 29, 1982, a Hazard Ranking System (HRS) score was developed for the EV site. On September 8, 1983, the EV site was proposed for inclusion on the National Priority List (NPL), and the proposal became final on November 21, 1984 (49 Fed.Reg. 185).

In October 1987, EV entered into an Administrative Order by Consent to conduct the Remedial Investigation and Feasibility Study at the EV site.

III. COMMUNITY RELATIONS ACTIVITIES

A Community Relations Plan for the EV site was finalized in March 1989. This document lists contacts and interested parties throughout government and the local community. It also establishes communication pathways to ensure timely dissemination of pertinent information. A fact sheet outlining the Remedial Investigation (RI) sampling program was distributed to interested parties in February 1991. U.S. EPA held a public meeting in Buchanan, Michigan on February 28, 1991, to explain the results of the RI. U.S. EPA was informed by the public at the public meeting on February 28, 1991, that children were regularly playing in the former lagoon area on the EV property. In response to this information, U.S. EPA collected five surface soil samples from the lagoon area soils. The samples were analyzed for arsenic, lead and cadmium. The levels of cadmium in the surface soils exceeded the recommended levels for residential backyard soils. U.S. EPA requested that EV construct a fence around these soils immediately to discourage children from trespassing on them. EV complied with this request. U.S. EPA held an availability session in Buchanan on May 14, 1991, to discuss the lagoon area soil sampling results and any other health concerns the public had.

U.S. EPA and MDNR notified the local community, by way of the Proposed Plan, of the recommendation of a remedial alternative for the EV site. To encourage public participation in the selection of a remedial alternative, U.S. EPA and MDNR scheduled a public comment period from October 1, 1991, to November 29, 1991. At the request of the Buchanan City Manager, the public comment period was extended to December 13, 1991.

U.S. EPA and MDNR held two public meetings in Buchanan, Michigan, on October 30, 1991, and November 14, 1991, to discuss the recommended remedial alternatives and the other alternatives identified and evaluated in the Feasibility Study (FS). Transcripts of these meetings are included as part of the Administrative Record for the EV site.

A significant change has been made in the remedy selected for the EV site since the publication of the FS and the Proposed Plan in September 1991. The remedy recommended in the Proposed Plan was Alternative 4A: institutional controls; soil vapor extraction of dry well area soils followed by excavation and landfilling of remaining sludge layer; Michigan's Act 64 cap on the lagoon area soils; pump and treat all on- and off-property contaminated groundwater. Since publishing the Proposed Plan, U.S. EPA has determined that an operable unit approach is more appropriate for this site than selection of a final remedy at this time. The Agency's decision to utilize an operable unit approach was made after considering the substantial number of public comments which preferred monitoring the off-property groundwater rather than actively remediating the off-property groundwater through pump and treat. U.S. EPA has determined that the operable unit approach is more appropriate at this time because it allows a more focused, logical approach, whereby the contaminated soils, which are the source of groundwater contamination, and the more highly contaminated groundwater, the on-property groundwater, are treated first. The treatability study is required under this first operable unit ROD. U.S. EPA will evaluate the effect of a treatability study on soils and on-property groundwater prior to making a final remedy decision for the off-property groundwater in the second operable unit ROD.

U.S. EPA's responses to comments received during the public meeting and to written comments received during the public comment period are included in the Responsiveness Summary which is attached to this ROD. This decision document presents the selected remedial action for the first operable unit for the EV site in Buchanan, Michigan, chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the NCP. The decision for this site is based on the Administrative Record.

All comments which were received by U.S. EPA prior to the end of the public comment period, including those expressed verbally at the public meeting, are addressed in the Responsiveness Summary

which is attached to this ROD.

IV. SCOPE AND ROLE OF THE ACTION

This ROD addresses the first of two operable units for the EV site and consists of treatment and excavation of the dry well area soils, closure of the lagoon area soils, treatment of the on-property groundwater and monitoring of the off-property groundwater. The threats posed by this site to human health and the environment are future residential use of contaminated groundwater (both on- and off-property), and future residential use of the lagoon area soils. The dry well area soils are the principal threat at the site because they are the source of groundwater contamination.

These threats will be addressed through the selected cleanup action, which includes:

Lower Aquifer Investigation

* Determine whether a lower aquifer exists below the clay till in the area of the dry well area soils, and ensure that no contamination from the EV site has entered the lower aquifer, if it exists.

Dry Well Area Soils

* soil vapor extraction
* excavation, solidification and landfilling of sludge layer
* closure, if cleanup standards cannot be met with SVE and excavation

Lagoon Area Soils

* determination of the extent of contamination
* capping of contaminated soils with a hazardous waste cover pursuant to Michigan Act 64

Groundwater

* pump and treat on-property groundwater with discharge to a publicly-owned treatment works (POTW)
* monitor off-property groundwater.

NOTE: The term "on-property groundwater" means all contaminated groundwater located under the EV property; "off-property groundwater" means the portion of the contaminated groundwater plume which was identified during the Remedial Investigation, extending from the EV property boundary approximately one-half mile north to McCoy Creek (see Figure 2, site map).

V. SUMMARY OF SITE CHARACTERISTICS

The purpose of a Remedial Investigation (RI) at a Superfund site is to characterize the nature and extent of contamination and associated risks posed by hazardous substances at a site. The objective of an RI is not to remove all uncertainty, but rather to gather information sufficient to support an informed risk management decision regarding which remedy appears to be the most appropriate for a given site.

The RI performed at the EV site was designed to determine the nature and extent of site contamination through a program of soil, groundwater and surface water sampling. Site geology and ground water flow patterns also were examined during the study.

Analysis of groundwater indicated the presence of eleven VOCs and two inorganic compounds. Maximum Contaminant Levels (MCLs), established by the Federal Safe Drinking Water Act, were exceeded in on-property groundwater for vinyl chloride, benzene, ethylbenzene, and toluene. Off-property groundwater consists of the groundwater contaminant plume which extends from the EV property boundary, approximately 2,000 feet north to McCoy Creek. Off-property groundwater exceeded MCLs for trichloroethylene and vinyl chloride. Contaminants detected in groundwater during the RI are presented in Table 1.

Fuel tank area soils indicated five VOCs in concentrations considered to be too low to pose a threat to human health and the environment.

Three out of five surface water samples from McCoy Creek showed levels of 0.6 ug/l of trichlorethylene, which is below the Michigan ambient water quality criteria (AWQC) of 94 ug/l.

The population within the study area is presently utilizing city water for domestic uses. The City's groundwater wells are not considered to be threatened by the EV plume, although they are located in the same aquifer.

Analysis of dry well area soils indicated the presence of nine VOCs, twenty-six semi-volatile compounds (SVOCs), and fifteen inorganic compounds above background levels.

Analysis of north lagoon area soils indicated the presence of two VOCs, five SVOCs, and thirteen inorganic compounds above background levels. Analysis of south lagoon area soils indicated the presence of three VOCs, ten SVOCs and seventeen inorganic compounds above background levels.

Contaminants detected in soils are presented in Table 2.

TABLE 1

CHEMICALS DETECTED IN GROUNDWATER

Chemical	Frequency of Detection: Overall	Frequency of Detection: Above MCL	Range of Sample Quantitation Limits (µg/L)	Range of Detected Concentrations (µg/L)	Background Levels (µg/L)
VOLATILES					
Acetone	7/40	NA	10 - 670	4 - 860	4 - 13
Benzene*	3/40	2	5	3 - 54	ND
Bromodichloromethane	7/40	NA	5 - 330	2 - 4	ND
2-Butanone*	2/40	NA	10	790 - 890	ND
Carbon disulfide	1/40	NA	5 - 330	1	ND
Chloroethane*	4/40	NA	10 - 670	1 - 31	ND
Chloroform	7/40	NA	5 - 330	2 - 8	ND
Chloromethane*	1/40	NA	10 - 670	10	ND
1,1-Dichloroethane*	5/40	NA	5	3 - 300	ND
1,2-Dichloroethane*	3/40	1	5 - 330	2 - 20	ND
1,1-Dichloroethene	1/40	NA	5 - 330	1	ND
1,2-Dichloroethene (total)*	13/40	1	5	1 - 120	ND
Dibromochloromethane	5/40	NA	5 - 330	2 - 3	ND
Ethylbenzene*	4/40	2	5	1 - 2,400	ND
4-Methyl-2-Pentanone	1/40	NA	10 - 670	27	ND
Methylene chloride	29/40	NA	5 - 330	1 - 6	1 - 6
Toluene*	4/40	2	5	1 - 10,000	ND
1,1,1-Trichloroethane*	3/40	0	5 - 50	7 - 35	ND
Trichloroethane*	18/40	11	5 - 330	1 - 76	ND
Trichloroethylene*	1/40	NA	ND	13	ND
Vinyl chloride*	4/40	5	10 - 100	5 - 72	ND
Xylenes (total)*	3/40	0	5	3 - 8,000	ND
SEMI-VOLATILES					
Benzoic acid*	1/40	NA	50 - 56	200	ND
bis(2-ethylhexyl)phthalate*	10/40	NA	10 - 11	5 - 10	10 - 40
2,4-Dimethylphenol*	1/40	NA	10 - 11	8	ND
2-Methylphenol*	1/40	NA	10 - 11	10	ND
4-Methylphenol*	1/40	NA	10 - 11	54	ND
Napthalene*	1/40	NA	10 - 11	130	ND
METALS					
Aluminum	4/40	1	23 - 27	25 - 54.5	26 - 69.9
Antimony	1/40	NA	33 - 50.2	20.9	ND
Arsenic	1/40	0	1.6 - 2.2	3.0	2.3 - 13
Barium	7/40	0	NA	44 - 162	46 - 297
Beryllium	1/40	NA	0.29 - 0.7	5.7	0.74 - 9.4
Cadmium	1/40	0	4 - 4.4	12.4	12.4
Calcium	7/40	NA	NA	54,800 - 124,000	90,300 - 1,040,000

Table 1 (cont.)

Chemical	Frequency of Detection: Overall	Frequency of Detection: Above MCL	Range of Sample Quantitation Limits (µg/L)	Range of Detected Concentrations (µg/L)	Background Levels (µg/L)
Chromium	1/48	0	6.2 - 8.1	8.9	8.9
Cobalt	2/48	NA	2.6 - 3.9	6.7 - 7.4	3.3 - 24.9
Copper	5/48	0	3.1 - 7.2	10.2 - 15.5	11.6 - 26
Iron	14/48	5	3.7 - 5	4.1 - 25,600	31.1 - 25,600
Lead	2/48	NA	0.91 - 1.1	2.6 - 9.7	2.6
Magnesium	7/48	NA	NA	22,200 - 46,000	38,000 - 51,600
Manganese	13/48	4	NA	11.3 - 673	4.2 - 502
Mercury	1/48	0	0.20	0.2	ND
Nickel	1/48	0	34 - 35.8	38	ND
Potassium	6/48	NA	1,770 - 2,020	1,610 - 9,780	4,710 - 10,200
Selenium	0/48	NA	3.2 - 10	ND	ND
Silver	0/48	NA	5.7 - 9.4	ND	ND
Sodium	7/48	NA	NA	7,670 - 264,000	8,370 - 26,700
Thallium	0/48	NA	1.3 - 2	ND	ND
Vanadium	4/48	NA	NA	3.4 - 10.9	4.8 - 25.6
Zinc	7/48	0	2.6	35.4 - 575	69 - 1,080
INORGANICS					
Cyanide	4/48	NA	10	14 - 2,070	14 - 2,070

(EH)EV2900:D2917, 01203, PM-21

NA = Not available.
ND = Not detected.
MCL = Safe drinking water at maximum contaminant level.

*Chemicals of potential concern.

Source: Ecology and Environment, Inc. 1990.

TABLE 2

CHEMICALS DETECTED IN SOILS

Chemical	Frequency of Detection	Range of Sample Quantitation Limits (µg/kg)	Range of Detected Concentrations (µg/kg)	Background Levels (µg/kg)
VOLATILES				
Acetone	17/25	10 - 24,000	11 - 3,800	ND
Benzene*	1/25	5 - 12,000	1,600	ND
2-Butanone*	3/25	10 - 24,000	560 - 4,900	ND
Chloroform	4/25	5 - 12,000	1 - 3	1 - 2
1,1-Dichloroethane*	4/25	5 - 12,000	4 - 200	ND
1,2-Dichloroethene (total)*	5/25	5 - 12,000	1 - 200	ND
Ethylbenzene*	8/25	5 - 830	11 - 99,000	ND
4-Methyl-2-Pentanone	1/25	10 - 24,000	4	ND
Methylene chloride	24/25	NA	4 - 4,000	ND
Styrene	1/25	5 - 12,000	3,600	ND
Tetrachloroethene*	5/25	5 - 830	1 - 14,000	ND
Toluene*	6/25	5 - 640	2 - 330,000	ND
1,1,1-Trichloroethane*	5/25	5 - 12,000	170 - 6,200	ND
Trichloroethene*	10/25	5 - 12,000	2 - 420	ND
Xylenes (total)*	9/25	5 - 6	4 - 710,000	ND
SEMI-VOLATILES				
Acenapathene*	1/15	340 - 1,500	170	ND
Acenapathylene*	1/15	340 - 1,500	120	ND
Anthracene*	1/15	340 - 1,500	200	ND
Benzo(a)anthracene*	1/15	340 - 1,500	850	ND
Benzo(k)fluoranthene*	3/15	340 - 1,500	39 - 2,000	ND
Benzo(b)fluoranthene*	3/15	340 - 1,500	39 - 2,000	ND
Benzo(a)pyrene*	1/15	340 - 1,500	910	ND
Benzo(g,h,i)perylene*	1/15	340 - 1,500	370	ND
Benzoic acid*	1/15	1,600 - 7,300	64	ND
Benzyl alcohol*	1/15	340 - 1,500	48	ND
bis(2-ethylhexyl)phthalate*	8/15	340 - 1,500	13,500 - 14,000	ND
Butyl benzyl phthalate*	1/15	340 - 1,500	120	ND
Chrysene*	2/15	340 - 1,500	45 - 830	ND
Dibenzo(a,h)anthracene*	1/15	340 - 1,500	150	ND
Dibenzofuran*	1/15	340 - 1,500	440	ND
Di-n-butyl phthalate*	3/15	340 - 1,500	150	ND
1,2-Dichlorobenzene*	1/15	340 - 1,500	94	ND
2,4-Dimethylphenol*	1/15	340 - 1,500	530	ND
Di-n-octyl phthalate	1/15	340 - 1,500	430	ND
Fluoranthene*	3/15	340 - 1,500	86 - 1,800	ND
Fluorene	1/15	340 - 1,500	710	ND
Indeno(1,2,3-cd)pyrene*	1/15	340 - 1,500	340	ND
2-Methylnaphthalene*	4/15	340 - 1,500	77 - 1,300	ND
2-Methylphenol*	2/15	340 - 1,500	620 - 640	ND
4-Methylphenol*	1/15	340 - 1,500	610	ND
Naphthalene*	4/15	340 - 1,500	11,000 - 14,000	ND
Phenanthrene*	3/15	340 - 1,500	54 - 1,400	ND
Pyrene*	4/15	340 - 1,500	50 - 1,200	ND
1,2,4-Trichlorobenzene	1/15	340 - 1,500	73	ND

[EM]EV2900:D2917, 81204, PM=15

Table 2 (cont.)

Chemicals	Frequency of Detection	Range of Sample Quantitation Limits (µg/kg)	Range of Detected Concentrations (µg/kg)	Background Levels (µg/kg)
METALS				
Aluminum	11/11	NA	1,100 - 6,520	2,880 - 3,300
Antimony	4/11	7.8 - 8.3	6.8 - 9.1	ND
Arsenic*	11/11	NA	1.5 - 14	2.8 - 4.7
Barium*	11/11	NA	4.8 - 89	12 - 13
Beryllium	8/11	0.061 - 0.73	0.19 - 0.46	0.39 - 0.40
Cadmium*	9/11	0.80 - 0.81	0.85 - 735	ND
Calcium	11/11	NA	828 - 97,900	531 - 4,100
Chromium*	11/11	NA	3.5 - 1,340	5.5 - 8.4
Cobalt	11/11	NA	2.3 - 5.3	2.1 - 6.1
Copper*	11/11	NA	7.3 - 152	10 - 15
Iron	11/11	NA	4,470 - 15,600	6,230 - 12,700
Lead*	11/11	NA	4.6 - 83	5.4 - 15
Magnesium	11/11	NA	993 - 39,600	816 - 3,060
Manganese	11/11	NA	225 - 518	196 - 721
Mercury	1/11	0.10 - 0.11	0.69	ND
Nickel*	10/11	6.5 - 6.9	7.1 - 133	8.1 - 17
Potassium	7/11	359 - 446	419 - 1,280	729
Selenium	0/11	0.45 - 4.5	ND	ND
Silver	1/11	1.9 - 2.4	77	ND
Sodium	11/11	NA	216 - 1,010	220 - 243
Thallium	2/11	0.38 - 0.47	0.4 - 0.42	ND
Vanadium	11/11	NA	5 - 16	8.4 - 10
Zinc	11/11	NA	31 - 999	40 - 77
INORGANICS				
Cyanide	5/11	0.51 - 0.57	7.5 - 24	ND

(EM)EV2900:D2917, 81204, PM=15

ND = Not detected.
NA = Not available.

*Chemicals of potential concern.

Source: Ecology and Environment, Inc. 1990.

VI. SUMMARY OF SITE RISKS

A baseline risk assessment (RA) was conducted for the EV site in accordance with the guidance provided in U.S. EPA's Risk Assessment Guidance for Superfund (RAGs): Volume I, Human Health Evaluation Manual and risk assessment guidelines developed by the State of Michigan. The RA for the EV site is presented in two documents entitled "Risk Assessment for the Electro-Voice Site," September 1990, and "Supplemental Risk Assessment for the Electro-Voice Site," March 1991. The baseline RA consists of an identification of chemicals of concern, toxicity assessment, exposure assessment, risk characterization and ecological assessment. The baseline RA assumes no corrective action will take place and that no site-use restrictions will be imposed. The RA then determines actual or potential risks or toxic effects that the chemical contaminants at the site pose under current and future land use assumptions.

The off-property portion of the groundwater plume of contamination moves for a half mile under residential and city property before it discharges to McCoy Creek. Therefore, exposures based on drinking and dermal absorption were used to estimate the risks posed by the groundwater. The source of hazardous substance contamination of the groundwater are the dry well area soils at the EV property. The property owned by EV is currently used for industrial purposes; however, the property is bounded on the north, south and west by residences. The east side is bounded by an elementary school. Therefore, exposures based on reasonable future residential land use are appropriate to estimate the risks posed by the source areas.

MCLs were exceeded in on-property groundwater for vinyl chloride, benzene, ethylbenzene, and toluene. Off-property groundwater exceeded MCLs for trichloroethylene and vinyl chloride.

A. Contaminants of Concern

Contaminants of concern are detected contaminants which have inherent toxic/carcinogenic effects that are likely to pose the greatest concern with respect to the protection of public health and the environment. Selected contaminants of concern, for the purpose of the RA at the EV site, are presented in Table 3.

B. Toxicity Assessment

The purpose of the toxicity assessment is to develop human health and environmental receptor toxicity and carcinogenicity data for the chemicals of concern at the site and to provide an estimate of the relationship between the extent of exposure to a contaminant and the likelihood and/or severity of adverse effects. The toxicity assessment is accomplished in two steps--hazard identification and dose-response assessment.

TABLE 3

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN

Chemical	Concentrations	
	Soils (µg/kg)	Groundwater (µg/L)
VOLATILES		
Benzene	1,600	3 - 54
Chloroethane	ND	1 - 31
Chloromethane	ND	10
1,1-Dichloroethane	4 - 6	3 - 300
1,2-Dichloroethane	ND	2 - 24
1,2-Dichloroethene (total)	1 - 4	1 - 120
Ethylbenzene	11 - 95,000	1 - 2,400
2-Butanone	560 - 4,900	790 - 890
Styrene	3,400	ND
1,1,1-Trichloroethane	170 - 6,200	7 - 35
Tetrachloroethene	1 - 14,000	ND
Toluene	2 - 330,000	1 - 10,000
Trichloroethene	2 - 420	1 - 76
Vinyl chloride	ND	5 - 72
Xylenes (total)	4 - 710,000	3 - 8,800
SEMI-VOLATILES		
Acenaphthene	170	ND
Acenaphthylene	120	ND
Anthracene	200	ND
Benzo(a)anthracene	890	ND
Benzo(k)fluoranthene	39 - 2,000	ND
Benzo(b)fluoranthene	39 - 2,000	ND
Benzo(a)pyrene	910	ND
Benzo(g,h,i)perylene	370	ND
Benzoic acid	64	200
Benzyl alcohol	48	ND
bis(2-ethylhexyl)phthalate	13,500 - 14,000	5 - 10
Butyl benzyl phthalate	120	ND
Chrysene	45 - 630	ND
Dibenzo(a,h)anthracene	150	ND
Dibenzofuran	440	ND
Di-n-butyl phthalate	150	ND
2,4-Dimethylphenol	530	8
Di-n-octylphthalate	420	ND
Fluoranthene	84 - 1,800	ND
Indeno(1,2,3-cd)pyrene	340	ND
2-Methyl napthalene	77 - 1,300	ND
2-Methylphenol	620 - 640	18
4-Methylphenol	610	54
Napthalene	11,000 - 14,000	130
Phenanthrene	94 - 1,400	ND
Pyrene	90 - 1,100	ND
PCB-1254	375	ND
METALS		
Arsenic	1.5 - 14	3.8
Barium	4.8 - 69	44 - 162
Cadmium	0.88 - 735	12.4
Chromium	3.5 - 1,340	8.9
Copper	7.3 - 152	10.2 - 15.5
Lead	4.6 - 83	2.6 - 9.7
Nickel	7.1 - 133	38
Zinc	31 - 999	35.4 - 575
INORGANICS		
Cyanide	7.5 - 24	14 - 2,070

(EN)EV2900:D2917. 81206. PM=24

ND = Not detected.

Source: Ecology and Environment, Inc. 1990.

The dose-response evaluation presents available human health and environmental criteria for the contaminants of concern, and relates the chemical exposure (dose) to expected adverse health effects (response). Included in this assessment are the pertinent standards, criteria, advisories and guidelines developed for the protection of human health and the environment. An explanation of how these values were derived and how they shall be applied is presented below.

Cancer potency factors (CPFs) have been developed by U.S. EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg/day)-1, are multiplied by the estimated intake of a potential carcinogen, in mg/kg/day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassay to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by U.S. EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

C. Exposure Assessment and Risk Characterization

The exposure assessment identified potential pathways and routes for contaminants of concern to reach the receptors and the estimated contaminant concentration at the points of exposure.

The risk characterization quantifies present and/or potential future threats to human health that result from exposure to the contaminants of concern at the EV site.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1x10-6 or 1E-6 or 0.000001). An excess lifetime cancer risk of 1x10-6 indicates that, as a plausible upper bound, an

individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. The U.S. EPA generally attempts to reduce the excess lifetime cancer risk posed by a Superfund site to a range of 1X10-4 to 1X10-6 (1 in 10,000 to 1 in 1 million), with an emphasis on the lower end, 1X10-6, of the scale.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. If the estimated non-carcinogenic risk is less than 1.0, no adverse effects are expected. If the calculated non-carcinogenic risk is greater than 1.0, adverse health risks are possible.

The EV current land use exposure scenarios and the calculated risk characterization associated with each exposure scenario are as follows:

1. Inhalation of vapors from dry well area soils to:
   a. on-site workers
   b. children trespassing
2. Workers at Front St. businesses, basement infiltration of groundwater vapors, inhalation exposure indoors.
3. Recreational fishermen using McCoy Creek, ingestion and dermal exposure to water, fish ingestion.
4. Children trespassers, exposure to lagoon area soils (ingestion, dermal and inhalation of vapors).
5. Child exposure to arsenic in dry well area soils (ingestion, dermal).

Scenario	Reasonable Max. Carcinogenic Risk	Reasonable Max. Non-carcinogenic Risk
1a	1 X 10-6	0.03
1b	1 X 10-7	0.03
2	8 X 10-7	0.0006
	5 X 10-4 (if VC detected in Groundwater at 5 ppb)	
3	3 X 10-8	0.000004
4	1 X 10-7	0.04
5	2 X 10-7	------

Note: bold numbers indicate risk is outside risk range set forth in the NCP

Scenario 2 indicates a possible adverse carcinogenic exposure. At the time the risk assessment was completed, no vinyl chloride had been detected in groundwater in the area where Front Street businesses are located. However, because the detection limit used was inadequate, vinyl chloride may be present at concentrations below its detection limit but high enough to still pose a significant health risk. To take this possibility into account, the risk assessor assumed that vinyl chloride was present at its qualitative detection limit (5 ppb). During a subsequent investigation of surface water, monitoring wells 26 (shallow), 28, 30 and 35 were sampled and analyzed for vinyl chloride at a detection limit of 1.5 ppb. Vinyl chloride was detected in monitoring well 30 at a concentration of 7 ppb; none of the other monitoring wells sampled showed vinyl chloride above the detection limit (1.5 ppb). Monitoring well 26 is located closest to Front Street.

The future residential land use exposure scenarios that were evaluated are as follows:

1. Residential use at dry well location (direct contact), outdoor soil exposures (ingestion, dermal, and inhalation of vapors).
2. Residential use at dry well location, infiltration of vapors, indoor inhalation only.
3. Residential use of groundwater for drinking and showering (ingestion and dermal).
4. Residential use of lagoon area soils (ingestion, dermal and inhalation of vapors indoors and outdoors).
5. Residential use at dry well location, exposure to arsenic (ingestion, dermal).

Scenario	Reasonable Max. Carcinogenic Risk	Reasonable Max. Non-carcinogenic Risk
1	5 X 10-5	0.6
2	1 X 10-5	0.2
3	**4 X 10-4**	**18.0**
4	1 X 10-5	**2.0**
5	4 X 10-6	-----

Note: bold numbers indicate risk is outside risk range set forth in the NCP

All of the future use scenarios indicate there is a low long-term carcinogenic threat. Scenarios 3 and 4 both indicate an unacceptable non-carcinogenic risk (greater than 1). The dry well area soils, although posing a low long-term threat, has been identified as the source of groundwater contamination.

The exposure assumptions used in the EV RA are in accordance with U.S. EPA's guidance document Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part A), December 1989, and are as follows:

Scenario		Exposure Frequency	Exposure Duration
1 - ingestion	adult	365 days/yr	30 years
	child	365 days/yr	5 years
1 - dermal	adult	120 days/yr	30 years
	child	150 days/yr	5 years
1 - inhalation	adult	365 days/yr	30 years
	child	365 days/yr	5 years
2 - inhalation	adult	365 days/yr	30 years
	child	365 days/yr	5 years
3 - ingestion	adult	365 days/yr	30 years
	child	365 days/yr	5 years
4 - ingestion	adult	365 days/yr	30 years
	child	365 days/yr	5 years
4 - dermal	adult	120 days/yr	30 years
	child	150 days/yr	5 years
4 - inhalation	adult	365 days/yr	30 years
	child	365 days/yr	5 years

D. Ecological Assessment

An ecological assessment of the EV site was undertaken in order to identify any environmental resources at or near the site that might be adversely affected by site contaminants. An ecological assessment is a qualitative or quantitative appraisal of the actual or potential effects of hazardous waste site contaminants on plants and animals other than humans and domesticated species.

Organic and inorganic contamination in the dry well area, lagoon area and fuel tank area soils is not expected to result in adverse effects on terrestrial ecosystems due to the absence of stressed vegetation or stained soils at the site. At the time the ecological assessment was conducted, no surface soil sampling had been completed anywhere at the site. Surface soil sampling of lagoon area soils was subsequently conducted and confirmed that contamination of metals existed in surface soils as well as subsurface soils in this area.

Chlorinated hydrocarbons, alkylbenzenes, and low concentrations of several PAHs were found in groundwater near the former dry well area. Groundwater is located 30 to 50 feet below ground surface at the site and does not discharge to the site surface. Groundwater is therefore not expected to have any on-site ecological impacts. Groundwater does discharge to McCoy Creek approximately one-half mile north of the site. Surface water sampling of McCoy Creek indicated that contaminant levels from the EV plume in the Creek are below MCLs. Therefore it does not appear that contaminated groundwater entering McCoy Creek will adversely affect plants or animals which utilize McCoy Creek.

There are no rare or endangered species known to be resident at the EV site, nor are there species of special economic or recreational value for which the EV site serves as critical habitat.

U.S. EPA ambient water quality criteria (AWQC) for the protection of freshwater species are available for 1,2-DCE and TCE, which are designated chemicals of concern for the site. A computer database search was conducted to assess the toxicological effects of 1,2-DCE, TCE and vinyl chloride on aquatic flora and fauna. The search included the AQUIRE, PHYTOTOX, ENVIROLINE, BIOSDIS, POLLUTION, ABSTRACTS, and other data bases.

The quotient method was chosen as the methodologies for assessing risks to aquatic systems. The risk characterization results indicate that no significant effects on aquatic organisms are expected to result from groundwater contaminants discharged to McCoy Creek.

VII. ENVIRONMENTAL STANDARDS NOT MET AT THE SITE

In addition to posing unacceptable risks to receptors, the Electro-Voice site does not meet certain applicable or relevant and appropriate Federal or State environmental requirements (ARARs) at this time.

A. Groundwater

Table 4 lists the representative chemicals found in the contaminated groundwater plume and the corresponding Federal and State groundwater cleanup standards which the U.S. EPA believes to be adequately protective of human health and the environment. The off-property groundwater contains trichloroethene, 1,2-dichloroethene, and vinyl chloride. All other chemicals identified in the groundwater were detected only in the on-property groundwater. The groundwater contaminant plume contains concentrations of hazardous substances which exceed most of these groundwater standards and cleanup criteria.

TABLE 4
FEDERAL AND STATE GROUNDWATER CLEANUP STANDARDS

CHEMICAL CAS #	MCL/MCLG (ug/l)	MI ACT 307 TYPE B* (ug/l)
Volatile Organic Compounds		
Alkylbenzene	____	20.00
Benzene 71-43-1	5/0	1.00
2-Butanone 78-93-3	-----	400.00
Chloroethane 75-00-3	-----	9.00
Chloromethane 74-87-3	-----	3.00
1,2-Dichloroethane (1,2-DCA) 107-06-2	5/0	0.40
1,1-Dichloroethene (1,1-DCE) 75-35-4	7/7	0.06
1,2-Dichloroethene (1,2-DCE)		
cis 156-59-2	70	70.00
trans 156-60-5	100	140.00
Ethyl Benzene 100-41-4	700/700	70.00
Toluene 108-88-3	1,000/1,000	800.00
1,1,1-Trichloroethane (1,1,1-TCA) 71-55-6	200/200	600.00
Trichloroethylene (TCE) 79-01-6	5/0	3.00
Vinyl Chloride 75-01-4	2/0	0.02
Xylenes (total) 1330-20-7	10,000/10,000	20.00
Semi-volatile organic compounds		
Bis(2-ethylhexy)phthalate 117-81-7	4/0+	2.50
Napthalene 91-20-3	-----	30.00

* Groundwater protection criteria.
\+ proposed MCL and MCLG

The point of compliance for groundwater for cleanup purposes shall be throughout the on-property plume within the EV property (see Figure 1). This first operable unit addresses only the contaminated groundwater located within the EV property boundary. Groundwater cleanup standards (Michigan's Act 307 Type B standards, see Table 5 of this ROD) shall be applicable throughout the on-property contaminated groundwater. Groundwater background concentrations shall be required to be established during the remedial design.

Groundwater Protection Goals and the National Contingency Plan

The U.S. EPA's groundwater protection goal has been set forth in the NCP as follows:

The national goal of the remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste. Title 40 of the Code of Federal Regulations (40 CFR) Section 300.430(a)(1)(i).

The NCP states that the U.S. EPA expects to return usable ground waters to their beneficial uses, wherever practicable, within a time frame that is reasonable given the particular circumstances of the site. Whenever restoration of groundwaters is not practicable, U.S. EPA expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction. 40 CFR Section 300.430(a)(1)(iii)(F).

U.S. EPA expects to use institutional controls such as water use and deed restrictions to supplement engineering controls as appropriate for short-and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants... The use of institutional controls shall not substitute for active response measures as the sole remedy unless such response measures are determined not to be practicable... 40 CFR Section 300.430(a)(1)(iii)(D).

State of Michigan Groundwater Protection Goals

Michigan Act 307 provides for remedial action, at contaminated sites within the State, which "shall be protective of the public health, safety, and welfare and the environment and natural resources." Additionally, all "remedial actions which address the remediation of an aquifer shall provide for removal of the hazardous substance or substances from the aquifer..." Michigan Act 307 also provides for the determination of acceptable criteria for groundwater remediation at the site.

Cleanup Standards

U.S. EPA's groundwater cleanup policy is to attain Maximum Contaminant Levels (MCLs) under the Federal Safe Drinking Water Act (SDWA); however, if cleanup to MCLs causes the residual risk levels to exceed the 1 X 10-4 to 1 X 10-6 risk range, then the U.S. EPA must apply risk-based cleanup levels to reach the goal of protectiveness (1 X 10-6 excess lifetime cancer risk).

Michigan Act 307 Rules contain clean-up criteria which include three different methods by which clean-up levels can be determined. The levels are Type A, Type B, and Type C. The methodology for Type A clean-up is based on background levels or method detection limits for chemicals of concern. The methodology for Type B clean-up uses standardized risk assumptions and exposure assumptions to determine clean-up levels which will be protective of human health and the environment and the use of the involved resource. Rules 299.5709 and 299.5711 of Michigan's Act 307 provide a thorough explanation on how to apply the Type B clean-up to the chemicals of concern and calculate the cleanup levels for the site. The methodology for Type C clean-up reviews the actual conditions of the site; the uses, present and future, of the site; a site specific risk assessment; and cost effectiveness analysis. Rule 299.5717 of Michigan's Act 307 provides a thorough explanation of how to apply the Type C clean-up to the chemicals of concern.

Michigan's Act 307, Type B clean-up criteria provide for the calculation of risk-based clean-up standards at the 1×10^{-6} excess lifetime cancer risk level for each carcinogenic compound. These standards are usually more stringent than the corresponding MCLs or non-zero Maximum Concentration Limit Goals (MCLGs). The U.S. EPA has determined that Michigan's Act 307, Type B criteria are protective and are applicable or relevant and appropriate to the EV site.

Table 5 lists the Groundwater Remediation Standards for the Electro-Voice site.

TABLE 5
GROUNDWATER CLEANUP STANDARDS FOR THE ELECTRO-VOICE SITE

CHEMICAL CAS #	(ug/l)
Alkylbenzene	20.00
Benzene 71-43-1	1.00
2-Butanone 78-93-3	400.00
Chloroethane 75-00-3	9.00
Chloromethane 74-87-3	3.00
1,2-Dichloroethane (1,2-DCA) 107-06-2	0.40
1,1-Dichloroethene (1,1-DCE) 75-35-4	0.06
1,2-Dichloroethene (1,2-DCE)	
cis 156-59-2	70.00
trans 156-60-5	140.00
Ethyl Benzene 100-41-4	70.00
Toluene 108-88-3	800.00
1,1,1-Trichloroethane (1,1,1-TCA) 71-55-6	600.00
Trichloroethylene (TCE) 79-01-6	3.00
Vinyl Chloride 75-01-4	0.02
Xylenes (total) 1330-20-7	20.00
Semi-volatile organic compounds	
Bis(2-ethylhexy)phthalate 117-81-7	2.50
Napthalene 91-20-3	30.00

NOTE: Table 5 is the more stringent standard of the standards presented in Table 4.

B. Dry Well Area Soils

Cleanup levels are developed in accordance with Michigan's Act 307 Type B criteria (aquifer protection criteria) or background, whichever is more stringent. U.S. EPA shall require establishment of background soil concentrations during the remedial design.

TABLE 6

CHEMICAL CAS #	MI ACT 307 TYPE B* (ug/kg)
Volatile Organic Compounds	
Alkanes	-----
Alkylbenzenes	-----
Benzene 71-43-1	20.0
Ethylbenzene 100-41-4	1,400.0
Styrene 100-42-5	20.0
Tetrachloroethene 127-18-4	14.0
Toluene 108-88-3	16,000.0
Trichloroethylene 79-01-6	60.0
Xylenes 1330-20-7	6,000.0
Semi-volatile Organic Compounds	
benzo(a)anthracene 56-55-3	100.0
benzo(k)fluoranthene 207-08-9	100.0
benzo(b)fluoranthene 205-99-2	100.0
benzo(a)pyrene 50-32-8	100.0
benzo(ghi)perlyene 191-24-2	100.0
Bis(2-ethylhexy)phthalate 117-81-7	40.0
Chrysene 218-01-9	100.0
dibenzo(a,h)anthracene 53-70-3	100.0
ideno[1,2,3-cd]pyrene 193-39-5	100.0
Napthalene 91-20-3	600.0

TABLE 6 (continued)

CHEMICAL CAS #	MI ACT 307 TYPE B* (ug/kg)
PCB	
PCB 1254 11097-69-1	1,000.0
Metals	
Arsenic	0.4+
Beryllium	0.8+

* Groundwater protection criteria.
+ Local background levels will be used as the cleanup standard if they are more stringent than Type B criteria.

C. Lagoon Area Soils

During remedial design, and prior to capping of the lagoon area soils, the horizontal and vertical extent of contamination shall be determined.

A Type C remedy developed pursuant to Michigan's Act 307 Rules has been determined to be relevant and appropriate for the lagoon area soils because these soils are located in a natural depression, and therefore are an unlikely area for future development. However, children may trespass and play in this area, both currently and in the future. The cap shall be designed in accordance with the State of Michigan's hazardous waste rules, Michigan's Act 64. A hazardous waste cap shall eliminate or decrease dermal contact and ingestion of lagoon area soils. The hazardous waste cap will also eliminate or decrease infiltration into the soils, thereby decreasing the mobility of cadmium, which was present at elevated levels in the lagoon area soils and was detected above background levels in the soil column at 26 feet deep (groundwater table is at 29.5 feet deep). Cadmium is one of the more mobile metals, and may pose a threat to groundwater in the future. See Figure 3.

D. Rationale for Further Action

Actual or threatened releases of hazardous substances from this site, if not addressed by implementation of the response action selected by this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment. Therefore, based on the findings in the RI report and the discussion above, a Feasibility Study (FS) was performed to focus the development of alternatives to address the threats at the site. The FS report documents the evaluation of the magnitude of site risks, site-specific applicable or relevant and appropriate requirements, and the requirements of CERCLA and the NCP, especially the groundwater protection policy, in the derivation of remedial alternatives for the EV site.

VIII. SUMMARY OF ALTERNATIVES

The principal objective of remedial action is to eliminate and/or reduce the threat or potential threat to human health and the environment posed by the areas of concern. The selection process for remedial actions is developed to address the specific threat posed in an area of concern, and considers the chemicals of concern and the routes of exposure, as well as effective technologies to address them.

The alternatives analyzed for the site are presented below. All of the alternatives except the No Action Alternative include a limited investigation for a lower aquifer. The purpose of the lower aquifer investigation is to determine if a second aquifer exists below the clay till layer in the vicinity of the dry well area and if so, if that aquifer has been impacted by contaminants from the EV site.

The estimation of groundwater cleanup times as presented in the Feasibility Study (FS) report assumes that relative decrease in contaminant mass (or concentration) with each pore volume is constant. In other words, for each pore volume, the same ratio of mass is removed from the system, but the total mass removed by each successive pore volume is less. This constant reduction in contaminant mass can be described by the first order exponential decay equation used in the FS.

Alternative 1: "No Action"

The NCP requires that a "No Action" Alternative be considered at every site. It is used as a basis for comparison during the evaluation of other alternatives. The "No Action" Alternative assumes that no active remediation shall be conducted to address potential public health and environmental problems.

Years to Attain Groundwater Cleanup Standards: 100+ years
Capital Cost: $0
Annual Operation and Maintenance (O&M) Cost: $0
Present Net Worth (over 30 years): $0

Alternative 2: Institutional controls; impermeable cap over all contaminated soils.

As a component to this Alternative, institutional controls shall require placement of deed restrictions on property and site monitoring. Deed restrictions shall restrict future excavation on the EV property and restrict groundwater usage throughout the contaminant plume. Site monitoring shall include site inspections and groundwater monitoring. The inspection program shall include inspecting the fence for damage and monitoring for any signs of trespassing. Groundwater monitoring shall track the long-term aquifer quality through sampling.

A clay cap that shall meet the requirements of Michigan's Act 64 (a minimum of 3 feet of compacted clay, with 2 feet of additional material including a vegetative layer) over the dry well area and lagoon area soils shall ensure long term effectiveness and permanence of protection of human health and the environment. The Resource Conservation and Recovery Act (RCRA) Subtitle C and Michigan Act 64 are not applicable because the wastes in the lagoon area soils are not RCRA listed wastes. RCRA Subtitle C and Michigan ("MI") Act 64 have been determined to be relevant and appropriate. RCRA Subtitle C/MI Act 64 are relevant because the wastes which were disposed in the former lagoons are sufficiently similar to RCRA listed wastes F006, F007 and/or F008. RCRA Subtitle C/MI Act 64 are appropriate because capping with a RCRA Subtitle C/MI Act 64 hazardous waste cap shall address the following concerns: a hazardous waste cap shall provide long-term protection of human health and the environment, specifically protection from direct contact or gardening of plants which may uptake the soil contaminants and enter humans via ingestion, at a future date; the additional degree of protection which shall be achieved with the hazardous waste cap (as opposed to a solid waste cap, RCRA Subtitle D or Michigan Act 641) is cost effective; a hazardous waste cap shall decrease infiltration into the soils, thereby decreasing the mobility of cadmium, which was present at very elevated levels in the lagoon area soils and was detected above background levels in the soil column at 26 feet deep (groundwater table is at 29.5 feet deep).

Cadmium is one of the more mobile metals, and may pose a threat to groundwater in the future. See Figure 3.

Based on groundwater modelling, it is estimated that without treatment of the source area (the dry well area soils), groundwater may take over 100 years to clean itself up.

Years to Attain Groundwater Cleanup Standards: 100+ years
Capital Cost: $580,000
Annual Operation and Maintenance (O&M) Cost: $24,000
Present Net Worth (over 30 years): $940,000

Alternative 3A: Institutional controls; soil vapor extraction and excavation and landfilling of sludge layer in dry well area soils; cap over the lagoon area soils; pump and treat on-property groundwater, monitoring of off-property groundwater.

This Alternative includes the institutional controls described in Alternative 2; a Soil Vapor Extraction (SVE) system in the dry well area and excavation, solidification, and off-site landfilling of dry well area sludge; a hazardous waste cap which meets the requirements of Michigan Act 64 over the lagoon area soils; and pump and treat of on-property groundwater followed by discharge to a local POTW. See Figure 4.

A combination of SVE, excavation, solidification and off-site landfilling of the sludge layer identified in the dry well area soils shall be used to clean up the dry well area soils to the cleanup levels specified in Table 6, page 21 of this ROD.

The SVE process acts as a vacuum to strip contaminated vapors from the soil. These vapors shall then be treated before being allowed to be released to the atmosphere. All releases to the atmosphere shall meet the requirements of the Clean Air Act prior to discharge. The treatment residuals shall be tested by the Toxicity Characteristic Leaching Procedure (TCLP) to determine if the treatment residuals are a characteristic waste as defined in RCRA. Proper disposal of the treatment residual shall be determined upon completion of the TCLP. Vapor extraction wells shall be placed near the sources of contamination in the dry well area. The SVE wells shall provide a consistent supply of oxygen, remove waste products, and control soil moisture distribution.

After 2 to 5 years of operation, the dry well area soils shall be sampled and analyzed at a laboratory approved by U.S. EPA to determine how much contamination remains in the soils. Excavation, solidification and off-site landfilling of the sludge layer may be required by U.S. EPA. Prior to landfilling, the solidified soils shall be tested to determine if the waste is RCRA characteristic. If the waste is characteristic, Land Disposal Restrictions (LDR) shall apply to its disposal. If the contamination levels are at or below the cleanup levels set forth

in Table 6 of this ROD, no further action will be taken on these soils. If contamination in the soils remains above the cleanup standards, U.S. EPA shall evaluate further remedial activities.

Lagoon area soils shall be capped with a Michigan's Act 64 hazardous waste cap as described in Alternative 2.

This Alternative contemplates a pump and treat for groundwater located within the EV property. Groundwater shall be treated on the property by either granular or powdered activated carbon, air stripping, chemical oxidation/reduction, or photolysis/oxidation. After treatment, groundwater shall be discharged to a POTW. It is estimated that it will take 2 years to clean-up the on-property groundwater. Treatment residues from the groundwater treatment system shall be tested by the TCLP to determine if it is RCRA characteristic prior to disposal. RCRA Land Disposal Restrictions may be applicable to these wastes. The remaining off-property contaminated groundwater, from EV's northern property boundary to McCoy Creek, shall be monitored.

Years to Attain Groundwater Cleanup Standards: 53 years
Capital Cost: $3,000,000
O&M Cost: $330,000
Present Net Worth: $4,100,000

Alternative 3B: Institutional controls; soil vapor extraction and excavation and incineration of sludge layer in dry well area soils; cap on the lagoon area soils; pump and treat on-property groundwater, monitoring off-property groundwater.

This Alternative is identical to Alternative 3A, with the exception that the dry well area source material, the sludge layer, shall be excavated and incinerated off-site instead of landfilled. Incineration of the source material will eliminate long-term risk associated with the highly contaminated sludge by complete destruction of the contaminants.

Years to Attain Groundwater Cleanup Standards: 53 years
Capital Cost: $8,300,000
O&M Cost: $330,000
Present Net Worth: $9,400,000

Alternative 4A: Institutional controls; soil vapor extraction of dry well area soils followed by excavation and landfilling of remaining sludge layer; cap on the lagoon area soils; pump and treat all on- and off-property contaminated groundwater.

This Alternative is identical to Alternative 3A, with the addition of a comprehensive groundwater cleanup component. This Alternative provides for pumping and treating the entire contaminated groundwater plume which stretches from the EV property to McCoy Creek (see Figure 5). On-property groundwater shall be pumped and treated on-property and discharged to a POTW, and off-property groundwater shall be pumped and treated and discharged either to a POTW or to McCoy Creek. If off-property groundwater is discharged to the creek, it shall be required to meet the substantive requirements of an NPDES permit for discharge of treated groundwater to a surface water body. Treatment shall consist of either granular or powdered activated carbon, air stripping, chemical oxidation/reduction, or photolysis/oxidation. Any treatment residues from pumping and treating the groundwater shall be tested by the TCLP to determine if the residues are RCRA characteristic prior to disposal. It is estimated to take 35 years to clean up off-property groundwater.

U.S. EPA has determined, based on the groundwater modeling presented in the feasibility study report, that groundwater shall reach standards that are protective of human health and the environment in a shorter timeframe than may be achieved through natural attenuation. The time savings that can be achieved by pumping and treating the groundwater versus natural attenuation is estimated to be 30%-35%. The additional capital cost for an off-property pump and treat is estimated to be $400,000.

Years to Attain Groundwater Cleanup Standards: 35 years
Capital Cost: $3,400,000
O&M Cost: $440,000
Present Net Worth: $5,700,000

Alternative 4B: Institutional controls; soil vapor extraction of dry well area soils followed by excavation and incineration of remaining sludge layer; cap on the lagoon area soils; pump and treat all on- and off-property contaminated groundwater.

This Alternative is identical to Alternative 3B, with the addition of a comprehensive groundwater component. The comprehensive groundwater component consists of on-property and off-property pump and treat. Groundwater from near the dry well source shall be pumped and treated and discharged to a POTW, and off-property groundwater shall be pumped and treated and discharged either to a POTW or to McCoy Creek. If off-property groundwater is discharged to McCoy Creek, it shall be required to meet NPDES discharge permit requirements. Treatment shall consist of either granular or powdered activated carbon, air

stripping, chemical oxidation/reduction, or photolysis/oxidation. Any treatment residues from pumping and treating the groundwater shall be tested by the TCLP to determine if the residues are RCRA characteristic prior to disposal. If the wastes are characteristic, RCRA Land Disposal Restrictions shall be required to be met.

Years to Attain Groundwater Cleanup Standards: 35 years
Capital Cost: $9,000,000
O&M Cost: $440,000
Present Net Worth: $11,010,000

Alternative 5A: Institutional controls; excavate and landfill all contaminated sludge and soils in the dry well area; cap on the lagoon area soils; pump and treat all on- and off-property contaminated groundwater.

Alternative 5A is similar to Alternative 4A with the exception that all soils in the dry well area including the sludge shall be excavated, solidified on-property and landfilled off-property at a RCRA-permitted landfill. Dry well area soils shall be removed to a depth of 40 to 50 feet. The excavated area shall be filled with clean soil. Capping of the lagoon area shall be performed as in the other alternatives. Groundwater extraction and treatment shall be identical to the requirements set forth in Alternative 4A. See Figure 6.

Years to Attain Groundwater Cleanup Standards: 35 years
Capital Cost: $7,000,000
O&M Cost: $350,000
Present Net Worth: $8,900,000

Alternative 5B: Institutional controls; excavate and incinerate all contaminated sludge and soils in the dry well area; cap on the lagoon area soils; pump and treat all on- and off-property contaminated groundwater.

Alternative 5B is identical to Alternative 5A with the exception that the dry well area soils including the sludge shall be incinerated at an off-property facility rather than solidified and landfilled.

Years to Attain Groundwater Cleanup Standards: 35 years
Capital Cost: $11,000,000
O&M Cost: $350,000
Present Net Worth: $13,000,000

IX. COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the NCP, the relative performance of each alternative is evaluated using the nine criteria, 40 CFR Section 300.430(e)(9)(iii), as a basis for comparison. An alternative providing the "best balance" of trade-offs with respect to the nine criteria is determined from this evaluation.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy. Alternatives 4 and 5 contain a component for treatment of the off-property groundwater. Because a final remedy for groundwater will be addressed in the record of decision for the second operable unit, these alternatives will not be evaluated further in this first operable unit record of decision. The following is a summary of the comparison of each alternative's strength and weaknesses with respect to the nine evaluation criteria. The nine criteria are: 1) overall protection of human health and the environment; 2) compliance with applicable or relevant and appropriate requirements (ARARs); 3) long-term effectiveness and permanence; 4) reduction of toxicity, mobility or volume through treatment; 5) short-term effectiveness; 6) implementability; 7) cost; 8) state acceptance; and 9) community acceptance.

Overall Protection of Human Health and the Environment.

This criterion addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

All alternatives, with the exception of Alternative 1 (No Action), will reduce risks to human health. As the No Action alternative does not provide protection of human health and the environment, it is not eligible for selection and will not be discussed further. Alternative 2 reduces human exposure to contaminants through institutional controls. However, institutional controls may not guarantee reduced risks to human health in the future and institutional controls may not reduce the risk to the environment.

Alternatives 3A and 3B further minimize the risks to human health and the environment by treating the dry well area soils, which are the principal threat, and treating the on-property groundwater. Alternatives 3A and 3B rely on institutional controls to protect human health and the environment from risks posed by off-property groundwater. Institutional controls may not guarantee reduced risks to human health in the future. A final remedial decision for the off-property groundwater shall be made in the record of decision for the second operable unit for this site.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

Alternatives 3A and 3B shall meet all ARARs for this first operable unit action, which consists of treatment of the dry well area soils, closure of the lagoon area soils, and treatment of the groundwater which is located on the EV property. Alternative 2 may not meet ARARs pertaining to the groundwater in this first operable unit action in a reasonable time frame as Alternative 2 does not require active remediation of the groundwater.

Long Term Effectiveness and Permanence.

This criterion delineates the residual risk and evaluates the ability of an alternative to maintain reliable protection of human health and the environment over time, once cleanup objectives have been met.

Alternatives 2 and 3 offer protection of public health and the environment over the long term by treating or containing contaminants. However, treatment alternatives are more effective at eliminating risk in the long term than the containment alternatives.

Alternatives 3A and 3B are most effective at eliminating long term risk because groundwater shall be treated and monitored, the lagoon area soils shall be capped, and once the sludge layer has been effectively treated or is removed, residual risk in those soils shall be greatly decreased. Closure or other similar action shall be considered if the treatment system in the dry well area is unable to reduce contaminant levels to equal or below Michigan's Act 307 Type B cleanup levels.

U.S. EPA has decided to collect and evaluate additional data regarding the off-property groudnwater before a final remedy is selected for the off-property groundwater. A final remedy decision for the off-property groundwater shall be addressed in the record of decision for the second operable unit, after additional information is gathered (see discussion in "Documentation of Significant Changes" at the end of this ROD).

Reduction of Toxicity, Mobility, or Volume Through Treatment.

This criterion evaluates the anticipated performance of the treatment technologies a remedy may employ.

Alternatives 3A and 3B shall utilize treatment to reduce the toxicity, mobility or volume of contamination in the dry well area and in the on-property groundwater in order to protect human health and the environment. Treatment of the dry well area soils shall address the principal threat (sludge layer in the dry well area).

Alternative 2 does not utilize treatment for soils or groundwater.

Short-Term Effectiveness.

Short-term effectiveness addresses the period of time needed to achieve protection and evaluates any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy.

All of the alternatives involve construction at the site. Protection of site workers and the community during the implementation of the selected alternative shall be addressed by site health and safety plans.

No unacceptable short-term risks or cross-media impacts shall be caused by the implementation of any of the alternatives. During the period required for remediation, institutional controls shall be used to mitigate the interim threats from possible use of contaminated groundwater and possible exposure to contaminated soils. The community and site workers may be exposed to contaminants in the soils and the air, and to dust and noise nuisance during implementation of the groundwater and soil remedies. Standard safety equipment, monitoring and dust control measures, shall mitigate any short-term risks.

Implementability.

This criterion considers the technical and administrative feasibility of implementing an alternative, including the availability of material and services needed to implement a particular option.

There will be some implementation problems for all of the alternatives. Deed restrictions which shall be required to be placed on all properties under which the contaminated groundwater flows could pose implementation problems because there are numerous parcels of properties under which the contaminated groundwater flows. Capping and SVE are well established technologies and should not be difficult to implement. Incineration, as contemplated by Alternative 3B, may pose problems with respect to locating an off-site incinerator to accept the waste.

Cost.

The estimated capital, annual operation and maintenance, and 30-year present worth costs for each of the alternatives is presented below:

Alternative	Capital Cost	O&M	Present Worth
1	$ 0	$ 0	$ 0
2	$ 580,000	$ 24,000	$ 940,000
3A	$ 3,000,000	$330,000	$ 4,100,000
3B	$ 8,300,000	$330,000	$ 9,400,000
4A	$ 3,400,000	$440,000	$ 5,700,000
4B	$ 9,000,000	$440,000	$11,010,000
5A	$ 7,000,000	$350,000	$ 8,900,000
5B	$11,000,000	$350,000	$13,000,000

State Acceptance.

The last two criteria, state and community acceptance are modifying criteria.

The Michigan Department of Natural Resources (MDNR) concurs with the U.S. EPA's selection of Alternative 3A as the preferred remedial alternative for the first operable unit for the EV site as presented in the next section.

Community Acceptance.

Based on the comments received by U.S. EPA, the community has expressed its desire for U.S. EPA to carefully consider and accept a proposal which EV presented to U.S. EPA during the public comment period for the final remedy selection. U.S. EPA has carefully considered EV's proposal and has decided to accept several of the components of EV's proposal. U.S. EPA has addressed why it has not accepted all components of EV's proposal and the community's concerns in the attached Responsiveness Summary. Briefly, the "common earth" cap which EV has proposed for the lagoon area soils does not afford long-term protection. The "common earth" cap is similar to a former Michigan Act 87 cap which was designed to last for only 2 years. Maintenance requirements for the "common earth" cap are expected to be excessive in light of the fact that the lagoon area soils cap shall need to be maintained indefinitely. In addition, the "common earth" cap proposed by EV does not keep infiltration from entering the contaminated lagoon area soils. Sampling conducted during the Remedial Investigation indicated that levels of cadmium and arsenic above background levels were detected at depths in the soil column of 26 feet and 23.5 feet, respectively. The groundwater table is located at 29.5 feet. These sampling results indicate that cadmium and arsenic are migrating toward

the groundwater table and may pose a threat to the groundwater. Cadmium is one of the more mobile metals. Therefore, a cap that does not reduce infiltration into the lagoon area soils is not sufficiently protective of the groundwater.

EV has proposed that five years of off-property groundwater monitoring be conducted instead of treatment of the off-property groundwater. However, U.S. EPA's groundwater guidance and the preamble to the NCP indicate that groundwaters which are currently being used as a drinking water source, or groundwaters which may be used as a drinking water source in the future (i.e., groundwaters which are not naturally unusable due to salinity or other natural factors), shall be actively remediated unless it is impracticable. At the EV site, MCLs have been exceeded and unacceptable risk has been identified with the groundwater. Also, the City of Buchanan's drinking water wells are located 4,000 feet west of the EV property. Therefore, in this first operable unit, the on-property groundwater shall be actively remediated. The second operable unit will address a final remedy decision for the off-property groundwater.

X. SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, as amended by SARA, and the NCP, the detailed analysis of the alternatives, and public comments, U.S. EPA has determined that Alternative 3A (institutional controls; soil vapor extraction of dry well area soils followed by excavation and landfilling of remaining sludge layer; Michigan's Act 64 cap on the lagoon area soils; pump and treat of the contaminated on-property groundwater and monitoring of the contaminated off-property groundwater) is the most appropriate remedy for the first operable unit to protect human health and the environment.

Alternative 3A shall achieve substantial risk reduction through soil vapor extraction followed by excavation of any of the remaining 2,100 cubic yards of sludge; capping of the lagoon area soils; and pumping and treatment of the contaminated on-property groundwater and monitoring of contaminated off-property groundwater. The dry well area soils, the source of the groundwater contamination, shall be treated for 2 to 5 years with SVE followed by excavation, solidification, and landfilling of any remaining sludge. If the dry well area soils do not meet cleanup standards after the SVE and excavation, additional treatment with SVE or closure shall be considered by U.S. EPA. The hazardous waste cap on the lagoon area soils shall ensure long-term effectiveness and permanence because it shall eliminate direct contact with the lagoon area soils both currently and in the future and shall eliminate or reduce infiltration which minimizes, if not eliminates contaminant movement in the soil column. The groundwater pump and treat for the contaminated on-property groundwater shall remediate the most highly contaminated

groundwater first. Monitoring of the off-property groundwater will allow U.S. EPA to detect any changes in the off-property groundwater before selecting a final remedy for the second operable unit. Alternative 3A provides the best balance of benefits, with respect to the nine evaluation criteria for this first operable unit among the alternatives considered.

A. Remediation Standards

The purpose of this response action is to control risks posed by ingestion and dermal contact with contaminated groundwater; ingestion, dermal and inhalation contact with lagoon area soils; and to treat the principal threat (dry well area soils). The future residential use scenario has been determined to pose an excess lifetime cancer risk of 4 X 10-4 and a hazard index of 18 from use of groundwater for drinking and showering. This risk relates to the concentration of vinyl chloride, 1,2-dichloroethene, benzene and trichloroethylene. Direct contact, ingestion and inhalation of vapors from lagoon area soils results in a hazard index of 2. This risk relates to the concentration of lead (up to 83 mg/kg) in these soils. These risks are outside U.S. EPA's acceptable risk range of 1X10-4 and 1X10-6 and exceeds the acceptable hazard index of 1. Michigan's Act 307 Rules sets forth cleanup levels for soils and groundwater. Michigan's Act 307 Type C cleanup levels will be achieved in the lagoon area soils, and Michigan's Act 307 Type B cleanup levels shall be achieved in the dry well area soils and in the groundwater located beneath the EV property. Off-property groundwater shall be monitored until a final remedy decision is made in the second operable unit ROD for this site.

XI. STATUTORY DETERMINATIONS

Under its legal authorities, U.S. EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

A. Protection of Human Health and the Environment

The selected remedy for the first operable unit for the EV site protects human health and the environment through treatment of the principal threat (dry well area soils), treatment of the contaminated on-property groundwater, capping of the lagoon area soils, and monitoring the off-property groundwater. The dry well area soils shall be treated with SVE to reduce contaminant levels to below Michigan Act 307 Type B levels. The sludge layer in the dry well area soils shall be excavated, solidified and landfilled if Type B cleanup levels cannot be met with SVE. If it is demonstrated that the SVE and excavation of the sludge layer cannot attain Michigan Act 307 Type B standards in the dry well area soils, continued treatment with SVE or closure shall be required by U.S. EPA. Lagoon area soils shall be contained with a Michigan Act 64 cap to ensure long term effectiveness and permanence from contact with these soils, and to eliminate infiltration. The contaminated on-property groundwater shall be pumped and treated. The contaminated off-property groundwater shall be monitored.

A limited investigation shall be conducted to determine if a lower aquifer exists at the site, and if so, if that lower aquifer is contaminated from EV site activities.

No unacceptable short-term risks or cross-media impacts shall be caused by the implementation of the remedy for the first operable unit. During the period required for remediation, institutional controls shall be used to mitigate the interim threats from possible use of contaminated groundwater and possible exposure to contaminated soils. The community and site workers may be exposed to organic and inorganic contaminants in the soils and air, and to dust and noise nuisance during implementation of the groundwater and soils remedies. Standard safety equipment, monitoring and dust control measures, shall mitigate any short-term risks.

B. Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy shall comply with the Federal and/or State, where more stringent, applicable or relevant and appropriate requirements (ARARs) listed below:

<u>Chemical Specific ARARs</u>

Chemical-specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. Chemical-specific ARARs typically determine the extent of clean-up at a site.

i. Groundwater

Federal ARARs

Maximum contaminant levels (MCLs) and, to a certain extent, non-zero maximum contaminant level goals (MCLGs), the Federal drinking-water standards promulgated under the Safe Drinking Water Act (SDWA), are applicable to municipal water supplies servicing 25 or more people. At EV, MCLs and MCLGs are not applicable, but are relevant and appropriate since the sandstone aquifer in the area of contamination is suitable for use as a source of drinking water in the future. The sandstone aquifer is currently being used as the drinking water source for the City of Buchanan. The city wells are located 4,000 feet west of the EV contaminant plume. MCLGs are relevant and appropriate when the standard is set at a level greater than zero (for non-carcinogens); otherwise, MCLs are relevant and appropriate. The point of compliance for Federal drinking-water standards is throughout the contaminated groundwater plume. For the purposes of this operable unit ROD, the point of compliance for groundwater for cleanup purposes shall be throughout the on-property plume within the EV property (see Figure 1). This first operable unit addresses only the contaminated groundwater located within the EV property boundary. The point of compliance for the off-property groundwater will be addressed in the second operable unit ROD.

State ARARs

The substantive provisions of Parts 6 and 7 of Michigan Act 307 rules and Rule 57 of Act 245 are relevant and appropriate to the EV site. U.S. EPA has determined that acceptable standards for groundwater clean-up, that have been derived under Type B criteria, are protective in all the areas of the plume. Clean-up levels derived under Type B criteria allow the aquifer to be restored to its beneficial uses by achieving risk-based clean-up standards. U.S. EPA has determined that these clean-up standards are protective of human health and the environment. The point of compliance for these standards is throughout the contaminated groundwater plume. For the purposes of this operable unit ROD, the point of compliance for groundwater for cleanup purposes shall be throughout the on-property plume within the EV property (see Figure 1). This first operable unit addresses only the contaminated groundwater located within the EV property boundary. The point of compliance for the off-property groundwater will be addressed in the second operable unit ROD.

U.S. EPA has determined that Type B criteria yields groundwater clean-up standards which also provide for the protection of surface water quality, in turn protecting human health and the environment.

Discussion

Alternative 3A will achieve the groundwater cleanup levels established pursuant to Act 307, Type B, for on-property groundwater. A final remedy decision for off-property groundwater will be made in the record of decision for the second operable unit.

For the purposes of this operable unit ROD, the point of compliance for groundwater for cleanup purposes shall be throughout the on-property plume within the EV property (see Figure 1). This first operable unit addresses only the contaminated groundwater located within the EV property boundary. The point of compliance for the off-property groundwater will be addressed in the second operable unit ROD; the final operable unit shall require compliance with Federal and State ARARS throughout the plume.

ii. Soils

State ARARs

MERA - Act 307, P.A. 1982 (Michigan Environmental Response Act) provides rules regarding the procedures for determining cleanup criteria for contaminants in groundwater, surface waters, soils, and air. Act 307 Type B criteria are relevant and appropriate for the dry well area soils, and Act 307 Type C criteria are applicable or relevant and appropriate for the lagoon area soils.

Discussion

The Michigan Act 307 Type B cleanup criteria shall be required to be met for groundwater and the dry well area soils. Type C cleanup criteria shall be required to be met for the lagoon area soils.

iii. Air

Federal ARARs

Regarding the Clean Air Act requirements, 40 CFR 50.1-50.12 requirements are applicable because emissions from the groundwater and soil treatment systems are subject to Primary and Secondary Ambient Air Quality Standards. Construction and treatment system activities are potential sources of fugitive dust, particulates, and VOCs and therefore, these activities are subject to the TSP standard.

State ARARs

Certain State Air Pollution Act requirements are ARARs. Act 348 contains rules regarding emission limitations and prohibitions

for particulate matter, fugitive dust, and VOCs. MAC Rule 336.1702, 336.1901, and 336.1373 requirements are applicable since emissions from the treatment system are subject to State standards for VOCs. Construction activities are potential sources of fugitive dust.

Discussion

The selected alternative shall meet air emission requirements through use of proper emission control devices.

Location-specific ARARs

Location-specific ARARs are those requirements that relate to the geographical position of a site. These include:

Federal ARARs

Executive Order 11988 and 40 CFR 264.18(b), Protection of Flood Plains, are relevant and appropriate for this site. This Order requires that the off-property groundwater treatment system be located above 100-year flood plain elevation and be protected from erosional damage. Any portion of the remedy that is constructed within the 100-year flood plain must be adequately protected against a 100-year flood event (i.e., geotextiles should be used to secure topsoil, etc.).

Section 404 of the CWA regulates the discharge of dredged or fill material to waters of the United States. Construction of surface water discharge points may be regulated under Section 404 of the CWA; therefore, the substantive requirements of Section 404 are relevant and appropriate to the remedial action at the site.

Action-specific ARARs

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances.

Federal ARARs

For landfill closure, RCRA Subtitle C requirements are relevant and appropriate because the lagoon area soils contain waste which is sufficiently similar to listed and/or characteristic RCRA Subtitle C waste. The Subtitle C cap is appropriate because long-term effectiveness and permanence of protection of human health and the environment shall be achieved with the cap.

RCRA Land Disposal Restrictions (LDR or Land Ban) are relevant and appropriate as applied to the solidified sludge layer if listed or characteristic RCRA Subtitle C hazardous wastes are identified in the sludge layer during sampling and analysis. The RI poorly defined inorganic contamination of the dry well area

sludge layer, and it is not known if listed or characteristic wastes are present in the sludge layer. Therefore, additional sampling of this area shall be required, and, if listed and/or characteristic RCRA Subtitle C hazardous wastes are identified, treatment requirements set forth in the Land Disposal Restrictions at 40 CFR Part 268 shall be satisfied prior to land disposal. In addition, LDRs are relevant and appropriate to any treatment residuals generated during remediation if the treatment residuals are determined to be listed or characteristic RCRA Subtitle C hazardous wastes.

Disposal of nonhazardous wastes are regulated under 40 CFR 257 and these requirements are applicable to disposal of nonhazardous wastes associated with this remedial action.

Disposal of the solidified sludge layer from the dry well area at an offsite landfill, if determined to be a hazardous waste, shall be regulated by 40 CFR 264.

40 CFR 264 and 40 CFR 268 (Subpart D) are applicable to excavation which shall occur in the dry well area to remove the sludge layer.

The only foreseeable manner in which the selected remedy may require storage or disposal of hazardous waste is when or if the groundwater treatment system requires emission control units to capture or contain volatile organics derived from aeration of the contaminated groundwater. The RCRA waste generation and temporary storage regulations under 40 CFR Part 262 are then applicable to that action. For example, spent activated carbon canisters utilized as emission controls shall be managed as characteristic waste if the waste canisters fail the Toxicity Characteristic Leaching Procedure (TCLP) test.

The treatment contemplated for some contaminated groundwater includes discharge of these liquids to a POTW. The POTW is regulated under 40 CFR 403.5, and the National Pollution Discharge Elimination System (NPDES). The actions of this remedy shall meet the substantive requirements of NPDES.

Direct discharge of treatment system effluent is regulated by 50 FR 30784 (July 29, 1985), 40 CFR 122.44, 40 CFR 122(a), 40 CFR 122.21, 40 CFR 125.100, 40 CFR 125.104, and 40 CFR 136.1-136-4. These requirements are all applicable to discharge of treated groundwater to McCoy Creek.

Applicable post-closure care requirements to ensure that the site is maintained and monitored are set forth in 40 CFR 264.310.

Responsibilities for offsite transportation of hazardous wastes shall be applicable to the transportation of the solidified dry well area sludge layer. See 40 CFR 262, 263 and 49 CFR 100-199.

State ARARs

The State of Michigan has been authorized to administer the hazardous waste program within the State. Under Hazardous Waste Management Act 64 of 1979, as amended, the State regulates the generation, transport, treatment, storage, and disposal of hazardous waste. Act 64 also regulates the closure, and the postclosure care, of hazardous waste disposal facilities in the State. As with RCRA Subtitle C, above, Act 64 is relevant and appropriate to closure of the lagoon area soils. Act 64 is applicable to the treatment residuals from on-site treatment.

Parts 4, 9, and 21 of the Water Resources Commission Act 245 of 1929, as amended, establishes rules for water quality by prohibiting injurious discharges to surface water. These rules are applicable to the discharge of treated groundwater to McCoy Creek or to a POTW treatment system.

The Michigan Environmental Response Act 307 of 1982, as amended (Act 307), provides for the identification, risk assessment, and evaluation of contaminated sites within the State. The U.S. EPA has determined that the substantive provisions of Parts 6 and 7 of Act 307 are relevant and appropriate to the EV site. The Act 307 rules require that remedial actions shall be protective of human health, safety, the environment, and the natural resources of the State. To achieve this standard of protectiveness, the Act 307 rules require that a remedial action achieve a degree of clean-up under either Type A (clean-up to background levels), Type B (clean-up to risk-based levels), or Type C (clean-up to risk-based levels under site-specific considerations) criteria. Type B criteria shall generally apply at sites where the desired outcome is to allow the site to be returned to unrestricted use at the completion of the remedial action. Type C cleanups shall generally apply at the largest and most complex sites, and at sites where the uses of the property are expected to be limited at the completion of the remedial action. U.S. EPA has determined that the Type C criteria are appropriate for the lagoon area soils since this area of the site is located in a natural depression area and therefore use of the area would be limited (e.g., homes would probably not be built in a natural depression area). However, protection is still required since homes could be built on the EV property where the building currently exists and the lagoon area soils would become the backyard to these future homes. Type B criteria are appropriate for the groundwater and the dry well area soil portions of this remedy because the goal of the selected remedy is to return the groundwaters and dry well area soils to unrestricted use.

C. Cost-Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its

costs, the net present worth value being $4,100,000. The only alternatives that are less costly than the selected alternative are Alternatives 1 and 2.

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

U.S. EPA has determined that Alternative 3A represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the first operable unit for the EV site. U.S. EPA has determined that Alternative 3A provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, also considering the statutory preference for treatment as a principal element and considering State and community acceptance for the first operable unit.

Alternative 3A shall significantly reduce the inherent hazards posed by the contaminated soils by treatment of dry well area soils with soil vapor extraction and excavation of the source (sludge layer), if necessary.

Alternative 3A treats the principal threat, the dry well area soils which are the source of groundwater contamination. Alternative 3A affords greater long term effectiveness and permanence and affords greater reduction of toxicity, mobility, or volume through treatment than Alternative 2 because on-property groundwater shall be treated. Short-term effectiveness is similar for all the alternatives considered, approximately 1 year. All of the alternatives will have similar implementability problems. Alternative 3A is the least costly option which provides for on-property groundwater treatment.

Alternative 3A provides a significantly greater degree of long-term effectiveness and permanence, reduction of toxicity, mobility and volume than Alternative 2, and is cost-effective.

E. Preference for Treatment as a Principal Element

By treating the dry well area soils, which are the source of the groundwater contamination, and then excavating, solidifying and landfilling the remaining sludge layer, the selected remedy addresses the principal threat posed by the site through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied for this operable unit.

XII. DOCUMENTATION OF SIGNIFICANT CHANGES

A significant change has been made in the remedy selected for the EV site since the publication of the FS and the Proposed Plan in September 1991. The remedy recommended in the Proposed Plan was Alternative 4A: institutional controls; soil vapor extraction of dry well area soils followed by excavation and landfilling of remaining sludge layer; Michigan's Act 64 cap on the lagoon area soils; pump and treat all on- and off-property contaminated groundwater. Since publishing the Proposed Plan, U.S. EPA has determined that an operable unit approach is more appropriate for this site than selection of a final remedy at this time. The Agency's decision to utilize an operable unit approach was made after considering the substantial number of public comments which preferred monitoring the off-property groundwater rather than actively remediating the off-property groundwater through pump and treat. U.S. EPA has determined that the operable unit approach is more appropriate at this time because it allows a more focused, logical approach, whereby the contaminated soils, which are the source of groundwater contamination, and the more highly contaminated groundwater, the on-property groundwater, are treated first. The treatability study is required under this first operable unit ROD. U.S. EPA will evaluate the effect of a treatability study on soils and on-property groundwater prior to making a final remedy decision for the off-property groundwater in the second operable unit ROD.

U.S. EPA has determined that the first operable unit, which is addressed by this ROD, shall consist of institutional controls; soil vapor extraction and excavation and landfilling of the sludge layer in dry well area soils; Michigan's Act 64 cap over the lagoon area soils; pump and treat on-property groundwater, and monitoring of off-property groundwater. A treatability study shall be conducted on the dry well area soils and the on-property groundwater beginning the summer of 1992 for a period of one year. The treatability study will be conducted with the cooperation of U.S. EPA's Superfund Innovative Technologies Evaluation (SITE) Program in Cincinnati, Ohio. The treatability study shall test the effectiveness of an innovative technology called the Subsurface Volatilization and Vapor System (SVVS), which is a combination air sparging/bioremediation system, and should be effective at cleaning up both the dry well area soils and the on-property groundwater at the EV site. The determination that this innovative technology may be effective at this site was made in November 1991. The advantages to the SVVS system are that most of the treatment is completed in-situ and the system is expected to clean up the soils and groundwater faster and be less expensive than conventional treatment systems. For further information regarding this technology, consult the Administrative Record for this site. If the treatability study indicates the SVVS system is effective at cleaning up the contaminants at the EV site, U.S. EPA will consider using this

technology to clean up the off-property groundwater in the second operable unit ROD in accordance with CERCLA and the NCP.

The Record of Decision (ROD) has also reordered the manner in which the chosen technologies will be applied to the dry well area soils, in accordance with EV's suggestion. The Proposed Plan indicated that excavation, solidification and landfilling of the sludge layer in the dry well area soils would be completed first, followed by soil vapor extraction (SVE) to remove residual contamination. The ROD indicates that SVE will be completed on the dry well area soils for 2 to 5 years followed by excavation, solidification and landfilling of any remaining sludge.

The remedy selected for this first operable unit is Alternative 3A: institutional controls; soil vapor extraction and excavation and landfilling of sludge layer in dry well area soils; Michigan's Act 64 cap over the lagoon area soils; pump and treat on-property groundwater; and monitoring of off-property groundwater. This change in remedy selection is a logical outgrowth based on the information available during the public comment period and the comments submitted. Alternative 3A has been determined to provide the most appropriate balance of tradeoffs among the alternatives, with respect to pertinant criteria, given the limited scope of this action.