United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-85/021
September 1985

EPA

Superfund Record of Decision:

Cemetery Dump, MI

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA/ROD/R05-85/021		

4. TITLE AND SUBTITLE	5. REPORT DATE
SUPERFUND RECORD OF DECISION Cemetery Dump, MI	September 11, 1985 6. PERFORMING ORGANIZATION CODE
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15. SUPPLEMENTARY NOTES

16. ABSTRACT

The Cemetery Dump Site is located in Oakland County, Michigan, approximately 35 miles northwest of Detroit. The 4 acre site was once used as a sand and gravel pit which has been backfilled and cleared. Citizen reports allege that approximately 300 to 600 barrels were dumped and buried onsite in the late 1960s or early 1970s. In September 1981, the Michigan Department of Natural Resources excavated and transported offsite approximately 20 to 30 barrel fragments. Analysis of the barrel contents indicated the presence of paint sludges, solvents, PCBs and oils.

This ROD is a source control remedial action that includes excavation and disposal of approximately 250 drums at an offsite RCRA facility. Total capital cost for the selected remedial action is estimated to be $1,883,261. Any additional remedial actions will be addressed in a separate Record of Decision upon completion of the RI/FS.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field Group
Record of Decision Cemetery Dump, MI Contaminated Media: Key contaminants:		

18. DISTRIBUTION STATEMENT	19 SECURITY CLASS (This Report)	21. NO. OF PAGES
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Record of Decision
Operable Unit Remedial Alternative Selection

Site: Cemetery Dump, Oakland County, Michigan

Documents Reviewed

I have reviewed the following documents describing the analysis of cost-effectiveness of remedial alternatives for the cemetery site.

- Remedial Actions Master Plan - Cemetery Site
- Phased Feasibility Study/Cemetery Industrial Waste Dump - July 1985
- Responsiveness Summary
- MDNR Geophysical Report - Cemetery Site

Description of Selected Remedy

- Excavation of approximately 250 drums containing paint sludges, solvents, polychlorinated biphenyls (PCBs), and oils, which will be disposed at a RCRA (Resource Conservation and Recovery Act), Subtitle C, approved off-site landfill facility.

Declarations

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, and the National Contingency Plan (40 CFR Part 300), I have determined that removing the buried drums at the Cemetery Dump is a cost-effective remedial action and provides protection of public health, welfare and the environment. The State of Michigan has been consulted and agrees with the approved remedial action.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust fund monies for use at other sites. In addition, the off-site transport and secure disposition is more cost-effective than other remedial action, is necessary to protect public health, welfare, and the environment and is consistent with anticipated final remedy.

The Michigan Department of Natural Resources (MDNR) under a Cooperative Agreement with the U.S. Environmental Protection Agency (USEPA) has initiated a Remedial Investigation/Feasibility Study (RI/FS) at Cemetery Dump to evaluate potential contamination pathways and will determine the potential contaminants remaining on-site after the buried drum removal. Any additional remedial actions will be addressed in a separate Record of Decision.

September 11th, 1985
Date

Valdas V. Adamkus
Regional Administrator

Summary of Operable Unit Remedial Alternative Selection
Cemetery Dump Site
Oakland County, Michigan

Site Location and Description

The Cemetery Site is located in the NE 1/4 of Section 27, Rose Township (T4N,R7E), Oakland County on Rose Center Road approximately 35 miles northwest of Detroit (Figure 1). The 4 acre site is a former sand and gravel pit which has been backfilled and is generally clear with low brushy vegetation and grass cover. An estimated 250 drums are buried in scattered groups within an approximate 2 acre area.

Five domestic wells are located within 100 feet of the site perimeter which all derive drinking water from the same unconfined aquifer. The same aquifer is continuous in the Cemetery Site area and is used as an area wide water supply. The residents adjacent to the dump have reported the discovery of drum fragments and waste deposits encountered during gardening.

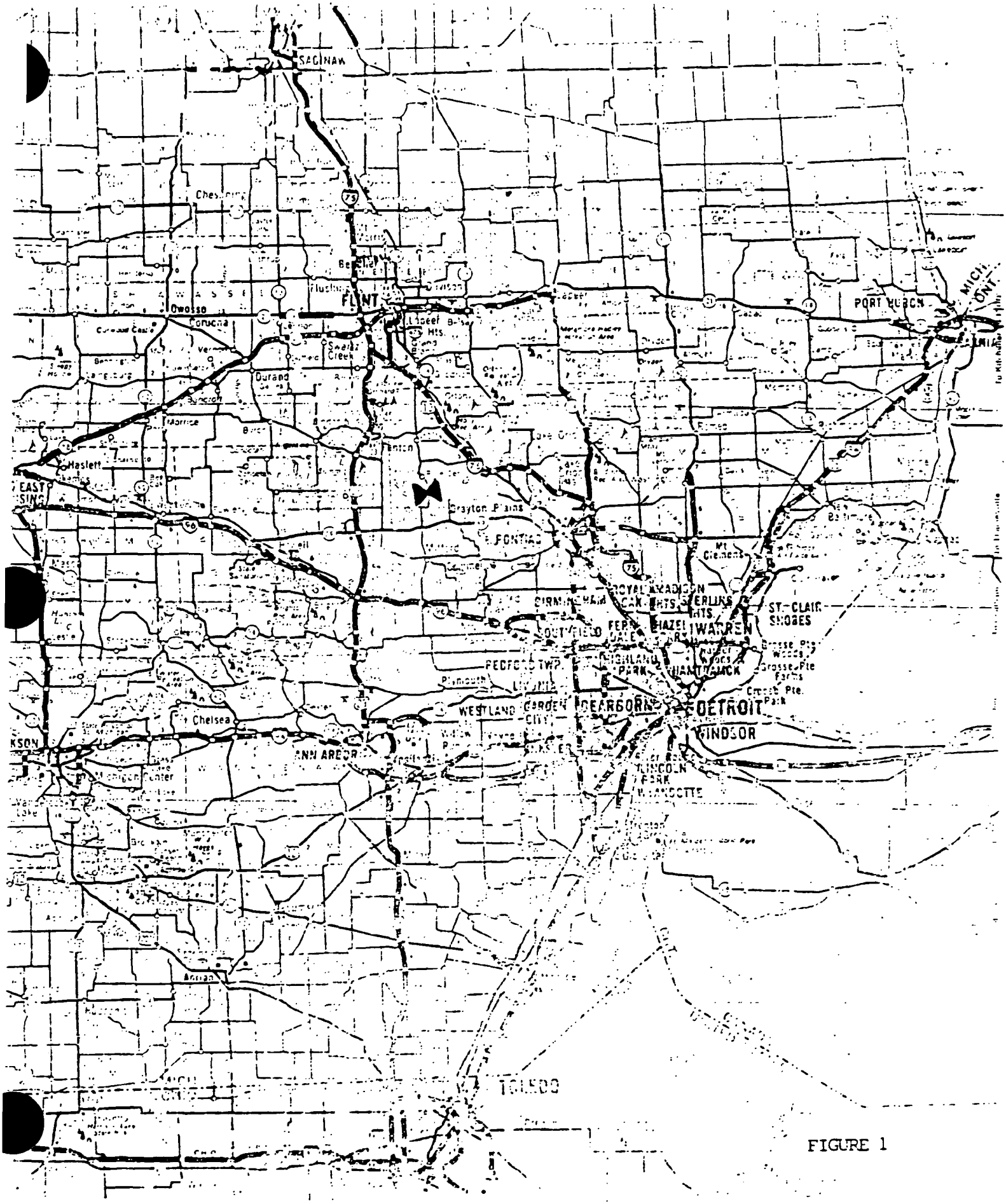
Site History

Citizen reports allege that approximately 300 to 600 barrels were dumped and buried in an old sand and gravel pit (Cemetery Site) in the late 1960's or early 1970's. The original site owner, Howard Wilson of Holly, Michigan, was approached by Tucker Ford (a waste hauler) during this time period to bury some 500 drums at the Cemetery Site. The disposal of the hazardous wastes at the Cemetery Site was an illegal dumping incident. Consequently, no records are available describing the disposed materials.

The parcel of land was subsequently subdivided and sold, and 4 residences were built on site (Figure 2). Portions of drums have been observed on the surface of the site and area residents have reported the discovery and removal of drum fragments and waste deposits encountered during gardening and other activities.

In September 1981, the MDNR excavated and transported off-site approximately 20 to 30 barrel fragments. Analysis of the barrel contents indicated the presence of paint sludges, solvents, polychlorinated biphenyls (PCBs) and oils. (Table 1)

The site was placed on the National Priorities List in 1982. The MDNR entered into a Cooperative Agreement in May 1984, with the U.S. EPA to conduct the Remedial Investigation/Feasibility Study (RI/FS) and Phased Feasibility Study (PFS), formerly known as the Focused Feasibility Study. The RI/FS is scheduled to be completed in the fourth quarter fiscal year 1986.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FERNDALE
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DETROIT
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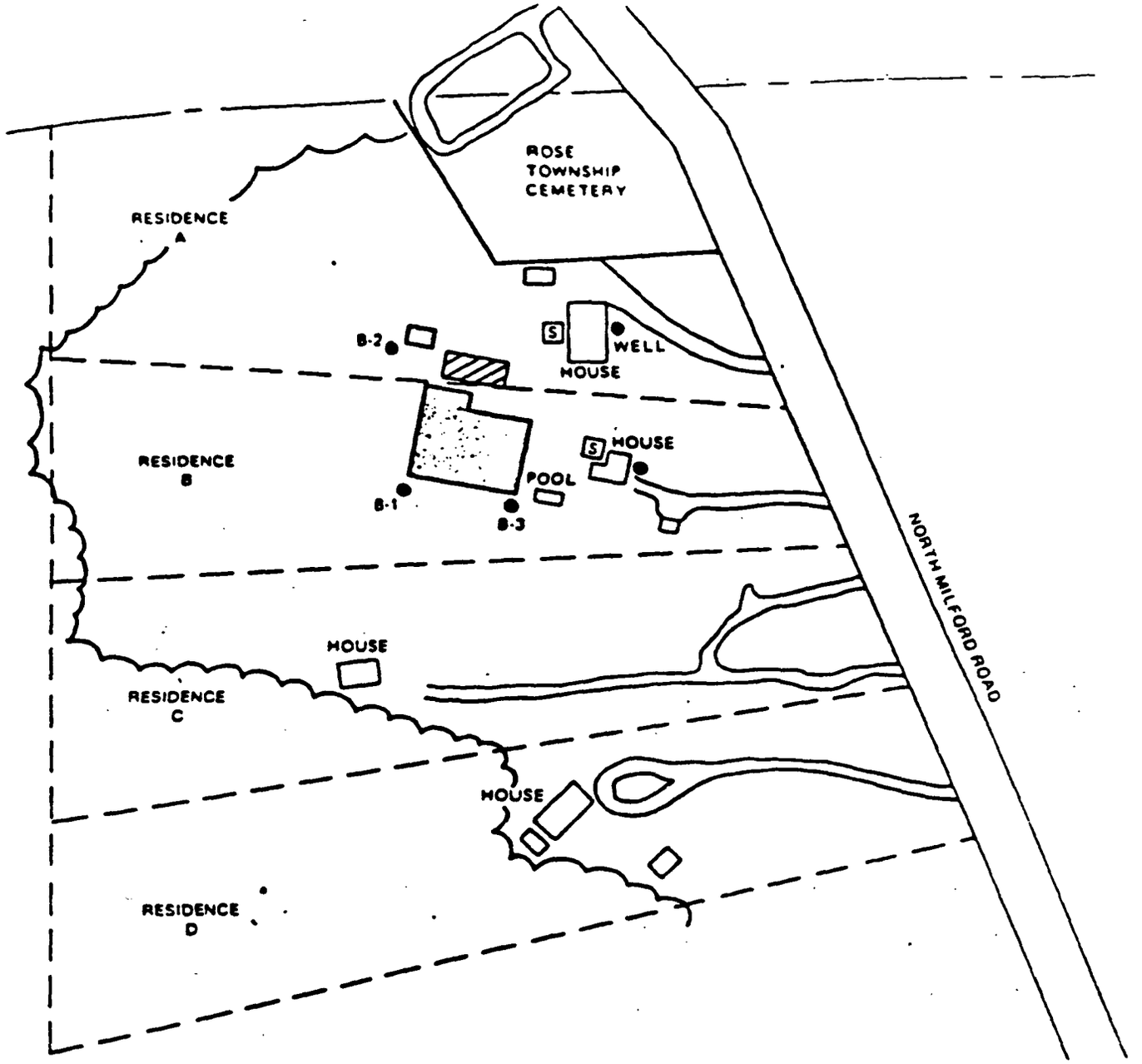
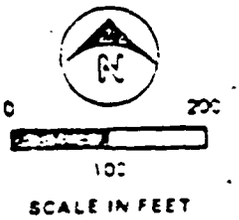
LINCOLN PARK
TOLEDO

FIGURE 1



LEGEND

- PROPERTY LINE
- GREATEST NUMBER OF BURIED DRUMS
- SIGNIFICANT NUMBER OF BURIED DRUMS
- S SEPTIC SYSTEM
- WELL MONITORING WELLS LABELED B-1 THROUGH B-3



This sketch is an estimate of the location of the disposal area in relation to property lines, wells, houses, ect. It is a compilation of three different maps:

1) An aerial photo of the site taken in 1980 (Scale 1" = 200')
2) A sketch of the well locations by Ecology and Environment, Inc. on September 9, 1982.
3) A map of the buried drums from the magnetometer study conducted by Ecology and Environment on April 19, 1982.

FIGURE 2
SKETCH OF CEMETERY SITE

TABLE 1

ANALYSES OF DRUM CONTENTS AT CEMETERY SITE
AS PRESENTED IN RAMP
(September 1981)

Chemical	Concentration Range (mg/kg)	E.P. Toxicity Test Concentration (mg/ℓ)	EP Toxicity Maximum Concentration (mg/ℓ)
Organics			
Xylene	10 - 1000's	--	--
Toluene	10 - 1000's	--	--
Benzene	10 - 1000's	--	--
Chlorobenzene	10 - 1000's	--	--
Cumene	10 - 1000's	--	--
Total Halogens	<300 - 1130	--	--
PCBs			
Aroclor 1242	ND - 280	--	--
Aroclor 1254	ND - 60	--	--
Aroclor 1260	ND - 2.0	--	--
Inorganics			
Arsenic	1.5 - 7.0	<0.002 - 0.009	5.0 mg/ℓ
Barium	<8.0 - 920	0.46 - 1.2	100 mg/ℓ
Cadmium	1.6 - 11	<0.010 - 1.2	1.0 mg/ℓ
Chromium	16 - 380	<0.020 - 0.36	5.0 mg/ℓ
Lead	90 - 370	<0.020 - 0.7	5.0 mg/ℓ
Mercury	0.034 - 0.48	<0.001 - 0.16	0.2 mg/ℓ
Selenium	<0.3 - 0.5	<0.001 - 0.16	1.0 mg/ℓ
Silver	<2	<0.001 - 0.16	5.0 mg/ℓ
Hexavalent Chromium	<0.1 - 0.63	---	---
Copper	9.6 - 45	---	---
Zinc	99 - 9,290	---	---
Nickel	18 - 110	---	---

ND = Not Detected.
--- = Not Tested.

Current Site Status

Subsurface conditions at the Cemetery site can be described as glaciofuvial sediments comprised of interbedded waterland deposits of sand and gravel, silt and sand, and local deposits of glacial till. The subsurface soils encountered during the drilling of boreholes at the site consisted primarily of fine to coarse silty sand and gravel. The overall formation appears to be a coarse textured glacial till, with a matrix that has variable amounts of cobbles and boulders. Except for sporadic occurrences of non-sorted clayey or silty lenses and a lack of stratification, it resembles an outwash deposit. There is no evidence of a continuous shallow confining layer underlying the entire site. The absence of a continuous naturally occurring barrier is critical to assessing the hazardous potential of wastes remaining at the site because there is no subsurface layer to prevent migration of buried wastes to the water table.

The depth of the water table at the site is estimated to range from 35 to 40 feet. The contour of the water table is flat directly beneath the site which may be due to the very high permeability of the soils. The water table gradient apparently increases quickly to the east of the site and tends to parallel the ground surface topography which would mean that ground water flows generally east-northeasterly. Because of the flatness of the water table in the site area, it is possible the direction of ground water flow may be modified in response to slight seasonal variations in water table elevations. The ongoing RI/FS will concentrate on the specifics of ground water conditions. However, based on the geophysics, test pits and soil borings, there is an obvious threat to the private water supplies adjacent to the site and in the surrounding area since there are no confining clay layers to protect the water supplies. Assuming the ground water flow varies with seasonal fluctuations and the cone of influence from the private water supplies may extend below the buried drums, the closest water supply (Figure 3) threatened is within 200-300 feet of the main disposal area.

The PFS relied upon geophysical techniques and test diggings to characterize the Cemetery Site. An initial site reconnaissance used an electromagnetometer to field screen the site for the location of buried metal objects. Equipment tests indicate that the electromagnetometer would detect a single 45 gallon drum to a depth of 12 feet of the Cemetery Site.

Twenty-nine suspect areas gave indications of buried metal objects. Most of the outlined areas showed responses indicative of metal objects scattered, rather than in clusters.

Based on the electromagnetic data, areas were selected to be scanned using ground penetrating radar (GPR). A total of 9 areas were defined for GPR surveying.

The results of the GPR survey were used to select a 20 foot by 20 foot area for test digging. Sixteen cylindrical or point metal targets defined as drums or partial drums are shown within the area along with one metal target not considered a drum. Additionally, a large portion of the southeast quadrant does not exhibit any target characteristics representative of drums or drum fragments.

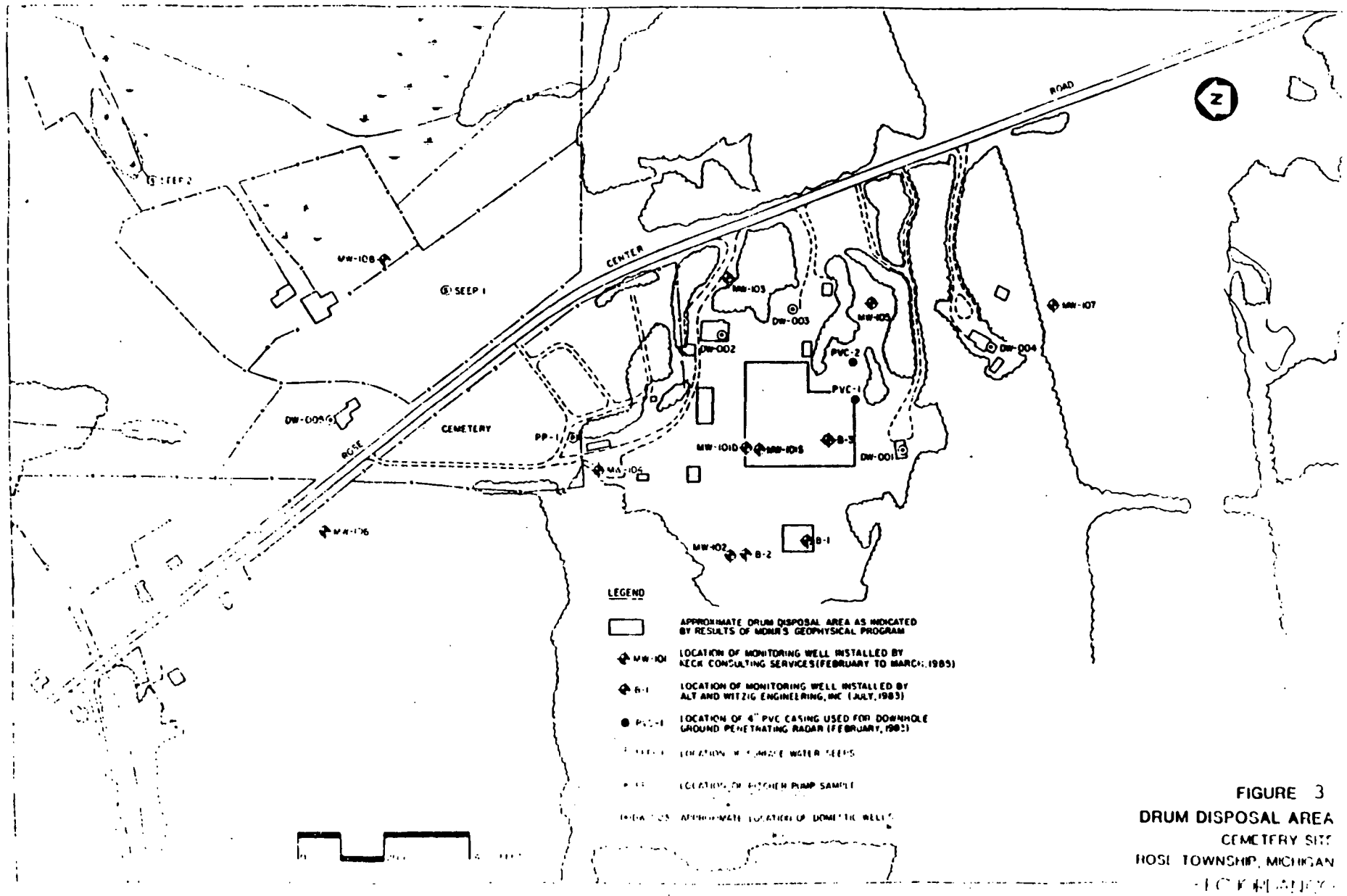


FIGURE 3
DRUM DISPOSAL AREA
CEMETERY SITE
ROSE TOWNSHIP, MICHIGAN

Results of the test digging are shown on Figure 4. Subsoils in the dig area are extremely cobbly. Fourteen metal objects were uncovered which correlate with defined radar targets. When radar indicated no metal targets (i.e., the major portion of the southeast quadrant), none were encountered. The accuracy of metal objects directly relatable to radar targets is 88%. Of the 15 radar targets considered to be drums (partial, whole, or fragments), 8 were confirmed as whole or partial crushed drums. Five drum fragments along with a 10 foot length of wire stranded cable and drum ring make up the remainder of the excavated objects. The cable and drum ring were clustered relatively close together resulting in their appearance as one radar target. Physical conditions of the drums and drum fragments are very poor (heavily corroded, perforated, deformed).

Vertical (depth) error is greater than horizontal location error. The largest error for estimated target depth compared to actual depth was object 5 which was estimated at 7 feet and was actually encountered at 2 feet. Estimated depth errors ranged from 0 feet to 5 feet for all 14 objects (Figure 4). However, only 3 of the 14 objects (#5, #6, & #9) were found more than 2.5 feet from their forecast locations.

Reevaluation of geophysical data, particularly radar signal confidence after ground truthing, indicates the estimate of 237 whole or partial drums is reasonable. If the test dig area is representative of the entire survey area, the error of estimate for drum count is less than 20%.

Based on the electromagnetic survey, ground penetrating radar survey, and test digging the MDNR concluded:

- The maximum depth of the old gravel operation was 24 feet from the present ground surface
- A 50 foot x 70 foot area may contain subsoils contaminated by spilled liquids
- Four areas contain 99% of the drums
- No drums are buried at a depth greater than 16 feet from the present land surface

Drum sample results from the May 1985 test digging are shown in Table 2. The data set was not available during the drafting of the PFS, but has recently been received and validated.

Acetone, toluene, chlorobenzene, naphthalene, bis (2-ethylhexyl)phthalate, and di-n-octyl phthalate are regulated hazardous wastes under RCRA. Methylene chloride is a known human carcinogen. Chlorobenzene is a suspected human carcinogen. Aroclor 1254 and 1248 are regulated by the Toxic Substance Control Act (TSCA) as a toxic substance.

Enforcement

CERCLA related enforcement activity began in June 1985. A total of 14 potential responsible parties had been identified for the Cemetery Site. Notice letters were sent to each party and a meeting was held to discuss the PFS. The potential responsible parties declined the opportunity to design and implement the operable unit on July 30, 1985.

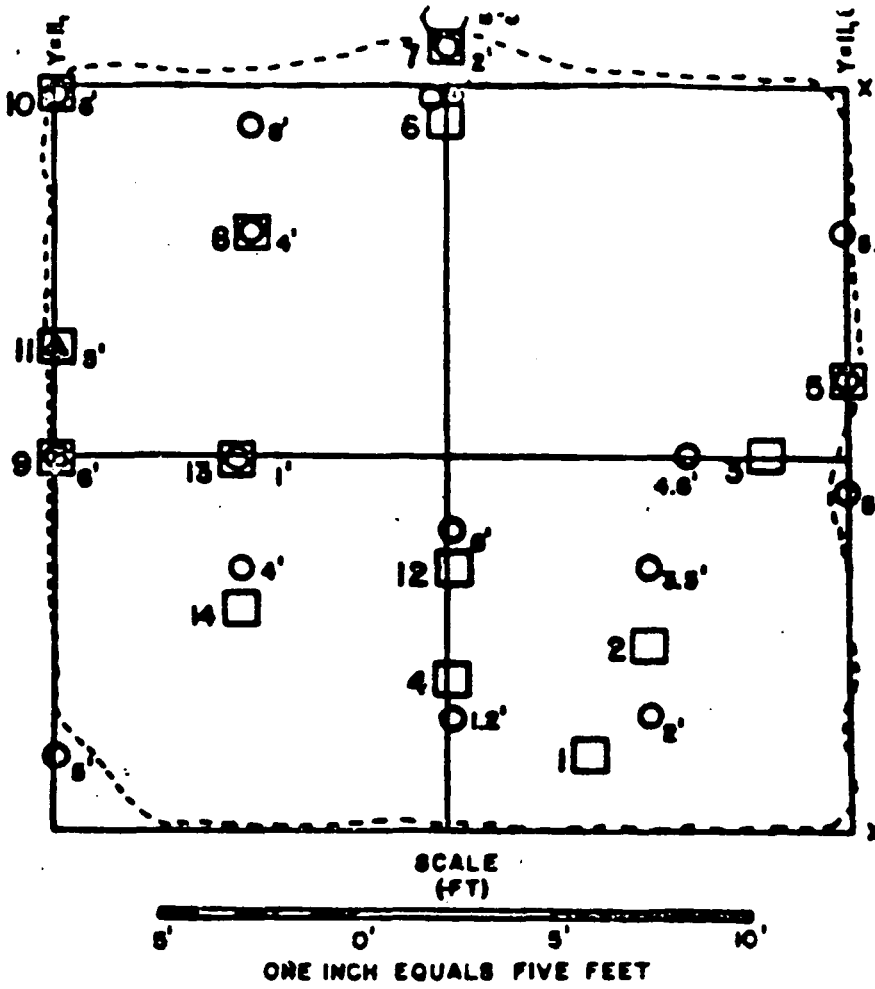


FIG. 4

GROUND TRUTH MAP

- DEPTH BELOW SURFACE IN FEET
- RADAR CYLINDERICAL METAL TARGETS
- RADAR METAL OBJECTS
- METAL CONFIRMED BY DIGGING
- MONITOR WELL
- APPROXIMATE BOUNDARY OF EXCAVATION

CHECK REFERENCE TABLE FOR DESCRIPTION OF METAL

N

REFERENCE TABLE

OBJECT NUMBER	ASSOCIATED RADAR TARGET DEPTH	DEPTH BELOW SURFACE IN FEET	DESCRIPTION
1	2'	4'	10" BY 8" DRUM FRAGMENT
2	3.5'	4'	CRUSHED METAL DRUM
3	4.8'	4.5'	CRUSHED METAL DRUM
4	1.2'	1'	CRUSHED METAL DRUM
5	7'	2'	CRUSHED METAL DRUM
6	4'	1'	CRUSHED METAL DRUM
7	2'	3.5'	DRUM FRAGMENT
8	4'	2'	1' BY 1', AND 1' BY 6" DRUM FRAGMENTS
9	6'	2'	CRUSHED METAL DRUM
10	6'	2', 4'	METAL CABLE, DRUM RING
11	8'	8'	CRUSHED DRUM FRAGMENT
12	6'	5'	CRUSHED METAL DRUM
13	1'	2'	DRUM FRAGMENT
14	4'	3'	CRUSHED METAL DRUM

Table 2

May 1985 Drum Sample Analysis

Methylene Chloride
Acetone
2-Butanone
Toluene
Ethylbenzene
4-Methyl-2 Pentanone
Chlorobenzene
Naphthalene
Bis (2-Ethylhexyl) Phthalate
2-Methylnaphthalene
Di-n-octyl Phthalate
Aroclor 1254 and 1248

Alternatives Evaluation

The PFS was initiated to evaluate the appropriate source control remedial action alternatives at the Cemetery Site. Preventing the release of the contaminants would eliminate the threat to the unconfined aquifer which is used by the area residents for water supply. According to the U.S. EPA Ground Water Protection Strategy published in August 1984, the threatened aquifer at the Cemetery Site appears to be a Class I-Special Ground Waters. This class of ground water is "highly vulnerable to contamination because of the hydrological characteristics of the areas under which they occur..." Based upon available data from the soil borings, geophysics, and test pits this unconfined aquifer is "irreplaceable, in that no reasonable alternative source of drinking water is available to substantial populations." The specific criteria to define each class have not been published for public review and the classification for this aquifer may change.

Contact with the drums must also be considered in the remedial action alternative. Although the drums are buried, the neighbors to the site have reported the uncovering of drums and wastes during gardening and other activities within their backyards. This material has been subsequently removed when encountered by the residents.

Based on the identification of the waste sources and potential receptors, the PFS screened several alternatives which would be appropriate for the Cemetery site. The screened alternatives are presented in Table 3.

Subsequently the four alternatives listed in Table 4 were proposed for detailed evaluation based on the following parameters:

1) Constructability
2) Reliability
3) Implementation
4) Cost
5) Level of Protection
6) Volume reduction
7) Adverse environmental impacts

TABLE 3
SUMMARY OF INITIAL SCREENING OF TECHNOLOGIES

Category of Action	Response Action	Remedial Technology Considered	Initial Screening: Acceptable Engineering Practice	Initial Screening: Effectiveness	Overall Status
Removal	excavation	on-site removal and draining of drums, removal of soils	feasible	effective	acceptable
	on-site landfill	excavation, disposal on-site in an approved hazardous waste facility	feasible	effective	acceptable
	flushing	water extraction (and subsequent treatment of subsurface wastes)	possibly feasible	unknown	unacceptable
	off-site land disposal	disposal off-site disposal in an approved hazardous waste storage facility	feasible	feasible	acceptable
Treatment	in situ biodegradation	favored use of soil bacteria to promote chemicals biodegradation	uncertain	uncertain	unacceptable
	land treatment	surface/subsurface biodegradation	feasible	uncertain	unacceptable
	incineration	on-site high temperature destruction in mobile incinerator	not feasible in this case	effective	unacceptable
		thermal destruction in a permanent off-site facility	feasible	effective	acceptable

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TABLE 3
SUMMARY OF INITIAL SCREENING OF TECHNOLOGIES

			Initial Screening		
Category of Action	Response Action	Remedial Technology Considered	Acceptable Engineering Practice	Effectiveness	Overall Status
	no action	posting of area	feasible	possibly adequate short-term-future status uncertain	acceptable
Receptor Avoidance	alternate water supply	development of new public water supply for area	feasible	not warranted at this time	unacceptable
	fencing	permanent site restrictions	feasible	partially effective at preventing access	acceptable with other technologies
	institutional constraints	legal restriction on site use and access	marginal	not effective	unacceptable
On-site Containment	capping	multi-barrier capping system	feasible	questionable for stopping subsurface migration	acceptable with other technologies
	vitrification	in-place high temperature solidification	not established	unknown	unacceptable
	solidification/fixation	waste excavation followed by chemicals mixing	feasible	unknown	unacceptable
	subsurface barrier walls	installation of a perimeter subsurface and impermeable material	feasible	ineffective to retard migration	unacceptable

Table 4

REMEDIAL ACTION ALTERNATIVES

Alternative 1 - No Action
Alternative 2 - Waste Excavation and Off-Site Land Disposal
Alternative 3 - Waste Excavation and On-Site Land Disposal
Alternative 4 - Waste Excavation and Off-Site Incineration

The PFS had proposed to remove the buried drums and the contaminated soils from the Cemetery site, however, the extent to which contaminants may have migrated in the soils has not been defined. Therefore, this operable unit will only address the buried drums. After the removal of the buried drums, additional soil samples will be collected to determine the remaining levels of contaminants. This additional soil data, along with the completed ground water study, will permit the MDNR and U.S. EPA to determine the appropriate target levels for compounds that could be left on site. The objectives of the PFS, source control and elimination of direct contact with drums, will still be achieved in this operable unit; however, the extent of total clean-up will be deferred until the conclusion of the RI/FS when more data will be available.

The cost estimates presented in the PFS included excavation of contaminated soils. These costs have not been deleted from the capital costs presented in this document. The remedial action estimate will decrease equally for Alternatives 2, 3, and 4 since only the buried drums would be removed.

Estimation of total volume removed during excavation is based on the following assumptions:

1. Drums are separate from each other and are placed at an average depth of 8.5 feet.

2. Each drum and associated contaminated soil covers an area 4 feet on a side.

3. Released materials migrate directly down with no horizontal migration since drums are located in the unsaturated zone.

4. Excavation will occur over entire suspected drum disposal area (approximately 250 feet x 250 feet).

5. A total of 250 drums are present.

6. Total excavation depth is 20 feet.

The above assumptions regarding the total waste and soil volume to be removed will have to be modified during the Remedial Design to obtain a more accurate cost. For example, Item 2 would not include associated contaminated soils but rather only the soil removed with the drums. Item 3 would not be appropriate in this operable unit. Item 4, excavation of main disposal area, may have to be modified to reduce the amount of soil removed. Finally, Item 6 will reflect the appropriate depth to remove the drums.

Alternative 1 - No Action

Alternative 1 evaluated "No Action" as required under Section 300.68(g) of the National Contingency Plan (NCP). This alternative would involve no remediation of the buried drums and contaminated soils at this phase of the project. The RI/FS would be completed before a final remedy for the site is evaluated. The PFS had proposed some minimal field activity to warn and protect people from the hazards present. This activity included a surface clean-up program, warning signs, and installation of temporary fencing. Since site access would be restricted by the fencing, the surface clean-up activity was deleted from the cost estimate. Table 5 summarizes the cost for this alternative.

Table 5
Cost for Alternative 1 - No Action Alternative

Capital Costs	$ 6,000
30 yr. Operation and Maintenance (O&M)	$26,000
Present Worth	$32,000

Alternative 2 - Waste Excavation and Off-Site Land Disposal

Alternative 2 involves the excavation and removal of approximately 1,700 cubic yards of drums and associated contaminated material. An estimated 61,778 cubic yards of uncontaminated soil (Table 6) would have to be moved to reach the buried drums.

Table 6
Total Excavation Calculations

a. Excavation depth 20 feet - sidewall stabilization required
   1. Sidewall slope - 2 horizontal to 1 vertical

b. Total surface area of excavation
   $250 \times [20 \times 2] \times 2 = 330'$ on a side

   Total Amount of Material Excavated

$$\frac{(330' \times 330') + (250' \times 250')}{2} \times 20 \times 1/27 = 63,481 \text{ cy}$$

   Amount of Contaminated Material Excavated and Disposed
   $4' \times 4' \times 11.5 \times 250$ Drums $\times 1/27 = 1,703$ cy

   Estimated Amount of Overburden to be Moved to Reach Drums
   63,481 cy - 1,703 cy = 61,778 cy

The site would be fenced before excavation is initiated to prevent direct contact by potential receptors with excavated wastes. Shallow depressions with a synthetic liner will be prepared for the temporary storage of drums, and associated solid wastes and soil. Any liquid wastes from the drums and pits will be temporarily stored in leak proof hoppers and tested prior to off-site disposal.

There are only two landfill facilities in the general area of the Cemetery Site which are RCRA (Resource Conservation and Recovery Act) approved for accepting the expected waste materials. Both facilities are approximately 100 miles from the site and were used in determining the transportation costs. Table 7 summarizes the costs for this alternative.

Table 7
Cost for Alternative 2 - Waste Excavation and Off-Site Land Disposal

Capital Costs	$ 1,883,261
30 yr. O&M	N/A*
Present Worth	N/A**

Alternative 2 would achieve the two objectives of the PFS by removing the threat of release from the wastes into the Class I aquifer. This alternative would also remove the most concentrated contaminant levels, therefore lowering the threat of contact that may exist to residents digging in the area for gardening and other activities. The RI/FS will develop acceptable target levels for any remaining contaminated soils. The reliability and level of protection for Alternative 2 would be acceptable since the drum source would be removed permanently from the site. Constructability and implementation are feasible for a depth of excavation no greater than 20 feet. The threat of any additional adverse environmental impact would no longer exist once drums are removed. Costs for this alternative are less than Alternative 3 and 4.

Alternative 3 - Waste Excavation and On-Site Land Disposal

Alternative 3 involves construction of an on-site disposal facility for the excavated contaminated material. The facility would meet all RCRA regulations as well as all State laws for constructing a disposal facility. In addition, the alternative must comply with site management and control techniques, installation of contaminant monitoring facilities, and contaminant migration protection strategies. The facility would require a double liner and double leachate collection system. A berm would be built around the facility and ground water monitoring program would be instituted in compliance with regulations. Table 8 summarizes the cost for this alternative.

Table 8
Cost for Alternative 3 - Waste Excavation and On-Site Land Disposal

Capital Costs	$ 1,961,966
30 yr. O&M	415,000
Present Worth	2,376,966

Alternative 3 would be feasible in terms of the constructability and implementation since construction of RCRA landfills is a proven technology. However, the source would be kept on site which offers only a medium level of protection to the unconfined aquifer should the on-site landfill integrity fail. Costs for Alternative 3 would exceed the capital costs in Alternative 2 due to construction and O&M costs for 30 years.

Alternative 4 - Waste Excavation and Off-Site Incineration

Under Alternative 4 the excavation and handling of waste before disposal would be the same as described in Alternative 2. The major difference between this Alternative and Alternative 2 would begin at the packaging requirements for waste materials. Non-pumpable solid materials are accepted at the incineration facility only in burnable plastic or fiber drums not exceeding 30 gallons or 300 pounds. Liquid materials are only accepted in bulk. Special hoppers and drum loading facilities will have to be provided

at the Cemetery Site to assure proper waste preparation. Furthermore, the excavated drums and drum fragments will have to be handled independently either by disposing in a landfill facility or by incineration separately from the soils. Table 9 summarizes the cost for this alternative.

Table 9
Cost for Alternative 4 - Waste Excavation and Off-Site Incineration

Capital Costs	$ 3,142,866
30 yr. O&M	N/A*
Present Worth	N/A**

Alternative 4 would meet all the criteria relating to the concerns at the Cemetery Site. The Off-site Incineration would also guarantee the total destruction of the waste.

* Because all of the alternatives involve remedial actions as part of an operable unit and not the final remedy, no operation and maintenance costs are involved. Operation and Maintenance requirements will be included in the final remedy for the site.

** Present worth values are not applicable for these off-site disposal alternatives because remedial activities are limited to a one time, short-term action.

Summary:

Alternative 1 does not meet the source control objective of the operable unit remedial action. The modified "no action" proposed would restrict site access and therefore minimize the threat of contact with contaminants through digging below the surface. This alternative would not prevent the release of contaminants into the unsaturated zone or potential migration into the unconfined Class I aquifer and private water supplies.

Alternative 3 would meet the objectives of the operable unit by isolating the contaminants from the environment and placing the wastes in an on-site RCRA approved disposal facility. However, the geology of the site and the lack of any guaranteed protection to the unconfined aquifer used by adjacent residents make on-site landfill construction inappropriate.

Alternatives 2 and 4 are technically feasible, do not require complex planning to design, protect the public health, are consistent with the final remedy, exceed environmental standards, and have low community impact. Alternative 4, off-site incineration, would ensure total destruction of the contaminants. However, Alternative 4 requires more pre-transportation preparation before leaving the site. The requirements that solid wastes be packed into burnable plastic or fiber drums and liquids contained in special hoppers would increase the health and safety concerns associated with handling. Additionally, drums and drum fragments would have to be separated from the contaminants and disposed separately, thereby increasing the time and costs of material handling. No additional public health or environmental benefits would be achieved by selection of Alternative 4. For these reasons, this alternative has been eliminated.

Alternative 2, off-site landfill disposal, is the most cost effective remedy proposed because it protects the public health and the environment, is consistent with the final remedy, less expensive than off-site incineration, and will minimize health and safety concerns during waste preparation.

Community Relations

Copies of the PFS were made available to the community on July 22, 1985. Two locations served as respositories in the area: Rose Township Hall and the Rose Township Library in Holly. The MDNR issued a press release on July 26, 1985, which announced the availability of the study, opportunity to comment until August 12, 1985, and the schedule for the public meeting.

The public meeting was held on August 1, 1985 at the Rose Township Hall. Approximately 25 residents attended the meeting. Representatives of the USEPA, MDNR, and local government were present. The MDNR presentation explained the purpose of the PFS, described the current situation regarding site contamination, and discussed the recommended alternative. One public comment was received in writing by the potential responsible parties. These comments are addressed in the attached Responsiveness Summary.

Consistency with Other Environmental Laws

Off-site transportation and disposal of drums and wastes will be in accordance with the appropriate RCRA and TSCA regulations for the transportation and disposal of hazardous waste and PCBs. This will include manifesting of wastes and shipment to a RCRA and, if necessary, TSCA, approved facility. Ground water contamination will be managed in future remedial actions. Appropriate RCRA technical regulations will be used when remedial alternatives are evaluated in the remaining RI/FS work to be conducted by the State of Michigan and EPA.

Recommended Alternative

The National Oil and Hazardous Substances Contingency Plan (NCP) [40 CFR Part 300.68(j)] states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial measure which the agency determines is cost-effective (i.e., the lowest cost alternative that is technologically feasible and reliable) and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare or the environment. Based on the evaluation of the cost and effectiveness of each proposed alternative, the comments received from the public and the MDNR, and State and Federal environmental requirements, Alternative 2 has been determined to be most cost-effective.

The recommended alternative is considered a source control, operable unit remedial action (removal of buried drums), as defined in section 300.68(d) of the NCP. The objective of the action is to eliminate the threat of release from the contaminant source to the Class I aquifer and to remove the threat of contact to the surrounding community and the wildlife in the area. The RI/FS will examine appropriate final response actions for the site.

The capital cost of this alternative is estimated to be $1,883,261. Since this action involves excavation and off-site disposal, and because this is an operable unit of the final remedy for the site, there are no operation and maintenance (O&M) costs for this alternative. In addition, present worth values are not applicable because the recommended alternative involves a one time, short term action with no O & M costs and an estimated construction time of two months.

Schedule

The MDNR will manage the design and construction of the remedial action. Implementation of the remedial action will not be initiated until the design is reviewed and approved by EPA.

Approve Remedial Action (Sign ROD)	09/10/85
Award MDNR Cooperative Agreement for Design/Action	09/10/85
Start Design	09/11/85
Complete Design	12/85
Start Construction	2/86
Complete Construction	4/86

Future Actions

The State lead RI/FS is scheduled for completion in summer 1986. The study will assess the ground water conditions and soils related to the Cemetery Site and propose the appropriate remedial actions.