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Record of Decision
Remedial Alternative Selection

SITE: Metamora Landfill, Metamora, Lapeer County, Michigan

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing the analysis of the cost-effectiveness of remedial alternatives for the Metamora Landfill:

- Metamora Landfill Phased Feasibility Study - August 1986
- Metamora Landfill Site Characterization Report - February 1986
- Summary of Remedial Alternative Selection
- Responsiveness Summary
- August 18, 1986 letter, Seth Phillips, MDNR to John Tanaka, U.S. EPA

DESCRIPTION OF SELECTED REMEDY

The recommended remedy for the Metamora site is to excavate disposal areas one and four, and dispose of all waste at an off-site RCRA compliant incinerator. The estimated present worth cost of the alternative is $41.5 million. The actual excavation of the material is expected to take approximately six to eight months to complete. Disposal of the material will depend on the availability of RCRA compliant facilities. No operation and maintenance will be required to effect the remedy.

DECLARATIONS

Consistent with the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the chosen remedy at the Metamora Landfill is a cost-effective remedy and provides adequate protection of public health and the environment. The State of Michigan has been consulted and agrees with the approved remedy.

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

The Michigan Department of Natural Resources, through a Cooperative Agreement with the U.S. EPA, is undertaking additional Remedial Investigation/Feasibility Study activities to evaluate the necessity for soil, ground water, and other remedial action. If additional remedial actions are necessary, a separate Record of Decision will be prepared for approval.

September 30th, 1986.
Date

Valdas V. Adamkus
Regional Administrator

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
METAMORA LANDFILL

SITE LOCATION AND DESCRIPTION

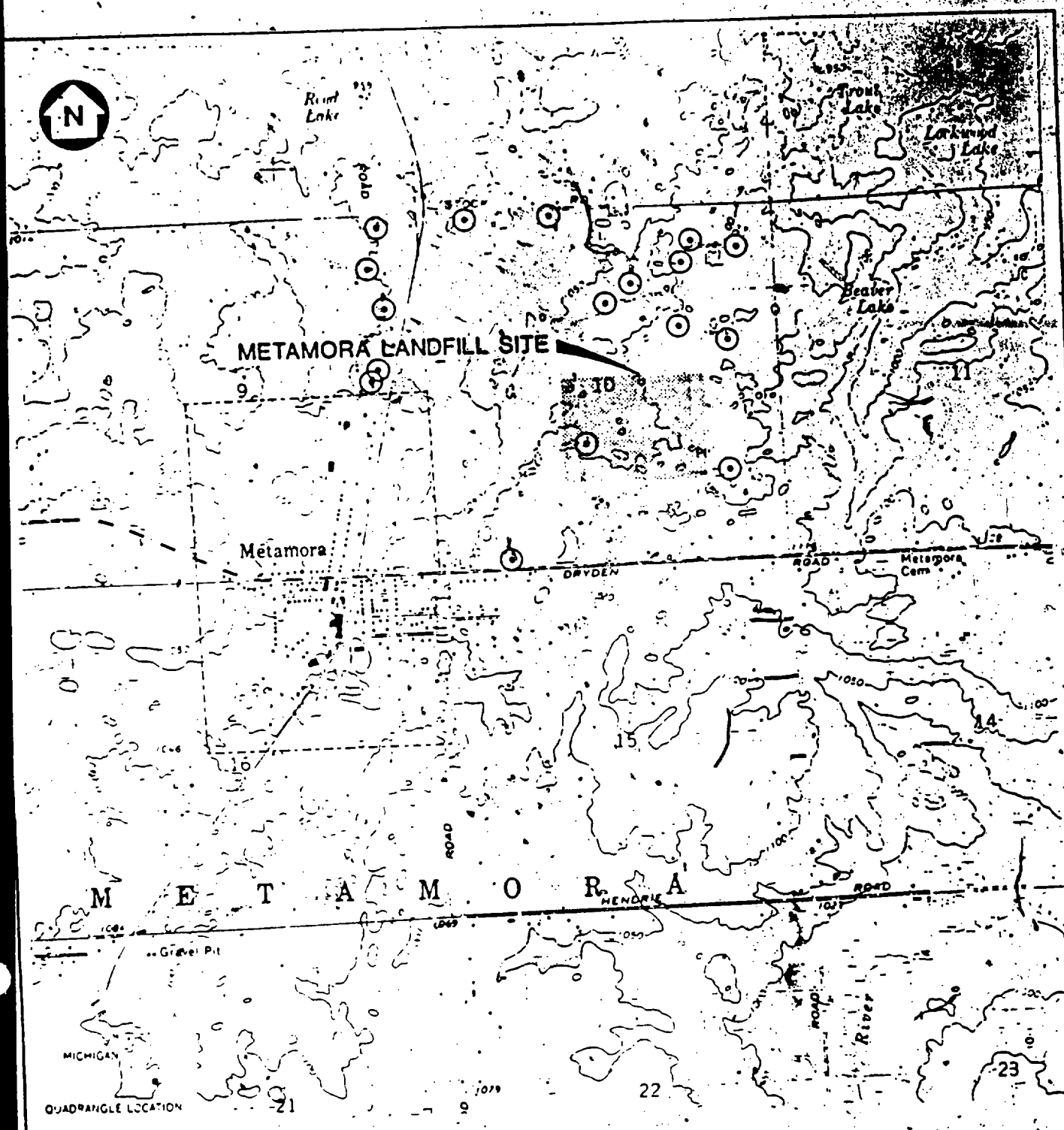
The Metamora Landfill is located in Metamora Township, Lapeer County, Michigan, approximately one-half mile northeast of the Village of Metamora, and 20 miles east-southeast of Flint, MI (Figures 1 and 2). The site is an 80-acre closed landfill that accepted industrial and municipal waste between 1966 and 1980. As many as 35,000 drums may be buried in the landfill. The area was previously used for gravel mining, which accounts for the many steep excavation faces and borrow pits on the site. A gravel mining operation continues immediately south of the site, and a licensed solid waste transfer station currently operates in the western area of the site. The surrounding land use is both residential and agricultural. About 60 people use ground water downgradient of the site. The Village of Metamora's 1982 estimated population was 596 people.

SITE HISTORY

The landfill began operations in 1966 as a privately owned, unregulated open dump. In 1969, the landfill was upgraded to meet existing standards, and licensed to receive general refuse. Two fires at the landfill were documented in 1972 and 1979. The 1972 fire reportedly burned out of control for three days, perhaps fueled by waste materials in the landfill. The site accepted both municipal and industrial waste until its closure in 1980. No records have been discovered that indicate the disposal practices of the former operator. However, it is likely that waste and drums were disposed of in unlined excavations (former mining pits or borrow areas).

PREVIOUS SITE INVESTIGATIONS

In 1981, approximately eight drums were unearthed in area four (Fig. 3) during borrow excavations for the nearby solid waste transfer station. The Michigan Department of Natural Resources (MDNR) sampled seven of these drums and identified (but did not quantify) the presence of methylene chloride, methyl chloroform, dichloroethylene, and styrene, and found up to 40 mg/kg lead. In 1982, the MDNR conducted a magnetometer survey which concluded that as many as 35,000 drums, some containing liquid waste, might be present in five disposal areas around the site (Fig. 3). The survey concluded that area one (16,000 drums) and area four (10,000 drums) contained about 74% of the total estimated number of buried drums in the landfill. Hazardous chemicals in buried drums from areas one and four were confirmed from limited test pit excavations done by the MDNR in June and September 1982 (Table 1).



METAMORA, MICH.

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1968

PHOTOREVISED 1980

DMA 4369 IV NE–SERIES V882

⊙ APPROXIMATE LOCATIONS OF NEAREST DOMESTIC WATER SUPPLY WELLS

0 2000 4000 FEET

FIGURE 2

SITE LOCATION MAP

E.C JORDAN CO.

4465-92

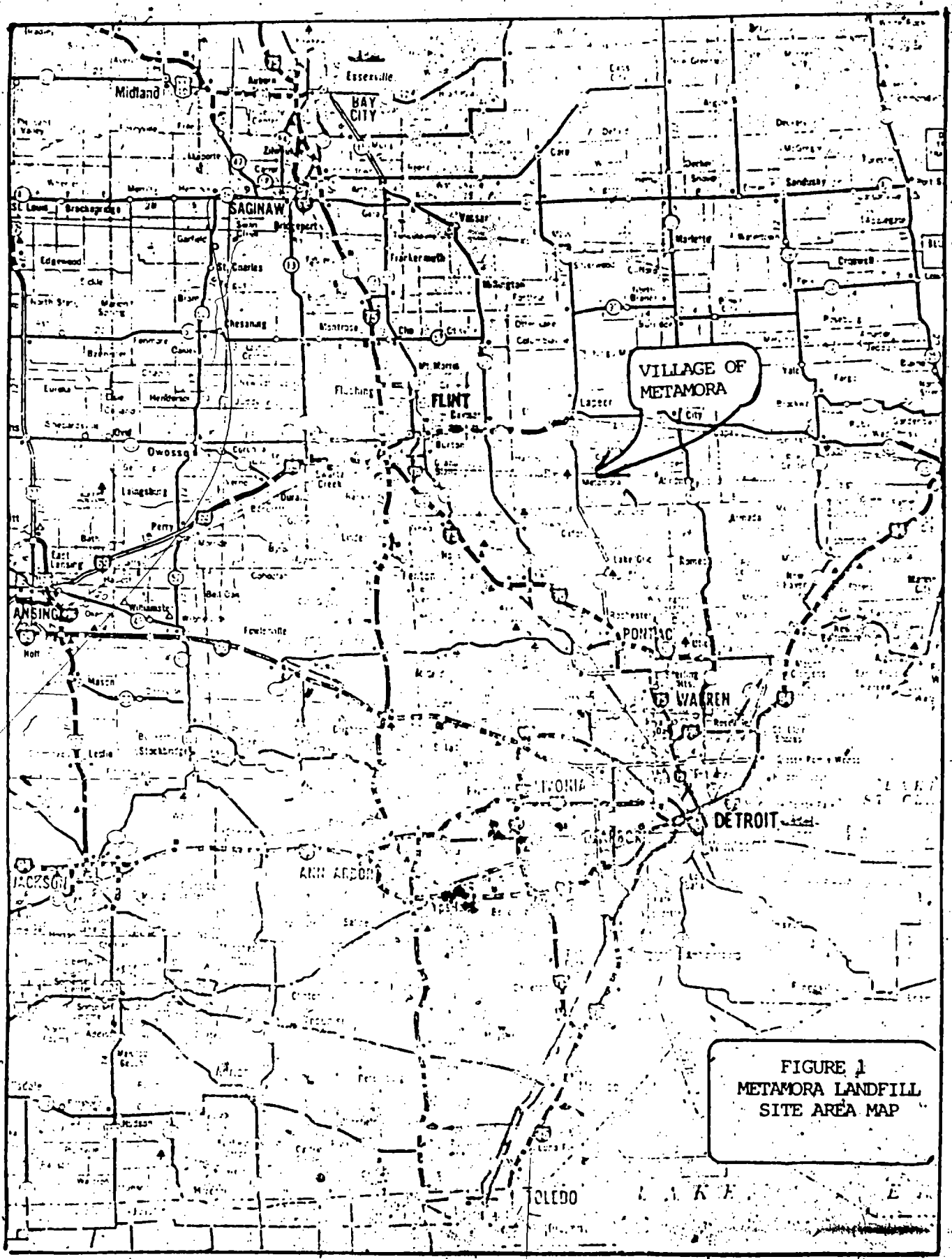
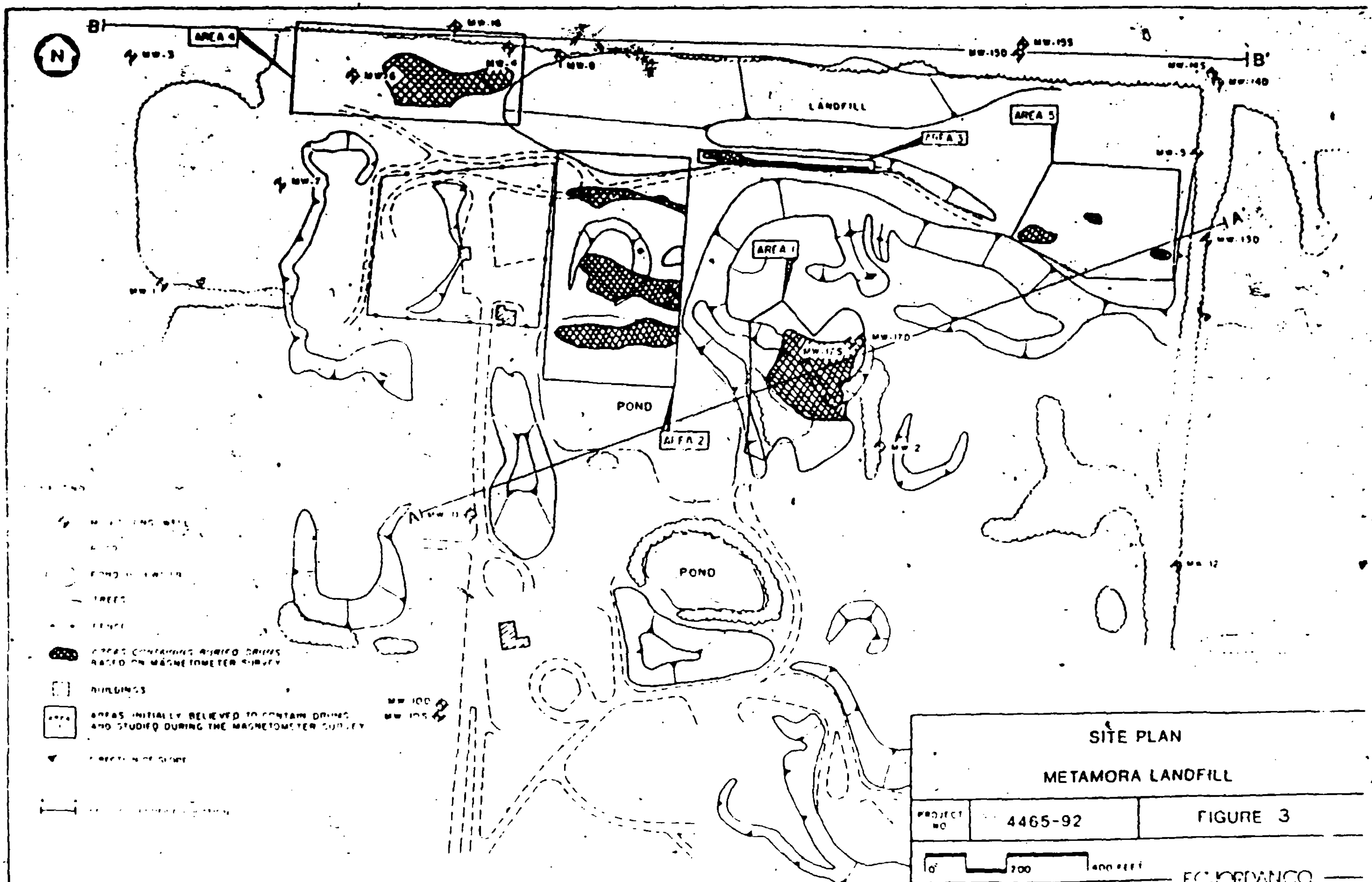


FIGURE 1
METAMORA LANDFILL
SITE AREA MAP



SITE PLAN

METAMORA LANDFILL

PROJECT NO	4465-92	FIGURE 3

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Table 1
Summary of Liquid and Solid Drum Samples

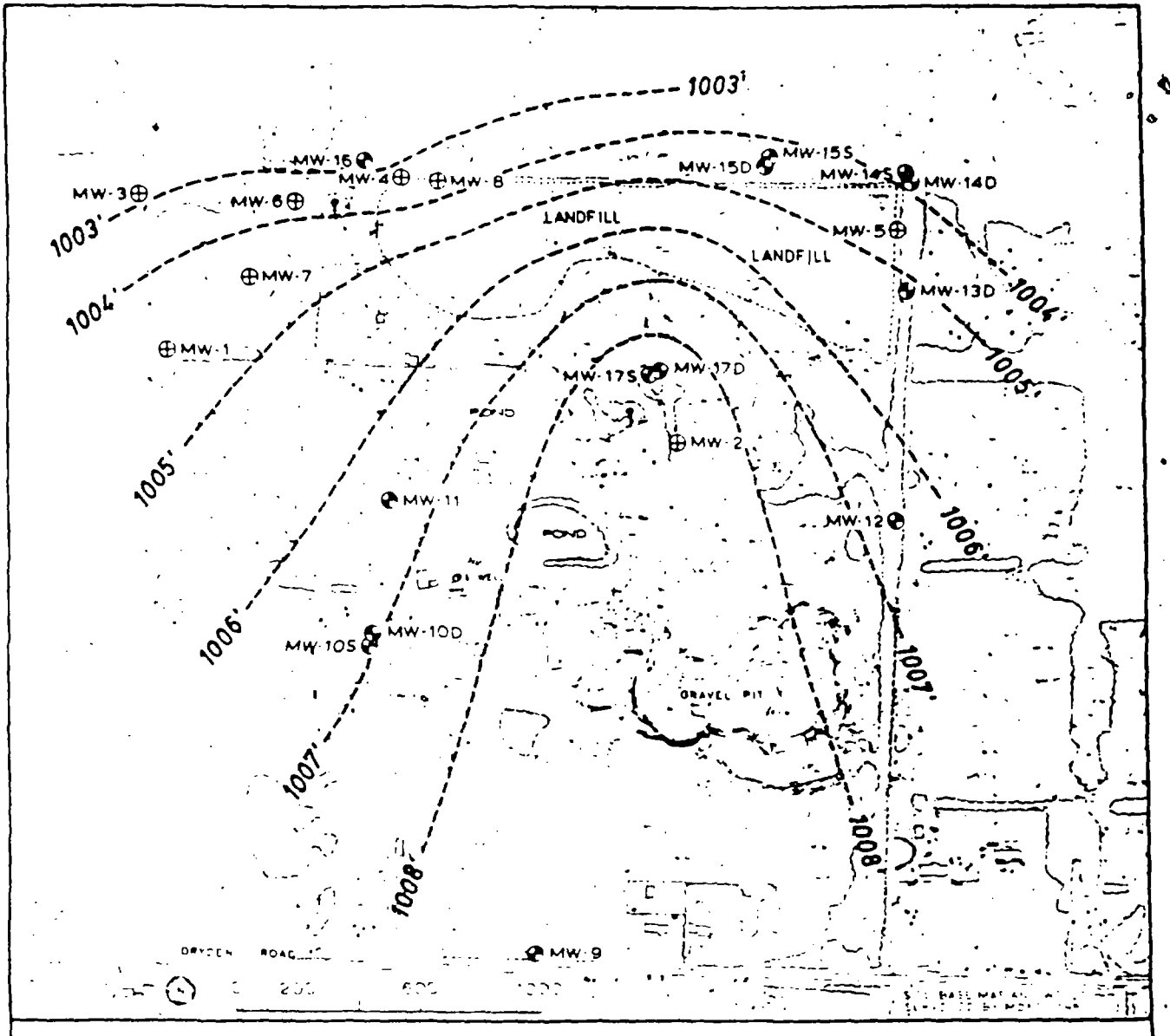
Compound Detected	Concentration Range	Area	Matrix
Ethyl benzene *	ND-27	1	Solid
" "	750-25,000	1,4	Liquid
Toluene *	ND-100	1	Solid
"	1,200-13,000	1,4	Liquid
Trichloroethylene *	ND-2.7	1	Solid
"	ND-20.	1,4	Liquid
1,1,1-Trichloroethane *	ND-1.6	1	Solid
"	ND-20	1,4	Liquid
Tetrachloroethylene	ND-3.5	1	Solid
"	ND-65	1,4	Liquid
Xylenes	ND-100	1	Solid
"	2,000-80,000	1,4	Liquid
PCBs	ND-1.7	4	Solid
Hexachlorobenzene	ND-3.2	4	Solid
1,2,4-Trichlorobenzene	ND-3.3	4	Solid
Octachlorocyclopentadiene	ND-0.28	4	Solid
1,3- and 1,4-Dichlorobenzene	20-22	4	Water
Chloroform	ND-150	4	Liquid
1,1-Dichloroethane *	ND-240	4	Liquid
1,2-Dichloroethylene	ND-25	4	Liquid
1,2-Dichloroethane *	ND-300	4	Liquid

Notes:

1. All values in parts per million (ppm)
2. ND = Not detected
3. * = Also detected in ground water
4. For complete data, see E.C. Jordan Site Investigation Report, February 1986.

Table 1 shows that a variety of organic chemicals were detected in high concentrations in liquid and solid samples from the drums, including the carcinogens 1,2-dichloroethane, and 1,1,1-trichloroethane, tetrachloroethylene, trichloroethylene, and hexachlorobenzene.

In the summer of 1985, the MDNR initiated pre-remedial investigation activities at the site, during which soil borings were taken and thirteen ground water monitoring wells emplaced. That work determined that the site geology is variable, but generally consists of unconsolidated sand and gravel that is 250-300 feet thick in some locations, underlain by a clay/till unit. Ground water occurs at an average depth of about 100 feet below ground surface, with the deep aquifer at about 300 feet. Ground water flows from the south-central part of the site to the northwest and northeast (Fig. 4). Sampling results from the investigation confirmed



? MAGNETIC ANOMALIES

⊕ PREVIOUSLY-EXISTING SITE WELLS

◕ "SHALLOW" WELLS THIS INVESTIGATION

◕ "DEEP" (SOIL) WELLS THIS INVESTIGATION

-1003'- INFERRED ELEVATION OF THE WATER TABLE 09-16-85 - MSL DATUM

FIGURE 4 - SITE AREA

INTERPRETIVE WATER TABLE ELEVATION

SURFICIAL AQUIFER

ECJORDANCO

the the existence of organic and inorganic ground water contamination. Monitoring wells MW-4 and MW-8, located in the immediate vicinity of area 4, and monitoring wells MW17s and 17d, located adjacent to area 1, all showed contamination by volatile organic compounds (Table 2).

Table 2
Summary of Monitoring Well Sampling

Compound Detected	Concentration Range (All Wells)	Wells Detected
Benzene	ND-23	4, 17s
Ethyl benzene *	ND-1500	17s, 17d
Methylene chloride	ND-79	4, 11, 14s, 15s, 15d, 17s
Toluene *	ND-660	17s, 17d
Trichloroethylene *	ND-13	8
Trichlorofluoromethane	ND-200	8, 14s, 14d, 15s, 15d, 17d
Trans-1,2-Dichloroethane	ND-360	4, 8
1,1,1-Trichloroethane *	ND-12	8, 14s, 15s
1,1-Dichloroethane *	ND-95	8, 14s, 15s, 17s
1,2-Dichloroethane *	ND-46	8, 17s
Diethylphthalate	ND-9.6	8, 14s
Dioctylphthalate	ND-410	17s
Bis(2-ethylhexyl)phthalate	ND-240	15s, 17s
Di-n-butlyphthalate	ND-38	11, 15d

Notes:

1. All results in micrograms per liter (ppb)
2. ND = Not detected
3. * = Also detected in drum samples
4. Table shows significant organic data only - for complete data see E.C. Jordan Site Investigation Report, Feb. 1986

Some of the same hazardous substances were detected in drum samples (Table 1) and in ground water samples near drum disposal areas one and four (Table 2). Therefore, it is very likely that hazardous substances in suspected drum disposal areas one and four have migrated into the ground water. The pre-RI work is summarized in the report entitled, "Site Investigation Final Report" (E.C. Jordan, February 1986).

RISK TO RECEPTORS VIA PATHWAYS

The primary public health threat posed by the Metamora site is consumption of contaminated ground water by downgradient residential users. Approximately 60 residents are potentially affected by migrating pollutants in ground water. Benzene, 1,2-dichloroethane, and trichloroethylene, which are known or suspected human carcinogens, have been detected in on-site

monitoring well samples in concentrations that exceed the 1x10-6 acceptable risk level established by U.S. EPA. The carcinogens chloroform, hexachlorobenzene, and tetrachloroethylene have also been found in excavated waste samples, and might migrate into the ground water. No contaminants have as yet been detected in downgradient residential water samples, but future contamination is very possible since the buried drums are probably in poor condition (rusted and/or leaking). The ongoing Remedial Investigation/Feasibility Study will better define the hydrogeology and the existence of any contaminant plume(s) in ground water. Direct contact with contaminated soils is currently not a threat since the waste is buried beneath at least 10 feet of fill dirt. No air emissions have been detected in the vicinity of the disposal areas. However, if the site were used in the future, and the fill covering the drums became exposed, the drums and their contents could present an inhalation and direct contact hazard.

ENFORCEMENT

On June 20, 1985, Notice Letters that described the upcoming Remedial Investigation and Feasibility Study were sent to nine Potentially Responsible Parties (PRPs). On April 29, 1986, Notice Letters were sent to ten PRPs offering them the opportunity to undertake the Agency's remedy for this operable unit. To date, PRPs have shown little or no interest in participating in the remedial process. On July 28, 1986, Region V EPA, through a joint memorandum from the Hazardous Waste Enforcement Branch and the Office of Regional Counsel, terminated the PRP negotiations for the operable unit. Therefore, Region V EPA has recommended the use of the Hazardous Substance Response Trust Fund, as described in CERCLA, Section 111, to fund the project. Two PRPs did, however, provide written comments on the public comment draft PFS, but still did not demonstrate a willingness to participate in the project. Theirs and other public comments are summarized in the attached Responsiveness Summary.

PHASED FEASIBILITY STUDY METHODOLOGY AND APPROACH

In response to the potential health threat posed by the site, a Phased Feasibility Study (PFS) was initiated, the objective of which was to formulate remedial alternatives that were protective of public health and the environment. To this end, source control remedial alternatives (as defined in the National Contingency Plan, 40 CFR Part 300.68(d)) that dealt with the five identified drum disposal areas were examined in detail. Management of migration remedial alternatives were not deemed necessary at this time since, based on the most recent monitoring well samples, contaminants had not migrated a significant distance from their original locations.

The PFS then analyzed which source control remedial alternatives were most appropriate. The study initially considered each of the five disposal areas thought to be a source of contamination: three of the disposal areas (2, 3, and 5) were inaccessible due to the depth (from 27 up to 80 feet) at which materials were disposed (Fig. 3), so the presence of buried drums in these areas was not confirmed. Areas 2, 3, and 5 also

were suspected of containing metallic municipal waste, which may have biased the magnetometer survey performed in these areas. Given the limited information available for areas 2, 3, and 5, and the anticipated depth of burial, it was not possible to accurately predict the cost of remedial action alternatives in these areas. On the other hand, no municipal waste was believed to have been disposed of in areas one and four, and the existence of drums in these areas was confirmed by limited excavations. Therefore, the PFS developed source control remedial action alternatives for disposal areas one and four only, in which it was estimated by the MDNR magnetometer survey that the majority of the drums (26,000 out of 35,000, or 74%) existed. Therefore, although areas 2, 3, and 5 may also contain hazardous waste, the PFS examined the known disposal areas (one and four) believed to be major sources of contamination at the site. The RI/FS will investigate areas 2, 3, and 5 in detail and propose appropriate remedial alternatives if necessary.

Soil and ground water contamination were not addressed by the PFS. This was because insufficient information was available to determine the extent of contamination. Therefore, reasonable cleanup targets could not be accurately established. The RI/FS, scheduled for completion in FY '88, will establish cleanup targets for ground water and soil.

Some material between the drums may be highly saturated with hazardous chemicals from leaking drums. For the purpose of the PFS, this interstitial material was considered to be waste, rather than soil. This waste material would be disposed of along with drummed material. Based on an estimate of 26,000 drums and associated "interstitial" waste material, the total estimated waste volume requiring disposal during this operable unit is 18,150 cubic yards (see Table 3 for calculations).

ALTERNATIVES EVALUATION

Using the response objective of source control of areas one and four as a guideline, potential remedial alternatives were assembled and screened. The following alternatives were eliminated during the screening process using the NCP criteria of cost, acceptable engineering practice, and effectiveness at addressing the site problem.

1. On-site incineration alternatives would involve the construction of a facility on-site. A key factor in the decision not to evaluate on-site incineration alternatives in detail was the additional time necessary to implement such a remedy. Due to the time needed to construct a facility, and the statutory requirements of Michigan Act 64 (Hazardous Waste Management Act), actual incineration of excavated waste under the on-site option would take an estimated 21 to 27 months longer than an off-site incineration alternative. Act 64 establishes a procedure whereby State technical standards are applied on a site-specific basis. This process is extremely lengthy and State technical standards are applied strictly. The process has seldom resulted in the construction of an incinerator on-site; incinerator construction has been authorized only once since 1979. Table 4 outlines the necessary activities and timeframes for both the on-site and off-site incineration scenarios.

Table 3
Estimate of Waste Volume to be Excavated and Disposed

Assumptions:

1. Number of drums in area one = 16,000
2. Number of drums in area four = 10,000
3. All drums uncrushed
4. Volume of one drum = 7.35 cubic feet
5. Interstitial waste material volume equal to volume of drums

Calculations:

DRUMS:

Solids:

$$21{,}000 \text{ drums} \times \frac{7.35 \text{ cubic feet}}{\text{drum}} \times \frac{\text{cubic yard}}{27 \text{ cubic feet}} = 5{,}717 \text{ cu. yd.}$$

Liquids:

$$5{,}000 \text{ drums} \times \frac{7.35 \text{ cubic feet}}{\text{drum}} \times \frac{\text{cubic yard}}{27 \text{ cubic feet}} = 1{,}361 \text{ cu. yd.}$$

INTERSTITIAL WASTE:

Interstitial Waste Volume = Volume of Drums = 7,078 cu. yd.

Total Excavated Waste	14,156 cu. yd.
Waste From Storage/Staging Area	4,000 cu. yd.
Total Waste for Disposal	18,156 cu. yd.

Table 4
Implementation Time for On-site vs. Off-site Incineration

Activity:	Implementation Time (months) On-site	Off-site
1. Test Pits	3-4	3-4
2. Remedial Design	6-8	6-8
3. Prepare Act 64 Application	3-6	N/A
4. MDNR Technical Review	3	N/A
5. Site Review Board Review	3.5	N/A
6. Procure Contractor	3-6	3-6
7. Construct Facility	6-8	N/A
8. Construction Inspection and Certification	1	N/A
9. Review Operating License Applic.	3.5	N/A
10. Trial Burn and Review	1-2	N/A
11. Excavate and Test Waste	3-4	3-4
12. Begin Incineration		
Total Time to Begin Incineration	36-49	15-22

Table 4 demonstrates that the off-site incineration alternative can be implemented at least 21 to 27 months sooner than the on-site option. The on-site alternative requires many more review steps than off-site incineration, which means that there are more ways that the project could be further delayed. Therefore, the estimate of 21 to 27 months is the minimum delay expected.

Besides having serious schedule implications, the on-site alternative has real environmental impacts associated with it as well. The drums in areas one and four are known to contain hazardous materials in relatively high concentrations. The Site Investigation report (E.C. Jordan, February 1986) has demonstrated that these drums are probably leaking their contents into the upper ground water aquifer which is currently used as a drinking water source. Ground water in the vicinity of the site generally moves to the northeast and northwest. (Off-site ground water flow must be further defined). Assuming that ground water flow continues in these directions beyond the site boundary, approximately 60 people within one mile of the site are in the path of a potential contaminant plume. (The current data neither confirm nor deny the existence of a contaminant plume). If off-site ground water flow turns out to have a western component, the supply wells for the Village of Metamora, (located approximately one-half mile to the west of the site), which serve about 600 additional residents, may also be impacted. If no plume currently exists, and contamination is confined to the area immediately adjacent to the source material, timely implementation of source control may prevent a contaminant plume from forming.

At a minimum, the implementation of source control will prevent further degradation of the drinking water aquifer. Much greater expense will be incurred in order to extract and treat contaminated ground water if contaminants continue to enter the soil and ground water. The current monitoring well network may not detect an off-site plume. Therefore, the minimum 21 to 27 month time delay associated with on-site incineration could prove to have significant adverse environmental effects.

In light of the above issues, and the fact that the project was designed as a source control remedial alternative requiring more immediate attention, it was decided that on-site incineration was not an implementable alternative at this time. Therefore, it was not carried through to the detailed alternatives analysis.

2. Solidification and/or chemical fixation technologies were screened out due to the high volatile organic content of the waste. The intent of this technology would be to create a non-leachable material to reduce the toxicity and/or mobility of the waste. Lime and inert organic polymers have been used in the past. However, fixation technologies have been generally used for wastes containing PCBs, metals, and some semi-volatile compounds. The high volatile content of the waste makes this particular technology inapplicable for this operable unit.

3. Landfarming would involve the mixing or dispersion of wastes into a soil-plant system, the objective of which would be microbial stabilization, adsorption, and immobilization of the waste. Landfarming was not considered in detail because of the heterogeneous nature of the waste, which would make the determination of the effectiveness and applicability of this technology very difficult. Furthermore, landfarming is a relatively untested technology for hazardous waste disposal.

4. Recycling was ruled out due to the heterogeneous waste stream, which limits the technology's applicability and effectiveness. Recycling has been normally applied to well-defined homogeneous industrial waste streams, and cannot be depended on to address a significant volume of waste during this operable unit.

DETAILED ALTERNATIVES ANALYSIS

After the alternatives screening process was completed, the following alternatives were examined in detail.

1. On-site RCRA landfill
2. Off-site RCRA landfilling
3. Off-site incineration
4. Combination off-site incineration and off-site landfill
5. No action

All of the alternatives except for no action involve the excavation and testing of waste in areas one and four, and the construction of two

temporary staging and testing areas on-site. The cost of these activities (total - $ 3.63 million) is the same for each alternative except no action (see Tables 5 and 6 for detailed costs).

1. On-site RCRA Landfill - This alternative would involve the construction of a double lined RCRA Subtitle C facility on the site, approximately one acre in size. The alternative would include provisions for leachate collection and disposal, general operation and maintenance, such as sampling and testing, and cap repair or replacement. Liquids would be solidified prior to disposal, but no waste treatment would take place. Long-term monitoring would also be an integral part of the remedy. Such a landfill would be easily constructed, and reasonably protective of public health and the environment. Detailed costs are shown in Table 7.

2. Off-site RCRA Landfill - Under this alternative, all waste would be transported and disposed of at an off-site compliant RCRA landfill. Liquids would be solidified (but not treated) prior to disposal. The landfill chosen could be expected to provide adequate protection of public health and the environment. Operation and maintenance would be the responsibility of the disposal facility. Detailed costs are shown in Table 8.

3. Off-site Incineration - All waste would be transported to and disposed of at an off-site incinerator. Depending on the waste characteristics, several different commercial incinerators might be used (e.g. liquids and solids might go to separate facilities). This remedy would offer a significant volume reduction of liquids, reduced waste mobility and toxicity, and long-term reliability, protection, and effectiveness. Detailed costs are shown in Table 9.

4. Combination Off-site Incineration and Off-site Landfill - Liquid waste would be disposed of at an off-site incinerator, and solid waste would be taken to a compliant off-site RCRA landfill. (See the above discussions for the elements of this remedy). Detailed costs are shown in Table 10.

5. No action - Under this alternative, no remedial activity would take place. No money would be spent for this alternative. It was included primarily to compare remedial alternatives to baseline conditions.

Table 11 shows the present worth and relative costs (as compared to the on-site landfill) of the alternatives.

TABLE 5

STAGING/STORAGE AREA COSTS

Access road and fencing around storage area		$ 4,400
Berms - 4'high, separating storage areas		4,800
Liner		38,300
Gravel working surface		14,500
Surface water control - drainage ditch, pond, piping, treatment		7,500
	Subtotal	$69,500
	Mobilization	3,500
	Contingency	17,000
	Total	$90,000

TABLE 6

EXCAVATION AND CHARACTERIZATION TESTING COSTS

Excavation		
Excavation Equipment - grappler, loaders, dozer		$439,000
On-Site transport equipment - tank truck, fork lifts		811,000
Labor - 10 people		698,000
Supervision		150,000
Cover soil over excavated areas		17,000
	SUBTOTAL	$2,115,000
	Mobilization	106,000
	Decontamination Facilities	127,000
	Contingency	530,000
	TOTAL	$2,878,000
Characterization Testing		
1 chemist and 3 technicians		$274,000
On-site laboratory		61,000
		$335,000
	Mobilization	$10,000
	Protective Equipment and Contingency	117,000
	TOTAL	$462,000
Total Cost		
Excavation		$2,878,000
Characterization Testing		462,000
Overpacks (assumes [illegible] overpacks @ $80 each)		200,000
	TOTAL	$3,540,000

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TABLE 7
COSTS FOR ON-SITE DISPOSAL

Capital Costs		
Site Preparation		$35,400
Liner		250,000
Leachate Control		74,100
Cap		17,800
Access road and fence		14,000
Leachate storage and treatment		19,800
Monitoring wells		47,900
Solidification of liquids (assume 5000 drums)		375,000
Placement of waste		259,000
	SUBTOTAL	$1,093,000
	Mobilization	55,000
	Engineering & Contingency	382,000
	Permitting	100,000
	TOTAL	$1,630,000
Annual Costs		
Sampling and Testing		$26,000
Maintenance		2,000
	TOTAL	$28,000
Cap Replacement Costs		
Cap		
	Mobilization	$17,800
	Engineering	1,900
	Contingency	8,000
	TOTAL	$27,700

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TABLE 7 (cont.)

Total Cost

In present worth, amortized at 10 percent for 30 years

Staging Area Costs (Table 5)	$90,000
Excavation and Testing Costs (Table 6)	3,540,000
On-Site Disposal Costs	
Capital Cost	1,630,000
Annual Cost	264,000
Replacement Cost	80,000
TOTAL	$5,604,000

TABLE 8

COSTS FOR OFF-SITE DISPOSAL

	PCB < 50 ppm		50 ppm < PCB < 500 ppm	
	Solids (per cy)	Liquids (per drum)	Solids (per cy)	Liquids (per drum)
Testing	$12[1]	$15[1]	60[2]	106[2]
Testing at landfill	2[1]	2[1]	10[2]	17[2]
Trucking	21	8	64	20
Solidification	--	75	--	75
Landfilling[3]	200	60	330	107
Subtotal	$235	$160	$464	$325
Contractor fee	60	40	136	95
Total	$295	$200	$600	$420

[1]Assumes compositing 80 drums of liquids or 100 cubic yards of solids.
[2]Assumes compositing 10 drums of liquids or 20 cubic yards of solids.
[3]These are average costs. Prices will vary depending on the type of waste.

Total Cost

In present worth, amortized at 10 percent for 30 years.

Staging Area Costs (Table 5)	$ 90,000
Excavation and Testing Costs (Table 6)	3,540,000
Off-Site Disposal Costs	
80% of total volume PCB < 50 ppm	
Solids - 12,240 cy	3,610,000
Liquids - 4,000 drums	800,000
20% of total volume - 50 ppm < PCB < 500 ppm	
Solids - 3,060 cy	1,340,000
Liquids - 1,000 drums	420,000
Staging area materials - 4,000 cy	1,180,000
Total	$11,480,000

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TABLE 9
COSTS FOR INCINERATION

	PCB [illegible] 50 ppm		50 ppm < PCB < 500 ppm	
	Solids (per cy)	Liquids (per drum)	Solids (per cy)	Liquids (per drum)
Testing	$9[1]	$91	$ 22[2]	$ 19[2]
Trucking	51	16	51	16
Incineration	1120[3]	210[4]	2800	400
SUBTOTAL	$1180	$235	$2873	$435
Contractor fee	340	65	857	130
TOTAL	$1520	$300	$3730	$565

[1]Assumes compositing 20 drums of liquids or 20 cubic yards of solids.
[2]Assumes compositing 10 drums of liquids or 20 cubic yards of solids.
[3]This is a base price. The price will increase depending on the types of wastes.
[4]This is an average price. The actual price may range from $105 to $840/drum.

Total Cost

In present worth, amortized at 10 percent for 30 years.

Staging Area Costs (Table 5)	$ 90,000
Excavation and Testing Costs (Table 6)	3,540,000
Incineration Costs	
80% of total volume - PCB < 50 ppm	
Solids - 12,240 cy	18,600,000
Liquids - 4,000 drums	1,200,000
20% of total volume - 50 ppm < PCB < 500 ppm	
Solids - 3,060 cy	11,410,000
Liquids - 1,000 drums	570,000
Staging area materials - 4000 cy	6,000,000
TOTAL	$41,300,000

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TABLE 10
COSTS FOR DISPOSAL/INCINERATION

	Incinerate Liquids - Per Drum		Landfill Solids - Per CY	
	PCB < 50 ppm	50 ppm < PCB < 500 ppm	PCB < 50 ppm	50 PPM < PCB < 500 ppm
Testing	$9[1]	$20[2]	12[3]	60[2]
Testing at Landfill	--	--	2[3]	10[2]
Trucking	16	16	21	64
Landfilling[4]	--	--	200	330
Incineration	210[5]	400[5]	--	--
SUBTOTAL	$235	$435	$235	$464
Contractor Fee	65	130	60	136
TOTAL	$300	$565	$295	$600

[1]Assumes compositing 20 drums of liquids.
[2]Assumes compositing 10 drums of liquieds or 20 cubic yards of solids.
[3]Assumes compositing 100 cubic yards of solids.
[4]These are average costs. Prices will vary depending on the type of waste.
[5]This is an average price. The actual price may range from $105 to $840/drum.

Total Cost

In present worth, amortized at 10 percent for 30 years.

Staging Area Costs (Table 5)	$90,000
Excavation and Testing Costs (Table 6)	$3,540,000
Incineration of Liquids	
80% of total volume - PCB < 50 ppm 4000 drums	1,200,000
20% of total volume - 50 ppm < PCB <500ppm 1000 drums	570,000
Landfilling of Solids	
80% of total volume - PCB < 50 ppm 12,240 cy	3,610,000
20% of total volume - 50 ppm < PCB <500ppm 3,060 cy	1,840,000
Staging Area Materials 4,000 cy	1,180,000
TOTAL	$12,030,000

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Table 11
Present Worth and Relative Costs of Alternatives

Alternative	Present Worth *	Relative Cost
1. On-site RCRA landfill	$ 5.6 million	1.0
2. Off-site RCRA landfilling	$ 11.1 "	2.0
3. Off-site incineration	$ 41.5 "	7.4
4. Combination off-site incineration and off-site landfill	$ 12.0 "	2.1
5. No action	$ 0	---

* Present worths calculated using a 10% interest rate and 30 year project period.

ENVIRONMENTAL IMPACTS

Many of the positive and adverse impacts of the alternatives were similar. For example, all of the alternatives, except for no action, would require excavation of areas one and four, causing some temporary noise and dust impact due to heavy equipment at the site. The no action alternative might allow hazardous chemicals to further migrate in the environment, potentially contaminating residential wells. No adverse long-term environmental or public health impacts are expected from the implementation of the alternatives retained for detailed screening. The specific positive and adverse environmental impacts of each alternative are discussed in the sections entitled, "Alternative Screening Process" and "Recommended Alternative".

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

All of the alternatives examined in detail were designed to be fully compliant with applicable environmental laws. The Resource Conservation and Recovery Act (RCRA) entered prominently into the analysis. The on-site landfill alternative would meet all requirements of the RCRA regulations at 40 CFR Part 264, Subpart N, as well as the requirements of the Toxic Substances Control Act (TSCA), 15 U.S.C., Section 2605(e), if concentrations of polychlorinated biphenyls (PCBs) were high enough to require a TSCA-regulated facility. However, it is expected that the majority of waste at Metamora will not require a TSCA-regulated facility. All off-site alternatives would involve only those facilities in compliance with RCRA and/or TSCA. The recommended alternative would fully comply with all applicable State (notably Act 64) and Federal statutes.

ALTERNATIVE SCREENING PROCESS

The detailed screening process used to select the remedy was consistent with the NCP, 40 CFR Part 300.68(h), U.S. EPA's most recent guidance concerning the selection of off-site remedial alternatives, and other Agency guidance as appropriate. In addition, consideration was given to the expected CERCLA reauthorization statutory language which stresses the selection of permanent remedies, such as thermal destruction. The NCP criteria used in the detailed alternatives analysis were:

1. Consideration of established technology and innovative and alternative technology where appropriate.

2. Detailed cost estimation, including operation and maintenance (O&M) costs.

3. Evaluation of engineering implementation, reliability, and constructability.

4. An assessment of the degree of protection afforded by a given alternative, including the attainment of relevant Federal standards.

5. An analysis of any adverse environmental impacts.

6. Consistency of remedial action with final remedy.

7. Cost-effectiveness of the alternative.

A summary of the alternatives with respect to the above criteria is presented in Table 12.

The National Contingency Plan, 40 CFR Part 300.68(j) states that, "the appropriate extent of remedy shall be determined by the lead agency's selection of a cost-effective alternative that effectively mitigates and minimizes threats to and provides for protection of public health and the environment," and that the lead agency shall consider, "cost, technology, reliability, administrative and other concerns, and their relevant effects on public health and the environment". The following alternatives were screened out based on the aforementioned criteria.

1. The on-site RCRA landfill was not selected for several reasons. Due to the relatively permeable nature of the native soils, the site would not be an ideal location for a hazardous waste landfill. Any breach in the containment liner would allow contaminants to easily migrate into the underlying ground water aquifer, which could then contaminate residential water supplies. A corrective action program for ground water would be very expensive since the upper and lower aquifers are about 100 and 300 feet below ground surface, respectively. Installing extraction wells, pumping, and treating ground water at these depths would be very time and capital intensive. Although the alternative offers greater protection of public health and the environment than no action, it does not utilize any treatment of the waste that reduces its volume, toxicity, or mobility. The on-site landfill alternative, though technically feasible, also suffers

TABLE 12

SUMMARY OF DETAILED SCREENING OF ALTERNATIVES

Screening Parameters	No Action	Excavation & Disposal On-site	Excavation & Disposal Off-site	Excavation & Incineration Off-site	Excavation Combination Incineration/Disposal Both Off Site
Constructability	Not Applicable	Readily Constructed	Readily Constructed	Readily Constructed	Readily Constructed
Reliability	Not Applicable	Moderately Reliable	Reliable	Reliable	Reliable
Implementation	Not Applicable	Difficult to implement due to soils on site and Michigan Act 64 Requirements	Readily Implementable	May be difficult to implement for all excavated wastes	Implementable
Level of Protection	Provides no additional protection	Meets RCRA guidance	Meets RCRA guidance	Meets RCRA guidance	Meets RCRA guidance
Volume Reduction	None	None	None	Will reduce volume of waste	Will reduce volume of waste
Adverse Environmental Impacts	Potential impacts to groundwater and drinking water	Possible impacts in the event of a liner failure	Possible impacts in the event of a liner failure	None	Possible impacts in the event of a liner failure
Institutional/ Regulatory Factors	Does not reduce chemical migration therefore does not protect public health and welfare or the environment as required by the NCP (300.68.i.1)	On-site facilities must meet all requirements for Subtitle C facilities under RCRA and Michigan Act 64 and must obtain all required state permits	Materials must go to permitted facilities	Materials must go to permitted facilities	Materials must go to permitted facilities
Total Cost	$0	$5.6 million	$11.5 million	$41.5 million	$12.0 million

from problems regarding implementability (see discussion re: on-site incineration, p.5).

2. The off-site landfill alternative was also screened out. The alternative requires a significant RCRA landfill volume (over 18,000 cubic yards), and capacity in compliant facilities is currently severely limited. A delay in the actual disposal of staged waste may occur while waiting for a facility to come into compliance. Additional negative aspects of the alternative were its reliance on proper operation and maintenance to preserve the integrity of the remedial action, and use of non-destructive disposal technology. (The volume, toxicity, and mobility of the waste would not be reduced).

3. The combination off-site incineration and off-site landfill alternative provides significant additional benefits over exclusively landfilling. This alternative provides for the disposal of liquids at a RCRA compliant incinerator and solid waste at a RCRA compliant landfill. The alternative is clearly more desirable than the off-site landfill since it incorporates incineration rather than land disposal of 5,000 drums of liquid waste at an incremental cost of $535,000. However, this option suffers from the same negative aspects as the off-site landfill alternative due to its use of non-destructive disposal technology, and its reliance on compliant RCRA landfill facilities. The alternative is about three and one half times cheaper than total incineration. However, the benefits gained from thermal destruction of the solid material, which constitutes the majority of the waste in areas one and four, outweigh the increased cost (see Recommended Alternative section).

4. No action was not selected since the site clearly poses a potential threat to public health and the environment.

RECOMMENDED ALTERNATIVE

Based on the factors discussed in the previous section, the recommended alternative for this operable unit is the excavation of areas one and four, and thermal destruction of all waste at a compliant RCRA off-site incinerator. Although it is the most expensive remedy ($41.5 million), it is also the most protective of public health and the environment. The main sources of hazardous substances will be removed, and thermal destruction significantly reduces the volume, toxicity, and mobility of the liquid wastes. The volume, toxicity, and mobility of any inorganic solid wastes will be reduced to a lesser degree. Thermal destruction of these wastes will still leave a significant amount of ash for disposal, and most heavy metals, if present in the waste, will remain in the ash. However, high concentrations of heavy metals in the waste are not expected.

The recommended alternative is both cost-effective and consistent with a permanent remedy since the waste is being permanently removed from the site. It is also consistent with the Agency's May 6, 1985 off-site policy (Memorandum from Jack W. McGraw, Acting Assistant Administrator). In addition, the recommended alternative will be easily engineered and constructed, and readily accepted by the public. In light of the above

factors, and U.S. EPA's trend toward the selection of permanent remedies, the additional cost of incinerating all of the waste for an additional $29.5 million, rather than incinerating only liquids, is justified.

It is estimated that 18,150 cubic yards of liquid and solid waste will be incinerated, including 4,000 cubic yards from the staging areas. The estimated total cost of this alternative is $41,500,000, assuming a 10% interest rate and 30 year project period (Table 10). For cost purposes, the PFS assumed that the nearest disposal facility (Chemical Waste Management facility in Chicago, Illinois) would be available. The unit disposal costs in Table 8 reflect this assumption.

COMMUNITY RELATIONS

The local community has been interested in the Metamora site since at least the late 1970's. At that time, their concerns centered around blowing trash, odor, and the height of the landfill. Local interest heightened in the early 1980's when buried drums were found at Metamora, and the site was included on the National Priorities List. In March of 1984, six local residents met with the MDNR and Michigan Department of Public Health to express their concerns regarding Metamora as a hazardous waste site. The MDNR then established a Citizen's Information Committee (CIC) to keep the affected public informed of project details. The CIC has met regularly during the course of the project. The meetings have included discussions regarding the RI/FS and the PFS.

The PFS was published for public comment on August 4, 1986. On August 18, 1986 a public meeting was held to discuss the findings of the Phased Feasibility Study and the recommended alternative. In general, public concern centered around the acquisition of site access to perform the operable unit (which has since been obtained), and the availability of CERCLA funds to to implement the remedy (due to the lack of CERCLA reauthorization. The public comment period ended on August 25, 1986. The attached Responsiveness Summary details the comments received during the public comment period.

OPERATION AND MAINTENANCE

The recommended alternative involves no operation and maintenance at the site in order to implement the remedy and maintain the protection of public health and the environment. The selected off-site disposal facilities would be responsible for operation and maintenance of their own facilities, and would be RCRA-regulated.

SCHEDULE

The following are the key milestones for implementation of the remedial action.

-Approve Remedial Action (sign ROD)	09/15/86
-Amend Cooperative Agreement for Design and Construction	10/15/86
-Start Design	10/31/86
-Complete Design	03/31/86
-Start Construction	11/01/87
-Complete Construction (begin incineration)	05/31/88

FUTURE ACTIONS

This Record of Decision (ROD) recommends the selection of the excavation of areas one and four with off-site thermal destruction. However, the possibility exists that at the time of implementation of the selected alternative, the cost of waste disposal will change the recommended (cost-effective) alternative. If such a situation arises, this ROD may be amended.

In order to complete the site response, an RI/FS has been initiated to study the potential impacts of contaminated soil, ground water, and other media. Test pits in areas one and four have been proposed in order to better define the number, condition, and contents of buried drums. The field work for the test pits is expected to begin in November or December of 1986. The data from the test pits will be used during the remedial design for this operable unit so that better cost estimates for the project may be made. This will allow potential remedial action contractors to submit more accurate bids for the construction of the operable unit. The RI/FS, which will evaluate alternatives for final site remediation, is scheduled for completion during the second quarter of FY '88. Another Record of Decision package shall be prepared for any additional remedial action recommended as a result of the RI/FS, or if test pit information warrants re-evaluation of this Record of Decision.

METAMORA LANDFILL PHASED FEASIBILITY STUDY
Responsiveness Summary

Introduction

A public comment period was in effect from August 4, 1986 until August 25, 1986 to provide for public review of a Phased Feasibility Study (PFS) for the Metamora Landfill Superfund site. The PFS has been prepared to evaluate existing information on the known and suspected disposal of drums of chemical wastes at the site and to determine if the drums pose a more immediate threat to public health or the environment which should be addressed prior to the completion of a full RI/FS. Copies of the Phased Feasibility Study were available for public review of the Metamora branch of the Lapeer County Library. In addition, a Citizen's Information Committee meeting and a public meeting were held during the public comment period. These meetings were conducted to give staff from the Michigan Department of Natural Resources and the U.S. Environmental Protection Agency the opportunity to explain to local residents and other interested parties the PFS and its recommendations, and to answer questions and receive comments.

Background

The Metamora Landfill is a closed municipal landfill, approximately 80 acres in size, of which about 50 acres have been used for disposal of both municipal and industrial chemical wastes. The site is located on Dryden Road approximately a quarter-mile east of the Village of Metamora in Lapeer County. This site currently appears on both the national Priority List (NPL) for the federal Superfund program and the state list of sites of environmental contamination promulgated under the Michigan Environmental Response Act (Act 307 of 1982). Inclusion on these lists makes this site eligible for federal and state funding to investigate the nature and extent of contamination at the site, to determine an effective and appropriate method of resolving the contamination, and to implement the appropriate remedy.

A full-scale Remedial Investigation and Feasibility Study under provisions of the Federal Superfund program, is just beginning at the site. The Michigan Department of Natural Resources, however, has conducted certain investigatory activities at the site since 1981. Two large areas of shallow drum disposal have been confirmed through magnetometer studies and limited excavation of drums. Sampling of these drums revealed various materials including solvents, C-58, toluene, ethyl benzene and perchloroethylene. The excavated drums were in poor condition.

The MDNR, in the fall of 1985, commissioned its site contractor to conduct a Phased Feasibility Study focusing on the two known barrel disposal areas. It was felt by staff that these areas posed the greatest potential threat of on-going release of contaminants to the environment, particularly the groundwater. The purpose of the study was to determine if cleanup or control measures should be implemented prior to the completion of the full site investigation in order to minimize further environmental contamination and threat to public health.

In August, 1986, the DNR and U.S. EPA released the draft Phased Feasibility Study. The draft Phased Feasibility Study evaluated five different clean-up options using criteria such as engineering constructability, reliability, implementability, clean-up level achievable, and other environmental impacts. The report includes the recommendation that the drums buried in the two known disposal areas be excavated, removed from the site, and that wastes be disposed of, as appropriate, through a combination of properly constructed and licensed hazardous waste landfills, and incinerators. The cost estimate for this work was $12 million.

A U.S. EPA policy decision which followed the release of the draft PFS has caused a change in the cleanup alternative now being recommended. In an effort to move away from landfilling of wastes whenever possible, the directive from U.S. EPA headquarters was to favor another alternative evaluated in the PFS which involves incineration of all waste materials rather than a combination of landfilling and incineration. The estimated cost for this option is $41 million. This policy decision was received prior to meetings MDNR and EPA staff held with the Citizen's Information Committee and the public meeting held during the public comment period. All commenters were aware of this modification in the report recommendations.

Comments and Responses

Written comments on the Phased Feasibility Study for the Metamora Landfill were received from two parties: Sea Ray Boats, Inc. and Chrysler Corporation.

The commenters provided a large quantity of information to support two primary contentions. These are:

1. No imminent threat to public health or the environment exists.

2. Insufficient information exists to properly evaluate the specific remedial alternatives discussed in the PFS nor to support selection of the alternative recommended.

Their conclusion offered in comment is that the decision to pursue the partial cleanup recommended in the PFS is premature and should not be undertaken.

Comment: No imminent threat to public health or the environment exists.

Response: While complete investigation of the Metamora site needs to be done, a number of investigation efforts since 1980 have provided significant information and understanding of the site. The magnetometer survey conducted at the site identified five areas of significant magnetic anomoly, indicating the presence of large quantities of buried metals. Limited excavation and sampling has been done in areas 1 and 4. These areas do not appear to be in the area of refuse disposal so potential interferences from other sources is thought to be a remote possibility.

The limited excavation and sampling work performed in these areas found no other items disposed except drums of chemical waste. Samples collected from these drums indicated a number of organic chemicals capable of

migrating through soils to the groundwater. Drums encountered were in varying states of integrity with some of them clearly having lost materials to the surrounding environment.

Groundwater monitoring wells installed in 1985 have shown the presence of some of these chemicals in the groundwater in concentrations which exceed established federal criteria for carcinogenicity. Concentrations exceeding these criteria have also been found in drum samples collected from these areas.

Available evidence indicates that groundwater on the site is being contaminated as a result of losses from the drum areas. Although complete detailed definition of the nature and extent of contamination and the environmental characteristics of the site is needed, and is proceeding under the auspices of the remedial investigation, there is sufficient evidence to believe that these drum areas have caused environmental contamination and, if left alone, would continue to contaminate the environment.

Residences near the site rely on groundwater for their water supply. Wells near the site utilize the surficial, contaminated aquifer as well as the bedrock aquifer in which contaminants have not yet been identified. The continued loss of contaminants to the surficial aquifer presents a future threat to some area water supplies.

Based on this information it is appropriate to eliminate the continuing loss and prevent the development of a groundwater problem that will be more significant, costly, and harder to control and clean up in the future.

Comment: Insufficient information exists to properly evaluate the specific remedial alternatives discussed in the PFS nor to support selection of the alternative recommended.

Response: The waste characterization information used to evaluate the remedial alternatives discussed in the PFS was based on a combination of specific information already collected at the Metamora site and the broader history of cleanup experiences of DNR and EPA at large disposal sites. While the real cleanup cost to clean up the two drum areas may show significant variation from the estimates presented in the PFS, cost recovery actions are based on actual expenditures rather than estimates developed during the planning process.

Commenters are correct in stating that additional information is needed prior to the actual removal activity commencing. As discussed during the public meeting on this report, a limited excavation and sampling activity to provide such information is planned in these two areas for late fall of 1986. In addition, further magnetometer work will be performed during 1986 to better define area #4. These efforts will provide information necessary to determine the details of how to proceed with the excavation/removal work in a safe and efficient manner. This work will also enhance the quality of currently existing information. However, until a full

excavation is completed, any waste characterization effort will be subject to question and will generate estimated costs which will likely be erroneous.

U.S. EPA has recently established cleanup policies which further directed the selection of remedial alternatives. These policies encourage destruction, detoxification and volume reduction of cleanup wastes. Elimination of land disposal approaches to waste management is directed. Given this policy, the only viable alternatives involve total incineration of the excavated wastes. As discussed in the PFS report, consideration of an on-site incinerator was not thought to be viable, leaving off-site incineration as the only viable remedial response.

The remaining comments and questions were voiced at the two meetings that were held in the community during the public comment period. Some of the comments and questions do not directly relate to the PFS or the cleanup recommendations.

Comment: Because of abnormalities in laboratory results of tests on nearby drinking water wells, not enough follow-up sampling of homes and areas in question is being done.

Response: The Lapeer County Health Department and the Michigan Department of Public Health are jointly conducting a series of tests of private domestic wells around the landfill site. In two subsequent rounds of sampling, trace levels of certain organics appeared in some of the samples. Follow-up sampling of the wells in question and others in the area revealed that these trace levels were not found in any locational pattern, and subsequent sampling never duplicated a finding of the same organic in the same well. Trace levels were also detected in field blanks. Because of these factors, it was determined by the county and state health departments that the trace levels found were due to contamination of the original laboratory bottles rather than any real contamination of local wells. It is felt that the follow-up sampling that has been done is sufficient to show these wells to be free of contaminants. The Lapeer County Health Department and Michigan Department of Public Health will continue a cooperative well sampling program which involves sampling of selected area wells on a semi-annual basis and other wells on an annual basis.

Comment: The barrel staging areas shown on the site map should be relocated to spots where air emissions to surrounding areas would be minimized.

Response: The location of barrel staging areas shown on the map are only general approximateions. The commenter is correct that staging areas should be designed and located so as to minimize air emissions or other potential release of contaminants to the environment. An important consideration is minimizing the distance between excavation area and staging area, since loss of materials is most likely during excavation and transport. Staging areas will be located with these factors in mind.

Comment: Since obtaining site access seems to be such a long process, why don't you start now to seek a site access agreement for the drum excavation?

Response: Obtaining site access can be a time-consuming process and one that is essential before any particular actions can be taken at a site. Site access agreements generally cannot be negotiated until the proposed actions are well defined. In other words, a "generic" access agreement to cover any and all site work is not usually possible. The MDNR will begin negotiating an access agreement with the site owner as soon as possible, as the scope of work for the actual excavation takes shape.

Comment: There is concern that Mr. Parrish, the site owner, is still "messing around" in the landfill site, possibly hauling more materials (particularly rubble) to the site.

Response: While the owner still operates a licensed transfer station at the site, any further disposal of wastes at or in the landfill would be illegal. Neither MDNR or EPA staff have seen evidence that further disposal has taken place at the site over the past couple years. Local residents who suspect any illegal activity are asked to bring any evidence of such activity to the attention of MDNR as quickly as possible.

Question: Why hasn't more really been accomplished at the landfill site since 1981?

Response: Funding is a primary constraint in taking action at sites such as Metamora Landfill. Until the early 1980's, there was no state or federal program in existence to deal with such circumstances. In late 1984, state funds under the Michigan Environmental Response Act (Act 307, P.A. 1982) were allocated for some preliminary hydrogeological investigations and this work has taken place. Funding under the Federal Superfund program for comprehensive site investigations became available in summer 1985. After resolving contracting issues and site access issues, this full-scale Remedial Investigation/Feasibility Study is about to proceed.

The preliminary hydrogeological investigation has helped to justify the drum removal action proposed by the Phased Feasibility Study. Funding to implement this excavation is again the issue as the U.S. Congress debates reauthorization of the Superfund program. The drum removal is not likely to proceed until funding is available through a reauthorized Superfund program.

Question: What safety precautions will be taken during drum excavation? Is there any possibility of evacuating nearby residents as was done at Berlin and Farro?

Response: Safety precautions, both for workers and nearby residents, are important considerations prior to implementing waste excavations such as proposed at this site. There is the potential for the release of air emissions, and, depending on the types of materials present, the potential for fire and explosion. There are many precautionary measures that can be employed to reduce these risks. First, both test pitting operations

and actual excavation is proposed for autumn months. Cooler weather will reduce emissions and potential for fire or explosion. Air monitoring will be conducted throughout test pitting and excavation work to determine whether or not volatiles are being released to the air. Work practices at the site can be modified if it is found that emissions are posing a problem. The test pitting and drum sampling scheduled for this fall will provide much more information on what materials are present in the drums and thus help MDNR and EPA to prepare accordingly.

MDNR staff feel that it is very unlikely that an emergency evacuation would become necessary. Despite this, MDNR staff have contacted the Lapeer County Emergency Prepardness Office to develop some initial plans for contacting and involving various local and state agencies in the event of an emergency. This plan will be developed and incorporated into the site safety plan prior to work proceeding.

At Berlin and Farro, a planned evacuation was carried out due to suspicions about the types of wastes present, the possibility of chemical reaction between waste types if accidentally mixed, and the close proximity of homes to the area of excavation. At this time it is not felt that any conditions at the Metamora site warrant such a planned evacuation.

Question: Does Michigan have incinerators that will take the wastes?

Response: No, Michigan does not have any commercial incinerators licensed to accept hazardous wastes. The wastes will need to be shipped out of state. Arrangements with specific incinerator facilities will be made based on the types of wastes encountered and on the basis of availability of incinerator capacity.

Comment: Additional on-site remedial actions should have been considered.

Response: The on-site incineration alternative was screened out early in the Phased Feasibility Study (PFS) process for the reasons stated in the Summary of Remedial Alternative Selection discussion. However, after the PFS had been published for public comment, additional information regarding the cost of on-site incineration became available. Specifically, the Spiegelberg, Michigan PFS estimated that the on-site incineration alternative would cost more than off-site incineration for that project. Using the methodology for the Spiegelberg site, a cost estimate of both on- and off-site incineration for the Metamora Landfill project was made. This analysis showed that on-site incineration at Metamora may be more expensive to implement than off-site incineration. The estimates are not necessarily within the +50/-30 % range developed for the alternatives retained for detailed screening in the PFS, but the estimate provides additional justification for not examining on-site incineration in detail. Furthermore, the concerns regarding the time to implement the on-site alternative are still valid. Nevertheless, the Region has decided to examine the on-site incineration alternative to the same level of detail (+50/-30 % cost accuracy) as the PFS alternatives retained for detailed screening in order to ensure the accuracy of the above-mentioned cost estimate. The revised cost estimate will be done during the remedial design phase of the project.