



Superfund Record of Decision:

K&L Landfill, MI

REPORT DOCUMENTATION PAGE		1. REPORT NO. EPA/ROD/R05-90/133	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION K&L Landfill, MI First Remedial Action - Final				5. Report Date 09/28/90
				6.
7. Author(s)				8. Performing Organization Rept. No.
9. Performing Organization Name and Address				10. Project/Task/Work Unit No.
				11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460				13. Type of Report & Period Covered 800/000
				14.
15. Supplementary Notes				
16. Abstract (Limit: 200 words) <p>The 87-acre K&L Landfill site is an inactive municipal landfill in Oshtemo Township, Kalamazoo County, Michigan. Surrounding land use is rural-residential with several nearby small lakes and ponds. The site overlies two sand and gravel aquifers (shallow and deep), which are not apparently hydraulically connected, but both are area drinking water sources. From the early 1960s to 1979, approximately 5 million cubic yards of refuse and an unknown quantity of liquid and drummed chemical wastes were accepted at the landfill. In 1972, the State notified the site owners to stop accepting chemical wastes, but the request was ignored. Residential well testing in 1976, 1978, and 1979 revealed ground water contamination. In 1979, the State ordered the landfill to cease operations, to supply an alternate water supply to affected residents, and to cover the landfill. This Record of Decision (ROD) provides a final remedy and addresses contaminated ground water in the shallow aquifer. The primary contaminants of concern present in the landfill affecting the soil, debris, and ground water are VOCs including benzene, toluene, and xylenes; other organics including acids, PAHs, PCBs, and phenols; and metals including chromium and lead.</p> <p>(See Attached Page)</p>				
17. Document Analysis a. Descriptors Record of Decision - K&L Landfill, MI First Remedial Action - Final Contaminated Media: soil, debris, gw Key Contaminants: VOCs (benzene, toluene, xylenes), other organics (PAHs, PCBs, phenols), metals (chromium, lead) b. Identifiers/Open-Ended Terms c. COSATI Field/Group				
18. Availability Statement		19. Security Class (This Report) None		21. No. of Pages 93
		20. Security Class (This Page) None		22. Price

Abstract (continued)

The selected remedial action for this site includes capping approximately 83 acres of landfill area with a RCRA multi-layer cap and installing gas vents throughout the landfill; pumping and onsite treatment of ground water using enhanced bioremediation/fixed-film bioreactor technology accompanied by aeration; conducting treatability studies or pilot tests to ensure the effectiveness of the selected technology; discharging the treated effluent by either onsite reinjection, discharge to an onsite filtration pond, or offsite discharge of ground water to a publicly owned treatment works (POTW); disposing offsite of any resulting sludges; continued ground water, surface water, and air monitoring; closure and abandonment of affected residential wells; implementing institutional controls including deed restrictions to limit ground water and land use, and site access restrictions such as fencing. The estimated present worth cost of this remedial action is \$16,407,100, which includes a total O&M cost of \$1,099,900 for 30 years.

PERFORMANCE STANDARDS OR GOALS: Remedial goals are based upon reduction of excess life-time cancer risks to 10^{-4} to 10^{-6} for carcinogens. For non-carcinogens, the Hazard Index (HI) will be reduced to 1 or less. Chemical-specific goals for ground water include acetone 700 ug/l (State), benzene 1.0 ug/l (State), toluene 40 ug/l (State), vinyl chloride 0.02 ug/l (State), xylenes 20 ug/l (State), phenols 300 ug/l (State), and lead 5.0 ug/l (State).

**RECORD OF DECISION
SELECTED REMEDIAL ALTERNATIVE**

Site Name and Location:

West KL Avenue Landfill
Kalamazoo, Michigan

Statement of Basis and Purpose:

This decision document presents the selected remedial action for the West KL Avenue Landfill, located in Kalamazoo, Michigan. The site is on the National Priorities List (NPL). The decision has been developed in accordance with CERCLA, as amended by SARA. This decision is based on the Administrative Record for this site. The Administrative Record Index identifies the items that comprise the Administrative Record, upon which the selection of the remedial action is based. The Administrative Record Index is attached to this Declaration.

The State of Michigan has concurred with the selection of groundwater extraction and treatment and the landfill portions of the selected remedy. However, the State of Michigan does not believe that the use of enhanced bioremediation as the groundwater treatment will meet the cleanup goals as stated within the Record of Decision. To compensate for the State of Michigan's concern, the Record of Decision has been written to have the groundwater treatment portion of the remedy either replaced or supplemented if it is shown during the remedial design phase that enhanced bioremediation will not attain the cleanup goals consistent with Michigan Act 307, Type B cleanup. The letter of concurrence is attached to the ROD package.

Assessment of the Site:

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

Description of the Selected Remedy:

The selected remedy addresses the final remedy for the Site and addresses the principal treats posed by the Site. The selected remedy for the West KL Avenue Landfill is as follows:

Groundwater:

- Limited Action including continued groundwater monitoring, deed restrictions and the proper abandonment of closed residential wells; and
- Groundwater extraction followed by treatment of the groundwater via enhanced bioremediation utilizing fixed film bioreactors would be

the selected remedy. The treated groundwater, treated to meet the more stringent of the state and federal applicable or relevant and appropriate requirements (ARARs), would then be injected back into the shallow aquifer, piped to the City of Kalamazoo POTW or discharged into an on-site infiltration pond.

Landfill Contents:

- Limited Action including limiting site access by installing a fence around the perimeter of the site, and by placing deed restrictions on the landfill property; and
- Landfill containment by utilizing a multi-layer RCRA type cap consisting of (from bottom up) a 2-foot clay layer, a 60 mil density polyethylene liner, a 12-inch drainage layer, a geotextile filter fabric, a 2-foot layer of clean fill, all topped by a 6-inch layer of topsoil. Gas venting and monitoring will be incorporated into the cap design.

Declaration:

The selected remedy is protective of human health and the environment, and attains Federal and State requirements that are applicable, or relevant and appropriate, to the remedial action. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. The remedy for the West KL Avenue Landfill will utilize treatment as a principal element of the remedy, as per statutory preference, via the groundwater treatment described above.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within 5 years after commencement of remedial action, to ensure that the remedy continues to provide adequate protection of human health and the environment.

9/28/90
Date


Valdas V. Adamkus
Regional Administrator

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ATTACHMENTS:

1. LETTER FROM THE MINR TO THE U.S. EPA DATED SEPTEMBER 28, 1990
2. RESPONSIVENESS SUMMARY

RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
FOR THE WEST KL AVENUE LANDFILL
OSHTIMO TOWNSHIP
KALAMAZOO, MICHIGAN

I. SITE NAME, LOCATION, AND DESCRIPTION

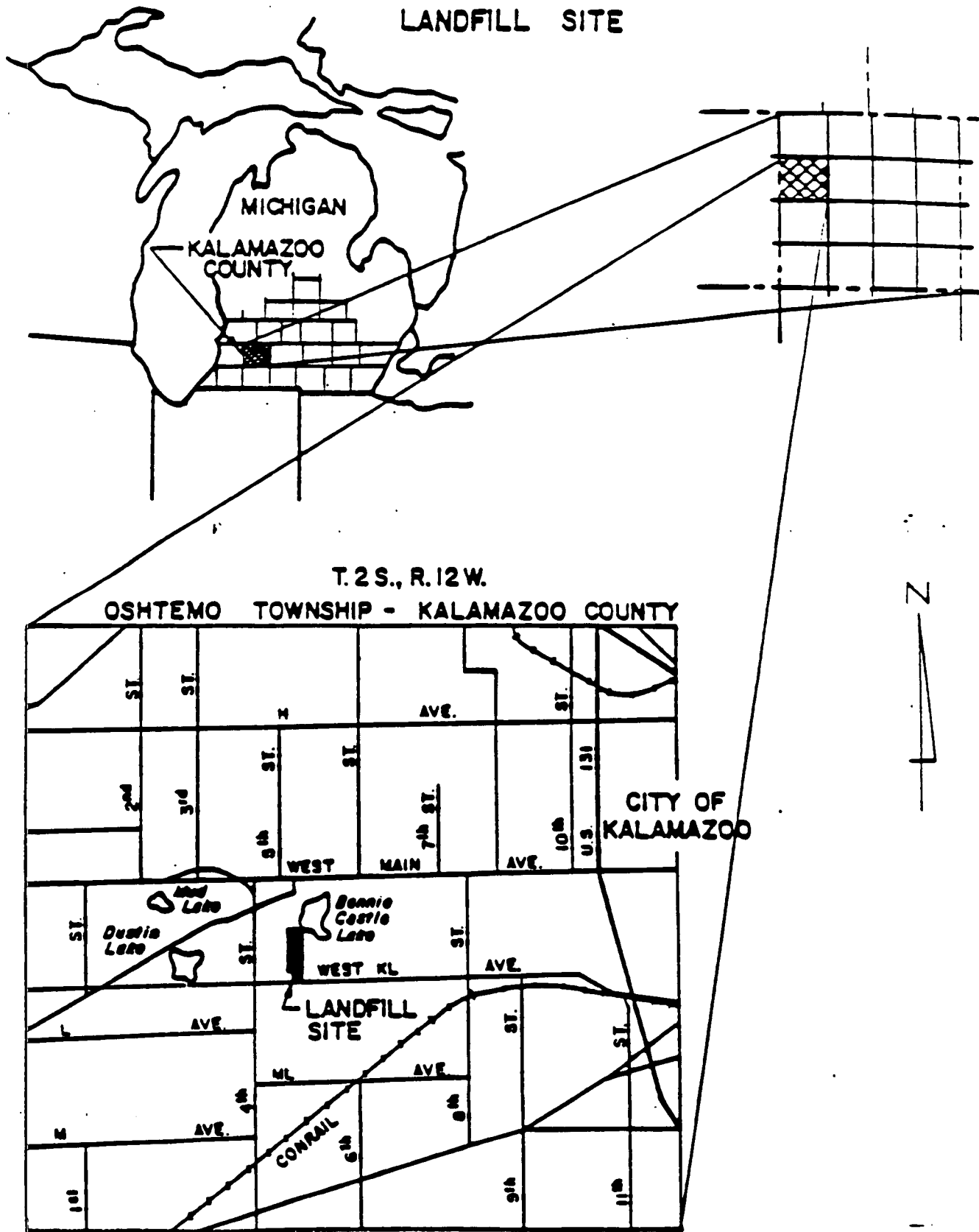
The West KL Avenue Landfill, also known as the Oshtemo Township Dump or the Kalamazoo County Landfill, is located approximately seven miles west of downtown Kalamazoo, Michigan (Figure 1). The landfill, consisting of approximately 87 acres of land, is situated in a rural-residential area. The closest residents to the landfill are immediately to the southeast and to the southwest of the landfill. Two small lakes, Bonnie Castle Lake, 200 feet northeast, and Dustin Lake, one mile west of the landfill, are the major surface water bodies in the area (Figure 2). The site sits atop two aquifers. The shallow aquifer, a thick (105 to 145 feet) sand and gravel outwash zone, is located 20 to 60 feet below the surface. The deeper aquifer, also a sand and gravel outwash zone, ranges from 10 to 30 feet in thickness. These aquifers are separated by a thick (56 to 179 feet) clay-rich till unit. The two aquifers do not seem to be hydraulically connected in the vicinity of the landfill. Both aquifers provide drinking water to local residents.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The West KL Avenue Landfill was originally operated by Oshtemo Township as a 20 acre town dump from the early 1960's to 1968. In May 1968, Kalamazoo County leased the site from Oshtemo Township for use as a county-wide landfill. The County purchased the surrounding land on either side of the original dump to form the present 87 acre site. The site was operated by the Kalamazoo County Bureau of Public Works under licenses issued by the MDNR from 1968 through 1974, and continued operation to May 1979 without licensing, at which time it was closed by the MDNR. An estimated five million cubic yards of refuse and an unknown amount of bulk liquid and drummed chemical wastes were disposed of at the landfill. In January 1972 the MDNR notified the County that disposal of chemical wastes at the landfill was unacceptable, yet file information indicates that the wastes continued to be accepted. The exact disposal location(s) of the chemical wastes within the landfill is not known. In February 1976, analytical tests showed that nearby residential wells were contaminated. The MDNR notified the County that no further operating licenses would be granted and the County was to seek an alternative disposal location. In November 1978 and January 1979 the residential wells showed more serious contamination problems. The discovery of volatile organic compound contamination in several wells caused the MDNR to order the landfill to cease operations in May 1979. The MDNR also ordered the County to provide an alternative water source to affected residents and to install an impermeable cover over the landfill. As a result, eleven new residential wells were installed in the deep uncontaminated aquifer for those residents whose wells were affected by contamination and a cap consisting of a 2-foot layer of mixed soil and granular bentonite was placed over areas of the landfill with less than 10 percent slope and in areas where the slope was greater than 10 percent, no

FIGURE 1

LOCATION OF WEST KL AVENUE
LANDFILL SITE



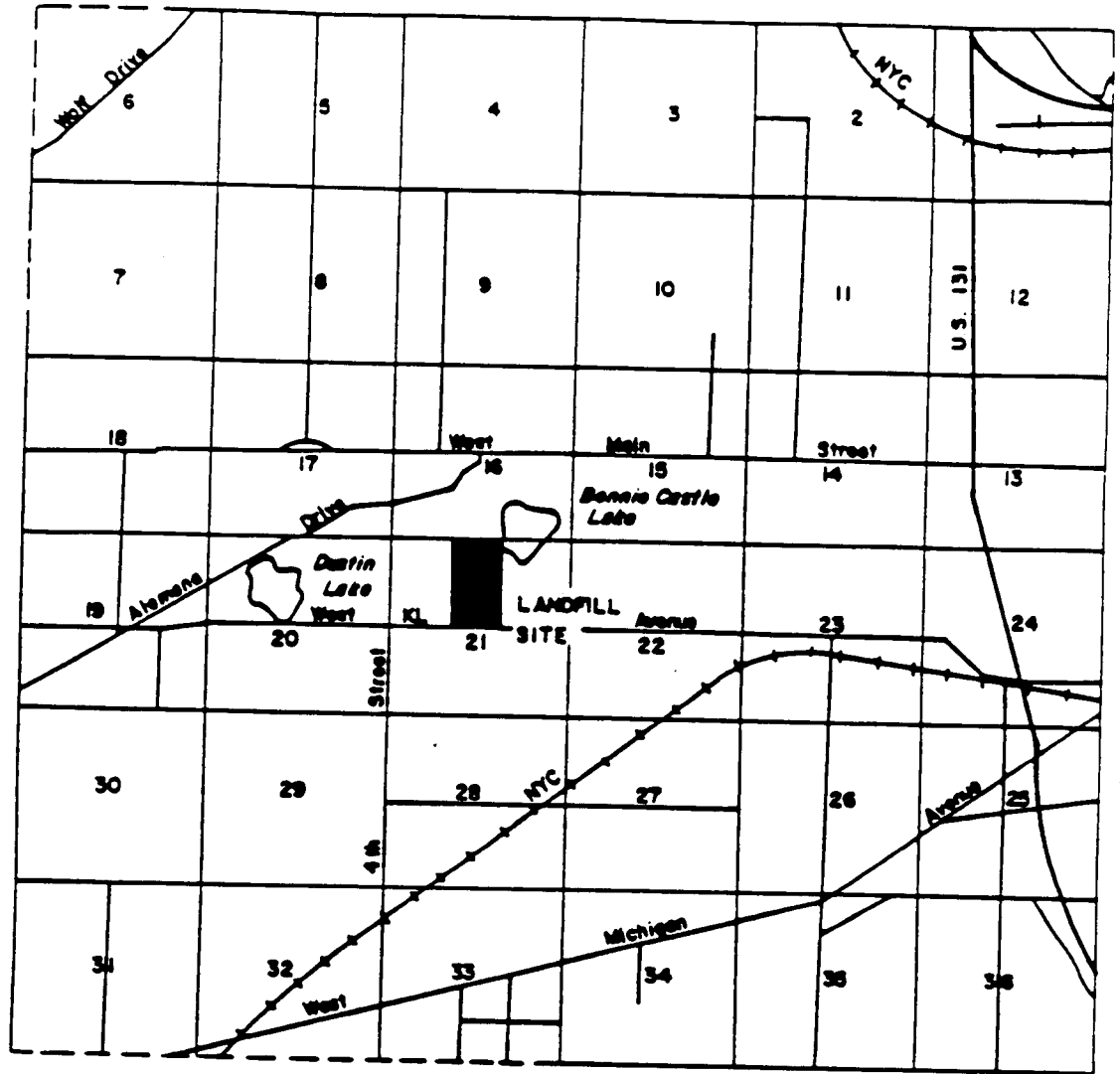


FIG. 2

LOCATION OF
WEST KL AVENUE LANDFILL
OSHTEMO TOWNSHIP



SCALE



bentonite was applied. Kalamazoo County also installed a new water main along West KL Avenue and South 4th Street near the landfill to service the residents requesting hookups.

The West KL Avenue Landfill remains closed and has not received any wastes since May 1979. The surface of the site is vegetated, but small areas are present where vegetative cover is sparse or absent. Ponding of precipitation has occurred in subsidence depressions on the surface of the fill area. Runoff from the east slope of the fill flows into Bonnie Castle Lake and the small adjacent ponds, while runoff from the south slope flows to West KL Avenue. Erosion of the cover has occurred at the site and refuse protrudes above the cover in numerous areas. Leachate flows and seeps are present along the south fill face.

The West KL Avenue Landfill was added to the U.S. EPA National Priorities List (NPL) in December 1982. Releases of hazardous substances from the site to the groundwater was the primary concern of the scoring package.

Notice Letters initiating negotiations for the RI/FS were mailed to Potentially Responsible Parties (PRPs) in three mailings (to over 200 PRPs) from mid to late 1985. After failing to reach an agreement, the U.S. EPA informed the PRPs that the negotiations were concluded on February 19, 1986 and that the RI/FS was to be conducted by the U.S. EPA.

On February 26, 1990, General Notice Letters were sent to approximately 90 Potentially Responsible Parties (PRPs), including waste generators and transporters and the site owners and operators. Special Notice Letters will be issued after this Record of Decision is signed.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

A Remedial Investigation/Feasibility Study (RI/FS) public kickoff meeting to explain the start of the Superfund process and the RI work to be performed to the local residents was held on April 28, 1986. Two information repositories were set up to help make pertinent site information available to the public, at the Oshtemo Township Hall and at the Oshtemo Township Branch of the Kalamazoo County Library. During the RI, several updates in the form of letters were sent to the West KL Avenue mailing list, derived from the signup sheet at the public meeting. According to Section 113(k)(1) of CERCLA, the Administrative Record has been made available to the public at the Library.

A public meeting was held on November 20, 1989 to explain the findings of the RI to the public. The Michigan Department of Natural Resources (MDNR) participated in this meeting, as well as at the previous meeting mentioned above.

The Public Comment FS and the Proposed Plan were made available for public comment from June 11, 1990 through August 10, 1990. Two public meetings were held to assist the public in understanding the process of remedy selection. The first was an availability session, held on July 16, 1990 and the second was a public hearing held on July 23, 1990. Comments received

during the public comment period and the U.S. EPA's responses to those comments are included in the attached Responsiveness Summary. The provisions of Sections 113(k)(2)(B)(i)-(v) and 117 of CERCLA have been satisfied.

IV. SCOPE AND ROLE OF THE RESPONSE ACTION

The scope of this response action is a final remedy to address the contamination and potential contamination caused by the waste disposed of at the Facility. The response action will address the principal threats caused by the Facility, such as the groundwater contamination (contaminants within the groundwater found above state and federal limits) at and around the Facility. The final remedy will also include the upgrading of the present landfill cap to contain the wastes and to minimize the contaminants reaching the groundwater. Since wastes will remain on site, periodic monitoring will need to be maintained, as well as a review of site conditions at least once every 5 years. The U.S. EPA has developed an approach to remediation which is addressed in this ROD and has determined that unless there is remediation at this Facility, there will continue to be actual and/or potential imminent and substantial endangerment to human health, welfare or the environment. The scope of the remedial action at the Facility is to achieve compliance with federal and state ARARs (Applicable or Relevant and Appropriate Requirements) regarding groundwater contamination and the containment of wastes at the site to prevent further releases at the Facility.

V. SUMMARY OF SITE CHARACTERISTICS

The RI and FS Reports have adequately described the current conditions of the West KL Avenue Landfill. The Final RI Report was submitted to the U.S. EPA by their contractor in May 1989 and the Public Comment FS was submitted to the U.S. EPA in March 1990. Field work for the RI was conducted in three phases and began in September 1986 and finished in January 1989. The RI consisted of the installation of monitoring wells, the sampling of monitoring and residential wells, soils, sediment, surface water, and air, a geophysical survey and the digging of test pits in search of buried drums. The RI Report should be referenced for details involving the components of the RI.

A summary of the conclusions of the RI Report is as follows:

- * Scattered organic compound contamination is present in surface soils near leachate seeps and non-vegetated areas.
- * Two locations of PCB contamination were found on the landfill. At both locations, PCB concentrations were between 180 and 700 parts per billion (ppb).
- * No contamination that can be attributed to the landfill was found in surface water and sediments (from Bonnie Castle and Dustin Lakes and nearby smaller ponds).

- * Sporadically occurring organic compound contamination was found in subsurface soils. These contaminant concentrations did not correlate with contaminant levels in groundwater samples taken from monitoring wells at the same locations.
- * Groundwater flow in the shallow aquifer is to the west and northwest from the landfill, which is consistent with regional flow patterns.
- * Contamination originating from the landfill has affected the shallow aquifer. Volatile and semi-volatile organic compounds were found in this aquifer only. Examples of the concentrations found in the shallow aquifer are found in Table 1. No indication of contamination in the deeper aquifer was found.
- * No inorganic contaminants in filtered groundwater exceeding primary drinking water standards were found. (Filtered samples provide results generally more indicative of dissolved components of groundwater; refer to the RI Report for further clarification of the two.) Filtered inorganic sample results are listed in Table 2. Table 1 shows the concentrations of inorganic compounds found in the unfiltered samples. These are the values that were utilized in the Risk Assessment since the use of the unfiltered sample data contributes to a more conservative approach to the risk assessment due to the generally higher values measured in the unfiltered samples (Refer to the Risk Assessment for further clarification).
- * The groundwater contaminant plume in the shallow aquifer extends to the west and northwest from the landfill (Figure 3). The highest concentrations are generally located across the central part of the landfill. Contaminant concentrations decrease gradually to the southwest and northwest and rapidly to the north, east, and south.
- * The transport of contaminants was observed to be much slower than estimated by an analytical model used to calculate the effects of adsorption on the plume's migration. This discrepancy may best be explained by biodegradation, both aerobic and anaerobic, occurring in the contaminant plume. Anaerobic conditions in the core of the plume promote the degradation of PCE, TCE and TCA into 1,1 DCA and 1,2 DCE, which are found in higher concentrations there. Aerobic biodegradation may be occurring near the margins of the plume where oxygen is available. This may account for the observed pattern of non-chlorinated compounds, which are in high concentrations in the plume's interior, rapidly decreasing in concentration near the plume margins.
- * Owing to the depths to groundwater in the shallow aquifer and supported by file information, the landfill contents are not believed to be in the groundwater.

TABLE 1

CHEMICALS OF POTENTIAL CONCERN IN SHALLOW AQUIFER MONITORING WELL SAMPLES
OF GROUNDWATER AT THE WEST KL LANDFILL. PHASE I ROUNDS I AND II AND PHASE II (a)

Chemicals	Frequency of Detection (b)	Geometric Mean Concentration (ug/L)	Maximum Concentration (ug/L)
Vinyl chloride	5/41	5.9	107
Chloroethane	10/41	6.3	100
1,1-Dichloroethane	26/41	23	1,200
1,2-Dichloroethane	15/41	6.6	200
trans-1,2-Dichloroethane	9/41	3.9	46
Acetone	27/41	109	36,000
4-Methyl-2-pentanone	22/41	35	1,700
2-Butanone	17/40	32	4,700
Benzene	24/41	13	720
Toluene	16/41	5.6	1,300
Xylene	5/41	3.5	58
Ethylbenzene	8/41	3.1	46
2-Hexanone	3/41	5.6	85
Phenol	11/40	9.1	1,400
4-Methylphenol	12/40	13	4,200
Benzoic acid	10/40	32	15,000
Barium	39/41	115	1,010
Cadmium	16/41	6.6	394
Chromium	14/41	6.2	136
Lead	33/41	18	900
Manganese	38/41	150	743
Iron	40/41	2,730	37,800
Nickel	15/41	12	86
Zinc	41/41	3,300	120,000

(a) Sample identification: MW1, MW2, MW3, MW7, MW9 through MW16,
TW2 through TW5, M2 through M5, M7.

(b) Number of samples in which the chemical was detected over the total
number of samples analyzed.

TABLE 2
SUMMARY OF R12 GROUNDWATER SAMPLING RESULTS: INORGANICS

CONSTITUENTS	INVESTIGATIVE SAMPLES(a)		BACKGROUND SAMPLES(b)		STATE AND FEDERAL MAXIMUM CONTAMINANT LEVELS	FEDERAL MAXIMUM CONTAMINANT LEVEL GOALS	FEDERAL SECONDARY DRINKING WATER STANDARDS	FEDERAL DRINKING WATER HEALTH ADVISORY FOR LIFETIME EXPOSURE	FEDERAL AMBIENT WATER QUALITY ADJUSTED FOR DRINKING WATER(d)	MONITORING WELLS EXCEEDING GROUND WATER STANDARDS
	Nb. of positive detections	Nb. of valid Range of observations Detection	Nb. of positive detections	Nb. of valid Range of observations Detection						
Radium	1/21	ND	0/5	ND						
Arsenic	4/21	4.4-12.4	0/5	ND						
Barium	19/21	10.3-733	6/5	27-46	1,000	1,900(d)		1,900		
Cadmium	2/21	4.4-6.2	0/5	ND	30	5(d)		5		PD
Calcium	20/21	1,100-98,000	6/5	13,700-222,000						
Chromium	3/21	7.9-14.1	3/5	9.9-10.4	90	120		120		
Copper	0/21	ND	0/5	ND						
Iron	11/21	41-6720	2/5	40.9-48.1			300			PD, TME
Lead	3/21	1.6-3.9	3/5	2.3-4.6	90(9d)	20(d)(0(d))			90	
Magnesium	19/21	70.2-107,000	6/5	10,800-28,500						
Manganese	10/21	21-400	4/5	28.5-56.6			90			(1) (2)
Mercury	0/21	ND	0/5	ND						
Nickel	6/21	13.8-82.9	0/5	ND						
Potassium	14/21	1,600-18,000	3/5	1,530-15,000						
Selenium	0/21	ND	0/5	ND						
Silver	3/21	7.3-11	3/5	7.1-9.4						
Sodium	10/21	2,400-96,000	4/5	8,400-304,000						Trillion
	0/21	ND	0/5	ND						
Zinc	19/21	41.2-3,300	6/5	101-9,110			5,000		5,000	MS
Antimony	1/21	67.6	0/5	ND						
TDS mg/l	21/21	162-1,000	5/5	170-231			900			(3)

Footnotes

a) Investigative Samples: PM1, PM2, PM3, PM7, PM9, PM10, PM11, PM13, PM16, PM, PM, PM2, PM3, PM5, 379 S. 4th, 8710 N HL Av, 8880 N HL, 9024.25 N HL Av.

b) Background Samples: PM5, PM, PM12, PM14, PM15

d) Proposed criteria

1) PM-15, 16, 2, 13, 9 and 10; M-3, 7; M-3, 5; 379 S. 4th, 8880 HL

2) M-3, 6; M-2, 13; M3; 8880 HL

3) M-9, 10, 11, 13 and 3; M3; M5

ND) Not Detected

NOTE: Results from unfiltered samples are not included on this table.
All units are parts per billion (ppb).

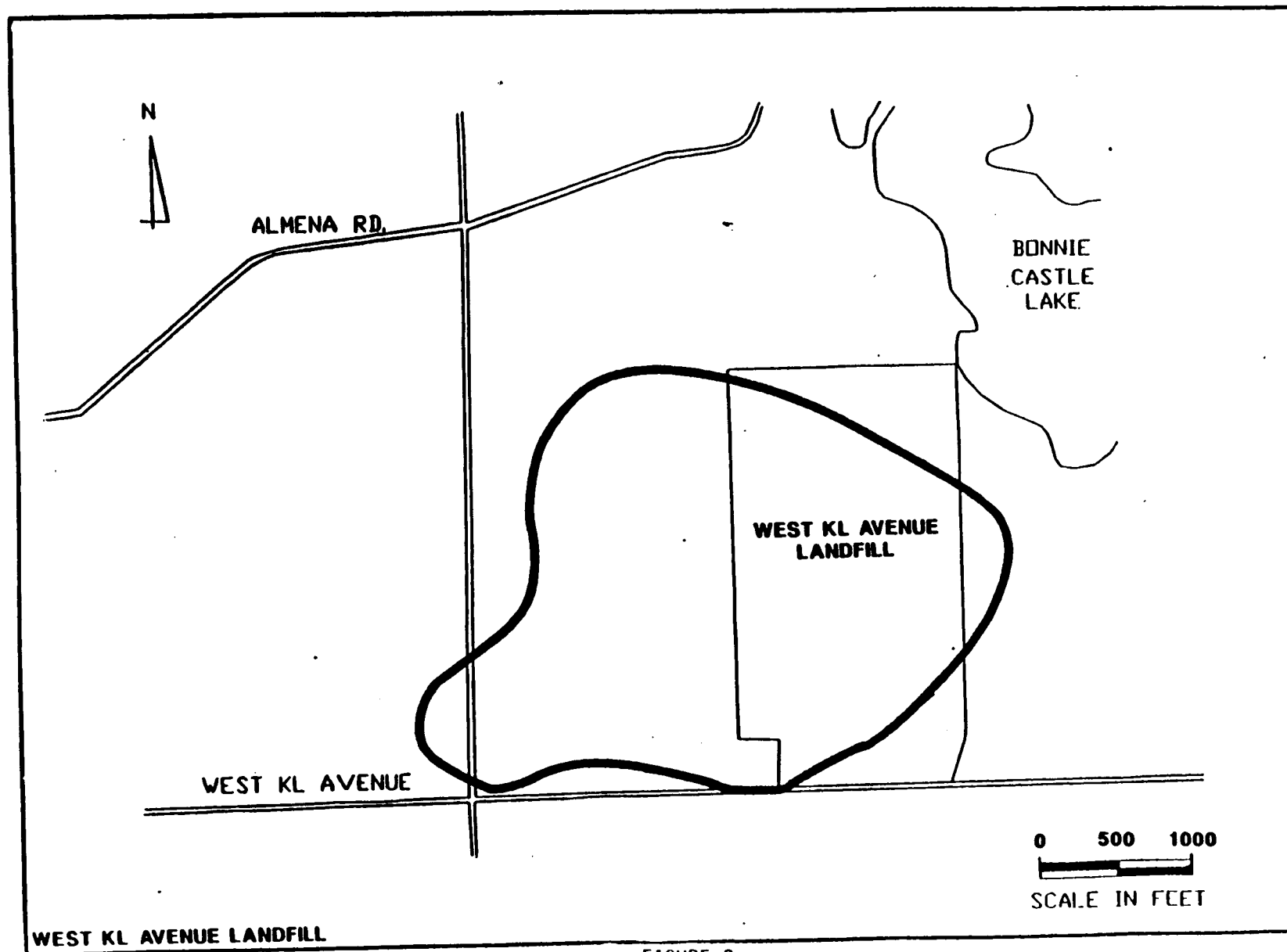


FIGURE 3
APPROXIMATE BOUNDARY OF CONTAMINANT PLUME

- * The results of the air sampling conducted near the landfill vents and in the ambient air around the landfill have shown low ppb levels of several organic compounds, the highest concentrations being found near the vents. Toluene, benzene and acetone were the compounds most often detected, and at the highest concentrations. There was no clear trend of higher concentrations downwind and during-excavation samples than in upwind or pre-excavation samples.
- * The test pit investigation strongly suggests that the landfill is the source of contaminants found in soils and groundwater near the landfill. The constituents found in both the test pits and air samples (source samples) and in groundwater are acetone, benzene, ethylbenzene, toluene, xylenes, chlorinated organics, phenols, and of number of inorganics. Only a few single drums were discovered during the test pit operations. The one full drum that was sampled appeared to be a grease type material and contained acetone, toluene, ethylbenzene and xylene. No areas of heavily concentrated drums or other contaminated materials, indicating potential "hot spots" were found through the test pit operation.

VI. SUMMARY OF SITE RISKS

CERCLA requires that U.S. EPA protect human health and the environment from current and potential exposure to hazardous substances found at the Facility. The RI Report contains a Risk Assessment which characterizes the nature and estimates the magnitude of potential and/or actual risks to public health and the environment caused by the contaminants identified at the Facility. A summary of the findings of the Risk Assessment is as follows:

A. CONTAMINANTS OF CONCERN

Chemicals identified as chemicals of potential concern and used in the risk assessment consisted of a variety of organics and inorganics. In total, 34 organic and 8 inorganic chemicals of potential concern were identified in one or more environmental media and were evaluated in the risk assessment (Table 3). These compounds have been used to evaluate toxicity, exposure pathways and potential health risks for individuals residing near the landfill or workers/trespassers on the landfill.

B. EXPOSURE ASSESSMENT

Potential pathways of exposure to contaminants originating from the West KL Landfill site under current and future land use conditions include contacts with the air and soil, on and around the site, utilization of the shallow aquifer for drinking water, and the uses of the surrounding ponds and lakes. These pathways were evaluated within the RI's Risk Assessment as to what risks to human health or the environment were or could potentially be present. These are summarized in the following sections.

TABLE 3
CHEMICALS OF POTENTIAL CONCERN CHOSEN BY CDM FOR THE
WEST KL LANDFILL SITE, MICHIGAN

Chemical	Surface Soil	Subsurface Soil	Groundwater	Sediment	Air (a)
Organics					
Acetone	X	X	X		X
Benzene			X		X
Benzoic acid	X		X		
Bis(2-ethylhexyl)phthalate		X			
Bromomethane					X
2-Butanone			X		X
Butylbenzylphthalate	X				
Carbon disulfide					X
Carbon tetrachloride					X
Chloroethane			X		
Chloroform					X
Dibenzofuran	X				
1,4-Dichlorobenzene	X				
1,1-Dichloroethane			X		X
1,2-Dichloroethane			X		
1,2-Dichloroethane			X		X
Diethylphthalate	X	X			
Di-n-butylphthalate				X	
Ethylbenzene	X		X		X
2-Hexanone		X	X		
Methylene chloride				X	X
4-Methyl-2-pentanone			X		
4-Methylphenol	X		X	X	
PAHs	X			X	
PCBs	X				
Pentachlorophenol		X			
Phenol			X		
Tetrachloroethane					X
Toluene	X		X		X
1,1,1-Trichloroethane					X
Trichloroethane					X
Vinyl acetate					X
Vinyl chloride			X		
Xylene	X		X		X
Inorganics					
Barium			X		
Cadmium			X		
Chromium			X		
Iron			X		
Lead			X		
Manganese			X		
Nickel			X		
Zinc			X		

(a) Represents all chemicals detected near gas vents or downwind of the landfill (i.e., no selection of chemicals was performed). As discussed in the text, it is not possible to determine site-relatedness from available data.

C. TOXICITY ASSESSMENT

Using data generated during the RI, the U.S. EPA conducted a site-specific baseline risk assessment to characterize the current threat to human health and the environment for each of the actual or potential exposure pathways discussed in Section B above.

Toxic substances may pose certain types of hazards to human and animal populations. Typically, hazards to human health are expressed as carcinogenic and non-carcinogenic toxic effects. Carcinogenic risk, numerically presented as an exponential factor (e.g., 1×10^{-6}), is the increased chance a person may have in contracting cancer in his or her lifetime. For example, a 1×10^{-6} risk due to a lifetime of drinking water that contains the contaminants of concern means that a person's chance of contracting cancer is increased by 1 in 1 million. The U.S. EPA attempts to reduce risks at Superfund sites to a range of 1×10^{-4} to 1×10^{-6} (1 in 10,000 to 1 in 1 million), with emphasis on the lower end (1×10^{-6}) of the scale. The Hazard Index (HI) is an expression of non-carcinogenic toxic effects and measures whether a person is being exposed to adverse levels of non-carcinogens. Any HI value of greater than 1.0 suggests that a non-carcinogen presents a potentially unacceptable toxic effect.

Based on toxicological studies of the contaminants of concern found in the groundwater at and near the Facility, several are classified as being carcinogens. Carcinogens found in the groundwater include benzene and vinyl chloride, classified as Group A - Human Carcinogens, and 1,1-Dichloroethane, 1,2-Dichloroethane and Lead, classified as Group B2 - Probable Human Carcinogens. The rest of the contaminants of concern found in the groundwater are non-carcinogenic. Carcinogens found in and near the gas vents on-site include benzene, Group A - Human Carcinogen, and carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, and trichloroethene, all Group B - Probable Human Carcinogens.

D. SUMMARY OF RISK CHARACTERIZATION

A summary of the risks associated with the contaminants of concern found at the West KL Avenue Landfill is found in Table 4. This table shows that the average excess cancer risk associated with the drinking of the groundwater is 5×10^{-4} , with a maximum risk of 1×10^{-2} . Also, the HI value is found to have an average value of 2, with a maximum value of 100. (See the Risk Assessment within the RI Report for details and driving forces behind the risk levels.) The health risks associated with the other pathways are within the acceptable risk ranges. The values for the exposure via inhalation of volatiles by residents and dirt bikers are near unacceptable levels, but these issues will be indirectly addressed through the containment (capping of the landfill) and the land use restrictions of the selected remedy.

E. ENVIRONMENTAL RISKS

The effects of the contamination on the environment were evaluated using potential exposures to PCBs and PAHs. The results are as follows (it should

TABLE 4
SUMMARY OF RISKS

Scenario	Total Upperbound Lifetime Excess Cancer Risks		Hazard Index	
	Average	Plausible Maximum	Average	Plausible Maximum
<u>Current Land-Use Scenarios</u>				
Direct Contact with Surface Soil -				
Children - landfill	1E-08	2E-08	<1	<1
Children - possible dumps	NC	6E-07	<1	<1
Direct Contact with Sediments -				
Children - collection ponds	2E-14	6E-13	<1	<1
Children - Dustin Lake	4E-14	1E-07	<1	<1
Children - Bonnie Castle Lake	2E-14	8E-08	<1	<1
Inhalation of Ambient Dusts -				
Trespassers - landfill	7E-11	3E-10	<1	<1
Residents - nearby	9E-10	1E-08	<1	<1
Inhalation of Volatiles -				
Trespassers - landfill	9E-08	4E-07	<1	<1
Residents - nearby	2E-08	2E-05	<1	<1
Inhalation of Dusts Generated by				
Dirt bikers -				
Dirt bikers - landfill	2E-13	7E-12	<1	<1
Inhalation of Volatiles by Dirt Bikers				
Dirt Bikers - landfill	2E-05	1E-04	<1	<1
<u>Future Land-Use Scenarios</u>				
Ingestion of Groundwater -				
Residents	5E-04	1E-02	2	100
Direct Contact with Surface Soils -				
Residents	2E-08	7E-08	<1	<1

NC = Not calculated.

be noted that there are many uncertainties associated with these estimates of risk, please refer to the risk assessment portion of the RI Report):

- 1) The levels of PCBs in the surface soils of the landfill cover are at concentrations below those associated with phytotoxic effects in some species of plants. Impacts on vegetation at the site from exposure to PCBs are believed not to be occurring. Other chemicals of potential concern in the soils of the site may be impacting vegetation, but given the relatively low concentrations of these other organic chemicals in the surface soils of the site, impacts on the vegetation of the area are not expected;
- 2) The estimated PCBs intake by robins and shrews exceeds the toxicity values derived for these species, therefore reproductive effects in some members of the population may be occurring (if the assumed conditions are assumed to be true). However, such effects may be expected to have negligible impact on the area's population of robins and shrews, given the likely small numbers of individuals of these species using or inhabiting the landfill and considering that reduced reproduction in a few members of any population will have inconsequential effects (in an ecological sense) on the reproduction of the population as a whole;
- and 3) The concentrations of PAHs in the sediments of Bonnie Castle and Dustin Lakes are well below those estimated to be associated with toxic effects in benthic species. Based on this comparison, PAHs in the sediments of the area's lakes are not at concentrations sufficient to impact aquatic life.

VII. DESCRIPTION OF ALTERNATIVES

The FS, based on the findings of the RI and the Risk Assessment, has identified and evaluated an array of remedial alternatives. This section describes identified remedial alternatives and Section VIII below compares the identified alternatives that could be used to mitigate or correct the contamination problems at the Facility. As discussed in more detail in Section VIII below, the comparison of alternatives is based on nine criteria. One of the threshold criteria is satisfaction of applicable or relevant and appropriate requirements (ARARs), such as Federal and State regulations governing the proposed alternative. The alternatives have been separated into two categories: 1) Groundwater (GW) Alternatives that address the contaminated groundwater at and near the site, and 2) Landfill (LF) Alternatives that address the source of the contamination, the landfill. The alternatives considered for the Facility are presented within the FS and are summarized below. In the FS, certain remedial alternatives were eliminated from further consideration due to the technical and administrative infeasibility of implementing the alternative, and/or due to the grossly excessive cost compared to the overall effectiveness of the alternative (such as excavating, treating and redepositing all the wastes in the landfill), pursuant to the NCP at 40 CFR 300.430(e)(7). For a more detailed description of the alternatives, please refer to the FS Report.

A. DESCRIPTION OF GROUNDWATER (GW) ALTERNATIVES

Alternative GW #1: No Action

The No Action alternative is mandated by the NCP to be carried through to the remedial action selection process in order to provide a baseline

comparison with other alternatives. Under this alternative, no remedial action or treatment would be taken at the West KL Avenue Landfill site. Therefore, the potential human health risks (as summarized above and within the Risk Assessment) due to ingestion of contaminated groundwater at the site would continue. ARARs regarding groundwater contamination would not be met.

Estimated Construction Cost: not applicable
 Estimated Total O&M Costs: not applicable
 Estimated Total Present Worth: not applicable
 Estimated Implementation Timeframe: not applicable

Alternative GW #2: Limited Action

This alternative involves continued monitoring of wells (residential and monitoring wells) to characterize the groundwater contaminant plume. No groundwater remediation or treatment is performed. Deed restrictions (restricting the use of the shallow aquifer as a drinking water source, at least until the clean-up goals are achieved) and residential well closures (the proper closure of the abandoned residential wells as well as any other residential well that may become affected by the contamination) are used as the main mechanisms for eliminating the potential groundwater exposure pathway. The provisions of this alternative can be implemented alone or in conjunction with other groundwater remedial alternatives. ARARs regarding groundwater contamination would not be met.

Estimated Construction Cost: \$4,200
 Estimated Total O&M Costs: \$141,400
 Estimated Total Present Worth: \$145,600
 Estimated Implementation Timeframe: 1 year, with 30 years of monitoring

Alternative GW #3: Collection and On-Site Treatment Alternatives

This alternative calls for the collection of contaminated groundwater followed by on-site treatment of the collected water. The groundwater downgradient of the site needs to be pumped and treated until the clean-up levels are met. The clean-up levels are to be dictated by federal and state ARARs. (Table 5 shows the cleanup levels for the primary contaminants of concern at this Facility.) Groundwater treatment will be required to reduce the risk levels from the present high risk levels (1×10^{-2} and an HI value of 100) to the risk levels of 1×10^{-6} and HI value of less than 1. No matter which groundwater treatment alternative is chosen, air emissions from the treatment unit(s) must comply with ARARs. Any sludges or residuals resulting from on-site treatment will need to be tested to determine whether they exhibit the RCRA toxicity characteristics for constituents regulated by the Land Disposal Restrictions (LDRs). LDR notification and certification requirements (and manifesting requirements) will be met to ship any characteristic wastes off-site. The off-site treatment and disposal facility will treat and dispose of the wastes in accordance with RCRA Subtitle C requirements, including LDR as per 40 CFR 268. The FS Report

TABLE 5
CLEANUP LEVELS FOR GROUNDWATER
WEST KL AVENUE LANDFILL
(ppb)

<u>Contaminant</u>	<u>MCL</u>	<u>MCLG</u>	<u>Michigan Act 307</u>	<u>Clean-up Goal</u>
Acetone			700	700
Barium	5000	5000	5000	5000
* Benzene	5.0	0	1.0	1.0
2-Butanone			350	350
Cadmium	5	5	4.0	4.0
Chromium (total)	100	100	35	35
1,1-Dichloroethane			700	700
* 1,2-Dichloroethane	5.0	0	0.4	0.4
Trans-1,2-DOE	100	100	140	100
Ethylbenzene	700	700	30	30
Iron	300 ⁺		300 ⁺	300
* Lead	50	0	5.0	5.0
4-Methyl-2-pentanone			350	350
Nickel	100	100		100
Phenol			300 ⁺	300
Toluene	2000	2000	40	40
* Vinyl Chloride	2.0	0	0.02	0.02
Xylenes	10,000	10,000	20	20

* == carcinogen

MCL = Federal Safe Drinking Water Act, Maximum Contaminant Level

MCLG = Maximum Contaminant Level Goal

Act 307 = Michigan's Act 307, Type B, 1×10^{-6} Levels or Human Life Cycle Safe Concentration Levels

+ == Secondary MCL

This chart is not conclusive, as it represents only the contaminants identified as the contaminants of primary concern at the time the RI was conducted.

If the best available detection limit is higher than the Clean-up Goal, then the detection limit will replace the stated Clean-up Goal.

If the background concentration is higher than the Clean-up Goal, as determined by the EPA in consultation with the MDNR, then the background concentration will replace the stated Clean-up Goal.

Other compounds detected, for which there are no health criteria or guidance, will have Clean-up Goals set at a technical performance based clean-up level.

estimates that a maximum pumping rate of approximately 2000 gallons per minute (gpm) will be required to capture the contamination plume, utilizing a minimum of 5 extraction wells, (the exact number of wells, gpm and location of the wells, to ensure that the wells' cones of depression overlap with each other and therefore capture the plume, will be determined during the Remedial Design phase). Treatability Studies will need to be conducted for which ever groundwater remedial action alternative is chosen to verify the effectiveness of the selected treatment method. Alternative GW #3 is divided into four alternatives reflecting different treatment technologies and combinations of these technologies that can best address the needs of the remedial action at this site. The alternatives are as follows:

Alternative GW #3a: Groundwater Treatment Utilizing Precipitation, Air Stripping and Carbon Adsorption

This alternative consists of groundwater collection, as mentioned above, combined with treatment of the extracted groundwater consisting of chemical precipitation, air stripping, and carbon adsorption (Figure 4). The chemical precipitation process will remove the inorganic contaminants to non-detect levels or near non-detect levels. The air-stripping process will remove the organic contaminants of concern to non-detect levels with the exception of several organics. The carbon adsorption process will remove the remaining organic contaminants which were not removed from the groundwater during air stripping.

The limiting design factor for the air-stripping and carbon adsorption systems is the requirement that the ketones be removed to non-detect levels. Because these compounds are neither readily strippable nor adsorbed, the sizes of the air stripper and activated carbon system must be increased significantly to remove the ketones. Groundwater ARARs will be obtained with this alternative if the ketones are removed. ARARs regarding air emissions will be addressed with carbon filters, if required.

Waste products will be generated from this treatment process, including sludges from the precipitation process, air emissions from the air stripper that may need to be captured, and spent carbon that will need to be regenerated or disposed of at an approved RCRA facility.

Estimated Construction Cost: \$6,406,400
 Estimated Total O&M Costs: \$17,783,800
 Estimated Total Present Worth: \$24,190,200
 Estimated Implementation Timeframe: Minimum of 6 years

Sub-Alternative GW #3a: Groundwater Treatment Utilizing Precipitation, Air-Stripping and Carbon Adsorption

The sub-alternative is exactly like GW #3a above except this sub-alternative does not provide the degree of ketone removal as does GW #3a, therefore using significantly less activated carbon. Waste products will be similar to GW #3a, but less activated carbon will be spent and needed to be regenerated or disposed of at an approved RCRA

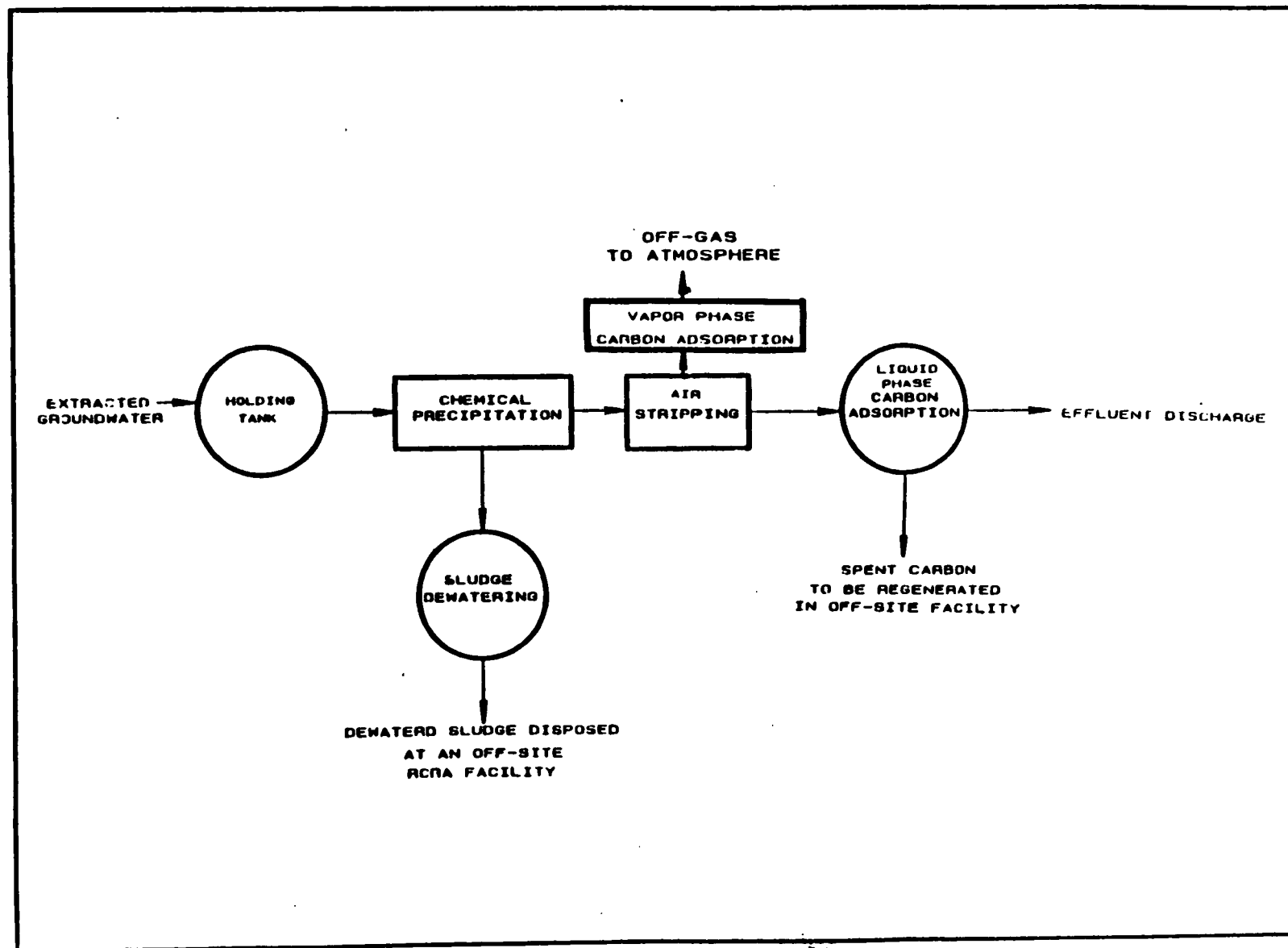


FIGURE 4
TREATMENT SCHEMATIC
FOR GROUNDWATER ALTERNATIVE 3a

facility. Groundwater ARARs may not be achieved since ketones will not be significantly removed. ARARs regarding air emissions will be addressed with carbon filters, if required.

Estimated Construction Cost: \$5,829,700
 Estimated Total O&M Costs: \$5,153,500
 Estimated Total Present Worth: \$10,982,500
 Estimated Implementation Timeframe: Minimum of 6 years

Alternative GW #3b: Groundwater Treatment Utilizing Precipitation, Steam-Stripping and Carbon Adsorption

This alternative consists of chemical precipitation, steam-stripping and carbon adsorption (Figure 5). The chemical precipitation process will remove the inorganic contaminants to non-detect levels. The steam strippers will remove the organic contaminants of concern to non-detect levels with the exception of phenol and 4-methylphenol. The size of the carbon adsorption system in this alternative is assumed to be of similar size as the one needed for sub-alternative GW #3a. This carbon adsorption process will adsorb the contaminants not removed by steam stripping, specifically phenol and 4-methylphenol. This alternative will achieve groundwater ARARs. ARARs regarding air emissions will also be addressed with the use of a carbon filter system, if it is determined that it is necessary.

Waste products will be similar to Sub-alternative GW #3a.

Estimated Construction Cost: \$7,011,500
 Estimated Total O&M Costs: \$6,715,300
 Estimated Total Present Worth: \$13,726,800
 Estimated Implementation Timeframe: Minimum of 6 years

Alternative GW #3c: Groundwater Treatment Utilizing Precipitation and Carbon Adsorption

This alternative consists of chemical precipitation and carbon adsorption (Figure 6). The chemical process will remove the inorganic contaminants to non-detect levels, while the carbon adsorption process will remove the organic contaminants of concern to non-detect levels. This alternative differs from GW #3a and #3b in that it utilizes carbon adsorp

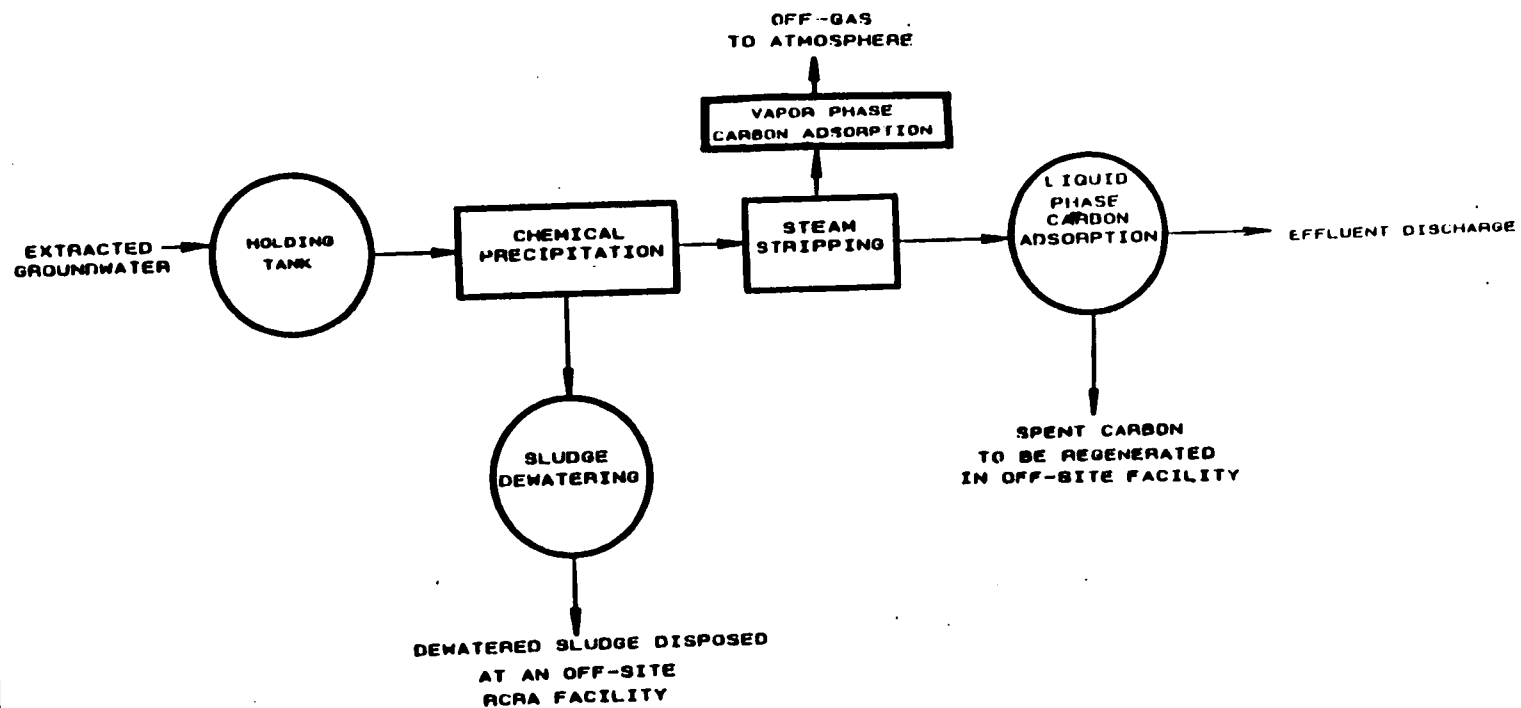


FIGURE 5
TREATMENT SCHEMATIC
FOR GROUNDWATER ALTERNATIVE 3b

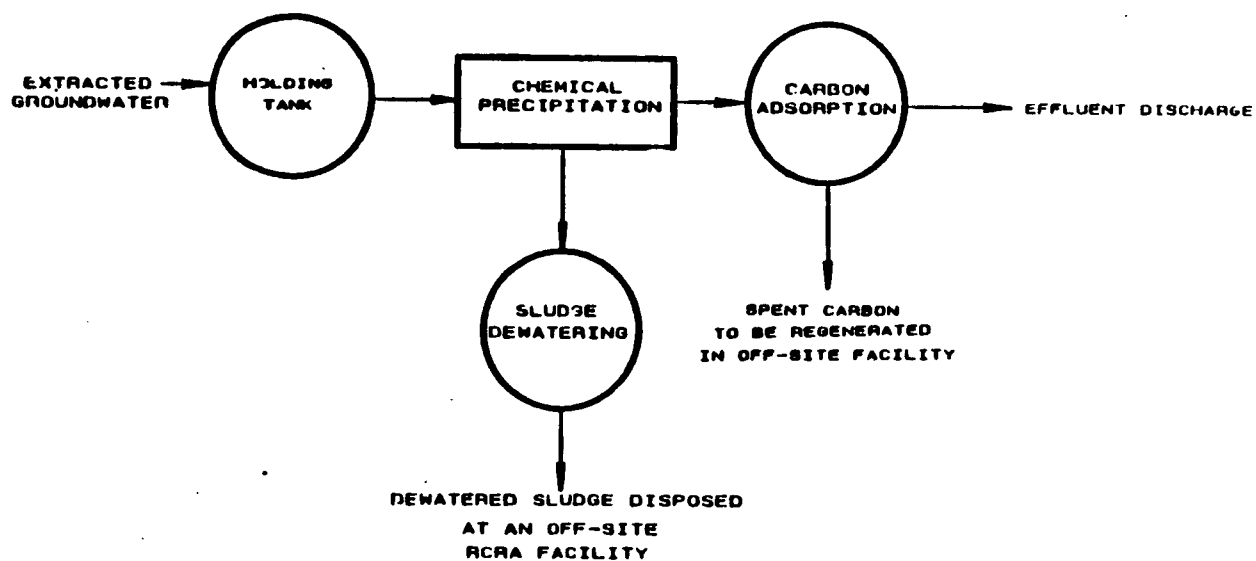


FIGURE 2
TREATMENT SCHEMATIC
FOR GROUNDWATER ALTERNATIVE 3c

Alternative GW #3d: Groundwater Treatment Utilizing Precipitation and UV-enhanced Oxidation.

This alternative consists of chemical precipitation and UV-enhanced oxidation (Figure 7). The chemical precipitation process will remove the inorganic contaminants to non-detect levels. The UV-enhanced oxidation process will remove the organic contaminants of concern to non-detect levels with the exception of 4-methyl-2-pentanone, which will be removed to a concentration of approximately 10 parts per billion. Groundwater ARARs should be achieved, but depend on the final concentration of 4-methyl-2-pentanone remaining after treatment. ARARs regarding air emissions will be achieved.

Waste products of this alternative include only the sludges from the chemical precipitation.

Estimated Construction Cost: \$5,943,200
 Estimated Total O&M Costs: \$6,870,400
 Estimated Total Present Worth: \$12,813,600
 Estimated Implementation Timeframe: minimum of 6 years

The above groundwater treatment alternatives (GW #'s 3a-d) all include 5 to 7 extraction wells (as described within the FS Report) but other factors which affect implementation of the alternatives include: 1) determining the location of the extraction wells; 2) determining the final disposition of the treated groundwater; and 3) determining the location of the treatment facilities. The exact number and location of the extraction wells will need to be determined during the Remedial Design phase of the project, after a pilot test is conducted. The FS Report discusses possible options on what to do with the large volumes of treated groundwater. Options that were discounted for reasons explained within the FS include: 1) discharge to Bonnie Castle Lake; and 2) shipment to an off-site RCRA facility. The methods that were brought through the FS evaluations were the re-injection of the treated effluent into the shallow aquifer, the construction of a receiving pond, and the extension of the municipal sewer line and the use of the local Publicly Owned Treatment Works (POTW), as in Alternative GW #4a below. The exact numbers and locations of the injection wells would need to be determined during the Remedial Design stage of the project. A preliminary layout of the groundwater extraction system is sketched in Figure 8. The feasibility and size of a receiving pond can not be fully determined until the exact pumpage rate of the extraction wells is known and therefore this option is not carried any further in this ROD, but may still be a viable discharge option. The location of the treatment facilities will be somewhat dependent on the final locations of the extraction and injection wells or the receiving pond. The potential need to purchase or lease private property will most likely elevate the costs of the groundwater treatment alternatives, based on the locations chosen for the extraction wells, the injection wells, the receiving pond, the associated piping, and the treatment facilities. The use of the local POTW will depend on the capacity of the nearest sewer line, the capacity and approval for use of the POTW, the POTW's record of compliance and compliance with the POTW's pretreatment standards. (See Alternative GW #4a below). Whether the POTW is

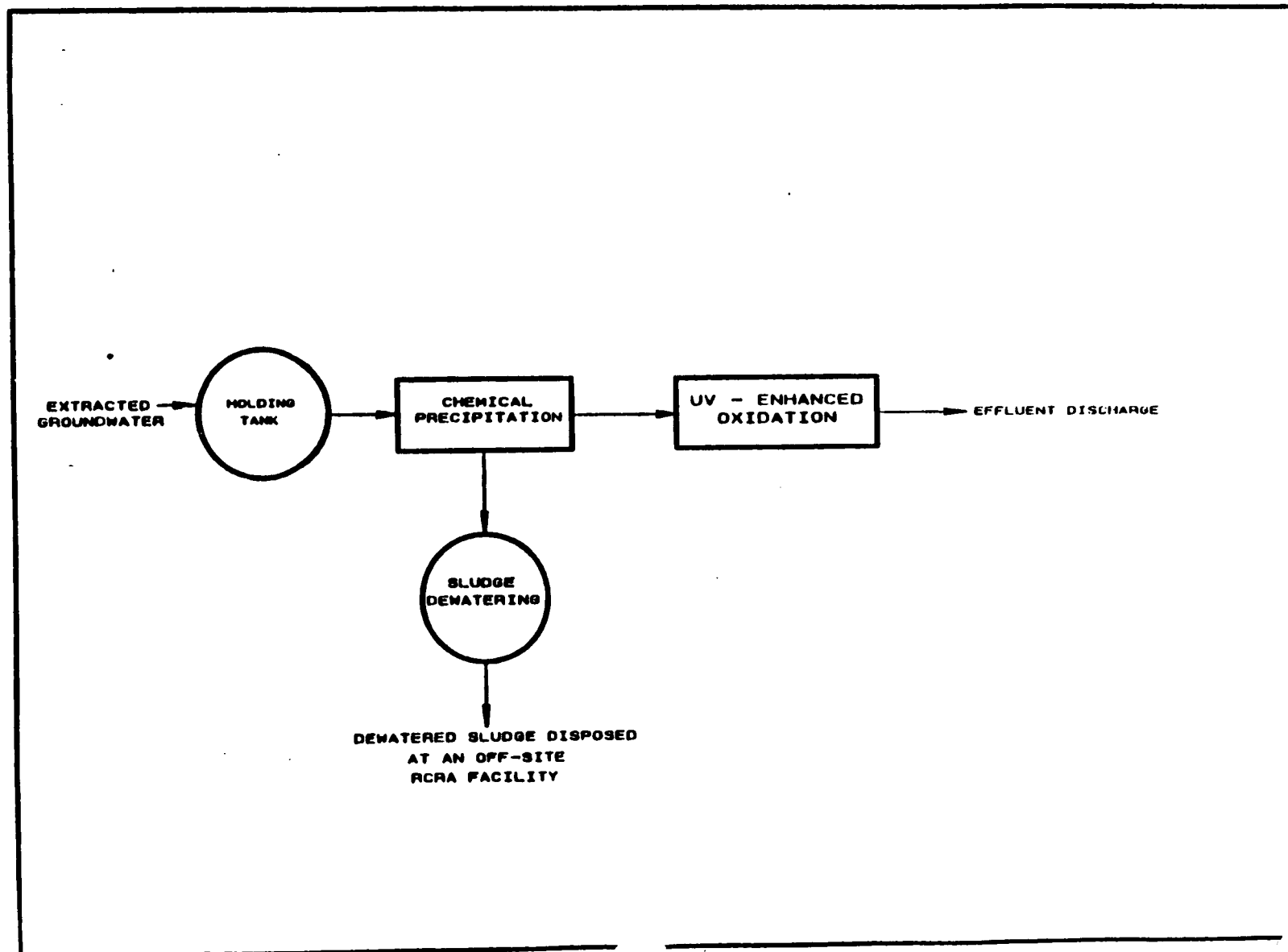


FIGURE 7
TREATMENT SCHEMATIC
FOR GROUNDWATER ALTERNATIVE 3d

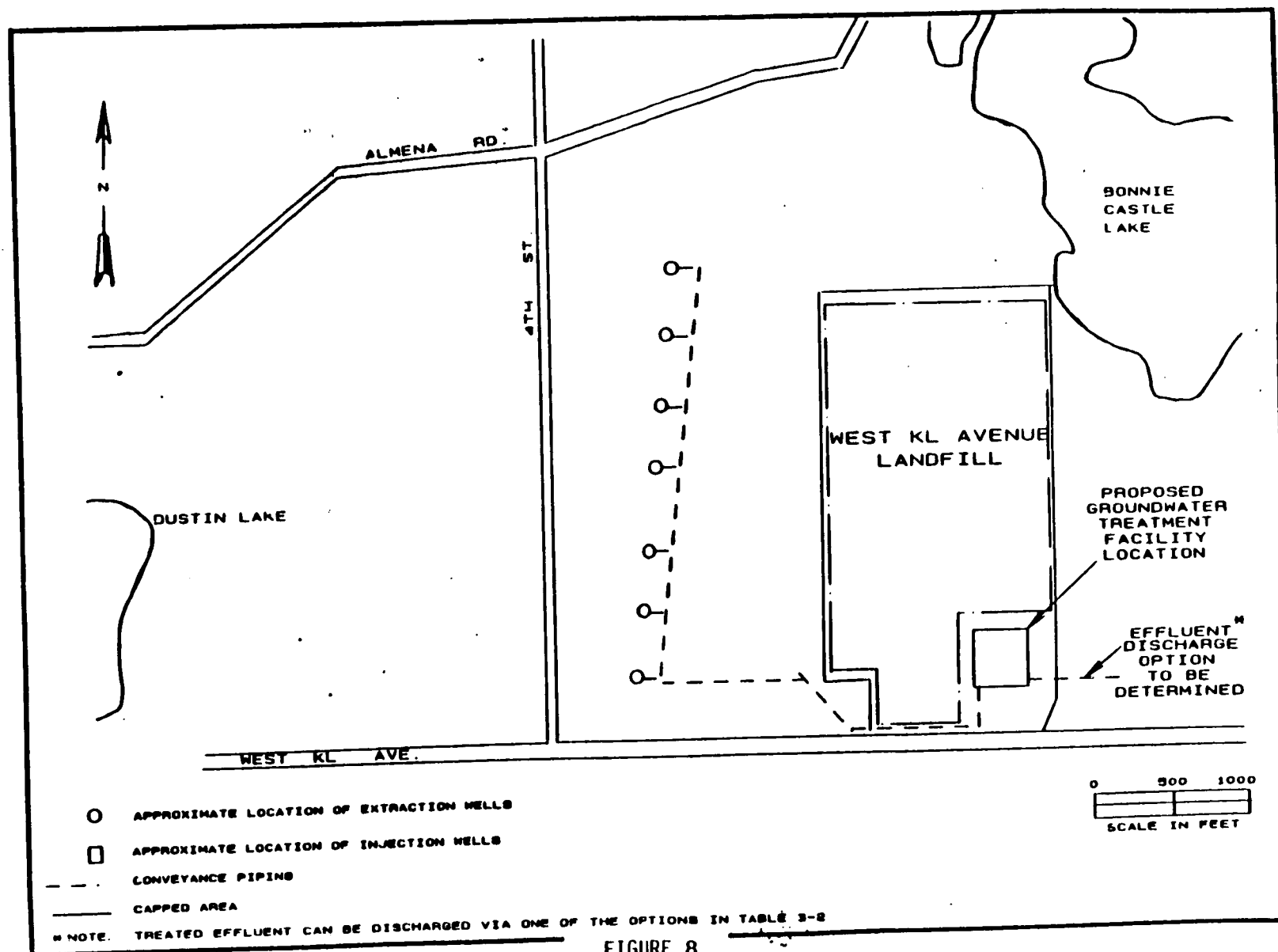


FIGURE 8
PRELIMINARY LAYOUT OF GROUNDWATER EXTRACTION,
TREATMENT AND INJECTION SYSTEM

used or other surface water discharge options are developed, the treatment requirements will be the same; meeting federal and state surface water quality standards. Any discharges/reinjection to the groundwater will need to have contaminants treated to ARAR cleanup levels. The overall costs of the GW alternatives will be dependent on which method of disposal of the pumped/treated groundwater is chosen.

Alternative GW #4a: Off-Site Treatment at the Kalamazoo POTW.

This alternative consists of extending the City of Kalamazoo's sewer lines to the Site and directly discharging the pumped groundwater (utilizing the extraction wells mentioned earlier) into the sewer system for treatment at the City of Kalamazoo POTW. A sewer line will have to be constructed to connect the extraction well system at the Site to the existing sewer system, which presently ends near 11th Street, approximately 3.25 miles to the east of the Site (Figure 9). Pretreatment to the levels established by the POTW will be required prior to discharge to the sewer/POTW. Cost figures below assume no pretreatment is necessary. The estimated quantity of groundwater discharged to the POTW is 2-3 million gallons per day. Groundwater ARARs will be achieved and ARARs regarding surface water discharges will be accomplished by the POTW meeting their NPDES permit requirements.

Estimated Construction Cost: \$2,592,300
 Estimated Total O&M Costs: \$6,735,400
 Estimated Total Present Worth: \$9,327,700
 Estimated Implementation Timeframe: 6 years

B. DESCRIPTION OF LANDFILL (LF) ALTERNATIVES

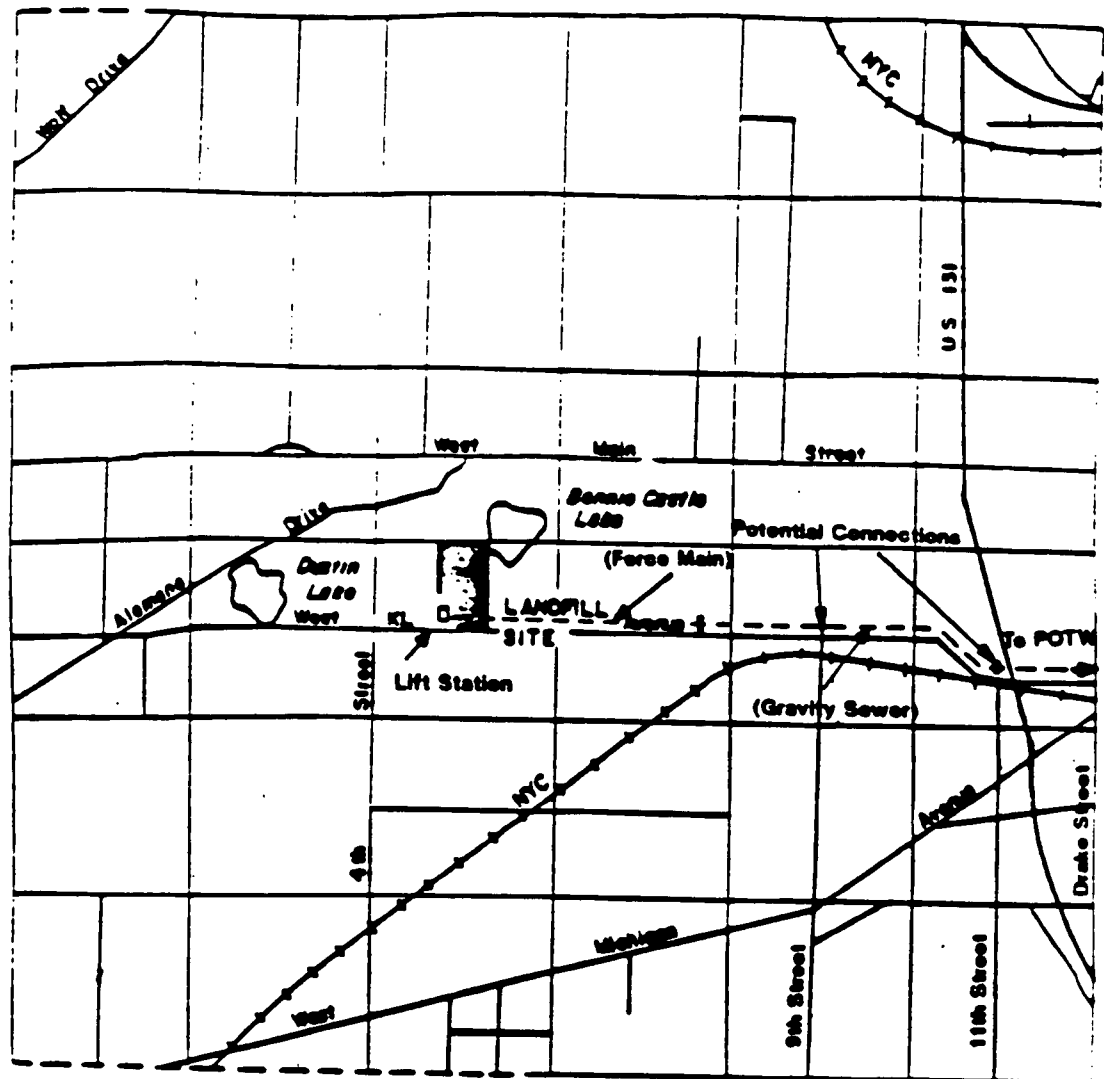
Alternative LF #1: No Action

The No Action alternative is mandated by the NCP to be carried through to the remedial action selection process in order to provide a baseline comparison with other alternatives. Under this alternative, no remedial action would be taken at the West KL Avenue Landfill site. Therefore, the potential human health risks (as summarized above and within the Risk Assessment) associated with exposure to landfill contaminants (waste materials have been observed protruding through the present landfill surface) would not be mitigated and would most likely increase as site conditions deteriorate. ARARs regarding landfill closure will not be achieved.

Estimated Construction Cost: not applicable
 Estimated Total O&M Costs: not applicable
 Estimated Total Present Worth: not applicable
 Estimated Implementation Timeframe: not applicable

Alternative LF #2: Limited Action

The Limited Action alternative involves measures designed to limit access to the site and to reduce exposure to landfill contaminants. This will be achieved by constructing a six-foot chain link fence



NOTES:

1. Drake Street is the north-south boundary between the City of Kalamazoo and Oshtemo Township.
2. Potential connection locations based on information provided by Oshtemo Township Engineer and the City of Kalamazoo.



FIGURE 9
POTENTIAL LOCATIONS FOR
CONNECTION OF NEW SEWER TO EXISTING PUBLIC SEWER
OFF-SITE GROUNDWATER TREATMENT ALTERNATIVE 4A

around the perimeter of the landfill, regrading small areas, revegetating areas without cover grass, and by placing deed restrictions (prohibiting the construction of buildings or other structures) on the landfill property or property immediately adjacent to it. No remedial action would be taken at the landfill under this alternative. (If this alternative is combined with a containment alternative, the regrading and revegetating of the landfill will be according to the containment option.) ARARs regarding landfill closure will not be met by this alternative.

Estimated Construction Cost: \$162,400
 Estimated Total O&M Costs: \$151,700
 Estimated Total Present Worth: \$314,100
 Estimated Implementation Timeframe: 1 year, with 30 years of monitoring

Alternative LF #3: Containment (Capping)

This alternative involves the containment of the landfill contents. This is provided by the installation of a cap over the filled portions of the site to prevent the release of contaminants at the surface and by reducing the quantity of waste constituents that reach the groundwater by infiltration. RCRA, Subtitle C closure or its equivalent, is a relevant and appropriate closure for this Facility since it has been documented that the landfill accepted quantities of hazardous waste (drums, bulk and sludges) during its operation, but prior to November of 1980. Michigan Act 641, Solid Waste Management Act, has not been considered any further in the FS process since closure under that Act will not attain the ARARs required by Act 64. The area of the landfill that needs to be capped under this alternative is estimated to be approximately 83 acres (Figure 10). This alternative is further broken down into three capping designs. Gas venting (an estimated 1 gas vent per 5 acres) and monitoring are a part of each of the containment options.

Alternative LF #3a: Containment Utilizing a Clay Cap; Michigan Act 64

This alternative calls for containment utilizing a minimum 3-foot compacted clay layer, a 3-foot clean fill layer, and a 6-inch topsoil layer (Figure 11), as per Michigan Act 64. The clay must have a maximum laboratory permeability of 1×10^{-7} cm/sec. The 3-foot clean fill layer will be placed on top of the clay to serve primarily as a frost protection layer. The clean fill layer will also protect the clay layer from penetration by deep-rooted plants and burrowing animals and provides for lateral drainage of precipitation. The 6-inch layer of topsoil will provide a substrate for vegetative cover.

Gas vents (an estimated 1 per every 5 acres) will be needed to alleviate the horizontal migration of landfill gas. These vents will be monitored. Landfill closure ARARs will be satisfied by this alternative.

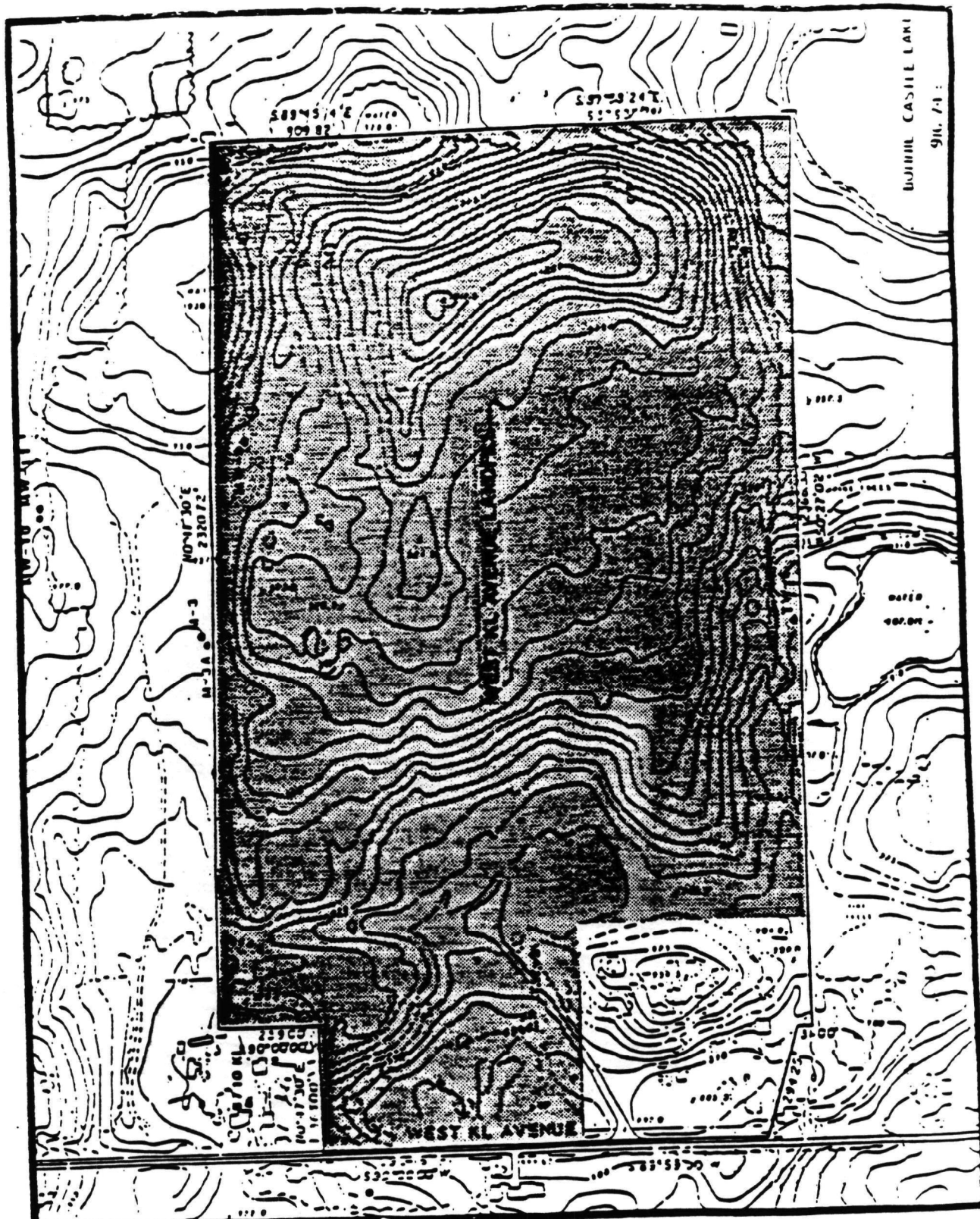


FIGURE 10

AREA TO BE CAPPED UNDER LANDFILL ALTERNATIVES 3a AND 3b

AND 3c 1" = 350



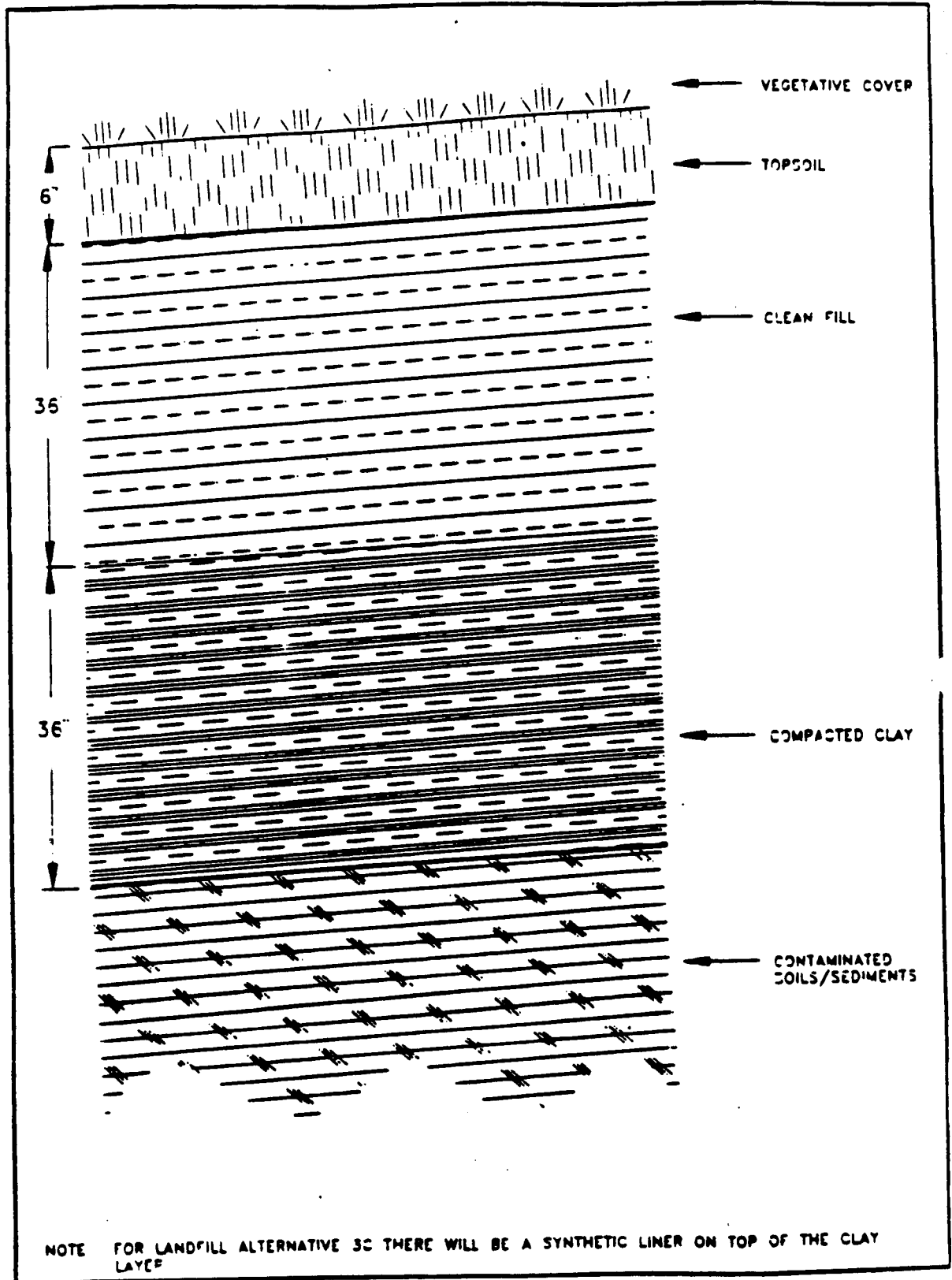


FIGURE 11
CROSS SECTION OF CLAY CAP FOR
LANDFILL ALTERNATIVE 3A

Estimated Construction Cost: \$11,251,900
 Estimated Total O&M Costs: \$150,800
 Estimated Total Present Worth: \$11,402,700
 Estimated Implementation Timeframe: 2-5 years, with 30 years
 of monitoring

Alternative LF #3b: Containment Utilizing a RCRA-Type Cap

This alternative calls for containment utilizing a RCRA-type cap that is similar to LF #3a except that an additional impermeable layer is provided in the form of a synthetic liner, in place of 1-foot of clay, and an additional drainage layer is added in place of 1-foot of clean fill material (Figure 12). The RCRA-type cap consists of a 2-foot clay layer with a 60-mil high density polyethylene liner placed directly on top of it. A drainage layer is necessary immediately atop the synthetic liner to allow lateral drainage of precipitation. This layer consists of 12-inches of pea gravel with a layer of 6-ounce geotextile filter-fabric placed above it to protect it from clogging. A 2-foot layer of clean fill is placed above the drainage layer to protect the lower layers from frost damage. Lastly, a 6-inch topsoil layer is placed on top in order to provide a substrate for the growth of vegetative cover.

The horizontal migration of landfill gas will be addressed as in Alternative LF #3a. Landfill closure ARARs will be satisfied by this alternative, since Alternative #3b is equal to or greater in performance than Michigan Act 64, (Alternative #3a).

Estimated Construction Cost: \$13,601,600
 Estimated Total O&M Costs: \$150,800
 Estimated Total Present Worth: \$13,752,400
 Estimated Implementation Timeframe: 2-5 years, with 30 years
 of monitoring

Alternative LF #3c: Clay Cap with a Synthetic Liner

This alternative is a combination of Alternatives LF #3a and LF #3b. It calls for containment (3 feet of compacted clay) meeting the requirements of Michigan Act 64, as in Alternative LF #3a, and in addition, includes a synthetic liner, as in Alternative LF #3b. The synthetic liner will be placed directly on top of the clay layer.

The horizontal migration of landfill gas will be addressed as in Alternative LF #3a. Landfill closure ARARs will be satisfied.

Estimated Construction Cost: \$14,139,100
 Estimated O&M Costs: \$150,800
 Estimated Total Present Worth: \$14,289,900
 Estimated Implementation Timeframe: 2-5 years, with 30 years
 of monitoring

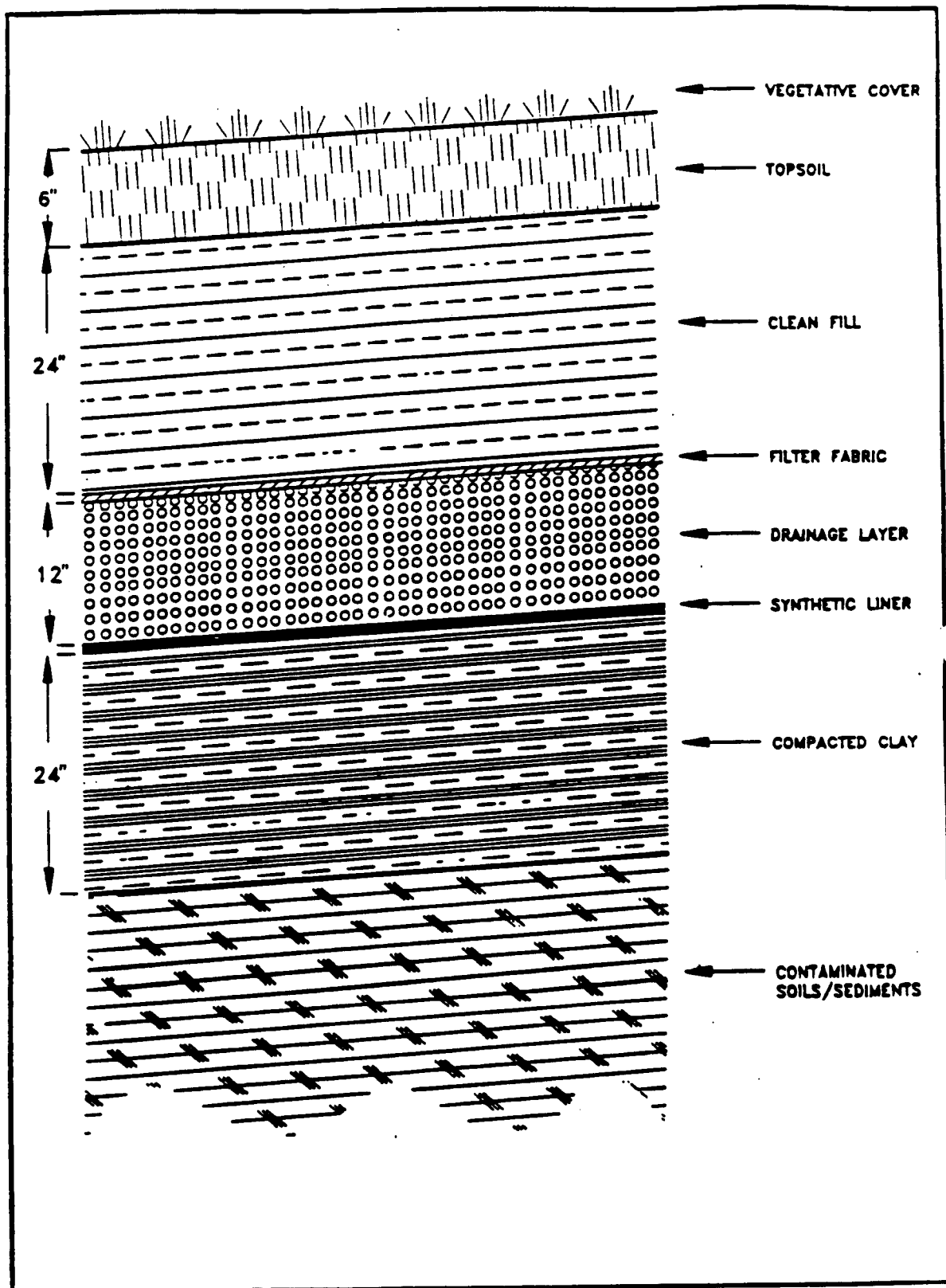


FIGURE 12
CROSS SECTION OF RCRA CAP FOR
LANDFILL ALTERNATIVE 3B

C. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Table 6 identifies the applicable or relevant and appropriate requirements (ARARs) for each of the alternatives mentioned in A and B above. The major ARARs for the groundwater remedial actions are the Federal Safe Drinking Water Act, Michigan's Act 307 rules, promulgated July 12, 1990. The Federal Safe Drinking Water Act is relevant and appropriate to this aquifer because the aquifer is a potential source of drinking water, assuring that no groundwater suitable for drinking water supplies exceeds the Maximum Contaminant Levels or Maximum Contaminant Level Goals. The requirement to perform either a type A, B or C cleanup under the Michigan Environmental Response Act (Act 307) is an ARAR for the remedial action to be undertaken at this site. This Act provides, *inter alia* that remedial action be protective of human health, safety and the environment, (Rule 299.5705(1)). The rules, under Act 307, Parts 6 and 7, specify that this standard is achieved by a degree of cleanup which conforms to one or more of the three cleanup types (Rule 299.5705(2)): a type A cleanup generally achieves cleanup to background (Rule 299.5707); a type B cleanup meets specified risk-based levels in all media (Rule 299.5709); and a type C cleanup is based on a site-specific risk assessment which considers specified criteria. EPA has decided that the selected remedy will meet the standards for a type B cleanup for the groundwater cleanup levels since the levels of contaminants found in the groundwater are in exceedence of federal and state drinking water standards. The EPA has further decided that the containment of the landfill wastes meets the criteria for type C cleanup, since no "hot spots" of wastes were discovered during the test pit operations; so containment by capping is the most feasible approach to address the release of contaminant from the landfill. LDRs are applicable to the disposal of any sludges or residuals produced by on-site treatment. The State has identified Act 245 as an ARAR since the treated groundwater may be reinjected into the shallow aquifer. The EPA disagrees that Act 245, as interpreted and applied by the State in this matter, is an ARAR. Nonetheless, it is the State's judgement that the selected remedial action for this site will provide for attainment of all ARARs including the Michigan Water Resources Act and Part 22 Rules. The remedial action will halt the migration of contaminated groundwater and restore the aquifer to a usable condition. In addition, the purged water will be treated prior to reinjection and then hydraulically contained by the purge wells in a manner that will prevent degradation of groundwater quality, consistent with the Water Resources Commission Act and Part 22 Rules. For the landfill containment remedial actions, the major ARAR is Michigan's Act 64. Act 64 addresses the closure of landfills that have accepted hazardous wastes for disposal, such as this Facility and is relevant and appropriate to this cleanup since hazardous wastes were disposed of prior to November, 1980.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The groundwater and landfill containment alternatives have been compared utilizing nine evaluation criteria. The criteria used for evaluating and comparing the alternatives are listed below. Please refer to the FS for further detail on the alternatives and the evaluation criteria.

TABLE 6
DETAILED ANALYSIS OF ALTERNATIVES
COMPLIANCE WITH ARARS
WEST KL AVENUE LANDFILL

ARAR	Requirements	Groundwater Alternatives							Landfill Alternatives				
		1	2	3a	3b	3c	3d	4a	1	2	3a	3b	3c
<u>Federal ARAR</u>													
<u>Contaminant-Specific</u>													
40 CFR 141	MCLs for drinking water quality.	N	N	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA
<u>Location-Specific</u>													
None applicable													
<u>Action-Specific</u>													
Clean Air Act, Section 101	Regional air pollution program addressing emissions during remediation.	NA	NA	R	R	R	R	NA	NA	R	R	R	R
40 CFR 52	Regional air quality plan for remedial activities.	NA	NA	R	R	R	R	NA	NA	R	R	R	R
40 CFR 50	Air quality standards for remedial activities.	NA	NA	R	R	R	R	NA	NA	R	R	R	R
40 CFR 257	Standards for solid waste disposal facilities (delegated to states).	NA	NA	NA	NA	NA	NA	NA	N	N	Y	Y	Y
40 CFR 261	Identification of hazardous waste.	NA	NA	R	R	R	R	NA	NA	NA	NA	NA	NA
40 CFR 262	Regulations for hazardous waste generators.	NA	NA	R	R	R	R	NA	NA	NA	NA	NA	NA
40 CFR 263	Regulations for transport of hazardous waste.	NA	NA	R	R	R	R	NA	NA	NA	NA	NA	NA

TABLE 6 (CONT.)
DETAILED ANALYSIS OF ALTERNATIVES
COMPLIANCE WITH ARARS
WEST KL AVENUE LANDFILL

ARAR	Requirements	Groundwater Alternatives							Landfill Alternatives				
		1	2	3a	3b	3c	3d	4a	1	2	3a	3b	3c
40 CFR 264	Regulations for owners/operators of hazardous waste facilities.	NA	NA	R	R	R	R	NA	NA	NA	R	R	R
40 CFR 268	Land disposal restrictions for hazardous wastes.	NA	NA	R	R	R	R	NA	NA	NA	NA	NA	NA
40 CFR 265	Regulations for owners/operators of interim status hazardous waste facilities.	NA	NA	R	R	R	R	NA	NA	NA	R	R	R
Executive Order 12372; 40 CFR 29	Requires state and local coordination of CERCLA projects.	R	R	R	R	R	R	R	R	R	R	R	R
<u>State ARAR</u>													
<u>Contaminant-Specific</u>													
Act 307 Rules (Michigan Environmental Response Act) Effective 7/12/90	Requires remediation of ground-water to specific risk levels for carcinogens and background for non-carcinogens.	N	N	Y ¹	Y	Y	Y	Y ²	NA	NA	NA	NA	NA
<u>Location-Specific</u>													
None applicable													
<u>Action-Specific</u>													
Act 64 of 1979 (The Hazardous Waste Management Act)	Hazardous waste regulations for State of Michigan.	NA	NA	R	R	R	R	NA	N	N	Y	R	Y
Act 127 of 1970 (The Michigan Environmental Protection Act)	Prohibits any action which pollutes state's natural resources.	NA	R	R	R	R	R	R	NA	R	R	R	R
* Act 245 of 1929 (The Water Resources Commission Act) Part 9	Reporting requirements for discharge to sanitary sewer system	NA	NA	NA	NA	NA	NA	*	NA	NA	NA	NA	NA

TABLE 6 (CONT.)
DETAILED ANALYSIS OF ALTERNATIVES
COMPLIANCE WITH ARARS
WEST KL AVENUE LANDFILL

ARAR	Requirements	Groundwater Alternatives							Landfill Alternatives				
		1	2	3a	3b	3c	3d	4a	1	2	3a	3b	3c
- Part 21	Effluent discharge permitting and monitoring requirements.	NA	NA	*	*	*	*	NA	NA	NA	NA	NA	NA
- Part 22	Prohibits the degradation of groundwater in usable aquifers as a result of a discharge.	NA	NA	*	*	*	*	NA	NA	NA	NA	NA	NA
Act 315 of 1969 (The Mineral Well Act)	Requirements for monitoring wells at site.	NA	R	R	R	R	R	R	NA	NA	NA	NA	NA
Act 345 of 1965 (The Air Pollution Act)	Requires permit for any equipment that produces air emissions.	NA	NA	R	R	R	R	NA	NA	NA	NA	NA	NA
Act 347 of 1972 (The Soil Erosion and Sedimentation Control Act)	Requires soil erosion and sedimentation control plan for remediation.	NA	NA	NA	NA	R	R	NA	NA	R	R	R	R
** Act 348 of 1965 (The Air Pollution Act)	Requires air emissions from devices or site work to be "non-injurious."	NA	NA	**	**	NA	NA	NA	NA	**	**	**	**
Act 368 of 1978 (Public Health Code)	Specifies procedures for water well abandonment.	NA	R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Act 641 of 1978 (The Solid Waste Management Act)	Standards for operation (and closure) of a solid waste landfill.	NA	NA	NA	NA	NA	NA	NA	N	N	Y	Y	Y

Note:

NA - ARAR is not applicable to the alternative.

Y - Yes; compliance with ARAR would be achieved if alternative were implemented.

N - No; compliance with ARAR cannot be achieved if alternative were implemented.

R - Required; compliance with ARAR would be required if alternative were implemented.

*Groundwater alternative 3a can provide complete contaminant-specific ARARs compliance by utilizing a high level of treatment or can provide partial ARARs compliance by using a reduced level of treatment.

*Will not be possible to analytically determine compliance with chemical-specific ARARs.

* The State has identified Act 245 as an ARAR. The United States disagrees that Act 245, as interpreted and applied by the State in this matter, is an ARAR. Nonetheless, it is the State's judgment that the selected remedial action for this site will provide for attainment of all ARARs including the Michigan Water Resources Act and Part 22 Rules. The remedial action will halt the migration of contaminated groundwater and restore the aquifer to a usable condition. In addition, the purged water will be treated prior to reinjection and then hydraulically contained by the purged wells in a manner that will prevent degradation of groundwater quality, consistent with the Water Resources Commission Act and Part 22 Rules.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT addresses whether or not a remedy provides adequate protection and describes how risks are posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

COMPLIANCE WITH ARARS (APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS) addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

LONG-TERM EFFECTIVENESS AND PERMANENCE refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

SHORT-TERM EFFECTIVENESS addresses the period of time needed to achieve protection, and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME is the anticipated performance of the treatment technologies a remedy may employ.

IMPLEMENTABILITY is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

COST includes estimated capital and operation and maintenance costs, and net present worth costs.

STATE ACCEPTANCE indicates whether, based on its review of the RI/FS and Proposed Plan, the State concurs in, opposes, or has no comment on the preferred alternative at the present time.

COMMUNITY ACCEPTANCE is based on comments received from the public during the public comment period. These comments are will be assessed in the Responsiveness Summary attached to the ROD following a review of the public comments received on the RI/FS report and the Proposed Plan.

A) THRESHOLD CRITERIA

The two most important criteria are statutory requirements that must be satisfied by any alternative in order for the alternative to be eligible for selection. These two criteria are as follows:

1) Overall Protection of Human Health and the Environment:

i) **Groundwater (GW) Alternatives:** GW #1 and #2 do not provide any treatment of the groundwater, and consequently do not protect human health and the environment from the potential or actual risks existing in the groundwater. The GW Alternatives that offer the most protectiveness to human health and the environment are those that include treatment as part of the remedy. Therefore, alternatives GW #3a-d and GW #4a are more protective.

than are alternatives GW #1 (No Action) and GW #2 (Limited Action), which offer no or little added protection. Among the treatment alternatives, the level of protectiveness is comparable, with the exception that GW sub-alternative 3a, which will leave higher concentrations of contaminants in the groundwater than would the other alternatives. Of the on-site treatment alternatives, all require that the sludges from the inorganic treatment process be disposed of off-site. Alternatives GW 3a-c require that spent carbon be regenerated or disposed of off-site. Alternative GW #3d requires no additional material to be disposed of off-site, since the organic contaminants are destroyed and not transferred to a different media. Alternative GW #4a would remove the contaminants from the Facility area and therefore be protective of human health and the environment in the immediate Facility area and by the POTW meeting its discharge permit requirements, this alternative would be protective of human health and the environment at the point of discharge. Under Alternative GW #4a, the extracted groundwater would be treated at the POTW and discharges of the treated water would then meet discharge standards prior to being discharged into the Kalamazoo River. All the treatment alternatives will be designed to reduce the level of risk presented in the groundwater from the present risk levels down to 1×10^{-6} cancer risk level and to a HI value of less than 1 for noncarcinogens. In summary, Alternatives GW #3a-d and GW #4a provide adequate protection to human health and the environment while Alternatives GW #1 and 2 do not provide adequate protection.

ii) Landfill (LF) Alternatives: The LF Alternatives provide varying degrees of protectiveness ranging from no protection (No Action Alternative LF #1), to marginal added protection (Limited Action Alternative LF #2), to maximum feasible protection (Capping Alternatives LF #3a-c). None of the Landfill Alternatives involve treatment as part of the alternative. The capping alternatives provide significantly greater protection to human health and the environment than LF #1 and #2, since they act on reducing or eliminating the mechanism for the contaminants to reach the groundwater, by reducing the generation of leachate within the landfill through containment. Alternatives LF #3b and 3c are more protective than Alternative LF #3a since they reduce leachate generation to a greater degree than does LF #3a. Alternatives LF 3b and 3c are comparable in protectiveness. In summary, Alternatives LF #3a-c provide adequate protection to human health and the environment while Alternatives LF #1 and 2 do not.

2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs):

i) GW Alternatives: Alternatives GW #1 (No Action) and GW #2 (Limited Action) do not achieve compliance with the contaminant-specific or action specific ARARs. Only the treatment alternatives, GW #3a-d and #4a, comply with ARARs, with the exception of sub-alternative GW #3a. See Table 6. The contaminant-specific ARARs are listed in Table 5 and are listed within the RI and FS Reports.

ii) LF Alternatives: Alternatives LF #1 (No Action) and LF #2 (Limited Action) do not achieve compliance with landfill closure ARARs.

West KL Avenue Landfill was a municipal solid waste landfill, making Michigan Act 641 an ARAR, but it also accepted hazardous wastes and substances, as documented in the Administrative Record, so Michigan Act 64 is also an ARAR, being relevant and appropriate. Alternatives LF #3a-c all meet the requirements of Act 641 but only Alternatives LF #3a and 3c comply with Act 64. Alternative #3b, even though it does not have the 3 foot layer of compacted clay as required by Act 64, it does have 2 foot of clay with a synthetic liner and therefore achieves similar or greater performance as does the Act 64 cap (LF #3a).

B) PRIMARY BALANCING CRITERIA

Five primary balancing criteria are used to identify major trade-offs between the remedial alternatives which satisfy the two threshold criteria. These trade-offs are ultimately balanced to identify the preferred alternative and to select the final remedy. The five criteria are as follows:

1) Long-term Effectiveness and Permanence:

i) GW Alternatives: The long-term effectiveness criterion primarily requires assessing the magnitude of residual risks remaining after an alternative has been implemented and the remedial action objectives have been met. Alternative GW #1 (No Action) does not reduce risk at the site and therefore provides no long-term effectiveness. Alternative GW #2 (Limited Action) provides little long-term effectiveness since it only reduces risk by preventing exposure and does not address the capture or treatment of the contamination. The treatment alternatives, GW #3a-d and GW #4a, all reduce the risk by removing contamination and consequently have the greatest level of long-term effectiveness. Proper operation and maintenance procedures will need to be observed in order to assure the continuing effectiveness of the treatment alternatives.

ii) LF Alternatives: Alternative LF #1 (No Action) does not provide any long-term effectiveness since it does not involve any remedial action. Alternative LF #2 (Limited Action) provides some degree of long-term effectiveness since it involves institutional controls such as deed restrictions, which will aid in reducing future risks at the site. The capping alternatives LF #3a-c, provide the greatest degree of long-term effectiveness provided that the cap is installed properly and the integrity of the landfill cap is maintained through regular repairs. Of the landfill caps, LF #3b and c provide significantly greater long-term effectiveness over the more permeable cap in LF #3a, because they allow considerable less percolation and infiltration through the landfill. None of the Landfill Alternatives offer treatment or removal of the wastes within the landfill, since these actions were screened out within the FS due to the infeasibility of implementing the alternative and/or due to the grossly excessive and disproportionate cost of the alternative.

2) Short-term Effectiveness:

i) GW Alternatives: Short-term effectiveness considers the effects that result during the implementation of the alternatives. GW #1 (No Action) and GW #2 (Limited Action) involve no or minimal remedial action so that short-term effectiveness is not an applicable consideration except for the fact that they can be rapidly implemented with little or no disturbance to the surrounding environment. The other groundwater alternatives require an implementation timeframe of several years, but involve only indirect exposure to contaminants by workers and no exposure to the groundwater or treatment residuals by the public. The local residents may be inconvenienced during the installation of the extraction wells and injection wells (if the POTW is not used), but this short-term inconvenience will occur with all the GW treatment alternatives. GW #4a will also inconvenience a number of local residents, on a short-term basis, since this alternative requires the installation of nearly 3 miles of new sewer line running down West KL Avenue. This inconvenience will be due solely to the construction of the sewer line and will not expose the residents to any contamination.

ii) LF Alternatives: Alternatives LF #1 (No Action) and LF #2 (Limited Action) involve no or minimal remedial action so that short-term effectiveness is not an applicable consideration except for the fact that they can be rapidly implemented with little or no disturbance to the surrounding environment. With the capping alternatives, LF #3a-c, short-term effectiveness will be ensured by the implementation of controlled construction procedures and by strict adherence to appropriate health and safety plan measures during construction. These factors will provide environmental and worker protection during construction. Community protection from indirect adverse effects such as noise and truck traffic during cap construction will be difficult to achieve under either of the capping alternatives. LF #3a may have less short-term effects on the local population than LF #3b and c, since less material would need to be brought to the site for the construction of the cap.

3) Reduction of Toxicity, Mobility, or Volume Through Treatment:

i) GW Alternatives: According to the guidelines within the National Contingency Plan (NCP), the groundwater at and near the Facility may be classified as a Class II-A aquifer, groundwater that is currently being used as a drinking water source. Therefore treatment is preferred. The reduction of toxicity, mobility or volume through treatment is satisfied only by the groundwater treatment alternatives, GW #3a-d and GW #4a. Since groundwater is not treated under GW #1 (No Action) and GW #2 (Limited Action), no reduction in toxicity, mobility, or volume is achieved through treatment. The degree to which each treatment alternative provides reduction in toxicity, mobility, and volume varies little with the treatment technologies utilized to achieve compliance with ARARs. All of the groundwater treatment alternatives meet the SARA treatment preference and provide nearly the same level of reduction in toxicity and mobility, although dilution is the primary toxicity reduction mechanism in GW #4a. Alternative GW #3d is the only treatment alternative that reduces

contaminant volume since it destroys organics by use of UV light. None of the other groundwater treatment alternatives involve volume reduction since the treatment is utilized only to achieve a reduction in the toxicity and mobility of the contaminants and the treatment systems simply transfer the contaminants from one media to another for later disposal or destruction. Systems utilizing carbon adsorption may eventually reduce contaminant volume, depending on the method of regeneration of the carbon material used in the system. The treatment alternatives may result in the generation of metal hydroxide sludges which will require proper disposal. Alternatives GW #3a-c utilize activated carbon adsorption and would periodically require the disposal of the exhausted or "spent" activated carbon. The use of the UV-enhanced oxidation (GW #3d) for organics removal does not generate residuals as in Alternatives GW #3a-c. As mentioned above, alternative GW #4a achieves treatment primarily via dilution enroute to the POTW, but the POTW utilizes tertiary treatment, so the extracted groundwater will receive treatment prior to discharge by the POTW. Pretreatment of the extracted groundwater may be deemed necessary prior to discharge into the POTW system.

ii) LF Alternatives: This criterion is not applicable because none of the three landfill alternatives provide treatment. The FS concluded that due to the large volume of waste present at the landfill, alternatives involving treatment which provides toxicity and volume reduction are not feasible, and/or have a cost which is grossly excessive and disproportionate to the overall effectiveness of the treatment alternative. The RI was unable to locate any concentrated areas of buried drums, so no removal or treatment options for the landfill contents were carried forward through the FS. It should be noted, however, that capping the landfill will reduce the mobility of the contaminants through containment measures and not treatment. The caps considered in LF #3b and #3c will allow less infiltration and will therefore provide better mobility reduction than the clay cap considered in LF #3a.

4) Implementability:

i) GW Alternatives: The No Action and the Limited Action Alternatives are the easiest alternatives to implement but as mentioned above, they do not attain ARARs or add any significant protection to human health and the environment. Of the groundwater remedial action alternatives, GW #4a, is easier to implement than any of the other remedial action alternatives. GW #4a will not require the construction of on-site treatment facilities as would the other groundwater treatment alternatives, unless pretreatment is required to meet the POTW's pretreatment standards. Each of the groundwater remedial action alternatives, except GW #4a, may require proper off-site disposal of precipitated inorganic sludges. Also, spent activated carbon will need to be regenerated or disposed of off-site for alternatives GW 3a-c.

The implementation of the GW #4a, over the other groundwater remedial action alternatives will be dependent on several factors including the following:

a) The quantity and quality of the CERCLA wastewater and its compatibility with the POTW.

- b) The ability of the POTW to ensure compliance with applicable pretreatment standards and requirements, including monitoring and reporting requirements.
- c) The POTW's record of compliance with its NPDES permit and pretreatment program requirements to determine if the POTW is a suitable disposal site for the CERCLA wastes.
- d) The potential for volatilization of the wastewater at the CERCLA site and POTW and its impact upon air quality.
- e) The potential for groundwater contamination from transport of CERCLA wastewater or impoundment at the POTW, and the need for groundwater monitoring.
- f) The potential effect of the CERCLA wastewaters upon the POTW's discharge as evaluated by maintenance of water quality standards in the POTW's receiving waters, including the narrative standard of "no toxics in toxic amounts".
- g) The POTW's knowledge of and compliance with any applicable RCRA requirement or requirements of other environmental statutes.
- h) The various costs of managing CERCLA wastewater, including all risks, liabilities, permit fees, etc.
- i) The approval from the owner of the POTW (City of Kalamazoo) and from the local governing body controlling the use of the sewer (Oshtemo Township and/or the County of Kalamazoo).

Alternative GW #3d is an innovative technology and is not as proven as the other technologies, especially on such a large scale as will be needed here. The major implementation problems to be encountered during the implementation of a groundwater remedy are similar among all the GW alternatives. Due to an expected high groundwater extraction rate needed to create a large capture zone, the groundwater treatment and reinjection system must operate at a very high flow rate, which may cause some implementation problems. The use of the local POTW has implementation problems including the factors stated above and the installation of sewer lines. Another implementability problem that may arise, and would be similar for all the GW remedial action alternatives, is the possible need to place extraction and/or injection wells or the treatment facility on private property and the need to purchase or lease this property may cause some implementation concerns. The limited action alternative (GW #2) is easily implemented, especially since the landfill is owned by the local municipality.

ii) LF Alternatives: The No Action and Limited Action alternatives are easily implemented, but as mentioned above, they do not attain ARARs or add any significant protection to human health and the environment. However, the limited action portion of the preferred

alternative (LF #2) is easily implemented, especially since the landfill is owned by the local municipality. For the LF remedial action alternatives, all the alternatives are proven to be implementable. LF #3b is slightly more difficult to install than the cap called for under LF #3a and is similar in installation difficulty as is Alternative LF #3c. The clay cap-synthetic liner-drainage layer (LF #3b) will be more difficult to install than would a straight forward clay cap (LF #3a), especially considering the approximate 83 acre size needing to be covered. LF #3b requires 2 feet of clay, a synthetic liner and a drainage layer, while LF #3c requires 3 feet of clay and a synthetic liner, and provides similar contaminant performance as LF #3b.

5) Cost:

i) GW Alternatives: There are no costs associated with GW #1 (No Action) and only nominal costs associated with GW #2 (Limited Action). All of the groundwater treatment alternatives require significant expenditures. The least expensive treatment alternative is Sub-alternative GW #3a, which does not comply with all ARARs. The remaining treatment alternatives do meet ARARs and cost more than Sub-alternative GW #3a. Of these, GW #4a is the least costly with respect to both total present worth and total capital (O&M)/replacement costs regardless of whether pretreatment is required prior to discharge to the POTW. Annualized O&M/replacement costs for GW #3a and #3c are much higher than GW #3b and #3d because of the use of activated carbon. Costs are comparable for GW #3b and #3d. All costs presented in Table 7 may increase or decrease depending on several variables, including lower total pumpage rates, the need to purchase property, longer or shorter running time for the treatment process, etc., but these cost increases/decreases should be similar for all the groundwater treatment scenarios.

ii) LF Alternatives: There are no costs associated with the LF #1 (No Action) and only nominal costs are associated with LF #2 (Limited Action). Of the three capping alternatives, the total present worth of Alternatives LF #3b and #3c (which involve installation of a synthetic liner) are 20 and 25 percent higher than the LF #3a (Clay cap), respectively. All capping alternatives have identical operations and maintenance costs.

C) MODIFYING CRITERIA

These two criteria reflect the comments and concerns of the State and the local communities on the alternatives presented to address the West KL Avenue Landfill contamination. These two criteria are as follows:

1) State/Support Agency Acceptance:

The MDNR has been the support agency for the RI/FS and has reviewed this Record of Decision. A Letter of Concurrence is attached to this ROD as Attachment 1. The MDNR concurs with the selection of groundwater and treatment as part of the remedy for the site, along with the selected remedy for the landfill. The MDNR, however, does not believe the use of enhanced bioremediation as the groundwater treatment will meet the cleanup

TABLE 7

COMPARATIVE SUMMARY OF ALTERNATIVE COSTS
WEST KL AVENUE LANDFILL

Alternatives	Total Capital Cost (\$)	Total O&M, Replacement, and Monitoring Present Worth (\$)	Total Present Worth (\$)
<u>Groundwater</u>			
1. No Action	0	0	0
2. Limited Action	4,200	141,400	145,600
3a. Precipitation, Air Stripping, and Carbon Adsorption	6,406,400	17,783,800	24,190,200
3a. Sub-Alternative: Precipitation, Air Stripping, and Carbon Adsorption	5,829,700	5,153,500	10,982,500
3b. Precipitation, Steam Stripping, and Carbon Adsorption	7,011,500	6,715,300	13,726,800
3c. Precipitation and Carbon Adsorption	5,687,900	17,215,100	22,903,000
3d. Precipitation and UV-Enhanced Oxidation	5,943,200	6,870,400	12,813,600
4a. Treatment at Kalamazoo POTW ⁽¹⁾	2,592,300	6,735,400	9,327,700
<u>Landfill</u>			
1. No Action	0	0	0
2. Limited Action	162,400	151,700	314,100
3a. Clay Cap	11,251,900	150,800	11,402,700
3b. RCRA-Type Cap	13,601,600	150,800	13,752,400
3c. Clay Cap with Synthetic Liner	14,139,100	150,800	14,289,900

Note:

(1) Based on the assumption that no pretreatment is needed for discharge to the POTW.

goals as stated within this ROD. To compensate for the MDNR's concern, the ROD has been written to have the groundwater treatment portion of the remedy either replaced or supplemented if it is shown during the remedial design phase that enhanced bioremediation will not attain the cleanup goals consistent with an Act 307 Type B cleanup.

2) Community Acceptance:

Relatively few comment letters were received during the public comment period. Some were received from residents living nearby the landfill, others were from the Potentially Responsible Parties (PRPs), including the County of Kalamazoo and Oshtemo Township. In general, comments were negative towards the capping remedy, stating that the disruption caused by the construction of the cap is not compensated by the added protection it will provide. Also, comments requested that the groundwater treatment alternatives be re-evaluated since the UV-enhanced oxidation is both innovative and expensive and the pumping rate of 2000 gallons is too excessive. All the comments and concerns from the public and PRPs (from comment letters received during the public comment period or received verbally at the public hearing held on July 23, 1990) regarding the West KL Avenue Landfill and the Proposed Plan, are addressed within the Responsiveness Summary which is Attachment 2 to this ROD. Also, changes to the U.S. EPA's Proposed Plan, due to comments received during the public comment period are detailed in Section XI, Documentation of Significant Changes of this ROD.

IX. THE SELECTED REMEDY

Based on the findings of the RI/FS, the documents within the Administrative Record and the results of the public comment period, the selected remedy for the West KL Avenue Landfill is as follows:

Groundwater Remedial Action GW #3: Groundwater extraction and treatment utilizing enhanced bioremediation/fixed-film bioreactors (based on comments received during the public comment period), Groundwater Limited Action Alternative GW #2, Landfill Limited Action Alternative LF #2 and Landfill Capping Alternative LF #3b. The specifics of the selected remedial action for the West KL Avenue Landfill are as follows:

GW #2, Limited action including the following:

- * Continued groundwater monitoring of the shallow and deep aquifers, including the installation of additional groundwater monitoring wells. Surface water and air (ambient and from the gas vents) will also need to continue to be monitored. Water level readings will continue to be taken in the groundwater monitoring wells.
- * Deed restrictions, or similar assurances, restricting the use of the shallow aquifer as a drinking water source, at least until the clean-up standards are achieved. The area to be covered by use restrictions includes the residences along

West KL Avenue (north and south sides) from the landfill, west to 4th St., and the residences along 4th St. (east and west sides) from West KL Ave. to Almena Ave. (See Figure 2)

- * Residential well closures (proper abandonment of the residential wells that were replaced in the early 1980's); and

GW #3, Groundwater pump and treat utilizing treatment technologies that will obtain the following groundwater remediation goals:

- * extraction wells to capture all contaminated groundwater emanating from the site (wells must be placed so that the cones of depression overlap to assure the capture or containment of the groundwater to the west, southwest and northwest of the landfill).
- * To restore groundwater to the levels indicated in Table 5 in the quickest time period practicable. Specifically, groundwater will need to be pumped until state and federal ARARs are obtained, which ever is more stringent. ARARs must be obtained at the landfill waste boundary and within all points beyond the boundary. In addition, the groundwater will be pumped and treated until contaminants do not exceed an individual excess cancer risk of 1×10^{-6} based on Michigan Act 307-Type B cleanup and a hazard index value greater than 1 (or comparable MI Act 307 human life cycle safe concentration (HLSC)). If MCLs or non-zero MCLGs are more stringent than the MI Act 307 values, then they are the cleanup levels. If background or best available detection limit values are higher than the cleanup levels, they will be substituted for the cleanup levels. Collectively, the cleanup levels will attain the 1×10^{-4} to 1×10^{-6} risk level as required by the NCP.
- * Any direct discharges to the groundwater must comply with the requirements of MI Act 307 (as stated on Page 15, Section VII.C. of this ROD). If the groundwater requires treatment for inorganic compounds, as determined by EPA in consultation with the MDNR, prior to discharge to comply with ARARs, then treatment involving precipitation, as described within this ROD and in the FS, will be implemented. Any sludges or residuals will need to comply with LDRs.
- * Any discharge to surface water bodies must comply with the Clean Water Act, NPDES permit requirements.
- * Any discharge to the POTW must comply with the pretreatment levels as set by the operators of the POTW.

With these goals in mind, the selected treatment technology is the use of Enhanced Bioremediation via the use of Fixed-Film Bioreactors as presented in the comment submitted by the West KL Avenue Landfill

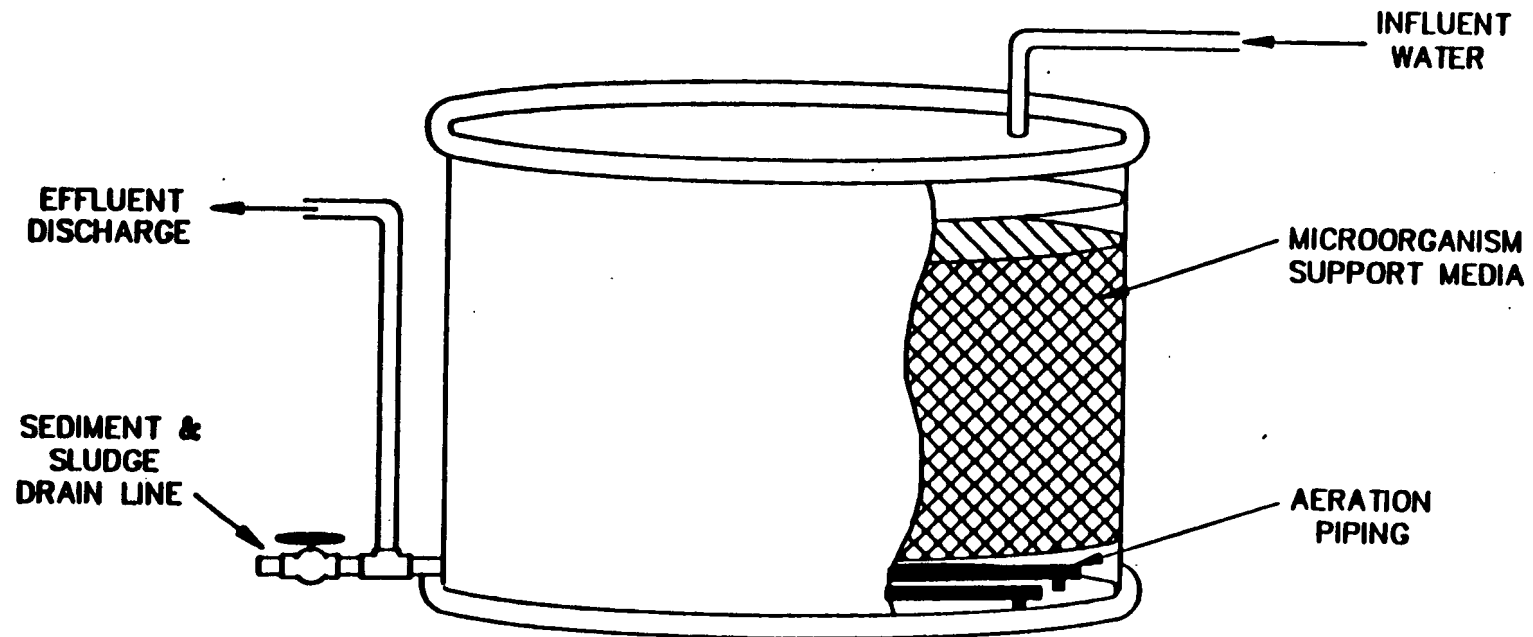
Steering Committee, a group of approximately 24 PRPs, including the County of Kalamazoo, and prepared by their consultant, Geraghty and Miller, Inc (G&M). A description of the selected technology, Enhanced Bioremediation via the use of a Fixed Film Bioreactor, (and detailed in the document written by G&M and submitted to the U.S. EPA by the PRP Steering Committee entitled, "Review of U.S. EPA Proposed Alternative and Proposal of Additional NCP Compliant Remedial Alternatives for Implementation at the West KL Avenue Landfill", August 9, 1990), for the groundwater remediation portion of the U.S. EPA's ROD is as follows:

Enhanced Bioremediation via the use fixed film bioreactors provides a viable method to remediate the groundwater in above-ground reactors at the site. According to the report by G&M, the above-ground biological reactors designed for low level concentrations of organic constituents are applicable for treatment of the present groundwater conditions at the West KL Avenue Landfill. The recommended bioreactor for this application is a submerged fixed-film bioreactor. This technology utilizes the slow decay, rather than growth, of organisms present on a biofilm. A healthy biofilm is initially grown within the bioreactor using a supplemental feed of organic carbon. When the biofilm has sufficiently matured, the organic feed is discontinued, and the waste stream to be treated (containing low influent organic concentrations) is fed into the reactor. Submerged fixed-film bioreactors use aerobic biofilm processes and must be supplied with an air distribution system. The average levels of iron and manganese would not require a pretreatment unit in order for the bioreactor to achieve necessary removal of organic compounds.

Figure 13 presents a schematic of a typical submerged fixed-film bioreactor. The dimensions for each submerged fixed-film bioreactor is approximately 10 feet in height and 12 feet in diameter and is cylindrical in shape. Aeration can be provided by blowers and distributed through an air distribution system located in the bottom of the bioreactors. The solid support media that will maintain the bacterial film should be honeycomb shaped and be approximately 7 feet in height. The media must remain submerged in the water because contaminants in the groundwater are the source of food for the biomass on the support media. The recommended hydraulic retention time is one hour. The bioreactor is designed for a flow rate of 80 gpm; however, the groundwater will be pumped at an approximated rate of 500 gpm (actual pumpage rate will be determined during the design phase), therefore, at least seven bioreactors may be required. These reactors should be installed in parallel, (see Figure 14).

The bioreactors may produce residuals such as sludges from settling activities and dead biomass. Also, if precipitation of the inorganics is deemed necessary after a pilot test is run, either to have the enhanced bioreactors work more efficient or to

SUBMERGED FIXED-FILM BIOREACTOR



SCALE: NO SCALE

GERAGHTY
MILLER, INC
Environmental Services

DRAWING NO.
 C104001-F1G3-A

DRAWN BY SG III	DATE 6/15/90
CHECKED BY [Signature]	DATE 6/29/90
APPROVED BY [Signature]	DATE 6/29/90

ALTERNATIVES ANALYSIS
WEST KL AVENUE LANDFILL
KALAMAZOO, MICHIGAN

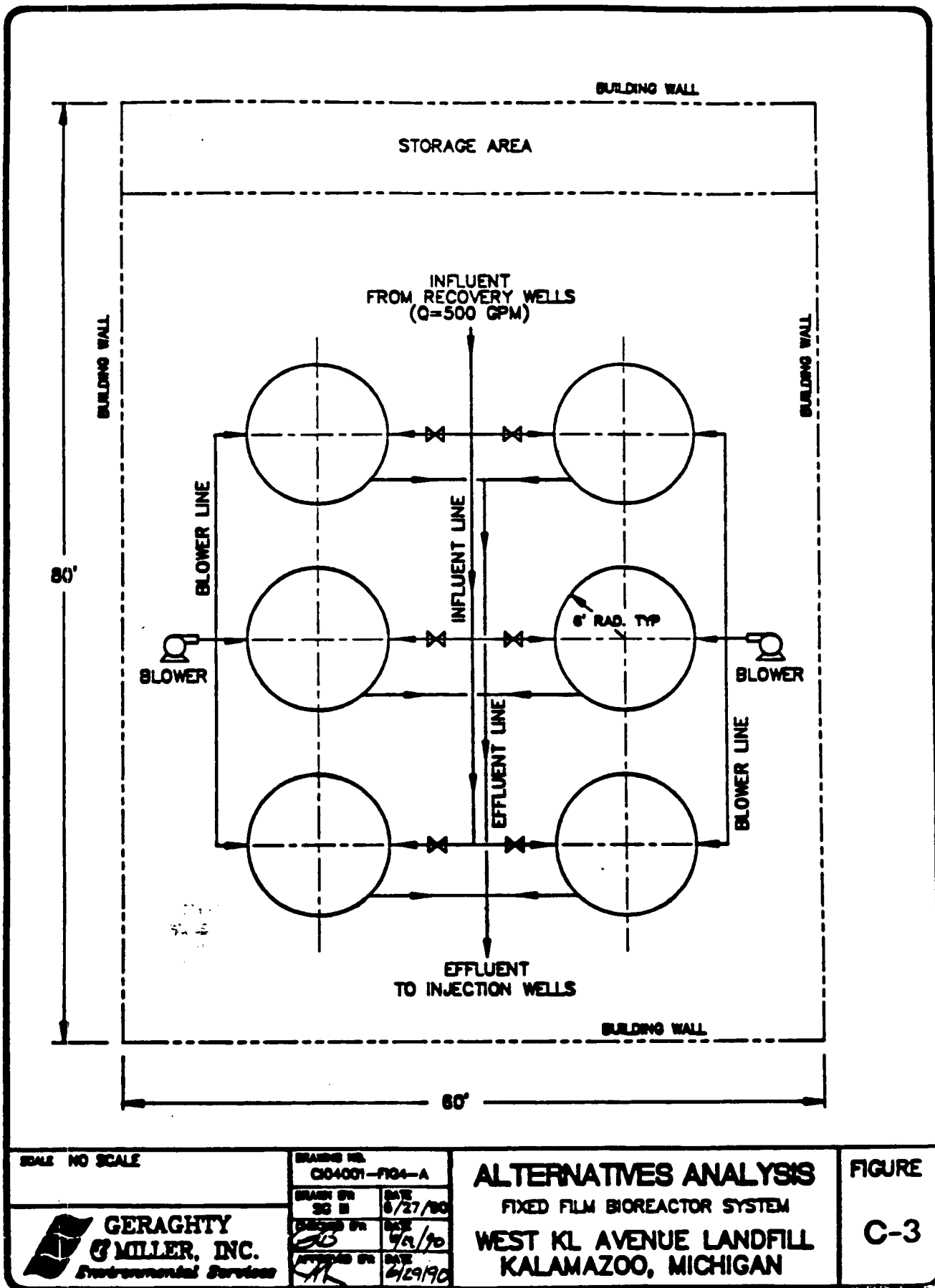
FIGURE

C-2

WEST 0/28/90
 1=1 SG III

FIGURE 13

FIGURE 14



meet ARARs regarding the concentrations of inorganics allowed to be discharged, metal hydroxide sludges will be produced. Any waste produced during the treatment of the groundwater will be analyzed using RCRA's toxicity characteristic leaching procedure and disposed of properly, according to the LDRs.

Additional considerations for implementing biotreatment include nutrient application, pH monitoring, and temperature control. It is likely that nutrients such as nitrogen and phosphorus may need to be applied to the bioreactors to maintain a healthy bacteria population. The pH should be monitored and kept between a range of 6.0 and 9.0 in order to prevent a toxic environment for the bacteria. Temperatures should be maintained above 50°F for optimal biological activity. Atmospheric temperature fluctuations will be limited by enclosing the bioreactors within a heated building.

At least 5 recovery wells should be pumped at a flow rate of approximately 100 gpm/well (actual number of wells and gpm/well will not be determined until the design stage). The treated groundwater may then be injected back into the shallow aquifer through at least 3 reinjection wells (the actual number of reinjection wells will be determined during the design phase). An infiltration pond is a viable alternative to reinjecting the treated groundwater, but the viability of an infiltration pond can not be fully determined until a pump rate is established in the design stage.

According to the G&M Report, approximate costs of the enhanced bioremediation/fixed-film bioreactor are as follows for an operation period of 18 years:

Estimated Construction Cost: \$1,351,600
Estimated Total Annual O&M Costs: \$80,000
Estimated Total Present Worth: \$2,195,000
Estimated Implementation Timeframe: 18 years

(Costs were estimated by G&M and may change depending on the actual number of extraction and reinjection wells that will be required, based on the design and the actual pumpage rate that will be required.)

If after a certain time period, to be decided by the U.S. EPA, in consultation with the MDNR, the enhanced bioremediation/fixed-film bioreactor remedy is not progressing toward achieving the cleanup goals, as stated in Table 5, an alternative shall be selected by EPA, in consultation with the MDNR, which shall be implemented to replace or supplement the bioremediation alternative. The alternatives which EPA may select shall consist of those which have been determined to satisfy the criteria discussed in this ROD. The comparative costs may differ at such time due to the remedial actions already conducted. The use of the POTW will have

preference over the others, but UV-enhanced oxidation, air stripping, steam stripping and the others, may be considered if, after pilot tests, they can be shown to achieve the above stated groundwater remediation goals.

LF #2, Limited Action, including the following:

- * Construction of a six-foot chain link fence around the perimeter of the Landfill. Including "No trespassing" signs and warning signs posted around the perimeter of the fence.
- * The placement of deed/use restrictions, prohibiting the construction of buildings or other structures on the landfill property and property immediately adjacent to it, without prior consent from EPA, in consultation with the MDNR; and

LF #3b, Containment utilizing a RCRA-Type Cap including the following:

- * Installation and maintaining a cap consisting of, from the bottom up, a 2-foot clay layer meeting the installation and compaction provisions of Michigan Act 64, a 60-mil high density polyethylene liner, a 12 inch drainage layer consisting of pea gravel, a 6-ounce geotextile filter fabric to protect the drainage layer from clogging, a 2-foot layer of clean fill for frost protection and on top, a 6-inch topsoil layer to provide a growth zone.
- * The cap will cover the entire landfill, estimated to be approximately 83 acres in size. (Some estimates show the size of the landfill to be capped ranging between 60 and 83 acres. The actual area to be capped will need to be determined during the design of the cap.)
- * The installation of gas vents throughout the landfill sufficient enough to alleviate the horizontal migration of landfill gas. Approximately 1 vent per 5 acres capped, at a minimum, will be necessary. Landfill gas will be monitored on a routine basis. If at any time the gas vent monitoring indicates contaminants being released into the air and presenting a health hazard outside the landfill boundaries (cumulative excess cancer risk outside the 1×10^{-4} to 1×10^{-6} range or cumulative HI value greater than 1) appropriate measures, as determined by EPA, in consultation with the MDNR, will be taken to correct the problem. Also, if at any time the landfill gas on-site or migrating horizontally off-site presents an explosive hazard, as determined by EPA, in consultation with the MDNR, appropriate action will be taken.
- * Continued operation and maintenance of the landfill cap.

X. STATUTORY DETERMINATIONS

The selected alternatives for the West KL Avenue Landfill, as listed in Section IX of this ROD, meet the statutory requirements as set forth in Section 121 of CERCLA, in that they are protective of human health and the environment, attain ARARs, be cost effective, utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable and have a preference for treatment as a principal element as described below:

A) Protection of Human Health and the Environment

The selected remedy will be protective of human health and the environment through the use of land and groundwater use restrictions, containment of wastes and subsurface soils, and by the extraction and the treatment of contaminated groundwater.

Protection of human health and the environment will be achieved by the selected remedy by the installation of the groundwater extraction wells which will intercept and collect the contamination within the groundwater around the Facility and treat the groundwater on-site with enhanced bioremediation/fixed-film bioreactors. The selected groundwater remedy will remove the contaminants from the groundwater and discharge the treated groundwater back into the shallow aquifer, into an infiltration pond or to the POTW. Groundwater extraction will occur at the Facility until the contaminants achieve the goals as referenced by Michigan Act 307, Type B cleanup (Table 5). Specifically, the groundwater will be pumped and treated until contaminants do not exceed an individual excess cancer risk of 1×10^{-6} based on Michigan Act 307-Type B cleanup and a hazard index value greater than 1 (or comparable MI Act 307 human life cycle safe concentration (HLSC)). If MCLs or non-zero MCLGs are more stringent than the MI Act 307 values, then they are the cleanup levels. If background or best available detection limit values are higher than the cleanup levels, they will be substituted for the cleanup levels. Collectively, the cleanup levels will attain the 1×10^{-4} to 1×10^{-6} risk level as required by the NCP.

Added protection to human health and the environment will be assured through the installation of a RCRA-type cap on the landfill (Alternative LF #3b). The installation of the cap, along with proper maintenance practices, is a reliable method to alleviate the direct contact threat from the site's contents and will also help in reducing leachate generation, thereby reducing the amount of contamination reaching the groundwater.

In addition to the remedial actions of the enhanced bioremediation/fixed-film bioreactor, and LF #3b, the land and groundwater use restrictions as set by Alternatives GW #2 and LF #2 will further assure protection to human health and the environment. The institutional controls as described in the selected remedy will reduce the likelihood of activities occurring on-site that may damage the site's cap and will prohibit the installation of water supply wells in the area affected by contamination from the Facility.

There will be no unacceptable short-term risks or cross-media impacts caused by the implementation of the groundwater portion of the selected remedy. Some short-term risks will be created by the installation of the landfill cap but these risks are similar for the cap alternative chosen and those not chosen. The risks due to the installation of the new landfill cap should be minimal if proper installation practices are followed.

B) Compliance with ARARs

The selected remedy will be designed to meet all applicable, or relevant and appropriate requirements (ARARs) of Federal and more stringent State environmental laws. A list of probable ARARs relating to the remedial action alternatives, selected and not selected, at the West KL Avenue Landfill are summarized in Table 6 of this ROD.

The major ARARs that will be addressed and met (or waived on the grounds of technical impracticability) by the selected remedy and whether the ARARs are applicable or are relevant and appropriate are listed as follows:

Groundwater:

Federal:

Safe Drinking Water Act; Maximum Contaminant Levels will be attained in the groundwater through groundwater pump and treat at and around the Facility.

State:

Preselected remedy will meet the requirements of a Type B cleanup under MI Act 307 (Michigan Environmental Response Act).

MI Act 368 of 1978 (Public Health Code), specifies the procedures for water well abandonment.

MI Act 315 of 1969 (The Mineral Well Act), states the requirements of monitoring wells at a site. (applicable)

Landfill Closure:

Federal:

40 CFR Part 264.310, RCRA Subtitle C, regulations for owners/operators of hazardous waste facilities regarding closure and monitoring.

State:

MI Act 64 of 1979 (The Hazardous Waste Management Act), Parts 2-6, regulates the treatment, transportation and disposal of hazardous wastes. States requirements of landfill closure and monitoring. (Note: This is not the ARAR regarding the clay thickness of the cap. Only 2 feet of compacted clay will be required by the selected remedy

and not the 3 feet as stated in this Act. The 3rd foot will be replaced by a 60-mil HDPE liner and will be as effective or more effective than the foot of clay it is replacing.)

Air:

Federal:

Clean Air Act, Regional air pollution program addressing air emissions.

40 CFR Part 50, National primary and secondary ambient air quality standards regarding the particulate standards that apply to dust generating construction activities.

State:

MI Act 348 of 1965 (The Air Pollution Act), requires air emissions from devices or site work to be "non-injurious", to be in compliance with promulgated state air emission regulations.

Residual Disposal:

Federal:

40 CFR 268, Land Disposal Restrictions, regulates manifesting, shipment and off-site disposal of wastes that exhibit RCRA toxicity characteristics.

Discharges:

Federal:

National Pollution Discharge Elimination System (NPDES), regulates the discharges into surface water bodies. This will be the responsibility of the City of Kalamazoo POTW as per their permit to discharge into the Kalamazoo River. If discharge is conducted through a retention pond on or near site, NPDES regulations must be complied with.

State:

MI Act 245 of 1929 (The Water Resources Commission Act), Part 9, states the requirements for discharge to sanitary sewer system. Part 21, states the effluent discharge permitting and monitoring requirements. (See Page 15, Section VII.C. of this ROD regarding MI Act 307 satisfying the requirements of MI Act 245.)

C) Cost-Effectiveness

The selected remedy, including Alternatives GW #2 and the enhanced bioremediation for groundwater, and LF #2 and LF #3b, is considered cost effective in that it produces the same or more protection than the other alternatives evaluated at similar or only slightly higher costs. Cost

comparisons for each alternative is presented in Table 7 and the cost for the bioremediation are summarized in Table 8. Portions of the costs within the limited action alternatives, GW #2 and LF #2, will be duplicative of costs within the remedial action alternatives, so the costs relating to the limited action alternatives will be somewhat lower than what is presented. Selected Alternative, enhanced bioremediation/fixed-film bioreactor is the groundwater remedial action alternative lowest in total present worth, while also providing protectiveness to human health and the environment and meeting ARARs. Of the landfill remedial action alternative, the selected remedy, LF #3b, is not the lowest in total present worth but it will allow up to 78% less leachate generation than the less costly LF #3a, for only an estimated 17% increase in cost. Therefore, alternative LF #3b is considered cost-effective when compared to the extra benefits it provides towards protectiveness to human health and the environment.

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

The alternatives chosen represent the best balance of alternatives evaluated to address the contamination problems found at the West KL Avenue Landfill, provide protection for human health and the environment and attain ARARs. The selected remedy will address the contaminants found in the groundwater, at and around the Facility, will reduce the generation of leachate within the landfill, therefore reducing the amount of contaminants reaching the groundwater, and will implement several institutional controls which will further provide protection to human health and the environment. Of the alternatives that comprise the selected remedy, only the treatment of the groundwater offers any degree of permanent solutions, utilizing treatment technologies. The use of the enhanced bioremediation/fixed-film bioreactors will treat and or destroy the contaminants so that they no longer present a hazard to human health or the environment. The selected alternative for the landfill cap is not a permanent remedy and will require appropriate amounts of monitoring and maintenance to assure the effectiveness of the cap. The selected remedy represents the maximum extent to which permanent solutions and treatment can be utilized for this action. Due to the large quantities of waste within the West KL Avenue Landfill, and the discovery of no "hot spots" within the landfill, alternatives involving the treatment or removal of the wastes were deemed impracticable and were not carried forward.

E) Preference for Treatment as a Principal Element

The principal threat posed by the West KL Avenue Landfill is the presence of contaminants in the groundwater in concentrations that exceed acceptable human health risks (refer to Section V and VI of this ROD and the RI Report). The selected alternative directly addresses this principal threat through treatment on-site with enhanced bioremediation/ fixed-film bioreactors. If the enhanced bioremediation does not treat the groundwater sufficiently enough to meet MI Act 307 goals and other ARARs, alternative remedial action alternatives, as described in the FS and above, also preferring treatment as a principal element, may be implemented.

TABLE 8

Table C-2.1. Cost Analysis for Ground-Water Collection and Fixed Film Bio-Treatment;
West KL Avenue Landfill, Kalamazoo, Michigan

Task/Description	Quantity	Unit Cost(\$)	Total Cost(\$) ^{a)}
Capital Cost			
Site Preparation			\$ 30,000
Pre-engineered Building ^{m)} (includes process piping, valves, HV, etc.)			97,000
Bioreactors	6	60,000	360,000
Support Media	6	8,500	51,000
Recovery wells (includes submersible well pumps)	5	25,000	125,000
Conveyance Piping (from recovery wells to treatment facility)			97,000
Reinjection wells	3	15,000	45,000
Conveyance Piping (from treatment facility to reinjection wells)			20,000
Electrical and Instrumentation			<u>50,000</u>
CONSTRUCTION SUBTOTAL			875,000
Health & Safety Contingency (10%)			87,500
Construction Contingency (30%)			126,600
Construction Oversight (LS)			262,500
CONSTRUCTION TOTAL			\$1,351,600
Engineering Design (7%)			94,600
Legal (5%)			65,600
Construction Services (2%)			<u>27,000</u>
TOTAL CAPITAL COST			\$1,538,800

TABLE 8

Table C-2.1. Cost Analysis for Ground-Water Collection and Fixed Film Bio-Treatment; West KL Avenue Landfill, Kalamazoo, Michigan (continued)

Task/Description	Quantity	Unit Cost(\$)	Total Cost(\$) ^a
Annual Operating Cost			
Electrical Power			\$ 14,000
Plant Operation ^{ab}			35,000
System Maintenance (considers periodic repair or replacement of mechanical and electrical components)			15,000
Monitoring/Laboratory Services			<u>16,000</u>
TOTAL ANNUAL OPERATING COST			80,000
Present Worth (10% Discount Rate for 18 Year Treatment Cycle = 8.201)			656,000
TOTAL PRESENT WORTH			<u>\$2,195,000</u>

Notes:

- i) Construction cost estimates are based on Geraghty & Miller project notes and data from the USEPA FS. All contingencies are provided by USEPA and reproduced here for consistency. An accuracy of +50 percent to -30 percent is assumed as recommended in the "Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA."
- ii) The costs for the 10,000 square foot pre-engineered building including the concrete slab on which the equipment will be placed are from the 1990 Means Building Construction Cost Data Sections 051-235-0110 and 033-130-4760.
- iii) Assumes one operator working approximately 20 hours per week.

XI. DOCUMENTATION OF SIGNIFICANT CHANGES

The overall goals of the remedial action as stated in the U.S. EPA's Proposed Plan have not changed. The only significant change to the Proposed Plan that was made within this ROD, is the replacement of the remedial action to address the groundwater contamination. Based on comments received from PRP's and the community, the preferred groundwater alternative was changed from the use of the POTW, with the contingency of using UV-enhanced oxidation if the use of the POTW was not agreeable with the City of Kalamazoo, to the use of enhanced bioremediation/fixed-film bioreactors. The specifics of the enhanced bioremediation alternative are described above and detailed further in the report by G&M, "Review of U.S. EPA Proposed Alternatives and Proposal of Additional NCP Compliant Remedial Alternatives for Implementation at the West KL Avenue Landfill". The goals of the groundwater remedial action have remained the same and are described above. The public comment period in which comments on the U.S. EPA's Proposed Plan and FS ran from June 11, 1990 through August 10, 1990.

XII. SUMMARY

The presence of groundwater contamination at and around the West KL Avenue Landfill requires that remedial actions be implemented to reduce the risk to public health and the environment. The U.S. EPA believes, based on the RI/FS and the Administrative Record, that the selected alternatives provide the best balance of trade-offs among alternatives with respect to the criteria used to evaluate the remedies. Based on the information available at this time, the U.S. EPA believes that the selected remedy will be protective of human health and the environment, will attain ARARs and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The total estimated costs for the selected remedy at the West KL Avenue Landfill are as follows:

<u>Alternative</u>	<u>Total Capital Cost</u>	<u>Total O&M, 30yr.</u>	<u>Total Present Worth</u>
GW #2	\$ 4,200	\$ 141,400	\$ 145,600
Enhanced Bioremediation	\$ 1,538,800	\$ 656,000 (18 years)	\$ 2,195,000
LF #2	\$ 162,400	\$ 151,700	\$ 314,100
<u>LF #3b</u>	<u>\$13,601,600</u>	<u>\$ 150,800</u>	<u>\$13,752,400</u>
<u>TOTAL</u>	<u>\$15,307,000</u>	<u>\$1,099,900</u>	<u>\$16,407,100</u>

ATTACHMENT 1
STATE OF MICHIGAN



NATURAL RESOURCES COMMISSION

THOMAS J. ANDERSON
MARLENE J. FULHARTY
GORDON E. GUYER
KERRY KAMMER
ELLWOOD A. MATSON
O. STEWART MYERS
RAYMOND POORE

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
P.O. BOX 30028
LANSING, MI 48909

DAVID F. HALCS, Director

September 28, 1990

Mr. Valdas Adamkus, Regional Administrator
U.S. Environmental Protection Agency
Region V, SRA-14
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Adamkus:

The Michigan Department of Natural Resources (MDNR), on behalf of the State of Michigan, has reviewed the proposed Record of Decision (ROD) which we received on September 19, 1990, for the West KL Avenue Landfill Superfund site in Kalamazoo, Michigan. The remedy in the proposed ROD consists of groundwater extraction and treatment, containment of the landfill, fencing, well replacement, and institutional controls.

We agree with the selection of groundwater extraction and treatment as part of the remedy for the site. However, we do not agree with the groundwater treatment system proposed. Our staff review of enhanced bioremediation using a fixed film bioreactor indicates that there is no evidence to support the theory that a bioreactor, or bioremediation in any form, substantially treats Vinyl Chloride, which has been found in the groundwater. We agree that the groundwater treatment system must meet the cleanup goals for the indicator compounds which are shown on Table 5 in the proposed ROD. These goals are consistent with Type B criteria for our Act 307 Rules.

The State has submitted the Water Resources Commission Act and the Part 22 Rules as applicable or relevant and appropriate requirements (ARARs) for remedial action for the following reasons. First, hazardous substances in the aquifer beneath the site are migrating to degrade previously uncontaminated groundwater which is prohibited by the Act. Second, one element of the selected remedial action is discharge of purged, treated water back into the groundwater through reinjection wells which is a direct groundwater discharge regulated by the Part 22 Rules.

It is the State's position that the selected groundwater treatment system does not meet the substantive requirements of either the Act 307 Rules or the Part 22 Rules and will therefore not meet ARARs. We do not concur with the proposed groundwater treatment system.

We concur with the remaining elements of the selected remedy for groundwater shown in the ROD. These include: continued groundwater monitoring of the shallow and deep aquifers, including the installation of additional groundwater monitoring wells; deed restrictions on the use of the shallow aquifer as a drinking water source until the cleanup standards are achieved; and proper closure of the residential wells that were replaced in the early 1980's.

In addition, we concur with the selected remedy for the landfill, which includes: construction of a six foot chain link fence around the perimeter of the landfill; posting no trespassing and warning signs around the perimeter of the fence; placement of deed/use restrictions prohibiting the construction of buildings or other structures on the landfill property without prior consent; and containment of the landfill using a RCRA-type cap.

The State acknowledges that CERCLA Section 104(c)(3) requires that the State pay or assure payment of 50 percent of any sums expended to respond to a release at a facility, that was operated by the State or a political subdivision thereof, either directly or through a contractual relationship or otherwise, at the time of any disposal of hazardous substances therein. Such payments will be the subject of requests for appropriations from the Michigan legislature which has the sole power to authorize expenditure of State money.

If you or your staff have any questions, please contact Mr. Peter Ollila at 517-373-8174, or you may contact me directly.

Sincerely,



Delbert Rector
Deputy Director
517-373-7917

cc: Dr. James Truchan, MDNR
Mr. William Bradford, MDNR
Mr. Peter Ollila/West KL Avenue Landfill File

ATTACHMENT 2

RESPONSIVENESS SUMMARY

WEST KL AVENUE LANDFILL KALAMAZOO, MICHIGAN

The U.S. Environmental Protection Agency (EPA) has gathered information on the types and extent of contamination found, evaluated remedial measures, and has recommended remedial actions to address the contamination found at and near the West KL Avenue Landfill, located just west of Kalamazoo, Michigan. As part of the remedial action process, two public meetings were held at the Oshtemo Township Hall. The first was an availability session, held July 16, 1990, and it was attended by about 30 people. The second was a public hearing, held July 23, 1990, and attended by nearly 60 people. The purpose of the meetings was to explain the intent of the project, to describe the results of the Remedial Investigation (RI) and the Feasibility Study (FS), and to receive comments from the public. A court reporter was present to record the proceedings of the second public meeting. A copy of the transcript is included in the Administrative Record.

Public participation in Superfund projects is required by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Comments received from the public are considered in the selection of the remedial action for the site. The Responsiveness Summary serves two purposes: to provide EPA with information about the community preferences and concerns regarding the remedial alternatives and to show the community how its comments were incorporated into the decision-making process. Comments regarding information specifically contained in the RI are not addressed in this Responsiveness Summary because this information is contained in the reports available in the Kalamazoo County Public Library, Oshtemo Township Branch, and at the Oshtemo Township Hall.

This document summarizes the oral comments received at the public meeting held July 23, 1990, and the written comments received during the public comment period, which ran from June 11, 1990 through August 10, 1990. Please refer to Appendix A for a list of the commenters.

The comments have been summarized as follows:

Comments from State Legislature:

Comment #1:

1.1. It seems appropriate that the government and community seek to minimize potential future exposure with a reasoned, cost-effective approach. EPA and the Michigan Department of Natural Resources (MDNR) have recommended that the landfill be fenced and bare spots be covered. I would concur with that recommendation and, in addition, suggest that on a short-term basis it may be advisable to post "no trespassing" signs (particularly during construction and the initial monitoring). However, neither EPA nor MDNR should foreclose the beneficial use of the site for a nature habitat, nature trails or similar uses which do not jeopardize the integrity of the landfill cover.

1.2. I believe a goal orientated, flexible approach must be taken which considers the inter-relationship of the parts to the total remedy proposed for the site. I believe a clean-up protective of the environment can be achieved, but I do not think the Rules to Act 307 would require type A standards for all aspects of the clean-up. I ask that EPA and MDNR reconsider the proposed cap and groundwater remedy in light of the following comments.

1.3. The proposed remedy, a Resource Conservation Recovery Act (RCRA) cap, is said to be 87 times more effective in reducing leachate than the MI Act 64 cap, but this comment does not take into consideration the inter-relationship between the cap and the proposed groundwater treatment system.

1.4. First, the proposed remedial plan does not consider the cost effectiveness of the combined cap and groundwater treatment system. Specifically, the MI Act 64 cap is estimated by EPA to cost \$11.4 versus \$13.7 million for the RCRA cap. It does not appear that EPA or MDNR have evaluated the combined remedial proposal to determine whether the \$2.3 million savings through installation of the MI Act 64 cap would result in only a marginal increase in the operation and maintenance cost of the groundwater treatment system. The cost to construct the cap is an immediate expenditure of money, whereas the cost to provide operation and maintenance on the groundwater treatment system is an expenditure in the future. The compounding effect on \$2.3 million held for six years results in almost doubling of that sum, yet it does not appear that either the EPA or MDNR have determined how much longer, if any, a groundwater treatment system would operate if a MI Act 64 cap were installed.

1.5. Second, the Alternatives Array Document (AAD) does not consider an Act 641 municipal cap. This site is principally a municipal landfill, not unlike numerous other sites throughout Michigan. If EPA and MDNR intend to impose hazardous waste standards at municipal landfills, the result will be to place a significant financial burden on Michigan state and local governments, businesses and residents. Again, if the principal focus of the cap is to reduce the cost of groundwater treatment, the EPA and MDNR should evaluate the amount of rainfall infiltrating the landfill under each cap scenario and the duration of the pump and treat system under each treatment scenario, including the scenario under the present cap, a municipal landfill cap, and those caps considered in the AAD.

1.6. Third, I am particularly concerned with the volumes of materials required for construction of the proposed RCRA cap. The FS states that 904,500 cubic yards of material will be required to construct a five and one-half foot cap over the existing cap at the landfill. Any proposal to cap the landfill should take into consideration the existing cover on top of the waste. Furthermore, the proposal to cover the landfill with such extensive volumes of soil and gravel will cause serious disruption to the neighborhood over the entire two to five years EPA and MDNR have estimated for the construction period. If it is assumed that each truck could transport 30 cubic yards to the site, this would involve over 60,000 trips to and from the site during the construction period just to deliver materials. It is imperative that EPA and MDNR incorporate to the maximum

extent possible the use of on-site and local material to fulfill any capping requirements.

1.7. In regard to the proposed groundwater remedy, I note that the proposed plan prefers discharge to the City of Kalamazoo treatment facility over UV-enhanced oxidation. The cost differential is approximately \$3.5 million. As between the two choices, MDNR and EPA were correct in preferring discharge to the City treatment facility. There appears to be no impediment to the facility's ability to operate, handle and treat the discharge once the sewer lines are extended to the landfill. This facility was constructed with state and federal money and designed to handle industrial waste. Since the landfill was used as a county-wide landfill, including the acceptance of waste from businesses and residents in the City of Kalamazoo, I would think that the City would be willing to accept the discharge from the landfill provided it is compensated for its costs.

1.8. Notwithstanding the above, I have some fundamental concerns with the EPA and MDNR's selection of the alternative remedy, UV-enhanced oxidation. First, as the Proposed Plan states, the use of UV is an innovative technology and is not as proven as other technologies, especially on such a large scale as will be needed here. The report also states that the "long-term effectiveness" of UV-enhanced technology is not well documented. I am concerned because, not only is the UV technology more expensive than the more traditional technologies, it is also more susceptible to failure. It has been the position of EPA (and presumable MDNR) that the risk of failure should be borne by those parties responsible for the conditions at the landfill. I am opposed to members of this community assuming the cost of a later, second groundwater remediation system which EPA and MDNR have sought to use this community as a test ground for a more expensive emerging technology. It is strongly suggested that if a decision is to proceed with this form of remediation that the community be protected from exorbitant costs over traditional remedies and the potential failure of remedy. Mixed funding is one solution to the problem.

1.9. Second, UV-enhanced oxidation costs almost \$2.0 million more than alternative GW #3a which is precipitation, air stripping and carbon absorption. Air stripping technology is a more traditional remedy for remediation of volatile organics in the groundwater. EPA and MDNR appear to have rejected this technology, not for technical reasons, but in favor of developing more knowledge concerning the UV-enhanced oxidation technology. Since the latter technology is considerably more innovative, it is likely to have a greater variation in its actual costs than would the more traditional air stripping remedy. Thus, when EPA and MDNR state that their estimates are accurate within a +50 or -30 percent, there is a greater probability that the UV-enhanced oxidation technology would result in greater expenses than estimated in the preferred plan.

1.10. Third, EPA and MDNR have concluded that the transport of contaminants is much slower than estimated by their analytical model. It attributes this slow migration to biodegradation, both aerobic and anaerobic conditions at the landfill. The report (RI) notes that there is a "rapidly decreasing concentration near the plume margin." The AAD does not include a

study of bioremediation. EPA and MDNR should consider more thoroughly the naturally occurring biodegradation of contaminants at the landfill and compare such information to the cost and remediation time of the remedies it has proposed to determine when the groundwater quality of the site will return to drinking water standards. This information should also be determined for the various site capping scenarios. Finally, EPA and MDNR should consider whether an enhanced form of bioremediation might be an acceptable groundwater remedy.

Response #1:

1.1. The purpose of the fence, to be installed around the landfill is two-fold. First it will protect the landfill cap from trespasser activities such as dirt biking, which may destroy the integrity of the landfill cap and secondly, to protect trespassers from exposure to landfill gases from the gas vents and other locations throughout the landfill. EPA agrees that more "no trespassing" signs are required, especially during any construction activity. In regards to returning the landfill into a useful piece of property, such as a nature habitat or trail, these are possible uses of the property in the future, but not in the near timeframe. It is important that the cap be protected from large shrubs and trees whose roots can cause harm to the cap layers. To this end, the landfill will most likely have a monotypic type vegetative cover, primarily short grasses, which may not be conducive to nature habitats.

1.2. The Proposed Plan and the Record of Decision (ROD) are calling for groundwater cleanup levels at the site to achieve MI Act 307 Type B cleanup and landfill cleanup levels at the site to achieve MI Act 307 Type C cleanup. A copy of the anticipated cleanup levels is included in the ROD. This comment is further answered in the paragraphs below.

1.3. The Proposed Plan mentioned that the RCRA cap lessens leachate generation by as much as 78 times more so than the Act 64 cap. In evaluating the caps, the interrelation between the cap and the proposed groundwater remedies were taken into consideration even though both activities have their own action specific ARARs (Applicable or Relevant and Appropriate Requirements) that must be met. In this case, RCRA closure and MI Act 64 dictate what type of closure is required for the landfill and the Federal Safe Drinking Water Act and MI Act 307 dictate what type of groundwater cleanup is required. The two activities, however, are interrelated in that the better the cap, the less leachate generated and, therefore, less contamination reaches the groundwater, which means less pumping and treating of the groundwater will be required over time.

1.4. As discussed in 1.3 above, the interrelationship between the cap and the proposed groundwater remedies were taken into consideration. The RCRA cap was selected over the Act 64 cap based upon its cost-effectiveness. Essentially, the inquiry is whether the alternative remedy represents a reasonable value for the money. In evaluating cost-effectiveness, three effectiveness criteria are first considered: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness, 55 FR 8728 (March 8, 1990). Then the

incremental cost difference of the two alternatives are compared to the incremental differences in effectiveness. In this case, the RCRA cap is 78 times more effective in reducing leachate than the Act 64 cap, yet the costs are relatively comparable at \$13.7 million to \$11.4 million, respectively. Consequently, the RCRA cap was selected.

1.5. The AAD did present a capping option of less stringency than MI Act 64, one requiring three 6-inch lifts of compacted clay and overlain with 6-inches of topsoil (Alternative 2a under the Containment alternatives within the AAD), comparable to a cap that would be required under Act 641. One of the purposes of the AAD is for the EPA and MDNR to identify their ARARs regarding pertinent remedies as presented within the document. After viewing the AAD, it was determined that Act 641 is an ARAR for landfill closure (as stated within the FS Report) but MI Act 64 was the ARAR governing this particular landfill because documentation exists that the landfill has accepted hazardous wastes. Therefore, the Act 641 cap as described in the AAD was upgraded to the Act 64 cap in the FS. The principal goals of the landfill cover are to attain ARARs, to contain the wastes within the landfill, and to minimize or eliminate percolation of water through the landfill thereby minimizing creation of leachate and contamination of the groundwater. The modeling conducted in the FS shows that the selected RCRA cap reduces the leachate generation up to 78 times better than the Act 64 cap for relatively comparable cost. An additional goal of the cap upgrade is to eliminate the need to pump and treat the groundwater in the future. As compared to an Act 641 cap, the Act 64 and RCRA cap offer better drainage and a frost protection layer, which will further protect the integrity of the cap. In total, 502,000 additional cubic yards of earthen materials are required to construct an Act 64 or RCRA cap than the Act 641 cap, much of which may be obtained locally. To reiterate the ROD, the Act 641 cap does not attain ARARs for closure since it is documented that the landfill did accept drummed and bulk hazardous wastes.

1.6. Any of the caps that attain the ARARs (Act 64 or better) will require large quantities of material to be brought to the site. The FS indicates that the selected alternative, IF #3b, the RCRA-type cap, will require the least amount of earth materials (not counting the filter fabric and the synthetic liner) and still attain ARARs. Also, by choosing the RCRA cap, one foot of compacted clay was eliminated, being replaced by the high density polyethylene (HDPE) liner. The actual amount of material is also being questioned by a number of other commenters, stating that the area to be covered should be 60 acres and not the 83 acres as stated in the Proposed Plan. The 83 acre number stated in the Proposed Plan and the ROD is an estimate based on site drawings and historical aerial photos. The actual size to be covered can be determined later, but the type of landfill cap will not be affected by the size of landfill. If the area to be covered is indeed only 60 acres and not 83, then the capping will cost less than the estimates within the FS and the ROD, and not as much material will be needed to be transported to the site. On or near-site soils can be used during the construction of the selected landfill cap, but the clay utilized for the RCRA-type cap must meet the specifications of MI Act 64 in lifts and in compaction. On or near-site soils can most likely only be used as grading layers or as the clean-fill and top-soil layers.

1.7. No response to comment needed.

1.8. Due in part to comments received during the public comment period, the use of the POTW and the contingent use of UV-enhanced oxidation are no longer the preferred groundwater remedial actions. They have been replaced by enhanced bioremediation using fixed-filter bioreactors as the selected groundwater remedial action. See the ROD for further explanation of the changes due to the selection of enhanced-bioremediation. Also, see responses to Comments #2 and 3 below. The preferred contingent groundwater remedial action, contingent upon the lack of adequate remediation from the enhanced bioremediation system, would include use of the POTW or UV-enhanced oxidation, or other alternatives that may achieve the cleanup goals. Since some of the enhanced bioremediation system may be used in implementing other groundwater technologies, such as UV-enhanced oxidation, (for example, installation of the groundwater injection wells), the cost-effectiveness of the two alternatives will have to be considered at that time. In addition, the POTW's willingness and ability to accept these wastes remain a factor.

1.9. See paragraph 1.8 above.

1.10. See paragraph 1.8 above regarding the use of bioremediation. In regard to the landfill cap, as stated above, the landfill cap is dictated by the requirements of RCRA closure and Michigan Act 64, and does not take into consideration what type of remedy is chosen for the groundwater. Naturally occurring bioremediation, according to the Remedial Investigation, is occurring within the contamination in the shallow aquifer. However, the levels of contamination are still in exceedence of State and Federal ARARs, so groundwater treatment must be implemented to supplement the natural process in addressing these exceedences.

Comments from PRPs:

Comment #2:

2.1. A group of approximately 24 of the Potentially Responsible Parties (PRPs) identified in connection with the site have formed the KL Avenue Committee. One of the activities of this group has been the review and analysis of various studies, assessments, and proposals regarding the site. The Committee (and their contractor) has also developed an alternative remedy proposal which meets all legal requirements and is actually more protective of human health and safety than EPA's proposed remedy.

2.2. The remedy recommended by the PRP group incorporates recognition of the ongoing in-situ bioremediation and monitoring of plume remediation in addition to constructing a municipal cap in an environmentally and fiscally responsible manner. The Committee's proposed remedy is protective of human health and the environment, is cost effective, and meets the legal criteria of CERCLA and the NCP, requirements which the EPA remedy fails to meet. Our proposal reflects not only an understanding of the requirements of CERCLA and the NCP, but also a recognition of the predominant sentiment of the local public in the area of the West KL Avenue Landfill. We believe the group's proposal would also prove more acceptable to the local governments.

2.3. This letter is supported by three separate attachments: 1) "Comments on the Proposed Plan and Feasibility Study for the West KL Avenue Landfill", by Geraghty and Miller, Inc. (G&M), 2) Technical data report "Review of U.S. EPA's Proposed Alternatives and Proposal of Additional NCP Compliant Remedial Alternatives", and 3) a letter from G&M to Randy Senger, dated August 9, 1990, which forms an executive summary of the technical data.

2.4. This letter and the attachments constitute the formal submission by the group of comments on the draft FS and the Proposed Plan for the West KL Avenue Landfill. These comments are submitted for inclusion in the administrative record file.

2.5. EPA's selection of a remedy, if arbitrary, capricious, or otherwise not in accordance with the law, is invalid, cannot be allowed to stand, and should prohibit recovery of response costs by the Agency. If the Agency selects the remedy currently proposed by the Agency, or any remedy given the current state of the record, such selection will violate the obligation of EPA under CERCLA.

2.6. EPA's decision on remedy would be arbitrary for several reasons. EPA has omitted significant data, including the twice-yearly County data, from its administrative record. As clearly pointed out in the attached technical documents and the attached affidavits of Mr. Woolf and Mr. Balkema, major technical flaws exist in EPA's analysis, such as the improper calculation of landfill size and the improper calculation of groundwater flow. Any decisions based on this inaccurate data base would be arbitrary and capricious.

2.7. EPA has failed to follow the requirements of CERCLA and the NCP and, therefore, any remedy selected at the present time would be selected contrary to law. There are several sections of the statute itself which EPA has ignored. Among other things, CERCLA provides that off-site transport of hazardous substances is to be discouraged. The goal is permanent and significant decreases in "toxicity, mobility, or volume of the hazardous substance....", EPA is to consider long-term maintenance costs, and EPA is to consider the "potential threat to human health and the environment associated with transportation, and redisposal" as well as those associated with containment. The Agency is to take into account "the degree of support for such remedial action by parties interested in such site." 42 USC § 9621 (b) (1) and (2).

2.8. Since sludges will be created by some of the EPA preferred remedial alternatives and these will be hazardous wastes which will have to be transported off-site, EPA is creating a situation which runs counter to Congress's instructions and, therefore, is not in accordance with law.

"Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants .. are to be preferred over remedial actions not involving such treatment. The off-site transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action

where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions, the President shall, at a minimum, take into account: A) the long-term uncertainties associated with land disposal; * * D) short- and long-term potential for adverse health effects from human exposure; E) long-term maintenance costs; F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and G) the potential threat to human health and the environment associated with excavation, transportation, and redispersion or containment."

42 USC § 9621(b). Under this same section it is mandated that the President select a cost-effective remedy. If the remedy selected would not be a preferred one using the above criteria, then EPA must justify why it deviated from Congress's directives.

2.9. Under another provision of the same CERCLA section, Congress states:

"(d)(4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria or limitation as required by paragraph (2), if the President finds that -

(B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options; and

(D) the remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method or approach; ..."

42 USC § 9621(d)(4). The Committee's position is even stronger than this passage would suggest. We are not implying that bioremediation will fail to meet ARARs but should be considered in any event. We believe it will meet properly identified ARARs. However, even if in-situ bioremediation did not meet ARARs, EPA could and should still choose it because it will result in a lesser risk to the public than EPA's preferred remedies.

2.10. We wish to emphasize that the group's remedy will meet all the Congressional mandates and be more protective of public health both in the short-term (e.g., no transportation of chemicals to the site, no storage of chemicals on the site, no transport of hazardous waste off the site) and in the long-term (e.g., no long-term disposal off-site of material with more concentrated hazardous substances in it than the material that exists on the site now).

2.11. As is apparent from the above, any review of the draft FS and Proposed Plan is largely technical in nature, but certain analysis, assessment, and comment cannot be adequately identified or explained in the context of primarily technical documents. The following portion of this letter is intended to identify or expand upon other discussions contained in the letter or the attachments, in several particulars. The Committee believes that the Agency must address concerns relating to the evaluation of relative risks posed by remedial alternatives as compared to the risks of existing conditions, deferral of significant decision making to the remedial design phase, identification of cleanup standards, identification and application of ARARs, and factors to be applied in remedy selection.

A. Risk Comparison:

- i. CERCLA requires, among other things, that the remedy selected be protective of human health and the environment. To identify a risk to human health as existing, however, is insufficient in and of itself to justify any remedy that will eliminate or minimize such a risk. Implementation of a "remedy" which creates a greater actual risk than the hypothetical risk of existing conditions is not protective of human health as contemplated by the statute.
- ii. A comparative risk assessment of limited (or no) action versus each of the various alternatives is noticeably absent from the FS. It is necessary to give consideration to this relationship since limited action is nominally, at least, an alternative. To presume that some action will be taken skews quantification of the risk. The risk of ingestion of carcinogens is virtually nonexistent at this site. No one has utilized the aquifer as a source of drinking water for years, and the existence of a reliable public water system renders the chance of future consumption virtually nonexistent. This is diametrically opposed to the starting premise of the FS that some action needs to be taken.
- iii. For example, a comparison of the risk associated with transportation of capping materials under the EPA preferred alternatives to the hypothetical risk of exposure to the groundwater should be undertaken. We believe that such an assessment will show that EPA's preferred remedy dictates reassessment of the appropriate response.
- iv. The revised NCP, in newly crafted Section 300.430(d)(4), discusses the use of baseline risk assessments. The preamble to the rule, which "reflects EPA's intent in promulgating (the) revisions to the NCP", (55 FR 8666) repeatedly dictates the need for the conduct and careful consideration of baseline risk assessments.
- v. One central portion of the preamble states that, "(a)s part of the (RI), the baseline risk assessment is initiated to determine whether the contaminants of concern identified at the site pose a current or potential risk to human health and the environment in the absence of

any remediation. It provides a basis for determining whether remedial action is necessary and the justification for performing remedial actions" 55 FR 8709.

vi. Later in the preamble, the issue is pointedly distilled: " ... When considering current land use, the baseline risk assessment should consider both actual risks due to current conditions and potential risks assuming no remedial action.... EPA is clarifying the language in (the NCP) to indicate that both actual and potential exposure routes and pathways should be considered." 55 FR 8710.

vii. "... 300.430(d)(4) of the rule has been clarified to indicate that both current and potential exposures and risks are to be considered in the baseline risk assessment," and, "... (e)xposure assumptions or other information ... " are items to consider in determining "whether the risks are likely to have been under-or over-estimated. These key assumptions and uncertainties must be considered in developing remediation goals." 55 FR 8711.

viii. EPA guidance states that "EPA considers information both from ATSDR health assessments and baseline risk assessments to get a complete picture of health threats." (Risk Assessment Guidance for Superfund, Vol. 1: Human Health Evaluation Manual, pp. 2-9, 2-10). The authority is clear that EPA is to consider the harm that may arise from the conduct of remedial action relative to the harm from simply taking no action.

ix. In an attempt to quantify risk at contaminated sites, assumptions not necessarily close to reality are made. At KL Avenue, the risk perceived as exceeding acceptable guidelines is based on assumed regular, human consumption of contaminated groundwater. The cleanup, therefore, is to achieve a reduction of organic concentrations in a media cut off from human exposure — i.e. the risk assessment assumes a completed exposure pathway when none exists.

x. The possibility of future exposure or the potential spread of the contamination to a point of exposure must be evaluated, but the hypothetical risk cannot justify the creation of real risks and the expenditure of millions of dollars simply to accelerate by a few years ultimate site remedy. Adoption of the proposed plan will create real and immediate risks to public safety in order to reduce a hypothetical and diminishing future risk.

xi. Given the absence of human exposure to the groundwater due to the availability of a public water supply, the remedy proposed by the PRP group of in-situ bioremediation, ongoing groundwater monitoring, and construction of a municipal landfill cap provides a protective, legal, and cost effective option. Speed of remedy is not an appropriate driving factor in remedial selection where human exposure does not exist and when environmental harm is being remedied, especially where the more speedy remedy creates unnecessary risk.

B. Deferral of Decision Making

i. As noted in other attached documents, EPA's data base on which the proposed plan is grounded lacks necessary information. During the Public Meeting, questions were often answered with a comment to the effect that resolution will be developed at the remedial design phase of the project.

ii. Deferral of selection of a remedy until all necessary and available information is gathered and analyzed is appropriate. Deferral of decisions on details of the implementation of a plan is appropriate. However, deferral of the decision on the basic, underlying remedial concept to the remedial design state is not appropriate. It deprives the public and the PRPs of due process with regard to remedy selection.

iii. CERCLA requires the opportunity for public comment. Adoption of the Agency's proposed plan at this time would cause fundamental decisions to be made outside of the public forum, contrary to the Congressional mandate. Avoiding a decision or failing to resolve basic, underlying questions until the Remedial Design phase simply removes those issues from the public debate. This improper circumvention of the clear obligations of EPA must be avoided. The information developed by the Agency to date does not permit a decision on remedial action to be implemented at this time.

C. Cleanup Standards:

i. EPA has failed to adequately assess and determine appropriate cleanup standards at the site, largely deferring this issue to a later date. The cleanup standards have a significant impact on the appropriateness, effectiveness, and cost of the remedial alternatives.

ii. For example, recently adopted rules under Michigan's Environmental Response Act (Act 307) create different levels of cleanup requirements to address different situations. We submit appropriate remedy selection cannot be made until detailed assessment and determination of cleanup standards in a manner either consistent with or in conformance with the Act 307 is completed, or justification for failure to do so is provided.

iii. These rules establish several different cleanup standards, identified as Types A, B, and C. It is the Committee's view that Type C remedial action may be the most appropriate at this site.

iv. All remedial projects under the Act 307 rules must be protective of public health, safety and welfare and the environment and natural resources. R 299.5601(1). The degree of cleanup required under a Type C project is to be developed on the basis of a site specific risk assessment. Factors to be considered include appropriateness for the site, appropriateness for reasonably foreseeable future property uses and cost effectiveness. R 299.5515.

v. Selection of a remedial alternative requires definition, as specified in the Michigan rules, of the extent of such cleanup which is mandated, i.e. the objective must be identified before the means to achieve the objective can be selected. That definition can dramatically affect the cleanup effort in terms of time, scope and cost. Failure to adequately address this key question in the Proposed Plan simply underscores the Agency's inability to justify any remedial plan based on the administrative record as it now exists.

D. Act 641 as the Proper Capping ARAR

i. CERCLA and the NCP require, foremost, that all the remedial actions be protective of the public health and the environment. A requirement which has been identified as applicable or relevant and appropriate (an ARAR) to a site condition does not necessarily set the cleanup standard, if the ARAR will not adequately assure achievement of this primary goal. See Amoco Oil Co. v. Borden. If two conflicting requirements both appear to be ARARs, it is not necessary that the more protective or stringent of the two be adopted as the cleanup requirement. Rather, the requirement which is chosen must be the one which is most appropriate and is most consistent with the NCP. It should be noted that one aspect of the NCP and CERCLA criteria is cost effectiveness of the remedial action.

ii. Section 121 of CERCLA requires that any hazardous substances remaining on-site at the completion of a CERCLA remedial action must meet any ARAR under federal environmental law or any more stringent requirement under state environmental law.

iii. Potential ARARs are identified by reviewing the federal environmental laws and the environmental laws of the state in which the site is located to identify standards and limitations which may be either applicable or relevant and appropriate to the site's cleanup. Section 121 provides that a state law can be a potential ARAR if it is more stringent than federal law. If a state program is similar to a federal program but is not federally authorized, the two programs must be carefully compared to determine the more stringent requirement.

iv. The final cover requirements for municipal and other solid waste landfills which are contained in the administrative rules for Michigan's Solid Waste Management Act (Act 641) do not have a federal counterpart. Therefore, they are a potential ARAR. EPA has accepted ACT 641 as an ARAR (Table 4-4 of Public Comment FS).

v. This site was not a hazardous waste landfill. Industrial wastes as well as other wastes were accepted consistent with then existing law and regulation. The landfill was permitted and operated according to permit. Acceptance of waste generated by industry does not render a landfill a "hazardous waste landfill" for which RCRA or Michigan Act 64 (Hazardous Waste Management Act) standards are necessary. The Michigan Act 64 rules (R 299,506) states that Act 64 rules apply only to

landfills disposing of hazardous waste after January 1, 1980. These rules therefore are not relevant to this site. EPA appears to have accepted this point in its review of ARARs (Table 4-4) but failed to propose a municipal landfill cover.

vi. As noted in the attachments, Act 641 is clearly the appropriate ARAR given the history of this site and the extent of remedial action required. To determine otherwise is to render Act 641 a nullity, since Act 641 caps would never be appropriate.

E. Remedy Selection Factors:

i. The U.S. EPA improperly evaluated the remedial alternatives for the site. The Public Comment FS states that it evaluated each alternative on the basis of nine criteria. It further states that it considered two criteria to be "'threshold' criteria in that an alternative must meet them in order for it to be eligible for selection as a preferred remedy." These 2 threshold criteria are: Overall protection of human health and the environment", and "Compliance with ARARs."

ii. The EPA improperly, 1) concluded that the No Action and the Limited Action groundwater remedy did not meet ARARs; 2) failed to array and/or evaluate remedies which would meet ARARs, and; 3) interpreted the law's ARAR requirement.

iii. CERCLA Section 121 provides, in part, that if hazardous substance, pollutant or contaminant remain on site, the remedial action selected, "shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria or limitation."

iv. EPA concludes without explanation that the No Action and Limited Action groundwater remedies do not meet 40 CFR which relates to standards for solid waste disposal facilities. However, assuming that EPA is referring to the Subpart F groundwater provision, the requirement to meet ARARs is upon conclusion of the remedial action. EPA failed to evaluate both the impact on groundwater of its proposed landfill capping remedy and naturally occurring bioremediation.

v. Also, EPA failed to evaluate several groundwater remedies (including in-situ bioremediation) and soil remedies (including Act 641 solid waste cover) which meet ARARs. Table 4-4 of the Public Comment FS reveals that an Act 641 landfill remedy meets ARARs. Furthermore, based on the report from G&M, the Table reveals that in-situ bioremediation meets ARARs.

vi. Finally, EPA's evaluation of remedies did not properly consider ARARs. CERCLA provides that an ARAR may be either a level or a standard of control which is achieved at the end of remedial action. For example, a landfill cover would be considered a standard of control

and attainments of groundwater MCLs upon completion of remedy a level. Therefore, CERCLA allows achievement of ARARs by either method.

vii. In this instance, the primary purpose of the landfill cover is to protect groundwater. Thus, EPA has chosen two groundwater remedies, both of which are designed to achieve groundwater ARARs. EPA neglected to consider combinations of alternatives, which together meet ARARs. Furthermore, EPA improperly screened out groundwater alternatives that require lower periods of time to achieve ARARs while at the same time underestimating the time period of its selected groundwater remedies to achieve ARARs. CERCLA Section 121 provides that a remedial action need not attain ARARs if, for example, "the remedial action selected is only part of a total remedial action that will attain such level or standard of control when complete, ..."

2.12. The Committee is confident that a remedy can be developed which meets the requirements of CERCLA and the NCP but which will not require the extensive and unwanted disruption to the local community and the potentially unwarranted expenditures on questionable hardware and unproven technology.

Response #2:

2.1. EPA recognizes the group of PRPs that has formed. EPA does not believe the remedy proposed by the group meets all legal requirements or is more protective than the remedy proposed or selected by the EPA. See responses to the rest of Comment #2 below for reasonings.

2.2. This paragraph of the letter states that the EPA's proposed remedy fails to meet the legal criteria of CERCLA and the NCP. It is EPA's position that the remedy does meet the legal criteria of both CERCLA and the NCP. The Proposed Plan and the selected remedy stated within the Record of Decision (ROD) have been established under the guidelines of CERCLA and the NCP. Points in which this comment letter state that the EPA's remedy does not comply with CERCLA and/or the NCP are addressed in the following paragraphs.

2.3. The attachments to the comment letter have been received and reviewed by the EPA.

2.4. This letter is part of the Responsiveness Summary, attached to the ROD for the West KL Avenue Landfill, and has been made part of the Administrative Record for the site.

2.5. The U.S. EPA does not agree with the statements made in this paragraph. As mentioned above and within this response, EPA feels that the selected remedy complies with CERCLA, the NCP, and State requirements.

2.6. Most, if not all of County's data, that was submitted to the EPA, is included in the Administrative Record. Please refer to the Administrative Record Sampling/Data Index for the West KL Avenue Landfill. The index states that the documents are not copied (because of the size of the data files) but may be reviewed at the U.S. EPA Region V Offices in Chicago. As

a matter of fact, the PRP's contractor, G&M, did review EPA's file that contained the County's data. The index has several entries regarding the data received from the County; for example, page 2 of the 4/27/88 Sample/Data Index shows that test well results from 1980 until March 1986, from Triemstra-Kal. Co. Bd. of Commissioners was entered into the record. Also, a section of the RI Report, Section 5.4.5, compares RI groundwater data with the data supplied by the Kalamazoo County Health Department. Claims of certain major technical flaws affecting the remedy choices are without merit. Landfill size and groundwater flow calculations have been presented as conservative estimates based on the specific data reported in the RI and FS, so that the estimates would not understate the remedy requirements. Although EPA has stated that the actual groundwater pumping rate can not be determined until a pump test is performed, the groundwater flow data is adequate to determine which groundwater remedy to select. Correspondingly, the landfill size estimate may also be revised based upon further data. In regard to the affidavits of Mr. Woolf and Mr. Balkema, and G&M's claim that the landfill is only 60 acres in size, EPA and its contractor based the size of the landfill on historical aerial photographs and topographic maps. At a minimum, EPA believes the size of the landfill that will be required to be capped is 71 acres. Overlapping of the sides to assure proper capping, and the general topography of the landfill could increase this total. EPA's contractor chose the conservative number of acres to be capped at 83.

2.7. EPA has followed the requirements of CERCLA and the NCP. The commenter cites to several CERCLA and NCP provisions and addresses them in subsequent paragraphs. EPA's specific responses are provided in the following paragraphs. The description of the NCP requirements is more accurately provided in the NCP, 55 Fed. Reg. 8702 (March 8, 1990). The NCP provides nine remedy selection criteria to assess whether a proposed remedial plan is consistent or complies with the NCP. Id. The NCP also provides procedures in applying the criteria and explanations of these criteria. Furthermore, off-site transportation of hazardous wastes is discouraged by the EPA, but that does not mean that off-site transportation is not acceptable. This alternative would be considered in the context of the nine selection criteria. EPA has not ignored any provisions of CERCLA or the NCP in selecting the remedial action for this site. The Proposed Plan and the ROD describe how each of the points raised in this paragraph was addressed.

2.8. The commenter cites to the NCP and CERCLA criteria preferring the remedial alternative which reduces the volume, toxicity or mobility of hazardous substances, pollutants and contaminants through treatment. However, this criterion does not stand alone. It is one of five criteria weighted against one another to determine which of the alternatives satisfying the two threshold criteria will constitute the preferred alternative. 40 CFR 300.430(f)(1)(i), 55 Fed. Reg. at 8850. Consequently, simply by disposing of wastes off-site as a result of treating groundwater at the site, does not make the proposed remedy or the selected remedy "not in accordance with the law." EPA prefers to be able to permanently treat wastes on-site, but this cannot always be accomplished. In cases where hazardous substances, pollutants, or contaminants need to be transported

off-site, Section 121 (d) (3) of CERCLA states, "In the case of any removal or remedial action involving the transfer of any hazardous substance, or pollutant or contaminant offsite, such hazardous substance or pollutant or contaminant shall only be transferred to a facility which is operating in compliance with section 3004 and 3005 of the Solid Waste Disposal Act (...) and all applicable State requirements. Such substance or pollutant or contaminant may be transferred to a land disposal facility only if the President determines that both of the following requirements are met: (A) The unit to which the hazardous substance or pollutant or contaminant is transferred is not releasing any hazardous waste, or constituent thereof, into the groundwater or surface water or soil; and (B) All such releases from other units at the facility are being controlled by a corrective action program approved by the Administrator under subtitle C of the Solid Waste Disposal Act." In addition to these restrictions any sludges or residuals produced by the onsite treatment will need to be tested to determine whether they exhibit the RCRA toxicity characteristic (TC) for constituents regulated by the Land Disposal Restrictions (LDRs) as cited in 40 CFR 268. EPA has fully discussed the remedy selection criteria in the Proposed Plan and the ROD.

2.9. The cited provision provides EPA with complete discretion, in contrast to a legal requirement, to select a remedy which does not comply with one of the threshold criteria, where EPA makes a specified finding. EPA has not made any of the specified findings cited by this comment. In particular, there is no indication that implementation of the proposed or selected remedy will produce any greater risk to human health or the environment than any of the other alternative options. The sludges produced by groundwater treatment should be in a stable form and, if handled, transported, and disposed of properly, will not create any risk, associated with toxicity, greater than the risk presented by the contaminants presently found within the groundwater. Therefore, ARARs will be met by the selected remedy even if sludges or other treatment derived wastes need to be further treated or disposed of offsite.

In regard to Section 121 (d) (4) (D), if an alternative is shown to attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through the use of another method or approach, then it may be selected in place of the ARAR compliant alternative. The alternative proposed by this comment, in-situ bioremediation, has not been shown to be to be equivalent in performance to that of the EPA's proposed or selected remedy, or any other ARAR compliant remedy. The in-situ bioremediation alternative, as proposed by this comment, is the same as no action in regards to the groundwater contamination, since the contamination is allowed to naturally attenuate. On this basis, the risk caused by the contamination within the groundwater will be the same as what is presented within the Risk Assessment in the RI and this shows that if no-action (or in-situ bioremediation) is taken, the risk levels will be above acceptable state and federal levels. EPA has, however, chosen to consider an enhanced form of the bioremediation as its selected remedy. See the ROD for the details regarding the selected remedy.

2.10. EPA does not agree that the group's remedy of in-situ bioremediation will meet all the Congressional mandates and be more protective of public health than the EPA's selected remedy as discussed in responses to this comment. In addition, the group's proposed remedy of an Act 641 equivalent landfill cover does not comply with the proper closure of a landfill that accepted hazardous wastes (Michigan consistently has applied their Act 64 closure regulations on landfills, such as West KL Avenue Landfill, that have accepted hazardous wastes), nor does it adequately address the contaminants that exceed drinking water standards as set by the Federal Safe Drinking Water Act or Michigan Act 307. Also, see the response to 2.9.

2.11. Responses to comments within this paragraph are broken down into the following:

A. Risk Comparison

i. Both federal and state regulations state that a selected remedy will be protective of human health, welfare, and the environment. To determine if a remedy is warranted, actual or potential risks are evaluated, as done within the Risk Assessment portion of the RI. At the West KL Avenue Landfill, both actual and potential risks have been found to be unacceptable to both the EPA and the MDNR. The risk is not considered hypothetical but real, because contamination is in the groundwater, which at one time was suitable for drinking but is no longer. EPA does not believe that its selected remedy will create a greater risk than presented by the contamination at the site.

ii. The combination of the Risk Assessment in the RI and the FS adequately addressed the limited and no action alternatives. The NCP requires a "site specific baseline risk assessment to characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to ground water..." The Public Health/Environmental Risk Assessment, Chapter 7 of the RI Report, represents the baseline risks present at the site now and if no remedial action is conducted at the site. See also Section 1.3.3 of the FS. The baseline risk assessment demonstrates that both the carcinogenic and non-carcinogenic risks substantially exceed "acceptable" risk levels. The EPA firmly believes that both the No Action alternative and the Limited Action alternative will not address the present and future risks at this site and, therefore, the Risk Assessment represents the comparative risk assessment for these alternatives. Consequently, EPA has determined that since neither the No Action or the Limited Action achieves the ARARs for the site, as mentioned in Section 4.4.2 of the FS, that these alternatives would not be as protective of human health, welfare, and the environment as would the alternatives that include some degree of remedial action. In regard to the statement within this comment that no one has utilized the aquifer as a source of drinking water for years, indicates that the problem is serious since this aquifer once was a source of drinking water for the surrounding community. According to the guidelines within the NCP, the groundwater at and near the site may be classified as a Class II-A aquifer, groundwater that is currently being used as a

drinking water source, and treatment is preferred. The aquifer is not being utilized in the immediate area of the site, but it is utilized both up and down gradient of the site. According to CERCLA and the preamble of the NCP, EPA must consider the current as well as potential uses of the groundwater. Natural attenuation (as would be in a No Action or Limited Action alternative) is generally recommended only when active restoration is not practicable, cost-effective, or warranted because of site conditions (such as Type III aquifers), or where natural attenuation is expected to reduce the concentration of contaminants in the groundwater to the remediation goals in a reasonable timeframe. EPA does not believe any of these conditions or situations are present at the site.

iii. Although EPA is concerned with any risk that may be associated with the truck traffic that will be caused by the capping of the landfill, that type of risk cannot not be compared to the risk that is caused by the contaminants at the site. See 40 CFR 300.430(d)(4), where the risk assessment is to characterize the risk "posed by contaminants migrating to ground water ..." The risks caused by the extra truck traffic will be temporary (lasting the 2-3 years that the landfill cap installation will take) and should cause minimal additional risks to residents if proper driving precautions are taken, as should be whenever one drives. The risks presented by the contaminants present within the groundwater will likely continue unless some remedial action is taken to correct the problem. EPA's ROD describes the method in which the remedy was selected to address the contamination at the site.

iv. The RI Report, Chapter 7 contains the baseline risk assessment for this site.

v. No response to comment needed.

vi. No response to comment needed.

vii. No response to comment needed.

viii. EPA is concerned with any harm or disruption to the community which may be caused by the implementation of the selected remedy, and EPA tries to minimize these additional risks and disruptions when selecting a remedy that is still protective of human health, welfare, and the environment, and attains ARARs. However, the "[r]isk assessment provides a consistent process for evaluating and documenting threats to human health and the environment posed by hazardous materials at the site", NCP Preamble 55 FR 8709. The baseline risk assessment is specifically to document existing and potential threats posed "by contaminants." 40 CFR 300.430(d)(4).

ix. The EPA must make conservative estimates in developing the baseline risk assessment in order to assure protection to human health and the environment, and in doing so is following the procedures within the Risk Assessment guidance. Even though at present time no one is

directly exposed to contaminated groundwater, as the commenter stated in v. above, potential risk must be determined. In addition, the baseline risk assessment is not the proper place to consider institutional controls, if any exist. 55 FR 8710. Consequently, future scenarios such as wells being installed near the site, or the contamination plume spreading either horizontally into areas previously not contaminated or vertically into the deeper uncontaminated aquifer are a concern.

x. As mentioned above in response to paragraph 2.11.A.i., EPA does not consider the risk posed by contaminants to be hypothetical. Contamination is present in the upper aquifer at and near the site, and the upper aquifer in the site area once was used as a source of drinking water by neighboring property owners. According to the NCP, a remedial action for a site must be both protective of human health and the environment and attain ARARs. Cost-effectiveness becomes an issue to be balanced against four other factors (e.g., long-term effectiveness) after it is determined the alternatives being considered have met the protectiveness and ARAR requirements. EPA included in the final NCP its expectations to better articulate the objectives of the program. 55 FR 8707. The Agency expects to return usable "groundwaters to their beneficial uses wherever practicable, within a time frame that is reasonable given the particular circumstances of the site." NCP §300.430(2)(1)(iii)(F). In regards to creating additional risks to public safety, refer to response 2.11.A.viii above.

xi. The options as recommended by the Committee do not attain ARARs, as determined by the EPA and the MDNR, and do not protect human health and the environment. These are the threshold criteria that must be met in order for an alternative to be considered. As mentioned above, the No Action or Limited Action alternatives have been deemed unacceptable as the remedial actions for this site.

B. Deferral of Decision Making

i. The RI phase of the project is meant to obtain general site specific data such as geology and type and extent of contamination. The FS takes this data and develops a number of alternatives to address the particular problem(s) presented by the contamination at the site. The Remedial Design (RD) phase takes whatever remedy was chosen from the FS (or from public comment) and designs how this remedy will best work at the site, taking into account site specifics. Many times, a pilot test of the remedy is required to test the proposed or selected remedy. This can be done during either the FS stage or the RD phase. In this case, some of the site specific details need to be determined during the RD, such as actual area of landfill to be covered, or the actual pumping rate and best location for the groundwater extraction wells.

ii. The public comment period is for the public to have an opportunity to review and comment on the EPA's FS and Proposed Plan and participate in the remedy selection process. The actual design and implementation

of the selected remedy comes after the public comment period and after the ROD is signed by the EPA's Regional Administrator. If the selected or contingent remedies have to be significantly changed due to impracticabilities or other reasons discovered during the design phase, any new remedy will again be placed before the public for its review and comment.

iii. The public comment period for the West KL Avenue Landfill extended from June 11 through August 10, 1990. During this period, the public was asked to review and comment not only on the Proposed Plan but also on the FS. The selection of a remedy has been based on the data presented within these documents, along with the documents contained within the Administrative Record, which is also available to the public. Any data that needs to be developed within the RD, such as the pumping rate of the extraction wells, or the number or extraction wells, is extraneous to the actual decision of what alternative should be selected to achieve the cleanup goals as stated by state and federal ARARs. As stated above in 2.11.B.ii, if the selected or contingent remedies are significantly changed because of any implementation problems discovered during the RD, then the public will again have the opportunity to review and comment on any new alternative remedy which may be selected.

C. Cleanup Standards:

i. EPA's Proposed Plan repeatedly stated that the cleanup goals or target cleanup levels are the state and federal ARARs, whichever is more stringent. Table 2-1 of the FS stated probable cleanup levels for the contaminants of concern. The ROD, Table 4, also indicates the cleanup standards that will apply to the remedy.

ii. At the very least, the cleanup goals for groundwater need to meet the standards as set by the federal Safe Drinking Water Act and, if the state has more stringent regulation, generally those must be followed. Newly promulgated Michigan Act 307 establishes 3 types of cleanup levels, Type A (total restoration), Type B (cleanup to 1×10^{-6} or equivalent health based levels), or Type C (site specific cleanup levels). For this site, Type B cleanup is selected, as explained in the ROD and in the MDNR's concurrence letter for the EPA's Proposed Plan.

iii. Refer to response 2.11.C.ii above.

iv. Refer to response 2.11.C.ii above.

v. Refer to response 2.11.C.i and ii above.

D. Act 641 as the Proper Capping ARAR

i. The MDNR has consistently applied MI Act 64 to landfills that have accepted hazardous wastes and have been on the National Priorities List (NPL). MI Act 641 and Act 64 are not considered conflicting

requirements but ones that are in succession to each other. For this site, since hazardous wastes were accepted for disposal at the landfill and the groundwater is contaminated by the wastes within the landfill, Act 64 should and does take precedence over Act 641. If the site accepted hazardous wastes after 1980, then the Act 64 is applicable; if the site accepted hazardous wastes prior to 1980, which is documented at West KL Avenue Landfill, then Act 64 is relevant and appropriate. This is consistent with the requirements of the NCP. Cost-effectiveness is balanced against four other factors only after potential remedies are protective of public health and comply with ARARs. In this case, Act 641, an ARAR since it deals with the closure of municipal solid waste landfills, does not achieve the standards as set by Act 64, the ARAR that is relevant for this site, since the site accepted hazardous wastes, as documented in the Administrative Record. It is also appropriate because there are wastes of high toxicity found at and near the site.

ii. No response to comment needed.

iii. No response to comment needed.

iv. Act 641 is a potential ARAR as stated above in response 2.11.D.i. But Act 64 is also a potential ARAR and is the State requirement that has been determined to be relevant and appropriate for this site.

v. This site was not designed or licensed to be a hazardous waste landfill, but it did accept hazardous waste for disposal. The FRP Committee has even provided the EPA with evidence to this effect, in the attempt to get more FRPs involved in the process. As stated above in Response 2.11.D.i, Act 64 is an ARAR because it is relevant and appropriate. The landfill did not receive a permit to operate from 1974 to its closure in 1979. (In fact, when the landfill was operating the MDNR did order by letter that liquid waste not be accepted after January 12, 1972, but available evidence suggests that liquid wastes continued to be disposed at the site beyond the date of that order. RI Report, Section 1, Page 7/12)

vi. See above responses.

E. Remedy Selection Factors:

i. As per the NCP, §300.430 (f)(1)(A)-(C).

ii. EPA does not agree that the No Action and the Limited Action alternatives achieve ARARs. Please refer to the FS and response 2.11.A.ii above. EPA can not possibly list or array all possible remedies that would achieve ARARs nor is it required to. See 40 CFR 300.430(e)(7)(ii) and 55 FR 8714 (March 8, 1990). The FS presents only those remedies which were determined to best meet the remedial action objectives based on site specific characteristics. EPA does not believe that the law's ARAR requirements have in any way been improperly interpreted; refer to comments above dealing with the ARAR issue.

iii. No response to comment needed.

iv. The FS, Chapter 4, Sections 4.2.1, 4.2.2, 4.3.1, 4.3.2 explain the No Action and Limited Action alternatives for groundwater and landfill containment. Section 4.4.2 and Table 4-4 explain that the No Action and the Limited Action Alternatives for both groundwater and landfill remedies does not achieve ARARs. The landfill cover material, as described in the RI (Appendix A-4, Technical Memorandum RE: Phase III, Test Pit Installation), varies in depth from 0.5 to 2 feet thick and appears to be mostly sandy soil. There is little evidence of compacted clay or hardened bentonite in the areas that were test-pitted. This shows that the No Action for the landfill cap will not suffice, and that the Limited Action alternative would include totally upgrading the cover since the present cap does not even comply with the standards of Act 641. As for No Action or Limited Action in dealing with the groundwater contamination, these situations would result in similar risks as outlined in the Risk Assessment, which are unacceptable, (as described in the RI, FS and in responses above), to the EPA and the MDNR. The landfill cap and naturally occurring bioremediation in the groundwater fail to adequately address existing contaminants in the groundwater.

v. In-situ bioremediation was evaluated by the EPA in the screening process within the FS. At present, bioremediation is naturally occurring within the contamination plume, but the contaminants, after 10 years, are still above acceptable levels. The FS, Figure 2-2, states that in-situ biological treatment would not be effective for the low level contamination found in the site groundwater. The ROD has reconsidered the use of enhanced-bioremediation, however, due in part to the comments received during the public comment period. Please refer to the ROD for details. The argument regarding Act 641 as an ARAR has been discussed in above responses.

vi. This comment, believed to be referencing CERCLA Section 121(d)(4), has misinterpreted CERCLA. ARARs exist for both landfill covers and for the addressing of contamination within the groundwater. These must all be met by the selected remedy. Section 121(d)(4) lists six possible approaches of when not meeting ARARs is acceptable: A) when more work, or an operable unit, will be conducted in the future to complete a remedy, B) compliance with the ARAR would result in greater risk to human health and the environment than other options, C) compliance with ARARs is technically impracticable from an engineering perspective, D) the selected remedial action will equal or better the standard of performance of the ARAR remedy, E) the state has not consistently applied the ARAR, or F) in the case of a remedial action to be undertaken solely under section 104 using the Fund, and the selection of a remedial action that attains ARARs will not provide a balance between the need for protection of public health or welfare, and the environment at the facility under consideration, and the availability of amounts from the Fund to respond to other sites which present or may present a threat to public health or welfare, or the

environment, taking into consideration the relative immediacy of such threats. EPA believes that none of the above are applicable in this case.

vii. One of the purposes of the landfill cap is to reduce the amount of contamination reaching the groundwater, but the landfill also needs to be capped to attain the closure requirements that are stated by ARARs (Act 64). The groundwater remedies are designed to accelerate groundwater cleanup to acceptable levels. By placing the Act 64 cap on the landfill, the length of time required to pump and treat the contaminated groundwater has been reduced. EPA, as mentioned above, has reconsidered the use of bioremediation, and has replaced the preferred groundwater remedy, as stated within the Proposed Plan (POTW or UV-enhanced oxidation) with enhanced bioremediation utilizing fixed-film bioreactors. In regards to the citation to Section 121, refer to response 2.11.E.vi above.

2.12. This comment has been answered in the context of responses 2.1-11 above.

Comment # 3: (Attachment to Comment #2 Letter, and supported by the document entitled, "Review of USEPA Proposed Alternatives and Proposal of Additional NCP Compliant Remedial Alternatives for Implementation at the West KL Avenue Landfill"):

A. Groundwater Comments:

3.A.1. The EPA calculation of hydraulic conductivity for the aquifer underlying the site is based on erroneous data. The highest conductivity value determined during the RI (104.7 feet/day) was selected as the basis for establishing groundwater flow rate parameters despite the fact that the RI states that this value is subject to substantial intrinsic error. The EPA is requested to justify selection of the highest conductivity (104.7 feet/day) as the representative value to establish groundwater flow rate parameters.

3.A.2. Analysis by G&M indicates that a more realistic hydraulic conductivity value of 20 feet/day should be utilized to represent the characteristics of the aquifer in the absence of pump results. EPA is requested to justify why the RI did not include a pump test and why, when a number of data were available to derive representative hydraulic conductivity values, a more realistic value of hydraulic conductivity was not selected to establish groundwater flow rate parameters.

3.A.3. There are significant implications in utilizing 104.7 feet/day as the hydraulic conductivity value rather than the realistic value of 20 feet/day. Based on a hydraulic conductivity value of 104.7 feet/day, the EPA determined that for the remedial alternatives incorporating groundwater recovery, the resultant groundwater recovery rate would be 2,000 gallons per minute (gpm). Utilizing a more realistic value of 20 feet/day, G&M determine that the resultant recovery rate would be approximately 500 gpm. It is requested of EPA to identify how this significant difference in the

estimated groundwater recovery rate would impact the number of required extraction and reinjection wells, sizing of groundwater treatment units, duration of operation and maintenance, and costs of groundwater recovery and treatment alternatives.

3.A.4. By applying a more representative groundwater recovery rate of 500 gpm, the estimated time it would take to remediate the groundwater would be significantly lengthened. EPA is requested to identify and assess the implications of a substantially lengthened recovery period on the evaluation of groundwater remediation alternatives. In-situ bioremediation should be included as part of the groundwater remediation alternatives that need to be re-evaluated based on a significant increase in the estimated time required to remediate the groundwater utilizing pump and treat technology.

3.A.5. EPA has proposed a capital and operating intensive remedy for groundwater that incorporates 5 to 7 recovery wells, 3 re-injection wells, and on-site UV/Oxidation treatment, should discharge to the POTW not be allowed. In light of the data available and the questions regarding the probable rate of groundwater capture, the cost estimates presented for the proposed groundwater remedy may not fall within the goal of providing cost estimates of -30 to +50% of the actual costs incurred over the duration of the remediation effort. EPA is requested to assess the accuracy of the cost estimates for the proposed groundwater remedy considering the implications of a lower, but more realistic, groundwater recovery rate and a longer operating lifetime.

3.A.6. The above mentioned capital and operating intensive groundwater remedy has been proposed by EPA even though there are no known sources of chemical releases, such as bulk liquid or drummed chemical wastes, contained within the confines of the landfill. EPA is requested to justify selection of the proposed groundwater remedy in light of the fact that there are no known sources of chemical releases contained within the confines of the landfill.

3.A.7. EPA has not thoroughly identified the ramifications of discharging any recovered groundwater to the local POTW, which has been identified by the Agency as a viable treatment and disposal option in lieu of on-site groundwater treatment and re-injection. EPA is requested to identify and assess the potential ramifications, including both short- and long-term effects to transmission and treatment capacity, that would result from discharging up to 2,000 gpm of recovered groundwater to the POTW and how these ramifications impact the implementability assessment of the groundwater recovery and treatment alternatives.

3.A.8. The FS discusses cleanup objectives for the groundwater as a function of recovering the groundwater at a flow rate of 2,000 gpm over a 6 year period. EPA is requested to explain how the groundwater cleanup objective was devised and to what degree it reflects the enforcement of ARARs.

3.A.9. Based on the data presented in the RI, as well as recent groundwater sampling data, the concentrations of contaminants in the groundwater show a definite decreasing trend. This decreasing trend, which occurs over the full areal extent of the plume of affected groundwater, is most likely the result of naturally occurring biodegradation. EPA is requested to justify why in-situ bioremediation, which is highlighted in EPA's SITE Program and offers the benefits of in-situ reduction to the toxicity, mobility, and volume of hazardous contaminants, was not analyzed as a viable groundwater remediation alternative in the FS.

3.A.10. Despite the fact that substantial data exist documenting continuing improvement in groundwater quality within the extent of the plume, the FS does not consider the impacts or implications of ongoing in-situ bioremediation. In-situ biological treatment can be viewed as innovative and proven when compared with above-ground reactor-based treatment. EPA is requested to answer whether the effectiveness of naturally occurring biological treatment is diminished by the fact that it is not overtly driven by costly mechanical influences.

3.A.11. On-site, above-ground reactor-based biological treatment is a viable treatment alternative for removing the contaminants contained in the groundwater at the West KL site. This technology has been documented to be effective in other related applications. In addition, since in-situ biological degradation is occurring in groundwater underlying the site, it is intuitive that above-ground reactor-based biological treatment would be effective for any recovered groundwater. EPA is requested to justify why above-ground reactor based biological treatment was not given further consideration during the FS.

3.A.12. EPA is requested to determine if naturally occurring biological activity (i.e., in-situ natural bioremediation) meets EPA's expectation for treatment as cited in Section 300.430 of the NCP.

3.A.13. Section 4.1.1. of the Review Report addresses the implications of in-situ natural bioremediation. This process can, on the basis of existing data, be projected to result in protection of public health and the environment and attainment of ARARs. Upon further evaluation, the remedy can be considered effective over the long term and will result in reduction of toxicity, mobility and volume of the contaminants in the groundwater. In addition, in-situ bioremediation, either natural or enhanced, would not result in any short-term risks, could be readily implemented, and would be cost-effective. As a result, in-situ bioremediation, either natural or enhanced, is a very viable alternative for groundwater remediation at the West KL site. EPA is requested to provide a full assessment of in-situ bioremediation since it has not been adequately addressed in the documents currently a part of the administrative record file nor was it presented at the public hearing.

3.A.14. The FS evaluates the option of UV-enhanced oxidation of groundwater compounds and this alternative is ranked second in the document. Research done by the Steering Committee indicates that UV/oxidation is experimental, unproven on the scale proposed at the site and for the type of

compounds, including 1,1,1 TCA and 1,2 DCA, expected to be contained in the recovered groundwater. The support provided in the FS is not representative of conditions likely to be encountered at the site. Based on a detailed review of this treatment technology, G&M has determined that UV/oxidation technology is inappropriate for groundwater treatment due to the operating conditions and chemical constituents expected at the site. It is requested that EPA provide documentation of full scale usage of UV/oxidation as an effective treatment technology on sites with similar waste chemistry and flow rates as that expected at the West KL site.

3.A.15. Based on G&M's evaluation of UV/oxidation technology for this site, we have serious concerns over the ability to estimate costs within the range of -30 to +50%. EPA is requested to explain how the limited experience with the EPA SITE Program's Lorenz Barrel and Drum site or other sites provides an acceptable confidence level for estimating UV/oxidation technology for treatment of the groundwater at the site.

3.A.16. Costs associated with pH control for the proposed UV/oxidation treatment alternative appear to be omitted from cost calculations. EPA is requested to address how inclusion of appropriate pH control measures affect the costs and maintenance requirements for UV/oxidation technology. In addition, EPA is requested to identify the skill level of the operator required to properly run and maintain the system.

3.A.17. Section 3.2.1 of the Review Report questions much of the basis for considering UV/oxidation as a viable treatment technology for use at the site. Of special note is the fact that iron removal, which would be necessary pretreatment step to protect the UV process, would generate sludge which would be as much as 15 times the mass of actual contaminants removed during the UV process (on a mass per time basis). According to the FS this sludge waste would need to be disposed of as a hazardous waste. EPA is requested to assess how this significant generation of sludge, which may be classified as a hazardous waste, is consistent with § 300.430 of the NCP which calls for reduction of toxicity, mobility, and volume of the contaminants through treatment.

B. Landfill/Source Control Comments:

3.B.1. EPA utilized a landfill area of 80 acres for the development and assessment of the various remedial alternatives that incorporate capping of the landfill. However, based on a detailed review of data provided by MDNR as well as engineering drawings which delineate the operating and closure limits of the landfill, G&M has determined that the area encompassed by the landfill is 60 acres. EPA is requested to justify selection of 80 acres as the area representing the extent of the landfill, as opposed to the 60 acre area identified by MDNR, and assess how this discrepancy impacts the evaluation and comparison of the remedial alternatives that incorporate capping of the landfill.

3.B.2. The difference in the area assigned to the landfill cap makes a significant impact on the estimation of increased surface water runoff and reduced leachate generation that would result from capping the landfill.

EPA is requested to identify and assess how a smaller landfill cap area impacts the evaluation of the developed landfill cap alternatives. In addition, EPA is requested to justify why the HELP Model, utilized in the FS to determine the effectiveness of the various cap designs, was not utilized to evaluate the effectiveness of the existing landfill cover.

3.B.3. Due to the significant volume of materials required to construct a RCRA-type cap over the landfill, a heavy volume of truck traffic would be necessitated during implementation of the landfill cap remedy proposed by the EPA. However, the impact on the local community relative to the large volume of heavy truck traffic is not addressed in detail in the FS and Proposed Plan. EPA is requested to identify and assess the impacts associated with the large volume of heavy truck traffic that would be realized during implementation of a RCRA-type cap.

3.B.4. EPA recommends that the landfill be covered with a RCRA-type cap and cites as partial justification, the risks involved with the ingestion of soils by an exposed child. However, an analysis of traffic statistics shows significantly greater risk as a result of transporting cover material to the site, for implementing a RCRA-type cap, than the risk associated with the unlikely event of soil ingestion by an exposed child. EPA is requested to re-evaluate the landfill capping alternatives considering the risks associated with the heavy truck traffic necessitated for each capping alternative.

3.B.5. In light of the dangerous and disruptive implication of hauling huge volumes of cover material to the site, EPA is requested to justify why a less material-intensive capping solution, consistent with the evaluation criteria cited in the NCP, was not evaluated in the FS.

3.B.6. EPA is requested to comment on whether the additional risk and expense of the more voluminous covers, such as a RCRA-type cap, are warranted in light of the expected reduction in infiltration. In addition, identification is being requested on how infiltration reduction relates to health risks.

3.B.7. EPA is requested to summarize the attitude of the public regarding the high volume of heavy truck traffic associated with the more voluminous capping options, such as a RCRA-type cap. EPA is also requested to comment as to what degree the issue of heavy truck traffic, and its associated risks to public health, was addressed during the public comment hearing.

3.B.8. Three cap design alternatives are discussed in the FS based on references to Michigan requirements. All 3 caps exceed the technology requirements provided by the logical ARAR (which is MI Act 641) as it applies to specifications for municipal solid-waste landfill covers. In fact, Act 641 was identified as an ARAR in the FS. In light of the levels of contamination and undefined nature of waste disposed at the site, it appears that the site was improperly classified for the purpose of specifying cap requirements. EPA is requested to justify why a municipal landfill cap was not evaluated in the FS when MDNR records clearly show that

the landfill predominantly accepted municipal waste and Act 641 was identified as an ARAR.

3.B.9. The FS did not evaluate existing baseline conditions and the projected leachate volume, based on infiltration through the existing landfill cover, that could potentially affect groundwater quality. Accordingly, the assessment of the inadequacy of the landfill's current cover is unfounded. This omission transgresses the requirement by SARA for the evaluation of the No Action alternative. EPA is requested to justify why the health risks differences between both the no action alternative and an Act 641 cap were not compared to the landfill capping scenarios offered by the EPA. In addition, EPA is requested to justify why the FS did not analyze the degree of capping technologies needed to attain ARARs in the groundwater.

3.B.10. The various covers proposed in the FS as meeting ARARs should be compared to no-action and modification of the existing cap. Tradeoffs between infiltration reduction, cost, and risk are typical in evaluating capping alternatives. The FS and Proposed Plan do not provide a reasonable array of alternatives capable of being engineered for the site. EPA is requested to justify why the FS only evaluated cap technologies that exceed ARARs and did not properly evaluate cap technologies that meet ARARs.

3.B.11. The RI and Risk Assessment do not agree with the FS regarding potential risks associated with exposure to landfill contaminants. It is requested of the EPA to justify why the FS disagrees with the Risk Assessment and, thus, proposed capping technologies with multiple and redundant safety factors?

C. Summary Comments:

3.C.1. The steering committee has developed either additional analysis of alternatives developed by EPA or alternatives not considered which are compliant with the requirements of the NCP but were not considered in EPA's final screening of alternatives in the FS and Proposed Plan. In the event EPA is not inclined to further consider or discuss these alternatives we request that the responsiveness summary address, in detail, EPA's perceived areas of the alternative's non-compliance with requirements of SARA and the NCP.

3.C.2. Included in the Review Report is a matrix evaluating the implications of the nine evaluation criteria specified in the NCP. Based on this analysis, the committee has concluded that in-situ bioremediation coupled with cap upgrade should be the recommended alternative for remediation of the site. EPA is requested to provide detailed comments as to why this remedial alternative would not comply with the NCP.

3.C.3. CERCLA and SARA require that the no action alternative be carried into the final screening phase of the FS. EPA is requested to explain why consideration of the no action alternative in the FS was dismissed with so little evaluation when the Risk Assessment concluded that there are no

significant risks associated with air or surface soil exposure and the risks posed by leachate generation were undefined.

3.C.4. Based on the evaluation of the committee and its consultants, it appears that further evaluation of alternatives is warranted prior to remedy selection. Issue of fact and new information are presented such that a response to comments will not be sufficient to allow the required public involvement in any subsequent remedy selection. Accordingly, the committee will review carefully the response to all comments to ensure EPA compliance with public participation requirements of SARA and the NCP.

Response #3:

A. Groundwater Comments:

3.A.1. The hydraulic conductivity, as stated in Appendix B of the FS states that the range of hydraulic conductivity at the site ranged from 0.29 to 104.7 ft/day. The highest value (104.7 ft/day) was used to develop the most conservative approach and to compensate for any errors in the data. Please refer to the FS, Appendix B for further reasoning on the selection of the hydraulic conductivity. The value may not be the best representation of the actual hydraulic conductivity, but it is considered the most conservative value in which to estimate a flow rate. Also, refer to the response to Comment #3.A.8 below.

3.A.2. A pump test is not a required part of a remedial investigation. If a pump and treat scenario is chosen as a remedy, the data gathered from the RI is used to estimate values such as flow rate and pumping rates that may be needed. The actual pump test is most often held off until the design or the conducting of a pilot test, when the need for such an involved test is definitely required. Until such a pump test is conducted, the most conservative approach is followed, by using the highest reported values, then, when the pump test is conducted, more accurate estimates can be established. The true value may well be close to the value stated in the comment or it may vary greatly from the value stated in the comment, or even from one area of the landfill to another.

3.A.3. As mentioned above in response 3.A.2., the value used in the FS is a conservative estimate. By using values such as presented by the comment, or any other value lower than the conservative approach, some changes will occur in the overall pump and treat system. The number of extraction wells may need to change, but the overall width of the plume still will need to be contained/captured, so if a lower pumping rate is used, more wells may be needed to properly cover the plume. The injection wells will be directly proportional to the number of extraction wells and the total gpm. The size of the treatment units is also dependent on the total overall gpm and the time it will take to treat that volume of water. The costs associated with the operation and maintenance of the system may be lower annually, but will most likely cost just as much or more than the estimates within the Proposed Plan due to the length of time that the pumping may be required. Overall, the costs may be somewhat lower for the initial construction and implementation of the pump and treat system, but due to the lower pumping

rates, the groundwater will have to be pumped for a longer period of time, so the costs may be comparable or somewhat higher than previously estimated.

3.A.4. See response 3.A.3 regarding the time needed to pump the aquifer. In-situ bioremediation is not a viable remedial alternative for this site since it will not achieve the cleanup objectives. The use of treatment technologies can be implemented to help accelerate the cleanup of groundwater. See the response to Comment #2.11.A.ii.

3.A.5. This comment is no longer pertinent at this time, since the groundwater remedy has been changed to enhanced bioremediation/fixed-film bioreactors, utilizing the cost estimates provided by G&M. The costs of the contingency remedy, i.e., use of the POTW, will be somewhat different if the pumping rates are lower than the EPA's estimated rate of 2000 gpm, but this would not be known until the design stage and the actual rate and duration of the pumping are known. The costs of a contingency remedy, such as the use of on-site UV-oxidation treatment, may be somewhat higher than previously estimated due to the longer period of time; however initial costs of certain components of the enhanced bioremediation may be applicable to a contingency remedy, thereby lowering the contingency cost. For example, both the enhanced bioremediation and the UV-oxidation technologies utilize injection wells or an infiltration pond, while the use of the POTW does not.

3.A.6. The landfill is the known source of the chemical releases in the landfill area, as stated in the RI in regards to the test pits. See response to Comment #2.D.v and the RI.

3.A.7. Basic evaluations are included within the FS, Proposed Plan, and in the ROD. As the ROD states, the selected groundwater remedy is no longer the use of the POTW, but the use of enhanced biodegradation/fixed film bioreactors. If the POTW is to be used, the POTW would be contacted and would have the opportunity to refuse the acceptance of the waste water based on the issues raised in the comment.

3.A.8. The use of 2,000 gpm as the estimated groundwater extraction and treatment rate is primarily the result of using a conservative value of 104 ft/day for the hydraulic conductivity of the shallow aquifer. Groundwater extraction modeling performed in the FS yielded a pumping rate of 1,400-1,700 gpm, and 2,000 gpm was the rate used for sizing and costing treatment equipment. It is stated on page 16 of Appendix B of the FS Report that a pump test is necessary to fully evaluate the feasibility of extracting groundwater and establishing the proper groundwater extraction rate. Because the RI did not define the aquifer characteristics needed to conduct a detailed evaluation of a groundwater extraction system, it was necessary to make certain assumptions as part of a preliminary feasibility determination of groundwater extraction and injection. One of these assumptions was that the highest conductivity value from the RI slug tests is representative of actual aquifer characteristics. As stated on Page 1 of Appendix B of the FS, slug tests results do not generally account for large-scale variations in hydraulic conductivity and can often lead to an underestimation of conductivity. It was therefore desired in the FS to utilize a conductivity estimate that was as large as reasonably possible to

initially determine if groundwater extraction was a feasible remedial technology. The conductivity value of 20 ft/day as presented in the G&M Review Report is also based on assumptions obtained from the RI slug test data. Specifically, the assumption that "a safety factor of 3 to 5 times the mean conductivity could appropriately compensate for the tendency of slug tests to underestimate conductivity" is subject to as much uncertainty as any conductivity assumption made in the FS. The issue is not one of justifying a lower extraction rate based on a preselected value used in the FS Report. The extraction rate will remain an undefined value until it is determined by a pump test as recommended in the FS Report. In regard to what degree the flow rate reflects the enforcement of ARARs, the flow rate is only a part of the groundwater extraction system, which as a whole is to be designed to help achieve ARARs.

3.A.9. Refer to the response for comment #2.11.E.v.

3.A.10. Refer to the response for comment #2.11.A.ii. and #2.11.E.v. Also, the RI Report and a summary received from Wilkens & Wheaton Environmental Services, dated August 10, 1990, show that several contaminants, including benzene and lead, are increasing in concentration in several groundwater monitoring wells, which indicates that in-situ bioremediation is not addressing all of the contamination within the groundwater.

3.A.11. The EPA has reconsidered the use of enhanced biodegradation and the use of above-ground bioreactor-based treatment and has selected it as its primary remedy to address the groundwater contamination at the site. Please refer to the ROD.

3.A.12. Yes, naturally occurring biological activity can be termed as a type of treatment as cited in §300.430 of the NCP, but since other treatment technologies can help contain/capture and treat the contaminant plume quicker, treatment technologies other than natural attenuation are favored. In addition, naturally occurring biological activity may not be fully treating contaminants within the plume. Please refer to the response to comment 3.A.10 above.

3.A.13. Please refer to the ROD. Enhanced bioremediation has been selected as the primary groundwater treatment method. Refer to the FS and responses to comments above regarding the use of in-situ bioremediation.

3.A.14. The preferred groundwater remedy, as stated in the EPA's Proposed Plan, has been changed. The ROD has selected the use of enhanced bioremediation as the technology to address the groundwater contamination at the site. If the selected remedy does not achieve the cleanup goals as stated within the ROD, contingent remedies may be selected to replace or supplement the enhanced bioremediation alternative. Comment as stated is no longer pertinent to the ROD at the present time.

3.A.15. See response 3.A.14 above.

3.A.16. See response 3.A.14 above.

3.A.17. Some inorganics may still need to be removed prior to being reinjected into the shallow aquifer to satisfy the requirements of MI Act 307. In regard to the NCP, treatment of any type that reduces toxicity, mobility or volume of waste is in compliance with the NCP. Any sludges or residuals produced as a result of treatment will need to be tested for RCRA toxicity characteristics (TC) for constituents regulated by the Land Disposal Restrictions (LDR). It may be determined that any sludges produced by the on-site treatment may require further treatment prior to disposal off-site.

B. Landfill/Source Control Comments:

3.B.1. 80 acres is a conservative number based on topographical maps and historical aerial photographs showing areas that were filled. Actual landfilled land is probably closer to 70-72 acres, but to account for the topographical features of the landfill and the feathering out of the cap, the conservative number of 80 acres was used. The size of the cap does not make any difference in regard to the evaluation criteria; i.e., the costs would be proportionally lower for each capping alternative should the area to be capped be less than 80 acres. Amounts of truck traffic would also change proportionally for each capping alternative.

3.B.2. Refer to response 3.B.1 above. In regard to the evaluation of the existing cap, please refer to the response to comment #2.11.E.iv.

3.B.3. Truck traffic is a negative part of each of the capping alternatives. Obviously, if there were no further capping, there would be no truck traffic and no risk caused by the excess traffic. But to correctly cover the landfill according to ARARs, and to prevent any further contamination from degrading the area's groundwater, the cap must be installed. The risks caused by the truck traffic is unfortunate and will be kept to a minimum if proper construction and road regulations are followed.

3.B.4. Truck traffic will occur with any of the ARAR-compliant landfill cap alternatives. This traffic is a serious concern to EPA. Less earthen material is required for the RCRA-type cap than for the other 2 ARAR-compliant caps evaluated (FS Table 4-2). As mentioned in above responses, the Act 641 closure does not comply with the MI Act 64 ARAR. Also, see preceding response.

3.B.5. The caps presented by G&M in the Review Report (Act 641 and the maintenance of the existing cover) do not comply with ARARs and therefore do not comply with the intent of the NCP. (See other responses above that address the ARARs for capping of this site.) Only the capping alternatives that would comply with the state and federal ARARs for the closure of hazardous waste landfills (Act 64 and RCRA) were evaluated within the FS.

3.B.6. The RCRA-type cap is predicted to be 78 times better in reducing leachate generation than is the Act 64 cap. G&M's Review Report indicates that the Act 641 cap is also better than the Act 64 cap in reducing leachate generation, which the EPA does not totally agree with. A HELP model

performed by G&M states that less infiltration will occur into the landfill with an Act 641 cap versus an Act 64 cap. Although this may be a valid interpretation of the HELP model results, it does not necessarily provide a suitable technical justification for the selection of the Act 641 cap. The Act 641 cap may experience a significant decrease in performance over the long term. Because the Act 641 clay layer is protected by only 6 inches of topsoil, it will be especially susceptible to damage by deep-rooted vegetation, burrowing animals, and most importantly, frost. These factors are not considered by the HELP model; therefore, the actual amount of percolation through the Act 641 cap will most likely be greater than the simulation indicates. As a result, the long-term effectiveness of the Act 641 cap (based on the amount of percolation it allows) may be less than that of the Act 64 cap. Additionally, the Act 641 cap does not satisfy the State of Michigan capping policy that has been consistently applied at similar sites within the state. In regard to how infiltration reduction relates to health risks, the less infiltration allowed through the landfill cover over time, the less contamination that reaches the groundwater. The RCRA-type landfill cover will reduce infiltration more so than either the Act 641 or Act 64 caps.

3.B.7. The responses from the public indicated that it does not believe that the capping and the additional disturbance caused by the truck traffic is warranted at this site. In order to comply with ARARs and to adequately protect human health, welfare and the environment, the cap upgrade must be performed. As mentioned in a response above, if proper construction and road regulations are followed, the inconvenience to the public will be kept to a minimum. The issue of increased truck traffic was not brought up during the public hearing except during one comment read by a representative from Senator Welborn's office. The senator suggested using on-site materials as much as possible to reduce the amount of materials that would be trucked in. EPA agrees that on-site materials may be used for fill and grading, thereby reducing truck traffic. See comment and response 1.6 above.

3.B.8. Please refer to response to comment #2.11.D.i. and v.

3.B.9. Please refer to response to comment 2.11.D.i-vi and 2.11.E.iv regarding the landfill cap. Also, the risk assessment is considered a baseline condition at the site and this assessment indicates that the amounts of contamination in the groundwater are at unacceptable levels. The No Action alternative was carried through into the Proposed Plan and, as stated in numerous responses above, was not selected because, as the risk assessment indicates, it does not achieve ARARs or protect human health and the environment. The Act 641 cap, as stated in responses 3.5 and 3.6 above, does not achieve ARARs and therefore was not analyzed in depth within the FS. Capping alternatives and groundwater alternatives are interrelated to some degree. An ARAR-compliant cap can reduce leachate generation to help reduce/eliminate contaminants from reaching the groundwater in the future. Groundwater alternatives reduce/eliminate contaminants that are already in the groundwater. Both activities, capping and groundwater remediation, have their own ARARs. At a minimum, the landfill cap, as stated above, must

comply with MI Act 64, and the groundwater remediation must comply with MI Act 307, among other ARARs.

3.B.10. Please refer to above responses regarding landfill caps and ARARs.

3.B.11. This comment did not indicate what inconsistencies existed between the RI/Risk Assessment and the FS with regard to the exposure to landfill contaminants. The "Summary of Risks" tables within the FS, extracted whole from the RI/Risk Assessment, and other summaries within the FS adequately reflect what was presented within the RI/Risk Assessment. EPA does not believe that redundant safety factors are being applied by the selected remedy. The goal of this remedial action is to protect human health, welfare, and the environment, and each component of the selected remedy contributes independently toward this goal. Some of the alternatives selected may complement each other, such as the relationship between the capping of the site and the groundwater pump and treat (the better the cap, the less time may be needed to clean the aquifer, since contaminants will not leach from the landfill to the groundwater), but there are no redundancies in the selected remedy.

C. Summary of Comments:

3.C.1. Issues addressed within this comment have been addressed in the responses to other comments above. Enhanced bioremediation was re-evaluated by the EPA and was selected as the primary groundwater remedy.

3.C.2. This comment is addressed in numerous responses within comments #1, 2, and 3 above.

3.C.3. The No Action alternative was carried through the FS and in the Proposed Plan. It did not meet ARARs, nor was it protective of human health and the environment. The risks posed by no action are reflected in the baseline risk assessment.

3.C.4. EPA feels that there is sufficient data in which to base a decision on remedial action selection for the West KL Avenue Landfill site. The MDNR has concurred with the selected remedies, as stated within the ROD. If any significant changes occur to the selected remedies, as a result of the Remedial Design, the public will have the opportunity to review and comment on such changes. Also, public participation and information opportunities will continue through the remedial design and the remedial action.

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The report "Review of USEPA Proposed Alternatives and Proposal of Additional NCP Compliant Remedial Alternatives for Implementation at the West KL Avenue Landfill" and the affidavits from Mr. Woolf and Mr. Balkema, that were attached to Steering Committee/G&M letters, were not responded to under individual comments/responses. The points brought forth by these documents were highlighted within either the Steering Committee letter or the letter from G&M. All the above referenced documents have been added to the Administrative Record for this site.
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Comment #4:

4.1. I am here to assure you that no one is drinking contaminated water from the landfill and my Department will see to it that safe drinking water continues to be available in the area.

4.2. After contamination was discovered in several wells, the County of Kalamazoo, along with the Charter Township of Oshtemo, took prompt action to restore the water quality. First, deep wells were drilled. Second, a waterline was extended to service the area.

4.3. Since 1981, my Department has taken annual samples from discontinued shallow wells. Lab analysis reveals that concentrations of all the compounds are decreasing, typically by more than 90% over the 9 year period the Department has taken samples.

4.4. My Department believes that the availability of a public water supply will result in all future development connecting to this supply. In the remote chance a resident chooses to have a well, he or she must demonstrate to our satisfaction that a safe drinking water supply is available prior to issuance of a permit.

4.5. The Michigan Public Health Code requires that the well location and construction be designed to protect against pollution and to exclude all known sources of pollution from entering the well. Our Department has developed a decision tree to evaluate applications for well permits within one half mile of a source of pollution.

4.6. Applications for well permits within one half mile down gradient of the intersection of 4th Street and West KL Avenue will be required to demonstrate that contamination will not reach the well. This demonstration may entail the drilling of a test well, use of the deep aquifer, and preconditions for issuance of the permit. One precondition will be the requirement to connect to the public water supply if contamination infiltrates the well system. If a public water supply is not available, our Department has the authority under the Michigan Public Health Code to order any party or parties responsible for the contamination to provide an alternative water supply.

4.7. In sum, my Department: 1) has taken annual well samples since 1981 which confirm a substantial improvement in the quality of groundwater, downgradient of the landfill; 2) have verified that wells in present use as drinking water supplies are within limits set by the Federal Safe Drinking Water Act and; 3) has provided for their assurance that residents will not be exposed to contaminated water supplies by the extension of a public water supply line and the Department's requirements for issuance of well permits.

4.8. Accordingly, EPA and MDNR should not base their remedial decision on the remote possibility that residents might be consuming water which exceeds the Federal Safe Drinking Water Act limits. My Department believes that both your organizations should compare such risks to the actual risks of implementing and operating the proposed remedial selection. We note, for

example, that a low-cost fence around the waste disposal areas of the landfill would remove foreseeable risks arising from contaminants in the air and soil according to the investigation results. Therefore, the principal focus of the \$31 million remedy is to remove risks arising from contaminants in the groundwater. My Department would like each of the remedial alternatives, including limited action alternatives, evaluated to determine when the quality of groundwater leaving the landfill will return to acceptable Federal Safe Drinking Water levels.

4.9. My Department, EPA, and MDNR are responsible for protecting public health. It is important that our organizations accurately convey to the public the risks posed by the landfill. Our Department believes these risks to be extremely minimal.

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Attached to the Comment Letter was the decision tree and the County's results from the April 1990 sampling of the groundwater at and around the landfill.
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Response #4:

4.1. No response to comment needed.

4.2. No response to comment needed.

4.3. Several contaminants found in the groundwater at and around in the landfill exceed levels set by the Federal Safe Drinking Water Act's Maximum Contaminant Levels (MCL) by orders of magnitude. For example, the most recent data available, (the data submitted with this comment, dated May 2, 1990) shows benzene still in the groundwater at levels of up to 750 part per billion. The MCL for benzene in groundwater is 5 part per billion. This indicates that even though some contaminants may have decreased in concentrations in areas of the contaminant plume, there are still several contaminants in the groundwater that exceed federal and state drinking water standards. Also, the RI and the summary report submitted by Wilkens & Wheaton indicate that several groundwater monitoring wells have shown an increase in some contaminants over the years.

4.4. No response to comment needed.

4.5. No response to comment needed.

4.6. The decision tree (Comment 4.5 above) and the permit process are adequate protection for people who follow permit procedures, but it can not be guaranteed that everybody will seek a permit to install a drinking water well, nor does it prevent use of the existing drinking water wells in the area. In addition, the remedial action as selected by the ROD, will assure that the contamination will not spread into areas not previously contaminated, (either horizontally within the shallow aquifer or vertically to the deeper aquifer). Whereas your program will prohibit new wells from being installed and will replace wells that become contaminated, the

selected remedy will prevent further wells from becoming contaminated and will accelerate the time that the aquifer may be used as a drinking water source again. Furthermore, the NCP does not allow the use of institutional controls to prohibit exposures to contaminated groundwater.

4.7. EPA agrees that residential wells presently in use are within the limits set by the Federal Safe Drinking Water Act, but the groundwater between these residents and the site has contamination within it that far exceeds acceptable levels. It is the duty of EPA and the MDNR to protect not only human health or welfare, but also the environment.

4.8. The selection of the remedial action at the site is not based solely on the risk factors derived from the Remedial Investigation. The issue of ARARs, (as explained within responses to comments 1, 2, and 3 above) also plays a large part in the selection of the remedial action. Without the installation of a proper landfill cap, there is no way to determine how long the contaminants will continue to leach from the landfill and enter the groundwater. With the RCRA-type cap, the volume of leachate generated will be greatly reduced and, in combination with the groundwater pump and treat, the shallow aquifer should be within federal drinking water standards within a much shorter timeframe than if no or limited action is done at the site. The FS estimated that if the pumping rate of 2,000 gpm was utilized, the aquifer would be cleaned in about 6 years. The G&M Review Report indicated that with a pumping rate of 500 gpm, the aquifer would need about 18 years to be within acceptable levels. The actual cleanup time period will be dependent on the number of wells used to extract the groundwater and the pumping rate of each well. No timeframe has been established in regard to how long it will take for the groundwater to naturally attenuate, since the quantity of waste within the landfill is unknown.

4.9. The MDNR and the EPA are also responsible for protecting the environment and the natural resources of the state. In pursuing our joint goals (protection of human health, welfare and the environment), EPA and the MDNR feel that the selected remedy within the ROD is the appropriate approach to this site.

Comment # 5:

5.1. In 1979, the County closed the West KL Avenue Landfill in accordance with and under the direction of the MDNR. The landfill was covered with approximately 2 feet of soil enhanced by bentonite and a water diversion system to reduce the infiltration of precipitation. Permeability tests of the bentonite treated areas reveal that infiltration was reduced to 2×10^{-6} . Gas vents were also installed and the landfill was vegetated. Thereafter, the landfill cover was inspected and repaired to maintain the integrity of the cover. Samples were and continue to be taken and analyzed from monitoring wells and neighborhood wells. This closure met the then existing Michigan closure requirements for sanitary landfills.

5.2. It now appears that MDNR is insisting (and EPA is concurring) on closure of the landfill under the more costly hazardous waste regulations. The County believes this decision is erroneous and could result in adding

ten to twenty million dollars to the cost of closure without appreciable benefits. This change in direction is not justified, since knowledge about the content of the landfill has not changed since 1979 when the landfill closed under the sanitary landfill regulations. The County believes that the government's contractors erred when it failed to fully evaluate the landfill based on upgrades to meet the Act 641 requirements. The EPA and MDNR should now evaluate and compare the effectiveness and cost of an Act 641 cover to its proposed remedial plan.

5.3. Second, in great detail the EPA and MDNR have evaluated the pathway of potential exposure based on the unremediated conditions at the landfill, but have only evaluated the potential pathways of exposure after implementation of the various remedial alternatives in general terms, such as, the proposed groundwater remedy "provides greater long-term effectiveness and permanence than provided by the no action alternative." Does the word "greater" mean that the preferred groundwater remedy will restore groundwater leaving the site to drinking water standards in 6 years (EPA' figure) as compared, for example, to 9 years for the no action alternative? EPA and MDNR should fairly evaluate and compare each of the remedial alternatives as well as the remedial alternatives based on a 641 cap and on the improving conditions at the landfill.

5.4. Third, information being developed by G&M indicates that the government's contractor has grossly overestimated the rate of groundwater extraction. I understand your comments acknowledging that 2000 gpm is not likely. Our review of the 1979 Closeout Plan for the site further reveals the area of the landfill to be 57.31 acres, not 83 acres as stated by the government's contractor. The rate of extraction and area of the landfill are two of the most important factors in evaluating remedial alternatives and will not effect the remedial alternatives proportionately. We are concerned that these errors may have been a material factor in the government's failure to consider certain remedial alternatives (a settling pond versus reinjection, an Act 641 cover versus an Act 64 cover, etc.) or its selection of the preferred remedial alternative, let alone the cost projections you are using. The EPA and MDNR should re-evaluate all remedial alternatives (including an Act 641 cover) in light of correct data.

5.5. Finally the County has previously expressed its concern over the UV-enhanced oxidation alternative groundwater remedy onsite. Its position has not changed. However, we do wish to add that the proposed groundwater treatment facility is to be located on an unused portion of the landfill. This area has value as a source of fill material for the cover thereby reducing the County's cost of remediation. Since this area will be disturbed, it is preferable that mobilization, decontamination, and location of the groundwater remediation system, if any, be located on the fill areas after taking appropriate precautions. This action will avoid delays and preserve this unused tract for use as cover material and possible future use.

5.6. I understand EPA has given preference to treatment of the groundwater by discharge to the City of Kalamazoo water treatment plant. The County believes at least that is a step in the right direction by EPA.

5.7. The purpose of a public comment period is to solicit responses to the EPA and MDNR proposed remediation plan. While the County may not agree with all the approaches taken by the government, we share in common the mutual objectives to make certain that releases from the landfill will not adversely affect human health and the environment.

Response #5:

5.1. Please refer to responses above (such as response to comment #2.11.E.iv) and the RI report, regarding the status of the current cap.

5.2. The cost of the landfill capping alternative is a factor in the selection process. However, as a threshold, the cap must be protective of human health and the environment and meet ARARs. Alternatives meeting these threshold criteria are then balanced among five factors, one of which is cost-effectiveness. Michigan Act 641 cap, as stated in response to comments above, does not meet the requirements of the closure that is required under the ARAR, MI Act 64. See responses to similar comments above.

5.3. Refer to response to comment #4.8 above as well as other similar responses to comments above regarding landfill closure ARARs.

5.4. EPA's contractor based their cost estimates on a conservative use of the data on hand. Actual prices will of course vary from the estimates (i.e., if in fact the gpm is decreased from EPA's high estimate of 2,000 gpm to G&M's estimate of 500 gpm). The groundwater remedial action alternatives have been re-evaluated, however, and the use of enhanced bioremediation is the groundwater remedial action selected within the ROD (refer to similar comments above and the ROD). The use of a settling pond has never been discounted but awaits the results of the pump test that will be needed during the design of the pump and treat system to determine the actual pumping rate (refer to the Proposed Plan and the ROD). The evaluation of an Act 641 versus an Act 64 landfill cover was not influenced by the actual size of the landfill. As mentioned in above responses to comments, EPA believes, based on historical aerial photos and topographical maps, that the estimate of the landfill size is probably closer to 70-72 acres, and, due to topographical features of the landfill and the need to overlap or feather out the landfill cap over the sides, the amount needed to be capped was conservatively set at 80 acres. Refer to responses to comments above regarding Act 641 versus Act 64 closure.

5.5. Refer to responses to comments above and the ROD regarding the selection of enhanced bioremediation over the POTW or UV/oxidation. The location of the treatment facilities and the extraction wells, as shown within the Proposed Plan and the ROD, are only approximate locations and the final locations can be negotiated at a later date.

5.6. The use of the POTW is no longer the preferred groundwater remedial action, replaced by the use of enhanced bioremediation. Refer to responses above and the ROD.

5.7. EPA believes that its ROD will significantly advance this mutual goal.

Comment #6:

6.1. It is important to understand that the County has a responsibility to its residents to ensure a safe, potable water supply in and about the West KL Avenue Landfill. To this end, the County and the Township of Oshtemo originally drilled deep wells and later extended the water line. Since 1980, the County's Health and Human Services Department has monitored area wells.

6.2. We are aware G&M is recommending a municipal landfill cover, in-situ bioremediation of the groundwater and monitoring. County officials, including officials from the Health and Human Services Dept., have discussed with G&M the facts and circumstances supporting its decision as well as the facts and circumstances supporting EPA's preferred remedial action plan. This is to advise you that the County does support the recommendation of G&M. I have explained below the County's thoughts on this matter and have raised several additional issues important to the residents of the County.

6.3. The County has participated in technical discussions with G&M and is aware that no attempt has been made by the FRP Committee to influence the decision of G&M.

6.4. Unlike other Superfund sites throughout the U.S. and Michigan, the County as a viable owner of the landfill is in a better position to manage and control remediation activities, including those activities necessary to protect human health. The County's Health and Human Services Dept. has monitored wells in the area of the landfill since 1980. The County recognizes that such monitoring would have to continue under the G&M proposed alternative remedy until such time as the water quality returns to acceptable state and federal drinking water standards.

6.5. The County is aware that both the state and federal governments have approved the use of bioremediation at Superfund sites. The EPA has recently announced its bioremediation field initiative on June 27, 1990. The initiative is designed to foster field tests, demonstrations, and evaluations of bioremediation. The EPA has concluded, and G&M has confirmed, that extensive bioremediation is occurring at the site. Independent studies by the Upjohn Co. has demonstrated the feasibility of in-situ bioremediation.

6.6. The County believes in-situ bioremediation can be a complete and final groundwater remedy at the site. The probability and advantages of success far outweigh the disadvantages of failure. In the Mason County Superfund site in Michigan, EPA recently issued a ROD to cap the site while continuing to monitor groundwater conditions to determine the effectiveness of the cap. The State of Michigan concurred in this remedy. Therefore, the state and federal governments have established precedent for the remedial alternative recommended by G&M.

6.7. In the remote event bioremediation does not achieve the appropriate clean up levels, I understand the law gives the federal government the authority to require further remediation. This obligation of the government to review the site every five years, combined with the commitment of the Health and Human Services Dept. to monitor the quality of the drinking water ensures the health and safety of our residents.

6.8. The potential savings to the residents and area business community of the G&M recommended alternative are enormous. First, the cost of the EPA alternatives is between \$16 million and \$20 million greater than the remedial alternatives proposed by G&M. In the unlikely event it becomes necessary to implement a groundwater extraction program, we do not expect to see a substantial increase in these costs. In fact, it may result that further monitoring and reduction of the leachate caused by the new cap could result in reduced future costs if further groundwater remediation becomes necessary. Furthermore, the EPA proposed groundwater remedy is likely to require obtaining off-site access for construction of the extraction system. This could add substantial delays to the time of remediation. In light of the above, the County believes it prudent to defer any decision on implementation of the EPA's proposed groundwater remedy until such time, if any, that the in-situ bioremediation fails to achieve its objectives.

6.9. Second, the EPA's proposed remedy does not have broad community support. In particular, the proposed soil remedy is likely to cause substantial disruption to the area residents. The County estimates that it may take approximately three years to deliver 30,000 truckloads of materials to the site to meet the cover design requirements. The County believes that such activity in and about the site would result in a substantial number of complaints from area residents concerned over safety, dust and deteriorating road conditions resulting from such activity. The proposed soil remedy of G&M reduces that cap requirements to less than half that proposed by EPA, allows use of the existing cap material and permits the use of on-site and adjoining site borrow material for construction of the cover. This would substantially reduce road traffic and thereby lessen the concern of area residents.

6.10. The County does share your goal to protect human health and the environment. It has demonstrated this commitment by the proactive response to restore potable water supplies and to close the landfill. The County looks forward to continuing its good working relationship with both the state and federal governments.

Response #6:

6.1. EPA understands the County's commitment and commends the County on its efforts to provide a safe, potable water supply to residents near the West KL Avenue Landfill site. The County's monitoring has verified that the groundwater in and around the site is still contaminated above the federal and state acceptable limits.

6.2. Please refer to responses to comments #2 and #3 above.

6.3. No response to comment needed.

6.4. This situation, in which a municipality is owner of the site, is not uncommon within Superfund. The advantages of a municipality handling the remedial activities, including the operation and maintenance, are well known.

6.5. Enhanced bioremediation is now the selected groundwater remedial action. Please refer to responses to comments above regarding in-situ and enhanced bioremediation. Also, refer to the ROD in regard to the selected remedy.

6.6. See responses to comments #2 and #3 above regarding the use of in-situ bioremediation. In regard to the Mason County Superfund Site, the EPA and the state did agree on capping the site first, then to conduct a groundwater remedy some time later if groundwater data indicated conditions were not improving. Substantial differences exist between the two sites. In particular, the contamination area at the Mason County site is much smaller than at West KL, and the contaminants at Mason County are found in concentrations much lower than at West KL. For instance, 1990 data from the Kalamazoo County Health Department shows benzene still found at levels up to 750 ppb, while at Mason County, benzene was found at levels of only up to 11 ppb. Other contaminants are similar in that they were found in concentrations which are magnitudes lower at Mason County than at West KL. Only benzene (MCL 5 ppb, found at 11 ppb) and 1,1-dichloroethene (MCL 7 ppb, found at 59 ppb in one sampling round) exceeded the federal drinking water standards at Mason County, while at West KL benzene (MCL 5 ppb, found at 720 ppb), 1,2-dichloroethane (MCL 5 ppb, found at 200 ppb), and vinyl chloride (MCL 2 ppb, found at 107 ppb) were the compounds that exceeded the federal drinking water standards. Also, West KL has more groundwater data available, so the presence of the contaminants is considered a fact, while at the Mason County site, only limited groundwater data was available, so continued groundwater monitoring was needed to verify the extent and level of the contamination. At Mason County Landfill, in short, the cap is being installed while the groundwater is being investigated further. The situation at the West KL site is much more serious than the situation at the Mason County site. Also, as a matter of record, Mason County is presently installing an Act 64 compliant cap.

6.7. EPA has the obligation to review remedies at site's in which hazardous wastes/substances remain on-site whenever warranted, but at least within 5 years. If the selected remedy does not achieve the cleanup goals as stated within the ROD, EPA will require appropriate measures to be taken to assure protection of human health or welfare, and the environment.

6.8. As discussed above, the NCP provides nine criteria to evaluate alternatives, categorized into three groups. 40 CFR 300.430(f). Cost factors are balanced against four other criteria in the second category. Consequently, cost savings is not the major objective in the selection of the most appropriate remedial action for a site. Cost-effectiveness is one of the balancing criteria when comparing alternatives against each other. Therefore, the use of enhanced bioremediation was re-evaluated and chosen as

the groundwater remedial action alternative because of cost-effectiveness. The estimated cost of the total remedial action at the site is now approximately \$16.5 million compared to the \$23.5 to \$27 million as estimated in the EPA's Proposed Plan. The purchase or lease of off-site property most likely cannot be avoided since contamination from the site does not stop at the landfill's borders and groundwater off-site will need to be extracted for treatment.

6.9. As mentioned in responses above, the disruption to the local residents will be unfortunate and will be kept to a minimum through the use of proper hauling and construction methods. The caps proposed by G&M do not achieve ARARs and, in effect, will not (at least for the proposed cap using on-site soils or the repairing of the existing cap) be much different from the cap that was applied in 1980 and has failed to prevent groundwater contamination.

6.10. EPA also looks forward to all parties cooperating in this important environmental matter.

Comment #7.

7.1. It is my understanding that the EPA's Preferred Remedial Action Plan calls for the construction of a proposed RCRA cap. To construct this cap, approximately 900,000 cubic yards of materials are required to place the five and one-half foot cap over the existing cap at the landfill.

7.2. Assuming a truck can transport 30 cubic yards per load to the site, this would involve over 30,000 loads of material taken to the site. Furthermore, it would take over three years just to bring materials to the site. This heavy volume necessarily means greater traffic in and around the site and a corresponding increase in the risk of accidents, injuries and fatalities. In addition, this traffic flow will increase noise, pollution and road wear and tear at greater expenses to the local taxpayers, let alone the disruption to the neighborhood throughout the roadway area to be utilized. What's more, as I recall, KL Avenue is an all-weather road only up to the site going west.

7.3. Given the forementioned facts, I believe the EPA should consider the following:

A) I believe it is important that the EPA incorporate, to the maximum extent possible, the use of on-site and local materials to fulfill any capping requirements. Furthermore, the EPA should consider other capping alternatives and scenarios which require that less material be brought to the site. For example, use of bentonite, utilization of the existing cap material or selection of a solid waste cap.

B) Next, that the EPA re-evaluate carefully its selection of soil and groundwater remedies and the risk implementation these remedies pose to the public at large. For example, the selection of a solid waste cap as opposed to a 641 cap results in the need to obtain far less cap material, thereby substantially reducing the risks associated with traffic accidents without

appreciable increase in the hypothetical risks associated with drinking contaminated groundwater.

C) Finally, that the Township of Oshtemo and the County Road Commission regulate the volume and weights of the various trucks and other utility vehicles traveling on local roads to and from the site to avoid, to the maximum extent possible, the impact on roads due to movement of heavy construction vehicles.

Response #7:

7.1. EPA's ROD requires the design and installation of a RCRA cap. The details of this cap are summarized within the ROD and detailed in the FS.

7.2. In order to adequately cover the site, meet ARARs and protect the integrity of the landfill cap to reduce leachate to the groundwater, the ROD has selected the RCRA-type cap. As mentioned in responses to the above comments, it is an unavoidable and unfortunate inconvenience for the neighboring residents. On-site materials should be used to the maximum extent practicable, but not at the sacrifice of a lesser quality cap than is called for by the ARARs. This would substantially reduce the amount of materials required to be transported to the site. Following proper hauling and construction methods will help to minimize the risks caused by the capping to the neighboring residents. In regard to the wear and tear on the roadways, this is a problem that must be solved outside of U.S. Government involvement. The construction contractors should be required to repair any damage caused to roadways because of the Remedial Action.

7.3.A. On-site and local soils can and should be used to the maximum extent practicable. The requirements of the RCRA-type cap must, however, be met (i.e. meet the clay thickness and compaction of MI Act 64). On-site materials can possibly be used for the grading, fill material, and topsoil layers. See responses to comments above regarding alternative capping methods.

B. The groundwater remedy has been re-evaluated, see above response to comments and the ROD. Also see above response to comments regarding alternative capping methods.

C. This is a local concern that must be addressed by the appropriate local officials.

Comment #8:

8.1. When the landfill was closed in May 1979, the MDNR prepared a closure plan pursuant to State law, rules, and regulations. The County of Kalamazoo, with assistance from the Charter Township of Oshtemo, complied with MDNR's directive and completed the closure plan in 1980 which along with other costs the County incurred totaled, at present dollars, \$1.5 million.

8.2. Ten years later EPA and MDNR have now proposed another closure plan that will cost \$20 - \$30 million. Municipalities, including the County of Kalamazoo, do not have unlimited financial resources to continue to finance new closure plans every ten years for the same landfill site. What assurances can you give that the Proposed Plan will be successful, or that another closure plan will not be required in ten years or at some other time in the future?

8.3. I would also like to request that EPA and MDNR strongly consider the comments and recommendations that will soon be submitted by G&M since they are much more cost effective, yet environmentally sound, for this landfill site than the Proposed Plan.

Response #8:

8.1. Due to the contamination present in the groundwater, it is apparent that the present landfill cap has failed. The Michigan regulations for the proper closure of sites that have accepted hazardous wastes are cited in Michigan Act 64. The selected alternative for landfill closure is a RCRA-type cap that is equal or better in performance than the MI Act 64 closure. See the ROD and FS for details on the capping materials.

8.2. The County alone does not have to finance the closure. Other Potentially Responsible Parties (PRPs) [PRPs include waste generators and transporters, and site owners and operators] will be involved in the financing of the remedy as well as the County. EPA believes that the cap will have a useful life of at least 30 years, and more if properly maintained.

8.3. See above responses to comments and the ROD regarding re-evaluation of the groundwater remedy.

Comment #9:

9.1. I question the need for and appropriateness of this proposed remedy (landfill cap) in view of the fact that approximately 20 acres of the site were capped in 1980 under then prevailing MDNR regulations. The proposed plan assumes that the entire 87 acre site needs to be capped, which is not consistent with records and site maps which indicate that only 60 acres was ever used for disposal or waste.

9.2. The proposed plan fails to take into account the true magnitude of such a capping project, both on an economic and practical level. A 60 acre cap consisting of 2 feet of compacted clay and 6 inches of topsoil would require in excess of 360,000 truck yards of clay to net 240,000 cubic yards of compacted material. This figure includes a "best case" shrinkage of 33% from loose clay to compaction. The closest permitted clay borrow material is in Watson Township in Allegan County 22 miles from the site.

9.3. My experience (in the excavation business for over 40 years) has been that under the best conditions on 40 yard gravel truck with a pup trailer, or "gravel train" will yield 26.5 cubic yards of compacted clay and such

gravel train could only complete one trip site to site in just under 2 hours, or at best 6 trips in a 10 hour day.

9.4. Under the most favorable weather conditions capping operations can only be performed for the 7 month period between mid-April and mid-November, as all available ingress and egress roads are subject to weight restrictions and frost laws by local authorities and the State of Michigan. All of this translates to over 9,000 truck trips into and out of the site just to complete the clay portion of a 60 acre cap. Given real world equipment, labor and weather problems it will take a minimum of 2 to 3 years of constant heavy traffic to complete a 60 yard cap. If you use the same calculations for your proposed remedy and acreage, you must increase the number of loads and time required by at least 30%.

9.5. For the above reasons, the EPA should re-evaluate and revise the proposed remedy as to landfill capping, taking into account 1) the capping which has already been performed, 2) the actual additional acreage which may need to be capped, and 3) the type of cap which may be needed. The marginal and questionable benefits of your proposed plan must be compared to the very real risks which its implementation will create, including but not limited to, traffic, air pollution, road damage, danger to the public and disruption of the community.

Response #9:

9.1. See above responses to comments regarding failure of the present cap and regarding the controversy over the acreage of the site.

9.2. See responses to similar comments above.

9.3. No response to comment needed.

9.4. No response to comment needed.

9.5. See above responses to similar comments.

Comment #10:

10.1. In behalf of the County, I'd like to again call your attention to the Mason County Landfill ROD and Responsiveness Summary. The EPA and the MDNR proposed a landfill cover remedy and deferred all action on the groundwater remedy pending a determination of the covers effectiveness.

A) "In addition, the effectiveness of the soil/clay cap of alternative 4 must be measured before resources are expended on a pump and treat system."

B) "Testing indicates that the soil/clay cap will reduce the leachate generation within the landfill as much as ninety percent. This will in turn decrease the amount of contamination reaching the groundwater and therefore, in the future, contaminants in the groundwater may be

dilute enough to fall below federal drinking water standards and acceptable risk levels."

10.2. The principal difference between Mason and West KL Avenue Landfills is that in the latter instance sufficient groundwater data exists to hypothecate the effectiveness of a cap on the quality of groundwater and EPA, G&M and Upjohn have substantiated the presence of naturally occurring bioremediation of the groundwater. Thus, sufficient information exists for EPA and MDNR to select in-situ bioremediation as the groundwater remedy.

Response #10:

10.1. Please refer to response to Comment #6.6 above regarding the comparison of this site to the Mason County Landfill.

10.2. Please see response to Comment #6.6 above regarding the comparison of this site to the Mason County Landfill.

Comment #11:

11.1. This letter is offered in support of comments by W. Freeland, Kalamazoo County Administrator, in his letter to you of 8/10/90. Oshtemo Township, like the County, is a FRP at the site and also has certain responsibilities to Township residents and the public. The Township shares the goals of the County, EPA and the MDNR to protect human health and the environment.

11.2. Township officials are familiar with the facts and circumstances of this site, including the G&M study and recommendations and the EPA's preferred remedial action plan. This will confirm on behalf of the Township, that of the proposals for further capping of the site, the Township supports the G&M recommendation of a municipal landfill cover. Of the proposals for groundwater treatment, the Township supports the G&M recommendation for in-situ bioremediation and monitoring. The reasons set forth in Mr. Freeland's letter in support of the preference for these alternatives are adopted by the Township.

11.3. The Township also joins in the concerns expressed over the volume of truck traffic which would be generated by EPA's proposed capping remedy. We believe the EPA's proposed remedy does not have broad community support. A number of Township residents have expressed justifiable concerns about the danger, noise, inconvenience, and destruction of roads which would result from construction of EPA's proposed landfill cap, and we join in those concerns. Construction of the landfill cap recommended by G&M would require substantially less truck traffic and would therefore substantially lessen the danger and inconvenience of the proposed remedy, with substantially less expense and with effectiveness equal to the remedy proposed by the EPA.

Response #11:

11.1. No response to comment needed.

11.2. See above response to G&M comment (Comment #3) regarding landfill caps. Also, see above responses and the ROD regarding the re-evaluation and selection of enhanced bioremediation as the groundwater remedy.

11.3. See above responses to similar concerns.

Comments from Residents:

Comment #12:

12.1. As stated at the meeting we identified ourselves as being the owners of forty acres immediately bordering the east of the site.

12.2. The proposed landfill cap will increase the height of the landfill by 5-feet, 6-inches.

12.3. I stated my concern about this because nothing was mentioned about prevention of water runoff onto my property, into my 2 wildlife ponds and/or into Bonnie Castle Lake, of which we own considerable frontage. I mentioned that the current berms are in poor condition and that much improvement would have to be made to prevent any runoff. It was also mentioned at this meeting that Kalamazoo County has already capped the site per your previous specifications. It was also stated that to again cap this area per your proposal it would take 60,000 truck loads of fill. This I feel would ruin KL Avenue, requiring much repair to be made to the road. Are you willing to pay for all this fill and necessary repairs to KL Avenue? We people on KL Avenue do not look forward to this additional nuisance traffic.

12.4. Installing pumps at the site to pump and treat the contamination may involve as many as 7 pumping wells. If this many pumps are required, we feel it will not only dry up our current well water supply, but will also affect the water levels in our two wildlife ponds and Bonnie Castle Lake.

12.5. It was also mentioned that after on site treatment of the contaminated water, that the treated water could be discharged into Bonnie Castle Lake. Nobody from your departments ever discussed this with the current property owners of Bonnie Castle Lake, of which that are only about 7 owners. I, at this time would be opposed to this method of pumping, treatment, and discharge.

12.6. It was mentioned that a sanitary sewer line be constructed to carry the contaminated fluids to the Kalamazoo Treatment Plant. Again, I ask, who is going to pay for this sewer line?

12.7. A water line was constructed along KL Avenue and 4th Street by Oshtemo Township because of some polluted water wells on the westerly side of the site.

12.8. If any water wells of property owners with frontage along this water line should go bad because of claimed pollution, they are required to pay front foot cost of the water line plus hook up connection fees to obtain city water. I claim this is not fair to the KL Avenue property owners. We

did not pollute the site, the whole of Kalamazoo and adjoining counties caused the claimed pollution. All should have paid for the installation of the water line. I agree those who connect to the water line should pay the hook up connection fee, but not the front footage cost; whether it be water line or sewer line.

12.9. A statement was read at this meeting from the Kalamazoo County Health Dept. that monitoring of test wells placed around the site showed a measured drop of pollution to the groundwater in the shallow aquifer.

12.10. It has been 10 years that the site has been closed. The County and Township have met all previous requirements pertaining to the site. I believe your cost estimate of \$25 million for the site is totally out of line and absolutely unnecessary.

Response #12:

12.1. No response to comment needed.

12.2. No response to comment needed.

12.3. The design of the landfill cover will take into account site specific issues such as surface water runoff, addressed by your comment. Also, see above responses to comments regarding the need to cap the site, the ARARs and the issues regarding the inconvenience to the neighboring residents. As mentioned in above responses, the PRPs will be sought to finance the remedial action at this site.

12.4. There should not be any effect on your well by the pumping action that will occur west of the site. During the actual design of the groundwater extraction/re-injection system, issues such as yours will be addressed.

12.5. Bonnie Castle Lake was dismissed as a discharge point very early in the decision process, so no discussion with the residents was deemed needed.

12.6. The use of the Kalamazoo Publically Owned Treatment Plant (POTW) is still a viable option. All costs would be picked up by the PRPs.

12.7. No response to comment needed.

12.8. This is not an EPA issue but should be addressed to the County and/or the Township. You may wish to consult the County or your attorney regarding this issue.

12.9. See responses to similar comments above.

12.10. Please refer to the RI Report, the ROD and the responses to comments as to the need for remedial action at this site.

Comment #13:

13.1. As home and property owners located adjacent to the site, we are concerned for the future cleanup plans of the landfill site.

13.2. We understand the need to cleanup the area, and to take action to prevent further damage by the landfill to the surrounding area but question the methods planned by the EPA and the amount of taxpayers' money to be used for these methods. The plans outlined at a recent township meeting seemed excessive for the problems listed. We would hope that federal officials would plan to spend tax dollars wisely while accomplishing what is necessary to cleanup the area.

13.3. We are also concerned with the fate of Bonnie Castle Lake. Since we moved to the area, we have worked continuously to clean up our shoreline and have made a conscious effort to remove debris from the lake. It is our sincere wish that any "clean up" action taken by the MDNR or the EPA will not adversely effect the area surrounding or the level and quality of water in Bonnie Castle Lake.

Response #13:

13.1. No response to comment needed.

13.2. The costs will be distributed among all the PRPs (generators and transporters of hazardous wastes and substances to the site and the owners and operators of the site) in a manner to be set. At present, there are over 65 PRPs which are to share these remedial action costs.

13.3. The remedial actions planned will not effect Bonnie Castle Lake. No groundwater treatment discharge will enter Bonnie Castle and the new landfill cap will be designed to deflect excess surface water drainage away from Bonnie Castle Lake. The groundwater extraction system will be located to the west of the site and will be designed not to effect the relationship between the lake and the groundwater.

Comment #14:

14.1. I would like to go on record of opposing any action being taken on the so called clean up of the KL Ave. Landfill in Kalamazoo for the following, among many, reasons: I question the degree of contamination and degree of hazard to one's health as reported at the meeting of July 23, 1990. As in most accusations of contamination and hazards to health the information is very sketchy, and the facts practically nonexistent. Lab tests on rats and mice are inconclusive as in past cancer scares about cranberries, red dyes, etc. They only proved, if anything, that these substances would have to be consumed or ingested in monumental quantities to pose a risk to one's health.

14.2. The landfill has been closed for 10 years and capped according to the DNR and EPA requirements at the time, and fully approved. In the 10 years the "contamination" level has decreased 90% according to concerned

agencies, which to me does not warrant the spending of millions of dollars on this land for something unknown and untested.

14.3. At this time, to my knowledge, no one needs to be concerned about drinking contaminated water caused by the landfill. New city water lines have been and are being made available to the entire area, along with deeper wells which have replaced the shallow ones in question.

14.4. There has been talk of bringing suit against companies who used the landfill, which covers Kalamazoo County and surrounding areas, which I feel is grossly unfair. I suspect the innocent companies who discarded nothing harmful would be paying for a few who dumped what you consider hazardous materials. The questionable materials were discarded by a minor few out of the tons and tons of many.

14.5. I do not believe in health hazard hysteria. Germs have been, and always will be here with us. I do believe in the purpose and intent of the DNR and EPA, but do not consider the expenditure of millions of dollars to clean up 87 acres and groundwater on a small tract of land in Kalamazoo County to be warranted. I believe the situation will be better and lessen, as is already happening, as time goes on. I feel the emphasis on clean up should be placed at each source producing questionable materials as it is occurring, and use the concentration of dollars for that purpose, and more clean up of the Great Lakes, our rivers and streams.

Response #14:

14.1. No response to comment needed.

14.2. Your concern is legitimate but the contamination at and around the site is real, as shown by the groundwater samples by the EPA and by the County. Even though some contaminants have decreased in concentration over the years, the concentration of several contaminants still exceed acceptable drinking water levels and remedial action must be taken. See responses to similar comments above.

14.3. See responses to similar comments above.

14.4. The EPA has done extensive searches to find out who disposed of hazardous wastes/substances in the landfill. Since the landfill closed in 1979, records are scarce. According to federal law, any generator or transporter of hazardous wastes/substances and the owners/operators of the site can be held liable for any investigation and cleanup of contamination at a site. Those who generated or transported only wastes which did not contain hazardous wastes/substances would not be liable for such costs. In the eyes of the law, those who disposed of minor amounts, can be just as liable as those who disposed of major amounts. You may refer to Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act of 1986 (better known as Superfund) for the legal specifics regarding liabilities at Superfund sites.

14.5. Refer to response 14.2 above.

Comment #15:

15.1. Although we are east of the landfill and in less danger of soil and water contamination, we are concerned about Bonnie Castle Lake and what effects your proposed plan for cleanup would have on the lake. What assurances do we have that the groundwater you propose to pump from the landfill into Bonnie Castle Lake won't still contain pollutants.

15.2. We feel opening up the landfill with heavy equipment would be like opening up a "can of worms". We feel this could do more harm than good.

15.3. As for putting on another cap of clay, liners, and soil, we feel that this is not necessary as contamination has decreased in the 9 years since the dump's closing. I'm sure you can imagine what hauling 60,000 loads of clay, soil, etc. over a period of 5 years would do to KL Ave.

15.4. My parents lived here during the 10 years the landfill was open. This was supposedly their "Golden Years" but it was emotionally draining to them to have the garbage trucks going by at 1/2 to 1 hour intervals. Now we live here in our "Golden Years" and face the same possibility.

15.5. We will be the ones to pay for the increased stress to the roadway through special assessments for road repairs. The same would be true if the so called polluted groundwater were to be pumped to the city sewage treatment plant. We would be assessed for sewer lines that we don't need. We have a good septic tank and dry well that should last us for our remaining years.

15.6. We also feel it would be unfair to residents west of the landfill to have deed restrictions put on their property.

15.7. If according to your figures something must be done, then we feel installing a low cost fence around the site would be sufficient at this time.

Response #15:

15.1. No water will be discharged to Bonnie Castle Lake. See responses to similar comments above.

15.2. The landfill will not need to be "opened." The landfill cap will be installed on the present cap. Some of the present cap material may need to be regraded, but the waste material does not need to be disturbed.

15.3. See responses above to similar comments.

15.4. The disturbance caused by the installation of the new cap is unfortunate and cannot be avoided. As stated above, if proper hauling and construction methods are followed, the disturbances should be kept to a minimum. The capping activity is estimated to take 3-5 years.

15.5. It will be the County's and Township's responsibility to address repairs to the roads. The City sewage treatment plant is no longer the preferred groundwater alternative but if the City's sewage treatment plant is used as part of the groundwater remedial action, the PRPs would need to pay for the sewer extension to the landfill and residents will most likely be charged only if they elect to hook-up to the system. Residents normally are only be charged for the hook-up from the home to the street, but this is a County or Township matter.

15.6. Deed restrictions are necessary as additional protection to the residents' health. We can not permit new wells or existing wells to receive groundwater that is contaminated beyond federal limits.

15.7. The fence will be used but the groundwater remedy is needed to actively address the groundwater contamination and meet ARARs. The upgraded cap is needed to meet ARARs and to prevent further contamination of the groundwater.

Comment #16:

16.1. The Oshtemo Lakes Association is composed of residents along Bonnie Castle and Dustin Lakes in Oshtemo Township, as well as those nearest the KL Avenue Landfill in Kalamazoo County. It was largely through the efforts of our organization that the KL Avenue Landfill was 1) prevented from expanding to 600 acres, as had originally been planned by the County; and 2) was subsequently shut down entirely. Accordingly, we have interests that run fully parallel to the concerns of EPA and we thank you for your efforts thus far.

16.2. We do, however, have serious qualms about some of the procedures you have proposed as a remedy. We are primarily concerned about any "heroic" measures that could negatively impinge on our water supply, such as an attempted purging of the aquifers below the landfill. With massive quantities of water pumped back to Kalamazoo treatment plants, wouldn't the water table of the area in general, and Bonnie Castle Lake in particular, be affected? Similarly, has ultraviolet treatment of contaminants been demonstrated as an effective mode at other landfill sites, and would there be sufficient protection against air pollution?

16.3. In view of the fresh water pipeline to people with affected wells and the diminishing pollution plume, one wonders if the multi-million-dollar measures you propose are really appropriate now. In this respect, we join the County in suggesting that a less ambitious and far less costly a remedy be devised.

16.4. At the same time, we must alert both EPA and the County that not everyone in the affected area benefits from the new water supply line along KL Ave. My well, for example, is the closest to the "MT Garbage" section of the site and yet it is monitored only twice a year, while 8269 West Main Street, also in the immediate area of the site, is not monitored at all. We also wonder why no monitoring wells were ever drilled at the north-northeastern edge of the landfill, which is our vector away from the site.

16.5. Other low-cost and immediate improvements necessary at the landfill would be to erect a fence around the perimeter. At present, motorized "dirt bikes" in summer and snowmobiles in the winter are tearing up the groundcover.

Response #16:

16.1. No response to comment needed.

16.2. The extraction of the groundwater should not affect Bonnie Castle Lake since the lake is divided by a layer of clay from the groundwater body that will be pumped. See the RI report for more details on the geological setting of the lake as compared to the site. The design of the groundwater extraction system will be set so that Bonnie Castle Lake will not be affected. UV-oxidation is no longer a preferred groundwater remedial action. The use of enhanced bioremediation is now the selected groundwater remedial action. The use of the City sewage treatment plant may be used if the enhanced bioremediation fails. No matter what system is chosen, air pollution will be monitored and addressed appropriately.

16.3. The estimate of the overall remedial action is now \$16 million compared to the \$23 - 27 million initially proposed. EPA and MDNR feel the actions selected are needed to assure the protection of human health, welfare, and the environment.

16.4. As the RI Report indicates, the groundwater flow direction in the West Kl Ave. Landfill area is to the west with components to the southwest and the northwest. Your well, located to the immediate northeast of the site, was sampled twice during the RI and did not indicate any contamination from the landfill. The RI did not sample all the residential wells in the area, only representative wells that had a possibility of showing contamination and appropriate background wells. The residential well located at 8269 W. Main Street was not sampled during the RI because it is further upgradient than your well and another background sample was not necessary (two background or upgradient wells were installed east of the site). Groundwater monitoring wells were not installed to the northeast of the landfill because your well was a sampling point, and since this location is considered an upgradient point, another upgradient or background well was not deemed necessary in addition to the background wells located just east of the site.

16.5. A fence will also need to be installed to protect the investment of the new upgraded landfill cap as called for in the ROD.

Comments Received Only at the July 23, 1990 Public Hearing:

Comment # 17:

17.1. I am a legislative assistant with the Michigan Township Association, an association of more than 1,200 townships in the State of Michigan. I have come here tonight to express the concerns of our memberships regarding

two issues which have emerged because of government action at the West KL Avenue landfill in Kalamazoo.

17.2. First, it is my understanding that this landfill ceased operations in 1979 and undertook a closure of the facility pursuant to and with full approval of the MDNR. It consists of a cap, gas venting, and water diversion system. I further understand since that time conditions about the landfill have substantially improved and that improvement is probably due, in principal part, to the remediation to close the landfill. It is my further understanding that the Township of Oshtemo and the County of Kalamazoo have extended public water supply lines to those parties on private wells in and about the area of the landfill.

17.3. Our association is particularly concerned with the wavering approach taken by the MDNR and the EPA in remediation of the site. Local governments need the assurance that actions they take pursuant to the direction of the MDNR and EPA have a reasonable degree of finality, particularly in situations like the West KL Landfill, where conditions are improving and the local governments have taken steps to minimize the risk to its residents while conditions continue to improve.

17.4. Local governments are not profit centers. When they agree to own and operate a landfill, they do so for the benefit of the entire community and without a profit incentive. Local governments need to be able to estimate the cost that they will incur in closing such facilities; and once closed, need reasonable assurance that it will not be necessary to pay substantial sums to upgrade the facilities already closed.

17.5. Second, according to the records of the MDNR, the site is composed of minimum amounts of industrial waste. Our association is also concerned with EPA's and MDNR's application of hazardous waste remedial requirements to sites that contain principally municipal wastes. The MDNR complies with the State Superfund list comprising over 2,600 sites in Michigan. The EPA has identified over 75 Superfund sites in Michigan. However, neither organization appears to have clearly articulated the conditions under which solid waste versus hazardous waste clean-up standards will apply.

17.6. The application of hazardous waste clean-up standards to sites substantially increase the cost of remediation. In this case, the EPA and the MDNR have estimated a remediation cost to be up to \$27 million dollars. A solid waste remediation could be accomplished for under \$10 million.

17.7. On behalf of the membership of the Michigan Township Association, I ask that the EPA and the MDNR reconsider their decision at the site in light of the implications resulting from fluctuating remedial positions and the ability of local government to predict and provide the proper costs.

Response #17:

17.1. No response to comment needed.

17.2. See responses to similar comments above regarding the inadequacy of the present cap.

17.3. EPA and MDNR feel that the combination landfill cap and groundwater extraction and treatment will address the contamination problem presently at the West KL site, and if installed and maintained properly, will assure protection well into the future. If, however, new or otherwise unforeseen contamination occurs at the site that is potentially harmful to human health, welfare, or the environment, the EPA and/or the MDNR may require further actions to address these new risks.

17.4. As mentioned in responses to comments above, the County and Township are not expected to finance the entire remedial action themselves. PRPs, as explained above, including waste generators and transporters, and the owners and operators of the site, all are equally liable in funding the remedial action at this site.

17.5. The amount of hazardous substances/wastes disposed of in this landfill have not and can not be estimated based on the data base presently available. The records do show, however, that hazardous wastes/substances as bulk liquids, truckloads of drummed wastes, and tank loads of sludges were disposed of within this site. The EPA and the MDNR feel that this evidence and the concentrations of contaminants found in the groundwater warrant the handling of this site according to hazardous waste clean-up standards.

17.6. See responses to above comments and the ROD regarding the costs of the selected remedial actions for this site. Also see above responses to comments regarding the reasonings for the RCRA-type landfill cap.

17.7. See responses to above comments and the ROD regarding the re-evaluation of the groundwater remedial action and the complete remedial action selected by the EPA.

Comment #18:

18.1. UV-oxidation seems like that is going to be high maintenance. I've only seen it on TV before. It looks like it is very fragile. I don't know if that's been worked into the plan or not, but it seems to me if you treat the groundwater directly beneath the landfill where one would think would be the heaviest contamination, you could pump the treated water back through the landfill treating the soils, which is the source.

18.2. And then on the outer fringes, come up with the nearest absorption or look at another feasibility or another remedial technology on the lighter contaminants instead of just going with one type of remedial design for the whole thing. It seems like to me you're basically looking at a heavily contaminated area. Again, I guess the idea about capping is basically out of sight, out of mind, maybe. I think we're asking for some problems 30 or 40 years down the road.

Response #18:

18.1 See above responses and the ROD regarding the use of enhanced bioremediation as the selected groundwater remedial action. The use of UV-oxidation, like the other remedial action alternatives presented within the FS, may be implemented to replace or supplement the selected remedy if it is shown that the selected remedy does not achieve the cleanup goals as stated within the ROD. The pumping of the groundwater directly beneath the landfill is a possibility if the groundwater already contaminated outside of the landfill is also collected. The exact locations of the extraction wells for the selected remedial action will be determined during the design of the extraction system. The extraction wells need to be placed in areas that capture or contain the contamination plume, but this may be done in stages with some wells nearer the site and some wells further out. When the wells further out are pumping clean water, they can be shut down leaving the wells nearer the site to continue to intercept the contaminants as they leave the landfill. The idea of pumping the groundwater through the landfill was considered, at least in theory, but was not carried forward because the exact types, quantity, and locations of the hazardous wastes within the landfill are not known. By "flushing" the landfill, you may in fact be creating more contamination than would have been created if the site was left as is, by making wastes or leachate that normally would not have migrated into the groundwater, migrate into the groundwater.

18.2. Refer to 18.1 above regarding the outer fringes of the contamination plume. In regard to potential problems with the site 30 or 40 years down the road, if the landfill cap is properly installed, according to the ROD, and is properly maintained, potential problems down the road will be minimized.

APPENDIX A

LIST OF COMMENTERS DURING THE PUBLIC COMMENT PERIOD
FOR THE WEST KL AVENUE LANDFILL
FROM JUNE 11 THROUGH AUGUST 10, 1990

<u>COMMENT #</u>	<u>NAME AND AFFILIATION</u>	<u>SOURCE OF COMMENT</u>
COMMENTS FROM STATE LEGISLATURE:		
COMMENT 1:	SENATOR JACK WELBORN	COMMENTS READ AT PUBLIC HEARING, 7/23/90, BY CRAIG STARKWEATHER AND HARD COPY GIVEN TO U.S.EPA
COMMENTS FROM PRPS:		
COMMENT 2:	FRP - KL AVENUE COMMITTEE CONSISTING OF 24 PRPS, LETTER SIGNED BY J.W. WHITLOCK, CHAIRPERSON, STEERING COMMITTEE. AFFIDAVITS FROM MR. WOOLF AND MR. BALKEMA ATTACHED	LETTER
COMMENT 3:	GERAGHTY & MILLER LETTER AND REPORT "REVIEW OF USEPA PROPOSED ALTERNATIVE AND PROPOSAL OF ADDITIONAL NCP COMPLIANT REMEDIAL ALTERNATIVES FOR IMPLEMENTATION AT THE WEST KL AVENUE LANDFILL"	ATTACHMENT TO COMMENT #2
COMMENT 4:	JOHN JADOWSKI, ENVIRONMENTAL HEALTH PROGRAM SUPERVISOR, HUMAN SERVICES DEPARTMENT, COUNTY OF KALAMAZOO, MI	STATEMENT READ AT THE PUBLIC HEARING HELD ON JULY 23, 1990. HARDCOPY OF THE STATEMENT, DECISION TREE AND RECENT COUNTY SAMPLING DATA HAND DELIVERED TO DAN COZZA AT THE HEARING
COMMENT 5:	WESLEY K. FREELAND, COUNTY ADMINISTRATOR, KALAMAZOO COUNTY GOVERNMENT	LETTER, DATED JULY 25, 1990
COMMENT 6:	WESLEY K. FREELAND, COUNTY ADMINISTRATOR, KALAMAZOO COUNTY GOVERNMENT	LETTER, DATED AUGUST 10, 1990

COMMENT 7:	HERMAN DREYER, CHAIRMAN, KALAMAZOO COUNTY BOARD OF COMMISSIONERS	LETTER, DATED AUGUST 9, 1990
COMMENT 8:	CHARLOTTE SUMNEY, COUNTY COMMISSIONER, KALAMAZOO COUNTY BOARD OF COMMISSIONERS	LETTER, DATED JULY 27, 1990
COMMENT 9:	JOHN BALKEMA, PRP	LETTER, DATED AUGUST 10, 1990
COMMENT 10:	THOMAS ARMSTRONG, ATTORNEY REPRESENTING KALAMAZOO COUNTY, SHIPMAN AND GOODWIN	FAX, RECEIVED AUGUST 13, 1990
COMMENT 11:	RON FLECKENSTEIN, SUPERVISOR, CHARTER TOWNSHIP OSHTIMO	LETTER, DATED AUGUST 13, 1990

COMMENTS FROM RESIDENTS:

COMMENT 12:	THEODORE SNOW, RESIDENT	LETTER, RECEIVED AUGUST 6, 1990
COMMENT 13:	GAIL L. HEIM, RESIDENT	LETTER, DATED AUGUST, 6, 1990
COMMENT 14:	BETTY J. SNOW, RESIDENT	LETTER
COMMENT 15:	HARL AND JENNIE SNOW, RESIDENTS	LETTER, DATED AUGUST 7, 1990
COMMENT 16:	PAUL L. MAIER, VICE-PRESIDENT, OSHTIMO LAKES ASSOCIATION	LETTER, DATED AUGUST 3, 1990

COMMENTS RECEIVED ONLY AT THE JULY 23, 1990 PUBLIC HEARING:

COMMENT 17:	MS. PAT MCAVOY, LEGISLATIVE ASSISTANT WITH THE MICHIGAN TOWNSHIP ASSOCIATION	STATEMENT MADE AT THE JULY 23, 1990 PUBLIC HEARING
COMMENT 18:	MR. ERIC LARCINESE, RESIDENT	STATEMENT MADE AT THE JULY 23, 1990 PUBLIC HEARING