United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-87/051
September 1987

EPA

Superfund Record of Decision:

Liquid Disposal, MI

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

1. REPORT NO. EPA/ROD/R05-87/051	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE SUPERFUND RECORD OF DECISION Liquid Disposal, MI First Remedial Action - Final		5. REPORT DATE September 30, 1987
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460		13. TYPE OF REPORT AND PERIOD COVERED Final ROD Report
		14. SPONSORING AGENCY CODE 800/00
15. SUPPLEMENTARY NOTES		

16. ABSTRACT

Liquid Disposal, Inc. (LDI) is a 6.8-acre site located in a residential/light industrial area in Shelby Township, Michigan. LDI is bordered by the Clinton River and its flood plain, the Shadbush Tract Native Study Area and automobile junkyards. The site was first used as a source of sand and gravel prior to becoming a landfill around 1964. Between 1968 and 1982, LDI operated as a commercial incinerator of liquid waste. During this time, the site contained a large volume of hazardous substances stored in the waste oil and scrubber lagoons, ash sludge piles, above and below ground storage tanks and in 55-gallon drums. Since 1982, EPA has completed four immediate removal actions. As a result of these actions, no surface waste sources exist at the site. However, several hundred waste sample jars, old incinerator parts, emptied tanks, wooden pallets, miscellaneous containers and other debris remain onsite. Currently, on and offsite soil and ground water (the upper aquifer) are contaminated with a wide variety of organic and inorganic chemicals. Onsite concentrations are generally higher than offsite. The primary contaminants of concern include: VOCs, semi-volatile organics, PCBs, barium, cadmium and lead.

The selected remedial action for this site includes: onsite land disposal of all existing debris and equipment; onsite solidification/fixation of soil and waste; ground water pump and treatment using air stripping and ion exchange with discharge to Clinton

(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Liquid Disposal, MI First Remedial Action - Final Contaminated Media: soil, gw Key contaminants: VOCs, semi-volatile organics, PCBs, barium, cadmium, lead		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report) None	21. NO. OF PAGES 63
	20. SECURITY CLASS (This page) None	22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

INSTRUCTIONS

1. **REPORT NUMBER**
   Insert the EPA report number as it appears on the cover of the publication.

2. **LEAVE BLANK**

3. **RECIPIENTS ACCESSION NUMBER**
   Reserved for use by each report recipient.

4. **TITLE AND SUBTITLE**
   Title should indicate clearly and briefly the subject coverage of the report, and be displayed prominently. Set subtitle, if used, in smaller type or otherwise subordinate it to main title. When a report is prepared in more than one volume, repeat the primary title, add volume number and include subtitle for the specific title.

5. **REPORT DATE**
   Each report shall carry a date indicating at least month and year. Indicate the basis on which it was selected *(e.g., date of issue, date of approval, date of preparation, etc.)*.

6. **PERFORMING ORGANIZATION CODE**
   Leave blank.

7. **AUTHOR(S)**
   Give name(s) in conventional order *(John R. Doe, J. Robert Doe, etc.)*. List author's affiliation if it differs from the performing organization.

8. **PERFORMING ORGANIZATION REPORT NUMBER**
   Insert if performing organization wishes to assign this number.

9. **PERFORMING ORGANIZATION NAME AND ADDRESS**
   Give name, street, city, state, and ZIP code. List no more than two levels of an organizational hierarchy.

10. **PROGRAM ELEMENT NUMBER**
    Use the program element number under which the report was prepared. Subordinate numbers may be included in parentheses.

11. **CONTRACT/GRANT NUMBER**
    Insert contract or grant number under which report was prepared.

12. **SPONSORING AGENCY NAME AND ADDRESS**
    Include ZIP code.

13. **TYPE OF REPORT AND PERIOD COVERED**
    Indicate interim final, etc., and if applicable, dates covered.

14. **SPONSORING AGENCY CODE**
    Insert appropriate code.

15. **SUPPLEMENTARY NOTES**
    Enter information not included elsewhere but useful, such as: Prepared in cooperation with, Translation of, Presented at conference of, To be published in, Supersedes, Supplements, etc.

16. **ABSTRACT**
    Include a brief *(200 words or less)* factual summary of the most significant information contained in the report. If the report contains a significant bibliography or literature survey, mention it here.

17. **KEY WORDS AND DOCUMENT ANALYSIS**
    (a) DESCRIPTORS - Select from the Thesaurus of Engineering and Scientific Terms the proper authorized terms that identify the major concept of the research and are sufficiently specific and precise to be used as index entries for cataloging.

    (b) IDENTIFIERS AND OPEN-ENDED TERMS - Use identifiers for project names, code names, equipment designators, etc. Use open-ended terms written in descriptor form for those subjects for which no descriptor exists.

    (c) COSATI FIELD GROUP - Field and group assignments are to be taken from the 1965 COSATI Subject Category List. Since the majority of documents are multidisciplinary in nature, the Primary Field/Group assignment(s) will be specific discipline, area of human endeavor, or type of physical object. The application(s) will be cross-referenced with secondary Field/Group assignments that will follow the primary posting(s).

18. **DISTRIBUTION STATEMENT**
    Denote releasability to the public or limitation for reasons other than security for example "Release Unlimited." Cite any availability to the public, with address and price.

19. & 20. **SECURITY CLASSIFICATION**
    DO NOT submit classified reports to the National Technical Information service.

21. **NUMBER OF PAGES**
    Insert the total number of pages, including this one and unnumbered pages, but exclude distribution list, if any.

22. **PRICE**
    Insert the price set by the National Technical Information Service or the Government Printing Office, if known.

16. ABSTRACT (continued)

River; and construction of a slurry wall and impermeable cap containment system. The estimated capital cost of this remedial action is $21,743,100 with present worth O&M of $316,600.

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

SITE NAME AND LOCATION

Liquid Disposal, Inc. (LDI), Utica, Michigan

PURPOSE

This decision document represents the selected remedial action for the LDI site in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act, the National Contingency Plan, 40 CFR Part 300, and Agency guidance.

BASIS

The attached index identifies the items which comprise the administrative record for the LDI site. The administrative record includes the documents upon which the selection of this remedial action is based.

DESCRIPTION OF SELECTED REMEDY

The recommended remedy for the LDI site is to dispose of all existing debris and equipment on-site, treat soil/waste using solidification/fixation technology, and treat ground water using air stripping and ion exchange technology. In addition, a slurry wall with an impermeable cap will be constructed. The estimated present worth cost of the alternative is $22,400,870. Treatment of the soil/waste is expected to take about one year. Ground water remediation is estimated to last three years on-site, and nine years off-site.

The recommended remedy requires periodic operation and maintenance to maintain its effectiveness. The attached Summary of Remedial Alternative Selection explains in detail the selected alternative, and the tasks associated with the selected alternative.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

9-30-87

Date

Frank M. Covington

for Valdas V. Adamkus

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
LIQUID DISPOSAL, INC.
UTICA, MICHIGAN

SITE LOCATION

Liquid Disposal, Inc. (LDI) is located about 20 miles north of Detroit, on Ryan Road, City of Utica, Shelby Township, Michigan, in a residential/light industrial area. The 6.8 acre site is bordered by the Clinton River and its floodplain to the north, the Shadbush Tract Nature Study Area to the east, and automobile junkyards to the south and west (Figure 1).

SITE HISTORY

The site area was first used as a source of sand and gravel prior to becoming a landfill around 1964. LDI operated from approximately January 1968 to January 1982 as a commercial incinerator of liquid waste. The major site features included a high temperature incinerator, a waste liquid lagoon, a scrubber water lagoon, and numerous above and below ground storage tanks (Figure 2 and Tables 1 and 2). LDI was permanently closed in January 1982 after two workers were killed in an industrial accident. Just prior to the accident, the site contained a large volume of hazardous substances stored in the waste oil lagoon, above and below ground storage tanks, and 55-gallon drums. In addition, the scrubber lagoon and ash sludge piles contained hazardous waste. Since LDI was closed, U.S. EPA has completed four immediate removal actions:

1. May - June 1982 - A PCB-contaminated oil spill from the waste liquid lagoon occurred. The spill traveled along a small creek which fed into the Clinton River. About 200 gallons of oil and 750 cubic yards of contaminated sediment and debris were recovered.

2. July - August 1982 - Site safety and security were improved, and action was taken to abate liquid losses from the overflowing waste liquid and scrubber lagoons. A leachate collection system was constructed to prevent scrubber lagoon leachate from migrating off-site.

3. April 1983 - April 1984 - An extensive surface cleanup was undertaken. The waste liquid and scrubber lagoons were drained, capped, and seeded, and all drums were removed for off-site disposal. Approximately 1.3 million gallons of liquid, 15,000 cubic yards of solids, and 1800 drums were removed from the site.

4. July 1985 - April 1986 - Flammable liquids and sludges in 22 above ground and 8 below ground tanks were incinerated off-site, and the leachate collection system installed during the July 1982 removal action was repaired.

As a result of the four removal actions, there are no longer any surface waste sources at the site. However, several hundred waste sample jars are currently stored in the existing office building. These jars are samples of waste submitted to LDI by various generators in order to get approval for incineration. Some parts of the old incinerators are still on site. The tanks that were emptied and removed during the fourth removal action are currently located in the southwest corner of the site. Also, a number of wooden pallets, miscellaneous containers, and other debris remains on-site.

In September 1983, the Michigan Department of Natural Resources (MDNR), through a cooperative agreement with U.S. EPA, initiated a Remedial Investigation and Feasibility Study (RI/FS) at LDI. The purpose of the RI/FS was to define the sources and extent of on- and off-site contamination, establish the human health and/or environmental risks posed by the site, and identify required remedial action (final remedial action). The final RI report was completed in May 1987.

In general, the RI concluded that on- and off-site soil and ground water in the upper aquifer is contaminated with a wide variety of organic and inorganic chemicals. On-site concentrations are generally higher than off-site. There are no current users of ground water downgradient of the site.

The RI report stated that insufficient evidence was currently available to fully evaluate the effect of LDI on the bedrock aquifer. The bedrock aquifer has likely been unaffected by contaminants leaching from surface waste sources. However, chemical data collected during the RI had anomalous results. Also, the public has stated its concern regarding the possibility of past injection of hazardous substances from the LDI production well into the bedrock aquifer. Three potential sources of bedrock aquifer contamination were discussed in the RI Report: 1) injection into the production well; 2) contaminants from the surface reaching the bedrock aquifer via a poorly sealed production well; and 3) natural causes. Such occurrences could explain the anomalous RI data. An analysis of these possible causes of bedrock aquifer contamination is presented in the following text.

Hydrogeology - Drilling logs and personal observations by field personnel established that the upper (surficial) aquifer was underlain by an extremely impermeable silt/clay layer that ranged between 90-136 feet in thickness. During bedrock monitoring well drilling, this layer was observed to be dry between about 40 and 70 feet at downgradient boring number 1D. Therefore, there was strong evidence that surficial contaminants did not reach the bedrock aquifer.

Bedrock Aquifer Contaminants - Four monitoring wells were screened in

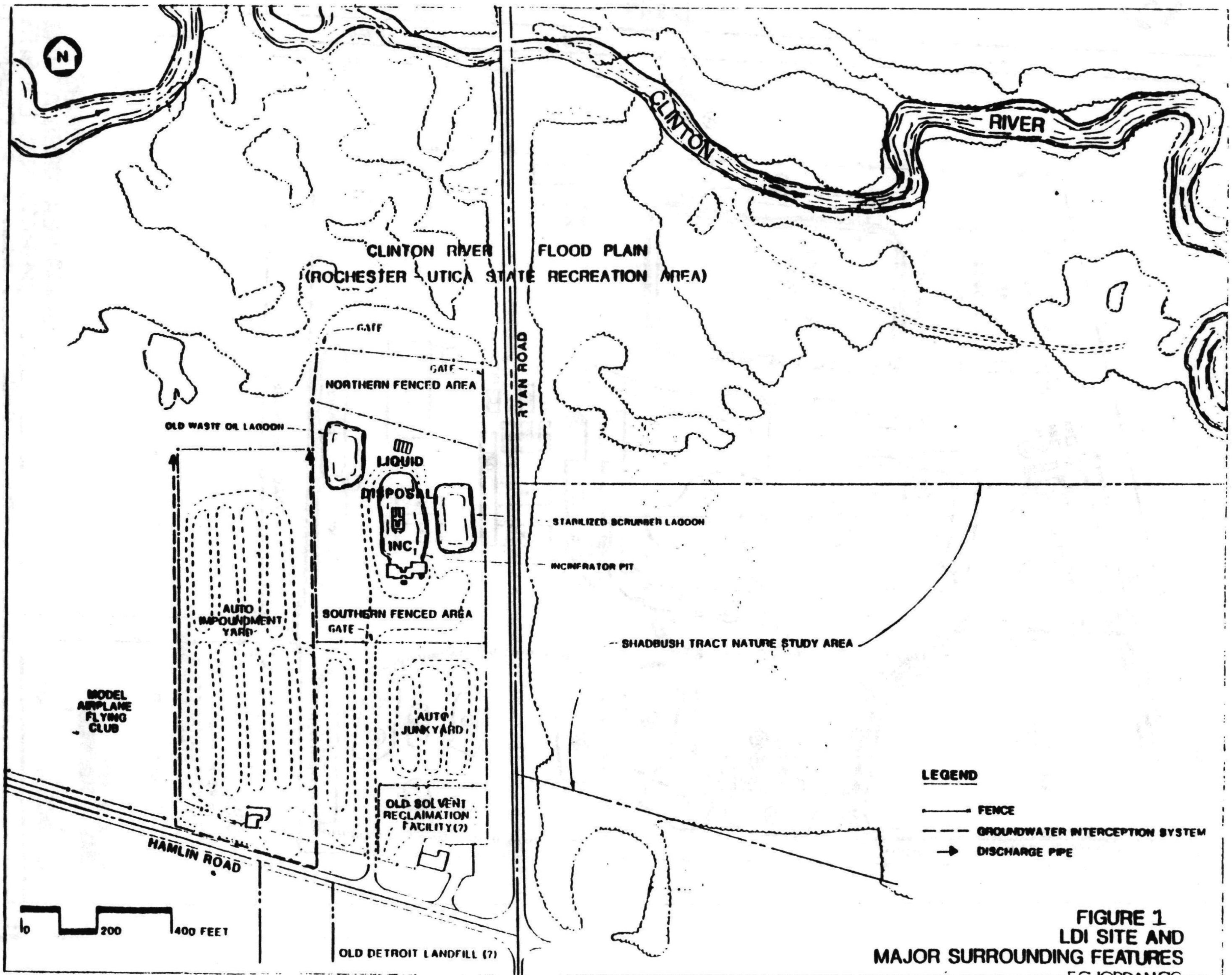

FIGURE 1
LDI SITE AND
MAJOR SURROUNDING FEATURES

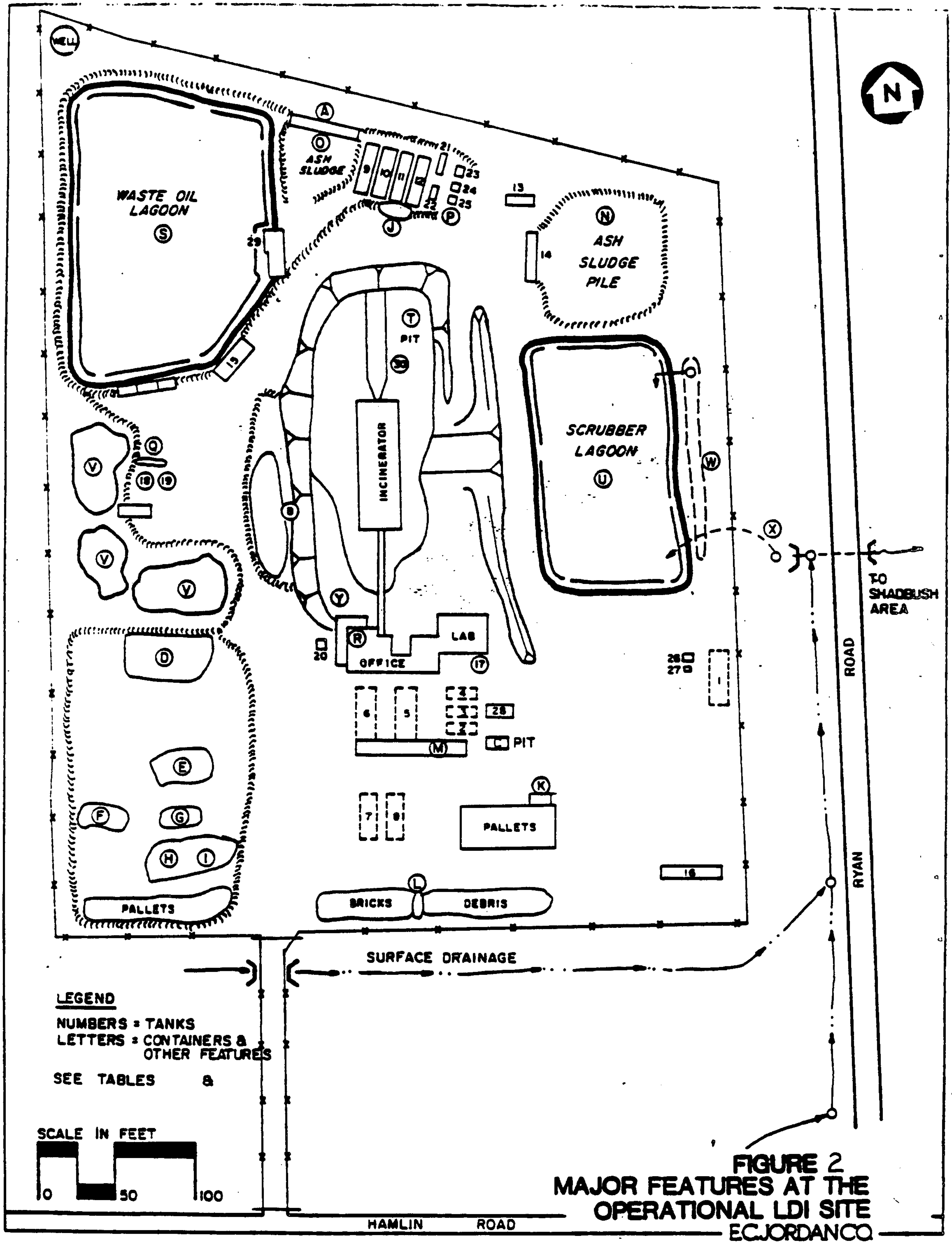

FIGURE 2
MAJOR FEATURES AT THE OPERATIONAL LDI SITE
E.C. JORDAN CO.

TABLE 1 INVENTORY OF TANKS AND ONSITE CONTAINERS AT LDI (1982)
(See Figure 2)

Tank Number	Material	Total Capacity (gallons)	Existing Quantity (gallons)	Direction of Flow	Secondary Containment
1	Unknown	50,000	48,063	Underground	Underground
2	Unknown	20,000	20,000	Underground	Underground
3	Unknown	20,000	10,040	Underground	Underground
4	Unknown	20,000	14,100	Underground	Underground
5	Unknown	20,000	8,824	(2 ft solids)	Underground
6	Unknown	20,000	20,000	(3 ft solids)	Underground
7	Unknown	20,000	18,731	(3 ft solids)	Underground
8	Unknown	20,000	19,443	(8 ft solids)	Underground
9	Unknown	17,300	2,422	North	Earthen Dike
10	Unknown	17,300	10,795	North	Earthen Dike
11	Unknown	17,300	17,000	North	Earthen Dike
12	PCB Oils	17,300	17,000	North	Earthen Dike
13	Removed by Owner, Waste-Oil Sludge	6,500	0	North	None
14	Removed by Owner, solids	8,000	0	East	None
15	Removed by Owner, wastewater	6,500	0	East	Flow intercepted by incinerator pit
16	Removed by Owner, oil-water	8,000	0	East	None
17	Empty	10,000	0	North	Flow intercepted by incinerator pit
18	Solids	10,000	10,000	East	Flow intercepted by incinerator pit
19	Empty	10,000	0	East	Flow intercepted by incinerator pit
20	Empty	500	0	Northeast	Flow intercepted by incinerator pit
21	Solids	5,000	1,250	North	Earthen Dike
22	Empty	3,000	0	North	Earthen Dike
23	Empty	1,000	0	North	Earthen Dike
24	Empty	500	0	North	Earthen Dike
25	Empty	500	0	North	Earthen Dike
26	Fuel-gasoline	500	0	North	None
27	Diesel-fuel	250	0	Northeast	None
28	Removed-Unknown oil/paint	2,100	0	Northeast	Flow interception by incinerator pit
29	Unknown Oil	560	560	Southeast	Screenhouse sump
30	Solids	10,000	2000	None	Incinerator pit
Total Volume:		342,100	220,228		

Source: Joint Michigan Department of Natural Resources, U.S. Environmental Protection Agency, Liquid Diposal, Inc. Site Inventory, October 15, 1982.

TABLE 2 INVENTORY OF WASTE DRUMS AND MISCELLANEOUS CONTAINERS AT LDI (1982) (See Figure 2)

Site Area	Container Type	Material	Number of Containers	Estimated Total Quantity (gall[illegible]
A	200 gal tank area at ash pile	Oils, solids	23	5,060
B	30 gal. cans/fiber drums of water-reactive materials	Chromic acid, (aluminum-tri-chloride) 1 overpack	50 jars 73 metal drums 55 gal. drums 12 fiber drums	3,120
C	3,000 gal. unloading pit in front of lab	Unknown seepage	1	Varies
D	Staged drums	Isocyanate solids	944	49,500
E	Staged drums	Isocyanate solids	263	16,500
F	Staged drums	Empty	80	
G	Staged drums	Unknown liquids	55	3,025
H	Staged drums	Paint	96	14,850
I	Staged acid drums	Unknown liquids	154	1,650
J	Drums	PCB wastes	22	1,100
K	Staged drums	Unknown	5	250
L	Drums	Unknown	5	275
M	1 gal. metal cans	Waste toluene, acetone ketone	15	20
N	Ash Pile	Barrels, solids, fly ash	1	864 cubic yards
O	Ash Pile	Barrels, solids, fly ash	1	588 cubic yards
P	Bottles & jars	Misc. lab wastes	50	20
Q	Drums	Oily liquid	12	660
R	Bottles & jars	Samples/lab wastes	100	660
S	Waste lagoon	Water/oil sludge	1	849,000 cubic yards sludge
T	Incinerator pit	Runoff	1	5,000
U	Scrubber lagoon	Water/oil metallic sludge	1	16,000 cubic yards 2,200 cubic yards
V	Waste stabilization ponds	Sludge from scrubber lagoon?		
W	Crude leachate collection system			
X	Leachate manhole			
Y	4-inch production well			

Source: Joint Michigan Department of Natural Resources, U.S. Environmental Protection Agency, Liquid Disposal, Inc. Site Inventory, October 15, 1982.

V through Y not on original site inventory.

the bedrock aquifer and available for sampling. These were labeled 1D. 2D, 3D, and the old LDI production well used for incinerator process water. Well 2D, the upgradient well, showed the lowest level of inorganic contaminants. Wells 1D, 3D, and the production well, which are downgradient, showed significantly higher levels of inorganic chemicals, particularly chlorides, sodium, and other minerals. However, highly mineralized ground water in the bedrock aquifer is common in Shelby Township.

One possible explanation for the high levels of downgradient contaminants is injection of contaminants (such as from the old scrubber lagoon) into the production well. It is not known whether this actually occurred. If injection did occur, the contaminants may have traveled further than 50 feet (which would be the calculated distance traveled according to ground water flow velocity given in the RI report) due to potential mounding of the injected fluid.

Another theory presented in the RI Report was that contaminants may have flowed by gravity from the surface along the production well casing. This assumes that the casing was poorly sealed. If this happened, contaminants probably would not have reached monitoring wells 1D or 3D due to the slow ground water flow velocity in the bedrock aquifer.

Finally, it was possible that the data were merely indicative of natural conditions in the bedrock aquifer. The RI report discussed a possible natural geologic source of brine from shale layers above and below the bedrock.

Since there is strong evidence that surficial contaminants have little or no chance of migrating through the impermeable, thick silt/clay layer, and no concrete evidence of injection into the bedrock aquifer is available, this Record of Decision only addresses the upper aquifer contamination. It is considered a final remedy, but in order to respond to public concerns and definitively characterize the aquifer, confirmation sampling will be performed during remedial design as part of this remedy.

U.S. EPA also evaluated whether confirmation sampling for dioxin contamination would be necessary during the remedial design phase of the project. During the RI, MDNR collected 5 surface soil samples for dioxin analysis. Dioxin was undetected in all but one sample, in which the concentrations detected were at levels which the RI Report concluded were not significant. Also, U.S. EPA believes that solidification treatment will be acceptable for treatment of dioxin. Thus, no additional confirmatory sampling is needed.

ENFORCEMENT

U.S. EPA has identified approximately 850 potentially responsible parties (PRPs) for the LDI site. The major source of information used to formulate the PRP list was business records recovered from the old LDI office building. Notice Letters pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) were first sent to the facility president, vice president, and bankruptcy trustee offering them the opportunity to perform the RI/FS. Notice Letters and CERCLA Section 104(e) information requests have since been sent to all known PRPs. U.S. EPA's National Enforcement Investigation Center (NEIC) has compiled the documents received from the information requests along with the site records. All records were arranged in individual generator folders and microfilmed. NEIC also prepared a draft transactional data base (TDB) from these records. The TDB shows each generator's individual transaction (waste shipment), the volume, cost, and major waste type sent for that shipment. A separate report shows the total waste volume contributed, and the relative and cumulative percent of waste shipped by each generator.

A PRP Steering Committee has been established, and is very active in the enforcement process. U.S. EPA has held extensive discussions with the PRP Steering Committee and has provided them with the TDB and other technical information as requested.

On August 21, 1987, Special Notice Letters pursuant to Section 122(e) of the Superfund Amendments and Reauthorization Act (SARA) of 1986 were sent to all PRPs. The deadline for receipt of a "good faith offer" to conduct the remedial design and remedial action is October 26, 1987. U.S. EPA is currently negotiating with PRPs for them to conduct the remedial design and remedial action discussed in this Summary of Remedial Alternative Selection and the Record of Decision.

COMMUNITY RELATIONS HISTORY

During the active life of the facility, numerous complaints were made by local residents regarding odors, noise, off-site discharges, and general dissatisfaction with the incinerator operation. MDNR established a Citizens Information Committee during the RI/FS to disseminate pertinent project information and reports to the affected community and elected officials. Public meetings have been held at regular intervals during the RI/FS. A public meeting was held on August 27, 1987 to discuss the public comment draft FS. The public comment period was originally established between August 19 and September 9, 1987. On September 2, 1987, U.S. EPA, in response to a request by PRPs, extended the public comment period to September 18, 1987. The attached responsiveness summary addresses specific questions and comments raised at the August 27, 1987 meeting and during the public comment period.

SUMMARY OF THE ENDANGERMENT ASSESSMENT

An endangerment assessment (EA) was performed as part of the remedial investigation to quantitatively determine the public health and environmental risks posed by the site. Due to the large number of chemicals detected at the site, each chemical was not quantitatively assessed. The first step of the EA was the selection of chemicals of concern. A selected group of chemicals was chosen to be representative of the chemicals causing the greatest public health or environmental risk because of concentration, frequency of detection, mobility and persistence in the environment, and/or toxicity. The selected chemicals of concern are shown in Table 3.

Once the chemicals of concern were established, an exposure assessment

Table 3
Chemicals of Concern for the LDI Site

	Volatile Organic Compounds	Matrix
1.	Chloroform	S, GW
2.	Methylene chloride	S, GW
3.	Trichloroethylene	S, GW
4.	Tetrachloroethylene	S
5.	2-Butanone	S, GW
6.	Benzene	S, GW
7.	Toluene	S, GW
	Semi-volatile Organic Compounds	
1.	Benzo(a)pyrene	S
2.	Bis(2-ethylhexyl)phthalate	S, GW
3.	Phenol	S, GW
4.	Napthalene	S, GW
5.	Fluoranthene	S
	Pesticides/Polychlorinated biphenyls (PCBs)	
1.	PCBs	S
	Inorganics	
1.	Barium	S, GW
2.	Cadmium	S, GW
3.	Lead	S, GW

Notes:

S = Detected in Soil
GW = Detected in Ground Water

was performed to determine the potential for receptors (human or environmental) to come into contact with these chemicals. Present and future exposure was evaluated for both the most probable and realistic worst case exposure scenarios. The exposure assessment concluded that public health was threatened by conditions presented in the realistic worst case scenario. The routes of exposure causing elevated public health risks were: 1) direct contact with on-site surface and subsurface soil; 2) future ingestion of ground water; and 3) direct contact with off-site soil and leachate. The only potential environmental risk to the Clinton River or its floodplain was acute or chronic toxicity to wetland organisms from iron and/or cyanide in ground water. (The floodplain area assessed includes the Rochester-Utica State Recreation Area and the Shadbush Tract Nature Study Area).

For complete details, the reader is referred to Chapter 7 of the Remedial Investigation Report (May 1987, E.C. Jordan Co.).

RESPONSE OBJECTIVES

Based on the findings of the endangerment assessment, the following response objectives were developed in the feasibility study:

o control the public health risk due to direct contact with on- and off-site soils

o control the public health and environmental risk due to direct contact with polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and inorganic chemicals in leachate

o control the environmental risk due to runoff of hazardous substances in on-site soil and leachate

o control the potential public health risk posed by the use of ground water as a drinking water source

o control future impacts of on-site ground water migration to wetlands

o control the public health risk due to inhalation of chemicals volatilized from or adsorbed on soil

Also, the presence or absence of bedrock aquifer contamination will be confirmed through additional monitoring well drilling and sampling.

These response objectives, when attained through remedial action, will provide protection of public health and the environment.

TECHNOLOGY SCREENING

With the response objectives identified, the FS then evaluated appropriate remedial technologies to attain these objectives. A total of 66 treatment and containment technologies were initially identified for screening. Treatment technologies were defined as those which reduce the mobility, toxicity, and/or volume of the hazardous waste. Containment technologies were defined as those which reduce the hazard by controlling the threat of release or direct contact. The screening process was necessary to reasonably limit the number of technologies required for detailed examination. In order to be evaluated further, the technology had to be:

o capable of meeting or contributing to the response objectives;

o applicable to controlling or treating chemical types identified in the RI and EA;

o appropriate for controlling or treating a chemically mixed waste stream; and

o applicable to site conditions.

A second screening was performed based on technology performance (action accomplished), reliability (proven operation), implementability (ease of construction), and applicability to site conditions. After this screening, 21 technologies were retained for the development of alternatives. Only the 21 technologies which passed the screening process were used to formulate remedial alternatives.

TARGET CLEANUP LEVELS

Target cleanup levels (TCLs) are quantitative, chemical-specific estimated cleanup goals. As with the endangerment assessment, a screening process was instituted to define the most critical chemical TCLs. The following criteria were used to establish TCLs:

o Baseline (present) risk level - TCLs were developed for only those chemicals which posed a "significant" risk as defined in the EA. The baseline risk level is defined as the risk resulting from exposure to chemicals currently found at the site.

o Treatability - different classes of compounds may have a different response to a given treatment technology. For example, air stripping is effective for volatile organic compounds, but not inorganic compounds. Therefore, two or more types of treatment may be necessary for a given medium to meet the identified target risk level.

o Location - Since the risks have been evaluated based on location (i.e. on-site vs. off-site), the TCLs for each location may be different. The TCLs were established so that each location would meet the response objectives after remediation.

o Frequency of detection - A compound detected with a much smaller frequency than other compounds may not require its own TCL. If the chemical's detection was an isolated occurrence, these results were carefully evaluated for accuracy prior to establishing a TCL for that chemical.

o Chemical class - All compounds that posed a significant risk were evaluated in the screening process. However, if a chemical was represented by another higher risk chemical of the same class, it may have been possible to establish one TCL for the higher risk chemical. This assumes that the deleted chemical would be treated as effectively as the selected chemical.

TCLs were established for each of the compounds that met the above criteria. Both carcinogenic and non-carcinogenic risks were evaluated. TCLs for carcinogens in soil and ground water were calculated assuming a one in one million (1 x 10E-06) health risk. In other words, the attainment of all TCLs for a particular medium (i.e. ground water or soil) would result in a cancer risk of no greater than one in one million. MCLs for the organic chemicals of concern were not used since none were final at the time the EA was prepared. MCLs for trichloroethylene and benzene have since been promulgated. In this situation, where complex mixtures of carcinogens exist, U.S. EPA uses the approach in the "Superfund Public Health Evaluation Manual" (U.S.EPA, October 1986), to reduce the additive risk from the chemicals of concern to an acceptable level. The Regional policy to reduce the unit cancer health risk to 1 x 10E-06 to receptors lies within the range of protection specified in the NCP.

For non-carcinogens in ground water, Maximum Contaminant Levels (MCLs), which are enforceable Federal standards for drinking water, were used (when available) as the TCLs. Non-carcinogenic soil TCLs were set using risk based calculations that assumed a "risk ratio" of less than one. The risk ratio was defined as the body dose level divided by the relevant standard, criterion, or guidance level. Body dose (human intake) levels were then calculated based on several factors, including concentration, soil contacted (or ground water ingested), percent absorption, and body weight. A risk ratio of greater than one was considered "significant", and less than one "insignificant" for the purpose of the EA analysis. The attainment of these TCLs would result in no adverse health affects. The method used is detailed in the Superfund Public Health Evaluation Manual. The reader is encouraged to refer to the EA (Chapter 7 of the RI report) for complete details.

Some background (upgradient) concentrations of lead in soil and methylene chloride in ground water, were found to be higher than the on-site or downgradient concentrations. It was theorized (but not confirmed) that this was due to other potential sources of contamination in the area, such as surrounding landfills, the auto junkyards, or the asphalt plant south of the site. The purpose of this project is to remediate the risks posed by the LDI site. Therefore, if background or upgradient concentrations are documented to be higher than the calculated TCL, the TCL will be raised to the lowest background concentration. If this is not done, the TCLs may be unattainable. The decision to adjust TCLs will occur during the remedial action phase of the project. The TCLs for all compounds are shown in Table 4.

It is important to note that soil/waste and ground water TCLs are not equal to absolute level of cleanup to be achieved during the remedial action. A wide variety of hazardous substances were detected during the RI. The FS used certain chemical data in order to arrive at TCLs.

Table 4
Target Cleanup Levels (TCLs) for the LDI Site

Ground Water

Chemical	TCL (ug/l)	Source
Barium	1000	MCL
Cadmium	10	MCL
Chloroform	0.1	Risk Calculation
Benzene	0.2	" "
Methylene chloride	1	" "
Trichloroethylene (TCE)	0.8	" "

Soils

Chemical	TCL (ug/g)	Source
Trichloroethylene (TCE)	77	Risk Calculation
Tetrachloroethylene (PCE)	16	" "
Benzo(a)pyrene	0.4	" "
PCBs	1	" "
Lead	20	" "

Notes:

1. ug/l = microgram per liter (part per billion)
2. ug/g = microgram per gram (part per million)
3. MCL = maximum contaminant level
4. All risk calculations are for carcinogenic risk except for lead.

During implementation of the remedial action, it is not likely that these exact concentrations will be found. In order to account for this variability, the goal of the remedial action is to achieve an additive excess cancer risk 1 x 10E-06 or less, and a risk ratio of one or less for non-caricinogens. In order to achieve this, confirmation sampling will be performed during the remedial action. The level of remediation will be based on chemicals of concern (Table 3) actually present in a given sample. Sample results will be corrected for background conditions and contaminants from sources other than LDI. In this way, the large number of known chemicals of concern can be taken into account. Hence, the remedial action will be guided by actual conditions, while ensuring that a protective level in soil/waste and ground water is met. Although some degree of flexibility will be possible, as a minimum, chemical-specific standards such as MCLs must be attained (unless background or other source contamination is higher than MCLs).

ALTERNATIVES DEVELOPMENT AND EVALUATION

Using the previously established response objectives and target cleanup levels, the FS then assembled the identified technologies into site alternatives (combinations of technologies to remediate the site). The site was divided into three areas requiring remediation:

- on-site debris, buildings, structures, equipment, and refuse
- on- and off-site soil/waste
- on- and off-site ground water

The following assumptions are common to all alternatives discussed in this Summary.

1. Leachate control will be addressed through the control of soil/waste and ground water.

2. Remediation is required in all areas within the site boundary. This is because no identifiable pattern of chemical contamination, either over a certain source area or with depth, was found during the RI.

3. Off-site soil requiring remediation will be treated and/or contained in the same manner as on-site soils (except alternative 2). This includes the soils from the access road.

4. The FS cost estimates assume that discharge of treated ground water is to the Clinton River. However, the possibility of discharge to a publicly owned treatment works will be evaluated during remedial design.

5. On- and off-site ground water will be treated using the same treatment system.

6. The waste sample jars located in the office building will be removed and disposed of at an off-site RCRA approved incineration facility.

7. Further study of the bedrock aquifer will be performed as discussed in this Summary.

After consideration of the response objectives and screening of the technologies, seven alternatives were assembled and examined in detail. With the exception of alternative 1 (no action), all of the alternatives are considered final remedies for the site. The major components of the alternatives are shown in Table 5.

DESCRIPTION OF ALTERNATIVES

Alternative 1

Description - No remedial action would take place under this alternative. It is primarily included as a baseline scenario to which other alternatives can be compared. It is not protective of public health or the environment.

Performance Goals - Since this alternative does not utilize any treatment, there are no performance goals.

Alternative 2

Description - The major components are on-site land disposal of debris/equipment (into the existing incinerator pit), a slurry wall and impermeable cap containment system, and an air stripping/ion exchange ground water extraction and treatment system. A slurry wall is a low-permeability fixed wall installed to contain and/or divert ground water flow. The wall will be trenched and keyed into the existing highly impermeable silt/clay layer that lies about 30 feet below the ground surface. The trench will be backfilled with clean soil mixed with bentonite, Portland Cement, or other suitable material. The slurry wall will form an impermeable ground water barrier around the entire site, roughly following the existing fence line. Excavated soils during slurry wall construction will be sent to a compliant RCRA landfill for disposal. The cap system, which will be constructed after the slurry wall, consists of a 24" compacted clay layer and a synthetic liner. The combination of the slurry wall and cap will prevent any significant surface or ground water infiltration, so that contaminants are contained within the site.

Air stripping involves passing a stream of air over the contaminated water using a blower system. This action physically removes VOCs from the water by volatilizing them into the air stream, which is then treated using vapor phase activated carbon. Ion exchange is a reversible process in which an interchange of ions occurs between a solution and an essentially insoluble solid resin in contact with the solution. Toxic ions are removed from the aqueous phase by being exchanged with non-toxic ions held by the ion exchange material. Ion exchange will treat inorganics in the ground water.

No direct treatment of soil/waste is included in this alternative.

Performance Goals - Since there is no treatment of soil/waste, this alternative will not meet soil/waste TCLs. The ground water treatment system will meet the TCLs. The air stripper must use an air emission control device. In the past, activated carbon has met the State of Michigan requirement for best available control technology (BACT). The emission control system must also be monitored for specific compounds during operation. Activated carbon, if selected for use, can be regenerated (incinerated) at an off-site facility, which makes this essentially a destruction technology.

TABLE 5 - LIQUID DISPOSAL, INC. FEASIBILITY STUDY ALTERNATIVES

ALT NO	CLEANUP MEDIUM	PRINCIPAL ELEMENTS	CAPITAL COST	O & M YEARS *	O & M COST	PRESENT WORTH
1	NO ACTION	MONITORING	$4,000	0 TO 30	$72,000	$682,[illegible]
2	DEBRIS/EQUIPMENT	ON-SITE LAND DISPOSAL	$79,750	0 TO 9	$144,300	$5,401,[illegible]
	SOIL/WASTE	SLURRY WALL/CAP	$9,698,650	10 TO 30	$78,500	
	GROUND WATER	ON-SITE AIR STRIPPING + ION EXCHANGE	$446,100			
3	DEBRIS/EQUIPMENT	OFF-SITE SANITARY LANDFILL	$247,500	0 TO 3	$122,600	$27,238,000
	SOIL/WASTE	OFF-SITE RCRA LANDFILL	$25,881,085	4 TO 9	$96,600	
	GROUND WATER	ON-SITE ACTIVATED CARBON + FLOC./PRECIP.	$481,100	10 TO 90	$2,000	
4	DEBRIS/EQUIPMENT	OFF-SITE SANITARY LANDFILL	$247,500	0 TO 9	$138,500	$69,456,[illegible]
	SOIL/WASTE	ON-SITE INCINERATION	$68,199,995	9 TO 10	$116,500	
	GROUND WATER	U/V OZONATION + FLOC./PRECIP.	$660,100	11 TO 80	$.2,000	
5	DEBRIS/EQUIPMENT	OFF-SITE SANITARY LANDFILL	$247,500	0 TO 2	$221,200	$21,758,000
	SOIL/WASTE	VAPOR EXTRACT. + SOLIDIFICATION/FIXATION	$20,089,650	8 TO 6	$205,800	
	GROUND WATER	ON-SITE AIR STRIPPING + ION EXCHANGE	$446,100	7 TO 9	$67,800	
				10 TO 30	$2,000	
6	DEBRIS/EQUIPMENT	OFF-SITE SANITARY LANDFILL	$247,500	0 TO 5	$120,700	$55,278,110
	SOIL/WASTE	IN-SITU BIODEGRADATION + SOLID./FIX.	$54,714,810	6 TO 9	$94,700	
	GROUND WATER	BIOTREATMENT + FLOC./PRECIP.	$549,900	10 TO 30	$2,000	
7	DEBRIS/EQUIPMENT	ON-SITE LAND DISPOSAL	$79,750	0 TO 3	$170,300	$22,400,870
	SOIL/WASTE	SOLID./FIX. + CONTAINMENT	$21,217,250	4 TO 9	$144,300	
	GROUND WATER	ON-SITE AIR STRIPPING + ION EXCHANGE	$446,100	10 TO 30	$2,000	

* NOTE: OPERATION AND MAINTENANCE PERIOD SHOWN REFLECTS VARIOUS O & M ACTIVITY FOR EACH ALTERNATIVE. E.G. ALTERNATIVE 7 INCLUDES GROUND WATER PUMPING (0 TO 3), WATER TREATMENT (0 TO 9), CAP MAINTENANCE (0 TO 30), AND FENCING AND SECURITY (0 TO 30). REFER TO THE FEASIBILITY STUDY FOR COMPLETE DETAILS.

Time to Meet Performance Objective - It is estimated that the construction of the slurry wall/cap containment system, including the installation of a ground water extraction and treatment system, will take 1 year. The estimated time for ground water remediation (i.e. time to reach the ground water TCLs) is 9 years. On-site ground water pumping is expected to last only 3 years since the slurry wall/cap containment system will prevent significant volumes of surface or ground water from entering the enclosed site.

Alternative 3

Description - The major components are off-site land disposal of debris/equipment at a sanitary landfill, off-site land disposal of soil/waste at a RCRA compliant landfill, and an activated carbon/flocculation and precipitation ground water extraction and treatment system. Activated carbon selectively adsorbs contaminants. It is widely used as a treatment medium for a variety of organic compounds. Flocculation involves the addition of a chemical to agglomerate (precipitate) small, unsettleable particles into larger, settleable ones. Activated carbon is proposed for VOC treatment, and flocculation/precipitation for inorganics treatment.

Performance Goals - Excavation of soil/waste will be performed until the TCLs are achieved. Sampling of the soil/waste left in place is envisioned to confirm that this goal is met. The ground water treatment system will meet the ground water TCLs. Sludge from the flocculation/precipitation process will be generated, and will most likely require further treatment or disposal at a RCRA facility.

Time to Meet Performance Objective - The excavation of soil/waste, including off-site land disposal, is expected to take about 3 years. Installation of the ground water extraction and treatment system will take about 6 months. The estimated time to reach the ground water TCLs is 9 years.

Alternative 4

Description - The major components are off-site disposal of debris/equipment at a sanitary landfill, on-site incineration of soil/waste, and an ultra violet (U/V) ozonation and flocculation/precipitation ground water extraction and treatment system. A mobile incineration unit will be brought to the site for soil/waste treatment. The U/V ozonation process involves the simultaneous application of ozone and ultraviolet light. Ozone is a highly reactive oxidizing agent, which will destroy certain organic compounds in the presence of ultraviolet light. Conventional U/V ozonation techniques involve bubbling ozone into a liquid solution containing the waste. The mixture is then exposed to ultraviolet light in a mixing tank. U/V ozonation is proposed for VOC treatment, and flocculation/precipitation for inorganics treatment.

Performance Goals - On-site incineration will meet the soil TCLs. A destruction removal efficiency (DRE) of 99.99% will be required for all compounds with the exception of PCBs, which must have a DRE of 99.9999%. Ash from the incineration process will retain most of the metals from the soil/waste, and may require treatment or disposal at a RCRA facility. Since incineration of soil does not greatly reduce its volume, the disposal cost of the ash is significant if it must go to a RCRA facility. Incinerator air emissions must meet the standards defined in RCRA Part 264 (minimum DREs, HCl limits, particulate emission limit). The ground water treatment system will meet TCLs. Sludge from the flocculation/precipitation process may require treatment or disposal at a RCRA facility.

Time to Meet Performance Goals - A mobile incinerator is envisioned for soil/waste incineration. It is estimated that 10 years will be required to incinerate the volume of soil/waste proposed for treatment. The worst case scenario is 15 years. Actual burn times are directly related to the capacity and feed rate of the proposed incineration unit, which is unknown at this time. An estimated 6 months will be necessary to install the ground water extraction and treatment system and dispose of the debris/ equipment off-site. The estimated time to reach the ground water TCLs is 9 years.

Alternative 5

Description - The major components are off-site disposal of debris/ equipment at a sanitary landfill, vacuum extraction combined with solidification/fixation for soil/waste, and an air stripping and ion exchange ground water extraction and treatment system. Vacuum extraction involves the installation of about 85 on-site wells primarily screened in the unsaturated zone. These wells are connected to a vacuum system that induces a flow of air across the soil/waste. This action volatilizes VOCs into the air stream, which is treated by an activated carbon system (located on the surface prior) to discharge into the atmosphere. After VOC treatment, the solidification/fixation operation will begin. The material will be excavated, then slurried with the solidification agent, and finally replaced in the excavation from which it was taken. Vacuum extraction will treat VOCs in the soil/waste, while solidification is primarily for inorganics. Similarly, air stripping is for VOCs in ground water, and ion exchange will treat inorganics (see alternative 2 for a description of ion exchange).

Performance Goals - Vacuum extraction of soil/waste is expected to meet TCLs for VOCs. Subsequent solidification/fixation converts the waste into an easily handled solid material with reduced hazards from volatilization and leaching. The inorganic and PCB chemical TCLs for soil/waste will be achieved through solidification/fixation. Air stripping and ion exchange will meet the ground water TCLs. The ground water treatment system must have an air emission control device such as activated carbon (see discussion in alternative 2).

Time to Meet Performance Goals - The off-site disposal of debris/equipment, and installation of the vacuum extraction and ground water extraction and treatment systems is expected to take 6 months. Approximately one additional month will be required to set up the solidification/fixation equipment, which must be done after vacuum extraction. The estimated time for VOC treatment using vacuum extraction is 2 years, after which solidification/fixation is estimated to take 1 year to accomplish. The estimated time to reach the ground water TCLs is 9 years.

Alternative 6

Description - The major components are off-site disposal of debris/equipment at a sanitary landfill, on-site biodegradation and solidification/fixation of soil/waste, and biological ground water extraction and treatment with flocculation/precipitation. The theory of biodegradation involves altering the soil environment to promote microbial catabolism of organic contaminants, which results in the breakdown and detoxification of the contaminants. The biodegradation of soil/waste can be done either in-situ or using excavation and mixing methods. The latter method is better suited for the site conditions since the subsurface physical and chemical conditions vary considerably. In this scenario, the soil/waste will be excavated and mixed in a slurry, then treated. Following biotreatment, the soil/waste will be solidified to treat the inorganic contaminants. Biotreatment of ground water is a much more proven technology. Activated sludge, extended aeration, contact stabilization, and rotating biological disks are some of the methods that may be considered. Flocculation/precipitation (described in alternative 3) is proposed for inorganics treatment.

Performance Goals - The biological treatment of soil/waste will be designed to meet TCLs for VOCs. Solidification of the soil/waste after biological treatment will bind inorganic contaminants and PCBs into a solidified and unleachable mass, thereby significantly reducing or eliminating the chance of exposure. Therefore, the soil/waste TCLs for inorganics will be achieved using solidification technology. Ground water biological treatment will also meet TCLs. Sludge from this process will be generated that may require further treatment or disposal at a RCRA facility.

Time to Meet Performance Goals - The off-site disposal of debris/equipment, and installation of the soil/waste biodegradation, solidification/fixation, and ground water extraction and treatment systems is estimated to last 8 months. The estimated time to reach the ground water TCLs is 9 years.

Alternative 7

Description - The major components are on-site land disposal of debris/equipment, on-site solidification/fixation of soil/waste, on-site ground water extraction and treatment using air stripping and ion exchange technology, and a slurry wall and impermeable cap containment system. Although solidification has been typically used for inorganics treatment, it is proposed for both organic and inorganic chemical treatment in this alternative. As discussed in the feasibility study, there have been recent developments in the use of solidification agents for organic treatment, including some proprietary additives. Since the mass of organic contaminants in the soil is very small in comparison to the soil mass, pre-treatment for VOCs may not be required. However, careful bench and/or pilot scale testing must be done prior to implementing this method. Slurry wall/cap construction is described in alternative 2. However, in this alternative, the excavated soil/waste during slurry wall construction will be placed on-site for later solidification/fixation. The slurry wall/cap containment system is being used in this alternative as a means to protect the solidified soil/waste from degradation by upgradient ground water that is slightly contaminated with chemicals not attributable to the LDI site.

Air stripping and ion exchange is described in alternative 2.

Performance Goals - The on-site solidification of soil/waste is expected to achieve VOC, PCB, and inorganic chemical TCLs through the immobilization and reduced leachability of chemicals in the solidified mass. No residual material will be generated by this process. The ground water treatment system will also meet TCLs. Depending on the type of air emission control technology used, there may be some amount of material (such as activated carbon) requiring periodic treatment or disposal.

Time to Meet Performance Goals - The on-site disposal of debris/equipment, and installation of the ground water extraction and treatment system and solidification/fixation system is expected to take 6 months to complete. Slurry wall construction will begin prior to soil/waste solidification since excavated slurry wall soils will be solidified on-site. The slurry wall construction time is estimated to be 6 months. Actual treatment (solidification) of the soil/waste is estimated to require 1 year to accomplish. On-site ground water pumping is expected to last only 3 years since the slurry wall/cap containment system will prevent significant volumes of surface or ground water from entering the enclosed site. The estimated time to reach the ground water TCLs is 9 years.

EVALUATION OF ALTERNATIVES

Each of the seven alternatives was evaluated using a number of evaluation factors. The regulatory basis for these factors comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). Section 121(b)(1) states that, "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The offsite 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." Section 121(b)(1) also states that the following factors shall be addressed during the remedy selection process:

(A) the long-term uncertainties associated with land disposal;
(B) the goals, objectives, and requirements of the Solid Waste Disposal Act;
(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;
(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 redisposal, or containment.

Section 121 of SARA also requires that the selected remedy is protective of human health and the environment, is cost-effective, and uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

In addition to the factors listed in Section 121 of SARA, alternatives were evaluated using current U.S. EPA guidance, including: "Interim Guidance on Superfund Selection of Remedy" dated December 24, 1986 and "Additional Interim Guidance for FY'87 Records of Decision" dated July 24, 1987. In the July 24, 1987 guidance, the following nine evaluation factors are referenced:

1. Compliance with applicable, or relevant and appropriate requirements (ARARs)
2. Reduction of Toxicity, Mobility, or Volume
3. Short-Term Effectiveness
4. Long-Term Effectiveness and Protectiveness
5. Implementability
6. Cost
7. Community Acceptance
8. State Acceptance
9. Overall Protection of Human Health and the Environment

The analysis in the following section was performed using the above factors.

Alternative 1 - This alternative is undesirable since it is not protective of public health and the environment. It will not meet the contaminant specific ARARs, such as MCLs for ground water quality, nor reduce the mobility, toxicity, or volume of the hazardous substances present at the site. Hazardous substances present in soil and ground water are likely to continue to migrate and potentially cause additional public health and environmental threats. The alternative is not a permanent remedy. The alternative is included primarily as a baseline alternative, and is not acceptable to local residents or the State of Michigan.

Alternative 2 - This alternative is primarily a containment option. Neither the volume nor toxicity of the soil/waste will be reduced, although its mobility will be reduced by the slurry wall. It is protective of public health and the environment over the short term, but lacks any treatment for soil/waste. Hazardous substances will remain untreated on-site, so the alternative is not a permanent remedy. Some short-term impact may result from the excavation of soil/waste during slurry wall construction. However, this can be minimized through limiting the area of open excavation and covering it to reduce dust and volatile chemical emissions. Although slurry walls have been successfully constructed, long-term performance data are not available. Additional remedial action costs may be incurred if the slurry wall fails (leaks or degrades due to soil/waste contaminants).

The ground water treatment system will reduce the mobility, toxicity, and volume of hazardous substances in ground water, and will meet Federal and State ARARs. This portion of the alternative will be fully protective of public health and the environment.

In summary, the alternative provides a fair degree of public health and environmental protection. However, since the soil/waste is not treated, it is not a permanent remedy which uses permanent solutions and alternative treatment technologies or resource recovery activities to the maximum extent practicable, as is preferred by SARA.

Alternative 3 - Although this remedy does not treat the soil/waste, it will meet ARARs for land disposal. The ground water treatment system will meet Federal and State ARARs. This alternative is protective of public health, but does not actually treat the excavated soil/waste (estimated volume = 136,650 cubic yards). There will be no reduction in the toxicity or volume of the waste, and the mobility of redisposed waste will depend on how well the disposal facility is constructed. Although the alternative will essentially remove the source of contamination from the LDI site, there is a potential for the waste to cause a contamination problem at the off-site facility at which it is eventually disposed. This is inconsistent with the goals of SARA and the Solid Waste Disposal Act, which call for treatment whenever feasible. SARA specifically states in Section 121 that off-site land disposal without treatment is the least preferred alternative. The alternative is readily implementable from a construction standpoint, but the RCRA Land Disposal Restrictions (40 CFR Part 268) may effectively preclude its selection. The alternative may have significant air emission impacts due to the large number of truckloads of hazardous waste that must be transported off-site. Both the State and local residents have expressed concern regarding excavation and redisposal of hazardous waste in landfills. Finally, the estimated cost of the alternative exceeds that of other alternatives that treat the soil/waste.

Alternative 4 - This alternative will attain all identified Federal and State ARARs, including the MCLs for ground water, NPDES permit requirements, RCRA requirements for incineration, the Michigan Hazardous Waste Management Act (Act 64), Michigan Water Resources Commission Act 245, and the Michigan Air Pollution Act (Act 348). It uses treatment as a principal element for all contaminated media. It will permanently destroy most organic chemicals in soil/waste, but is also the most expensive option. Incineration of soil is a proven technology for organics, so the alternative has a very good rating for long-term protectiveness. The mobility and toxicity of the soil/waste is significantly reduced, and the volume is slightly reduced. The incinerated soil/waste will produce an ash which may be high in metals content, requiring further treatment or disposal at a RCRA facility. Incineration on-site should be relatively easy to implement, although there may be some problem acquiring a mobile incinerator. However, the level of treatment afforded by incineration, while desirable, particularly for PCBs, is not cost-effective for the LDI site contaminants. The RI concluded that there was no clearly identifiable pattern or "hot spots" of contamination at the site. Due to the non-uniform and unpredictable waste distribution, the cost-effectiveness of selectively incinerating certain waste types or site areas could not be determined. Therefore, the FS assumed that the entire soil/waste volume on-site would require incineration (125,000 cubic yards). Thus, an alternative type of treatment was further analyzed in the FS.

Although the alternative is considered a permanent remedy, it is estimated that soil/waste incineration of the 136,650 cubic yards of waste (125,000 cubic yards from on-site plus 11,650 cubic yards from off-site) will take 10 years (based on a 16 hr/day operation, 5 days/week). A very negative public reaction is anticipated to the selection of an alternative using on-site incineration, since numerous complaints were received by local residents during LDI's operating period.

Alternative 5

This alternative also uses a high degree of treatment for soil/waste and ground water. It will attain all identified Federal and State ARARs, including RCRA requirements, MCLs for ground water, NPDES permit requirements, the Michigan Hazardous Waste Management Act (Act 64), Michigan Water Resources Commission Act 245, and the Michigan Air Pollution Act (Act 348).

Vacuum extraction for soil treatment is currently considered an innovative technology. However, it has been proven for VOC treatment at several hazardous waste sites. The mass of VOCs in the soil/waste is less than 1% of the mass of the entire soil mass. Therefore, it may not be costeffective to use vacumm extraction for pre-treatment. Also, the State of Michigan has serious concerns about the effectiveness of vacuum extraction technology for this site. Soil conditions (moisture, permeability, uniformity, and other physical parameters) directly affect vacuum extraction treatment efficiency. A permeable and homogeneous material such as sand is a good medium for vacuum extraction. The soil at the site is very heterogeneous due to natural sands and gravels, the presence of old landfill materials, and solidified material in the waste oil and scrubber lagoons (from the previous removal actions). Under favorable site conditions, vacuum extraction reduces the mobility, toxicity, and volume of hazardous substances by extracting and transferring them to a treatment system, in this case activated carbon. The carbon can be regenerated (incinerated) for reuse.

Solidification/fixation is used for non-volatile organic (including PCBs) and inorganic contaminants. The closure requirements outlined in RCRA Part 264 are ARARs, and will be met by this alternative. The alternative will reduce the mobility and toxicity of hazardous substances in the soil/waste, but will increase the volume by an estimated two times.

Overall, the alternative is protective of public health and the environment. It will reduce the primary risks posed by the site through treatment of the hazardous substances involved. The risks posed by the soil/waste will be reduced to the TCLs in about three years. The long-term risk posed by contaminants remaining in the soil/waste will be minimal due to the elimination of direct contact and threat of leaching of hazardous substances from the solidified soil/waste. The alternative will be readily constructable since standard equipment and materials are used, particularly for the ground water extraction and treatment and solidification/fixation systems. Vacuum extraction will require a specialized contractor with expertise in the process, but the materials will not be difficult to obtain. Pilot and/or bench scale tests will be required to determine the proper type of solidification/fixation agent for the soil/waste. The estimated cost of alternative 5 is approximately the same as alternative 7, given the +50/-30% accuracy of the FS cost estimates.

Alternative 6

This alternative will attain all identified Federal and State ARARs, including RCRA requirements, MCLs for ground water, NPDES permit requirements, the Michigan Hazardous Waste Management Act (Act 64), Michigan Water Resources Commission Act 245, and the Michigan Air Pollution Act (Act 348). It also uses an innovative technology for soil/waste treatment (biodegradation). Biodegradation will reduce the mobility, toxicity, and volume of organic chemicals in soil/waste and ground water. Solidification/fixation is required to treat inorganics and PCBs. The mobility and toxicity of these compounds will be reduced, but the volume of the soil/waste will increase by an estimated two times. Biodegradation has been tried on a very limited scale in hazardous waste soil treatment applications. It is a proven technology for water treatment. Short-term impacts include potential air emissions during excavation for the soil/waste biotreatment and/or solidification process. The bench scale study (during remedial design) will assess the potential for volatilization of chemicals during excavation. The long-term risk posed by contaminants remaining in the soil/waste will be minimal due to the elimination of direct contact and threat of leaching of hazardous substances from the solidified soil/waste.

The closure requirements outlined in RCRA Part 264 are ARARs, and will be met by this alternative.

The alternative is readily implementable, although the ground water treatment and soil/waste biotreatment processes require pilot and/or bench scale tests. A specialized contractor will be needed to implement the alternative and optimize the treatment systems.

Properly designed, alternative 6 will be protective of public health and the environment. However, it is the second most expensive alternative evaluated. Also, biological treatment of a mixed stream of hazardous substances in soil has not been well documented. Given the uncertain likelihood of success and its relatively high cost, the alternative is not recommended for selection.

Alternative 7

This alternative will attain all identified Federal and State ARARs, including RCRA requirements, MCLs for ground water, NPDES permit requirements, the Michigan Hazardous Waste Management Act (Act 64), Michigan Water Resources Commission Act 245, and the Michigan Air Pollution Act (Act 348). It uses treatment as a principal element (as do alternatives 4, 5, and 6). Solidification/fixation of soil/waste without pretreatment for VOCs is proposed. Although there are high concentrations of certain VOCs in the soil/waste, the total VOC mass is relatively small compared to the mass of the entire soil/waste. The proper solidification/fixation agent (or combination of agents) must be found during pilot and/or bench scale studies. The remedy will reduce the mobility and toxicity of the waste by greatly reducing or eliminating the ability for hazardous chemicals to leach out of the solidified mass. However, hazardous chemicals still remain in that mass. The solidification/ fixation process will increase the volume of soil/waste by an estimated two times.

The closure requirements outlined in RCRA Part 264 are ARARs, and will be met by this alternative. Specific RCRA closure requirements are discussed in the Recommended Remedy section.

In addition to the treatment components of the remedy, alternative 7 includes the construction of a slurry wall and impermeable cap. This system will contain the hazardous substances within the site. The slurry wall/cap system will also protect the solidified soil/waste from degradation by upgradient ground water that is slightly contaminated with chemicals not attributable to the LDI site.

Short-term impacts include potential air emissions during excavation for the slurry wall and/or the on-site solidification process. The bench scale study will be designed to assess the potential for volatilization of chemicals during excavation. It is estimated that 18 months (6 months installation and 1 year treatment time) will be required to meet the soil/waste TCLs. Of the soil/waste treatment options evaluated, this is the shortest time frame for that process (since no VOC pre-treatment is proposed).

Alternative 7 will be protective of public health and the environment. Its cost is nearly equal to alternative 5, given the accuracy of the FS cost estimates. Alternatives 5 and 7 are the least expensive alternatives that use some type of treatment for all contaminated media. Alternative 7 has been endorsed by the State of Michigan. Some concerns regarding the solidification/fixation process were raised at the August 27, 1987 Public Meeting. U.S. EPA's response to these concerns is detailed in the Responsiveness Summary.

RECOMMENDED REMEDY

The recommended remedy for selection and implementation is alternative 7. Alternatives 1, 2, and 3 clearly do not meet the preferences mandated by SARA since they do not use treatment as a principal element of the remedy. Alternative 1 leaves the site essentially unchanged, which is unacceptable from a public health and environmental standpoint. It will not meet Federal or State ARARs. Alternatives 2 and 3 merely contain the soil/waste without treatment, which is counter to the preferences established in Section 121(b) of SARA for implementation of remedial action. Alternatives 4, 5, 6, and 7 all use treatment as a principal element of the remedy. Alternative 7 is considered the most cost-effective alternative.

Protectiveness

Alternative 7 provides a high degree of treatment of the hazardous substances present at the site. It will be both a source control measure (through the remediation of soil/waste) and a management of migration remedy (ground water). Therefore, the alternative will reduce the threat of direct contact with hazardous substances, and the future threat of ingestion of contaminated ground water. The soil/waste may be solidified using a pozzalan-type material (e.g. fly ash) and/or a cement based agent (e.g. Portland Cement). The exact solidifying agent or combination of agents will be determined during bench and/or pilot scale tests during the remedial design. In addition, the potential for volatilization of chemicals during the solidification/fixation process will be assessed.

Although hazardous substances in the soil/waste will be solidified to significantly reduce their mobility and toxicity, they will not be permanently destroyed. Section 121(c) of SARA requires that the selection of a remedial action which results in any hazardous substances remaining at the site must be reviewed no less than every five years after initiation of such remedial action. This is to ensure that the selected remedial action continues to be protective of human health and the environment. The recommended alternative (No. 7) will require such review.

Consistency with Other Laws

Alternative 7 is designed to meet all applicable, or relevant and appropriate requirements (ARARs) of Federal and State statutes. The federal ARARs include RCRA (42 U.S.C. § 6901 et seq. and 40 CFR Part 264), OSHA (29 CFR Part 1910), the Clean Water Act (40 CFR Parts 122, 125 & 403), and the Toxic Substances Control Act (TSCA, 40 CFR Part 761). State ARARs include the Michigan Hazardous Waste Management Act (Act 64), the Michigan Solid Waste Act (Act 641), the Michigan Air Pollution Act (Act 348), and the Michigan Water Resources Commission Act (Act 245).

The following specific ARARs will be met by alternative 7.

RCRA:
Alternative 7 involves placement and treatment of soil and debris wastes. Placement of wastes or treated residuals is prohibited under RCRA Land Disposal Restrictions (LDR) unless certain treatment standards are met. LDR standards have not been promulgated for soil and debris wastes, but when published, may be applicable or relevant and appropriate. Despite the absence of specific treatment standards, the treatment method employed as part of this remedial action satisfies the statutory requirement to, "...substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized." (Section 3004(m) of the Hazardous and Solid Waste Amendments).

Other RCRA requirements are discussed below.

o Corrective Action provisions of Subtitle C regarding Hazardous Waste Management.

o Part 264.116 - A survey plat indicating the location and dimensions of the hazardous waste closure area will be submitted to the local zoning authority, or the authority with jurisdiction over land use. The plat will also be submitted to the U.S. EPA Regional Administrator and the Director of the MDNR.

o Part 264.14 and 264.117(b) and (c) - A 24-hour surveillance of the site will be maintained during closure activities to prevent unauthorized access. The use of the facility area must be restricted so that the containment system and the monitoring system are not disturbed.

o Part 264.310 - The cover system must be designed to meet the performance standards referenced in this section.

o Part 264.114 - All debris/equipment must be properly decontaminated prior to disposal. In addition, construction equipment must be decontaminated prior to leaving the site.

o Part 264.91-264.101 - MCLs will be used as minimum ground water quality requirements, except if background levels exceed the MCL.

Occupational Safety and Health Administration:

o The selected remedial action contractor must develop and implement a health and safety program for his workers, if such a program does not already exist. All on-site workers must meet the minimum training and medical monitoring requirements outlined in 40 CFR 1910.

Clean Water Act:

o The treated ground water discharge to the Clinton River will meet the technical requirements of Section 402 of the Clean Water Act (National Pollutant Discharge Elimination System). Specific chemical discharge standards will be developed for the ground water treatment system that will ensure protection of water quality and aquatic life in the Clinton River. Additional NPDES requirements are discussed under the heading, "Michigan Water Resources Commission Act."

Toxic Substances Control Act:

If PCBs are found in concentrations of 50 parts per million (ppm) or more, the following requirements of 40 CFR Section 761 will be met. (To date, no PCBs greater than or equal to 50 ppm have been detected at the site.)

o Section 761.60(a)(4) requires that such material be disposed of at a TSCA approved incinerator or landfill.

o Section 761.79 outlines the requirements for decontamination of PCB containers and equipment.

o Section 761.180 outlines record keeping and monitoring requirements.

Michigan Hazardous Waste Management Act:

o The alternative will meet the technical requirements of this Act. Many of these are similar to the RCRA requirements.

Michigan Air Pollution Act:

o The treated air emissions from the air stripper will meet the technical requirements of Michigan Air Pollution Act, including the requirement for best available control technology. Activated carbon has met this requirement for past remedial actions in Michigan.

Michigan Water Resources Commission Act:

o The State of Michigan, as an authorized state, manages the NPDES program pursuant to the Clean Water Act, and the Water Resources Commission Act. The requirements of the State NPDES program will be followed.

Summary Discussion

Considering the various evaluation factors found in SARA and the National Contingency Plan, alternative 7 offers the most cost-effective solution to the contamination problem at the site. The principal threats posed by the site are direct contact with on- and off-site soils and leachate, and future ingestion of ground water. In order to remedy these threats, alternative 7 uses treatment as a principal element to the maximum extent practicable. Solidification/fixation of on- and off-site soils will eliminate or greatly reduce the possibility for contaminants to leach into ground water. In addition, the slurry wall and impermeable cap system will reduce surface water and ground water from contacting the solidified mass, thus adding to its long-term stability and protectiveness. Ground water contaminants (both on- and off-site) will be removed and destroyed during activated carbon regeneration. While alternatives 4 and 6 provide a higher level of soil/waste treatment, the solidification/

fixation unit cost ($125/cubic yard) is approximately four and two times less expensive than incineration ($480/cubic yard) and biodegradation ($250/cubic yard), respectively. Although cost is not the deciding factor during remedy selection, the objectives of the remedial action can be accomplished with alternative 7 at a lower cost than alternatives 4 and 6. Alternative 5 also provides additional soil/waste treatment (of VOCs) compared to alternative 7 at a cost roughly comparable to alternative 7. One reason for not selecting this alternative (which includes vacuum extraction treatment of soil/waste VOCs) is the questionable likelihood of success of vacuum extraction given the site soil conditions. Also, solidification/fixation is expected to be effective for treatment of the relatively low mass of organic contaminants found in the soil/waste.

Based on the above analysis, the recommended alternative is fully protective of public health and the environment, cost-effective, utilizes treatment technologies to the maximum extent practicable, and will attain all applicable, or relevant and appropriate Federal and State requirements.

Operation and Maintenance

The recommended alternative requires certain annual operation and maintenance (O & M) activities in order to ensure that the TCLs are achieved and maintained throughout the life of the project. After the construction of the ground water and soil/waste treatment facilities, and the slurry wall/cap system, the following O & M tasks must be performed:

Activity	Years
1. Ground water monitoring	1 through 30
2. Cap maintenance	1 through 30
3. On-site ground water pumping	1 through 3
4. Water treatment system	1 through 9
5. Off-site ground water extraction	1 through 9
6. Fencing and security	1 through 30

Ground water monitoring is required in order to assess the effectiveness of the ground water extraction and treatment and the slurry wall/cap systems. Cap maintenance is needed to make minor repairs to the clay cap to prevent erosion and large surface cracks from developing. On-site ground water pumping is required to maintain the water level within the slurry wall/cap system and to prevent ground water mounding. The water treatment system cost includes electricity, chemicals, and general O & M. Offsite ground water extraction includes electricity and general O & M. Finally, fencing and security O & M is needed to ensure that the treatment systems and associated equipment are not disturbed or vandalized.

SCHEDULE

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

o Approve remedial action (sign ROD)	Sep. 1987
o Amend cooperative agreement for remedial design (RD) and remedial action (RA)	Nov. 1987
o Start RD	Dec. 1987
o Complete RD	Dec. 1988
o Begin RA	Apr. 1989

LIQUID DISPOSAL, INCORPORATED
COMMUNITY RELATIONS RESPONSIVENESS SUMMARY

INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) and the Michigan Department of Natural Resources (MDNR) have completed a Remedial Investigation and Feasibility Study (RI/FS) regarding the Liquid Disposal, Inc. (LDI) site at 3901 Hamlin Road in Utica, Michigan. In the RI/FS, U.S. EPA and MDNR have collected information on the nature and extent of contamination at LDI, have evaluated alternatives for appropriate remedial action at LDI, and have proposed a remedial action for LDI. Throughout this process, several public meetings have been held in which U.S. EPA and MDNR discussed the RI/FS progress and received comments and questions from the public.

The RI/FS has been undertaken under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and federal regulations entitled the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Under CERCLA, comments received from the public are considered in U.S. EPA's selection of the remedial action for each site. This document summarizes the public comments received and provides responses as to how the comments were considered in the selection of the remedial action for LDI.

The responsiveness summary has three sections:

<u>Section 1. Overview.</u> This section briefly presents the U.S. EPA's proposed plan for remediation at LDI.

<u>Section 2. Background of Community Involvement and Concerns.</u> This section provides a brief history of community interest and concerns raised during remedial planning activities at the site.

<u>Section 3. Summary of Public Comments Received During Public Comment Period and U.S. EPA Responses.</u> Both oral and written comments are grouped by issues, followed by U.S. EPA responses to these comments.

The detailed transcript of the Feasibility Study public meeting and the written comments are not included in the report. They are available for public inspection from U.S. EPA Region V in Chicago, Illinois and the repository at the Shelby Township Library, Utica, Michigan. A summary of the major comments and suggestions made at the public meeting is appended to this Responsiveness Summary.

1. OVERVIEW

On August 19, 1987, U.S. EPA and MDNR presented to the public for comment the draft Feasibility Study report for the LDI site. In the FS report, U.S. EPA and MDNR analyzed different methods for cleaning up contamination related to the LDI site, with a detailed analysis of seven remedial alternatives. U.S. EPA and MDNR proposed remedial actions which included the following:

1. No remedial action. The principal element of this alternative is monitoring the site. This alternative is primarily included as a baseline scenario to which other alternatives can be compared. It is not protective of public health or the environment.

2. On-site land disposal of debris/equipment into the existing incinerator pit, a slurry wall and impermeable cap containment system, and an air stripping/ion exchange ground water extraction and treatment system.

3. Off-site land disposal of debris/equipment at a sanitary landfill, off-site land disposal of soil/waste at a RCRA compliant landfill, and an activated carbon/flocculation and precipitation groundwater extraction and treatment system.

4. Off-site disposal of debris/equipment at a sanitary landfill, on-site incineration of soil/waste, and an ultraviolet (U/V) ozonation and flocculation/precipitation groundwater extraction and treatment system.

5. Off-site disposal of debris/equipment at a sanitary landfill, vacuum extraction combined with solidifiation/fixation for soil/waste, and an air stripping and ion exchange ground water extraction and treatment system.

6. Off-site disposal of debris/equipment at a sanitary landfill, on-site biodegradation and solidification/fixation of soil/waste, and biological ground water extraction and treatment with flocculation/precipitation.

7. On-site land disposal of debris/equipment, on-site solidification/fixation of soil/waste, on-site ground water extraction and treatment using air stripping and ion exchange technology, and a slurry wall and impermeable cap containment system.

U.S. EPA received several comments from the public at the August 27, 1987 public meeting in Utica, and received additional comments from individuals, Potentially Responsible Parties (PRPs), a representative of thirteen PRPs, and the PRP Steering Committee.

2. COMMUNITY INVOLVEMENT ACTIVITIES

Chronology of Community Relations Activities

The chronology of community relations activities at the Liquid Disposal, Incorporated site is as follows:

July 21, 1982 Letter to residents of Shelby Township (Progress Report #1) announcing MDNR request for U.S. EPA response to contamination at LDI.

August 17, 1982 Progress Report #2 - U.S. EPA approves $250,000 for response action at LDI. LDI is proposed on interim NPL.

September 22, 1982 Progress Report #3 - discusses completion of limited emergency action.

October 21, 1982 Progress Report #4 - U.S. EPA announces first public meeting at LDI.

January 28, 1983 Progress Report #5 (Handout at public meeting) - describes phase one Remedial Investigation work.

April 25, 1983 Progress Report #6 - describes removal action at LDI.

May 25, 1983 Progress Report #7 - announces that U.S. EPA is funding more removal work and alloting $385,000 for RI.

August 15, 1983 Progress Report #8 - announces formation of Citizens Information Committee, more removal work, and the September 1983 public meeting.

September 15, 1983, Public Meeting to announce local call-in center and discuss action on LDI.

May 16, 1984 Progress Report #9 - provides update of RI and announces more removal work.

May 24, 1984 Public Meeting to give an update report on tank removal.

March 15, 1985 Progress Report #10 - discusses RI and more removal work.

September 3, 1985 Progress Report #11 - provides RI/FS Update and report on tank removal.

February 3, 1986 Progress Report #12 - provides update to announce Toxic Substances Control Commission meeting in Shelby Township with focus on LDI.

September 11, 1986 Progress Report #13 - provides update on initial RI findings for LDI.

January 30, 1987 Progress Report #14 announces February 19, 1987 public meeting to summarize RI findings for LDI.

February 19, 1987 Public Meeting to discuss LDI RI report and discuss work at the nearby G&H site.

August 19, 1987 Public Comment Period begins.

August 20, 1987 Progress Report #15 - summarizes LDI FS.

August 27, 1987 Public Meeting regarding public comment on LDI FS.

September 18, 1987 - Public Comment Period ends.

U.S. EPA originally established a public comment period from August 19, 1987 to September 9, 1987. Several PRPs requested an extension of the public comment period for up to 30 additional days. In response to the PRP requests and site specific circumstances, U.S. EPA, on September 2, 1987, extended the public comment period from the 21 days specified in the NCP to 30 days, with the public comment period ending September 18, 1987. A further extension of the public comment period was not feasible in light of U.S. EPA's and MDNR's mutual desire to implement remedial action for the LDI site as quickly as practicable, and Congress' desire to expedite superfund cleanups, as evidenced by the cleanup schedules of Section 116 of CERCLA.

3. SUMMARY OF PUBLIC COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD AND U.S. EPA'S RESPONSES

Comments raised during the LDI Feasibility Study public comment period are summarized below. In addition to these comments, there were a number of comments submitted on liability for remediation of the sites. These comments are not considered to be germane to the selection of the remedy and are beyond the scope of this Responsiveness Summary.

Issue: The PRP Steering Committee, their technical consultant and several PRPs commented that the Remedial Investigation (RI) fails to adequately characterize the site.

Comments:

1. The RI failed to meet its objectives as a result of poor quality contractor work, poor laboratory analysis, and a disjointed work plan.

2. Several different U.S. EPA contractors worked on the RI (GMC, Associates, Ecology and Environment, E.C. Jordan).

3. The RI Report prepared by GMC is completely inadequate.

4. The E.C. Jordan RI did not identify off-site contaminant pathways and levels.

5. There is no adequate analysis of LDI's contribution to ground water or off-site contamination.

6. Shallow background wells shown to be unaffected by the site (2s, 5s, and 13s) should be used as representative of background.

7. There are sources upgradient of LDI that have impacted shallow ground water quality.

8. The E.C. Jordan RI does not adequately assess background ground water quality.

9. The E.C. Jordan RI fails to measure the impact on the environment of junkyards, landfills, and industrial facilities surrounding the site.

10. The E.C. Jordan RI lacks quantitative chemical data.

11. The Laboratory Data Audit Methodology and Results prepared by the PRP consultant, Fred C. Hart, shows much of the laboratory data used by E.C. Jordan is invalid as a result of failure to follow QA/QC procedures.

12. The consultants used by U.S. EPA did not audit their entire data base.

13. The data validation procedures used by E.C. Jordan were not described. None of the worksheets or checklists were submitted to determine auditing procedures for data reviewers.

14. Different sampling methods and techniques used by different EPA contractors resulted in an inconsistent approach to data collection to characterize the site.

15. LDI RI samples were sent to different laboratories.

16. E.C. Jordan audited only some data collected by GMC.

17. Several groups of samples were not audited at all.

18. E.C. Jordan assessed the effect of laboratory contamination samples in a manner different from EPA data validation protocol. Due to the presence of several common laboratory contaminants on-site, sample data was rejected by E.C. Jordan for common laboratory contaminants if compounds were found in over 80% of the samples from a particular round of samples. EPA protocol for evaluating method blank contaminants is that the concentrations of laboratory contaminants in the sample must be at least ten times the concentration of the laboratory contaminants in the method blank in order for the data to be used.

19. The rationale for the chemical groupings formed, based on mobility for chemicals found at LDI, was not presented in the E.C. Jordan RI.

20. There is a lack of replicate ground water sampling, making time and spatial comparisons difficult.

21. There is not one complete round of sampling data for both organic and inorganic parameters from all existing on-site and off-site wells.

22. More emphasis should have been placed on the potential fill area identified upgradient of the site in the LDI RI geophysical investigation.

23. Many of the figures in the RI Report are essentially useless due to poor graphic design.

24. On the map showing boring locations, two boring locations were labeled B-112.

25. Soil data interpretation was difficult because the quantity and variability of the data.

26. E.C. Jordan determined some soil sampling data was invalid. The GMC audit and Hart audit of this data suggested that some of this data was valid. Some on-site soils data were invalidated by E.C. Jordan. These soils were not resampled.

27. On the shallow water table map drawn in the E.C. Jordan RI, contour lines were improperly drawn in the vicinity of wells 21s and 20s and where contour lines cross the Clinton River.

28. The potentiometric surface map for the deep aquifer in the E.C. Jordan RI relied on use of an estimated hydraulic head in the production well. The methodology for estimation was not explained.

29. The fact that the data base shows a great deal of variability from location to location and with time, is the result of the inclusion of invalid data or exclusion of valid data.

30. Due to lack of site knowledge, unnecessary assumptions about the site have been made and has resulted in a great deal of variability in the data provided.

Response:

U.S. EPA maintains that the LDI RI was properly conducted. The RI Report provided adequate information to 1.) determine the nature and extent of contamination, 2.) define the public health and environmental hazards posed by the site, and 3.) array and evaluate remedial alternatives for the site.

The RI Report was built on a sound data base. Large amounts of quantitative data were collected from soil, leachate, ground water, surface water, sediment, and biota, on and near the site. This information is summarized, presented, and evaluated in Chapter 6 of the E.C. Jordan RI Report. It is presented in tabular form in Appendices M through S of the Jordan RI Report. Not all samples collected produced usable data, but adequate resampling was done in order to fill any significant data gaps.

Work on the LDI RI was performed with major support from three different contractors: GMC Associates, Ecology and Environment (E&E), and E.C. Jordan. All RI work performed by these contractors was executed only after work plan documents were reviewed and approved by MDNR and U.S. EPA. The planning documents for all RI tasks performed are in the site Administrative Record. In review of these documents, U.S. EPA and MDNR assured the sampling and analysis procedures used at the site were adequate to build a comparable data base for the site. Although different contractor personnel were used for the LDI RI, careful quality control of their work was exercised by U.S. EPA and MDNR. Any contractor work deemed inadequate by MDNR or U.S. EPA was not used in the final RI Report or for remedy selection.

The draft RI Report prepared by GMC was considered incomplete by MDNR and U.S. EPA. Furthermore, portions of the GMC RI work were deemed inadequate by U.S. EPA. These portions of the GMC work were not considered in the LDI remedy selection process. Portions of the GMC RI work considered acceptable are incorporated in the E.C. Jordan RI Report. Comments raised on the GMC draft RI Report are not addressed in this Responsiveness Summary. Responses are provided only on comments on the final RI, which includes useful information generated by GMC.

The LDI RI established releases of site contaminants to the ground water and soils. Soil contamination was documented with comparison of on- and off-site soil samples to established background soil conditions. Background soil conditions were determined as described on pages 6-21 and 6-22 of the E.C. Jordan RI Report. Concentrations of contaminants in on-site soil were found in a complex distribution. However, on-site soil contamination distribution was usually indicative of activities that took place at those locations (page 6-96 of the RI Report). Off-site soil contamination was documented and was found in off-site areas that would appear to intercept off-site contamination, based on surface runoff patterns, ground water flow and discharge patterns, and direction of prevailing winds (for airborne contaminated soil particles). (Page 6-98 of the RI Report).

Releases of contaminants from LDI to the ground water were established as described on page 6-101 of the RI Report. Background ground water quality (unaffected by any potential sources) could not be established due to the potential contributiuon from sources surrounding the site. The other potential sources were not quantiified since it was outside the scope of the RI. The actual level of ground water remediation will consider (and not provide a greater degree of remediation than), the ground water quality upgradient of LDI considering such "background" (upgradient) wells as 2s, 5s, and 13s, which are affected by contamination from sources other than LDI.

The quality of the data in the final LDI RI was assured by use of U.S. EPA contract laboratory program (CLP) including specified protocol for sample collection, tracking, and analysis, and data audits. The RI samples were collected and tracked as prescribed in the RI planning documents. Samples were analyzed by different laboratories, all of which are in the U.S. EPA CLP. Laboratories in the U.S. EPA CLP have been approved for use by U.S. EPA and provide specified sample analyses per approved U.S. EPA protocol. Laboratories in the CLP are required to provide rigorous quality control/quality assurance checks on the data they produce. The different laboratories in the CLP provide U.S. EPA with high quality, comparable data.

All LDI RI sampling data was audited with established U.S. EPA protocol for data evaluation, with one exception to this established protocol. Sample data with common laboratory blank contaminants was evaluated as described in comment 18 above, and as described on page 6-5 of the RI Report. U.S. EPA considers this method reasonable for the LDI RI.

Data generated by GMC was audited by GMC. If the data was determined unusable by the GMC audit, it was not used. If the data was determined useable without qualification by GMC it was used. If the data was determined usable with qualification by GMC it was re-reviewed by E.C. Jordan. All sampling data generated by MDNR and E&E was reviewed by E.C. Jordan. Use of the specified EPA protocol for data review (with the above-mentioned exception) assured that the data audit process was consistently applied by MDNR consultants. All review sheets from the performed data audits are included in the LDI Administrative Record. U.S. EPA maintains that all data used in the LDI RI are valid data.

As described on page 2-3 of the RI, all data generated during the RI was conducted by laboratories in the U.S. EPA Contract Laboratory Program and was validated according to specified U.S. EPA protocol. Historical data generated previous to the RI, are the only data presented in the RI Report not validated.

Contrary to PRP comment, the rationale for the chemical groupings of organic chemicals detected at LDI, is presented on page 6-2 of the RI. The chemical groupings were established by an analysis of the organic chemical structure in relation to potential adsorption. The grouping presented by Hart (page 12 of their "Review of the GMC Associates and E.C. Jordan Draft and Final Remedial Investigation Reports") do not coincide with the grouping in the E.C. Jordan RI because the Hart groupings were based solely on Koc values.

There is a voluminous amount of RI data that have been collected since RI field work commenced in April 1984. A phased approach for the hydrogeologic investigation was performed. Ground water monitoring well data is available from seven discrete sampling events (May 1984, June 1984, November 1984, December 1984, April 1985, November 1985, and February 1986). (See page 6-68 of the RI.) The data base has been established over nearly two complete years. Although one complete round of sampling from all wells for all parameters has not been performed, U.S. EPA believes that the existing data adequately characterize ground water quality in the upper aquifer on-site and off-site.

RI field activities have also included numerous soil samples. Hand auger borings, with multiple samples per boring, were conducted at numerous locations on- and off-site. Deep profile borings were also conducted on-site. U.S. EPA also believes that the nature and extent of contamination has been adequately defined by this sampling for the purpose of remedial alternative selection.

Regarding the RI Report figures, U.S. EPA believes that their quality was more than adequate to present the data in an organized and meaningful way. In reference to Figure 6-5, which shows two locations labeled B-112, the figure is in error. The B-112 boring designation in the incinerator pit is the correct designation. The B-112 boring designation immediately south of the waste oil lagoon is incorrect. This designation should be deleted from Figure 6-5, as it does not represent anything. Examination of the geologic cross section C-C' on Figure 6-7 illustrates proper use of the correct B-112 boring. The incorrect B-112 designation was not used in the RI Report for any data interpretation.

U.S. EPA acknowledges that the 645 foot contour line on Figure 6-33 has been misaligned. However, this error does not affect any of the conclusions in either the RI Report or the FS. The estimated head in the production well used in Figure 6-34 was based on professional judgment.

U.S. EPA maintains that the variability of the data from the LDI RI reflects the site conditions from location to location and with time. Lack of a clearly distinct pattern of soils contamination is expected at a site like LDI. The incineration, gravel excavation, and landfilling activities that took place while the site was active, as well as significant manipulations of the site in the subsequent removal activities, account for the random distribution of contaminants at the site. A significant amount of good quality data were collected in the LDI RI. The RI adequately characterized the site.

<u>Issue</u>: The Steering Committee, their technical consultant, and other PRPs commented that the Endangerment Assessment (EA) in the RI report fails to properly evaluate the risks posed by the site. They also commented that the EA used unrealistic assumptions to establish the risk posed by the site, and/or methods used in the EA were incorrect.

<u>Comments:</u>

1. The assumption of future human ingestion of downgradient groundwater is improper to assess the risks posed by site contaminants. State and local law would preclude the installation of a supply well downgradient of the site. It is unrealistic, arbitrary and capricious to assume that there may be future human receptors.

2. Maximum Contaminant Levels (MCLs) and cancer advisories are inapplicable and/or inappropriate to downgradient groundwater.

3. The aquifer downgradient of the site would be classified as Class III by U.S. EPA, and therefore drinking water standards are neither applicable nor relevant and appropriate.

4. The EA is not adequate because it did not consider environmental fate and transport. Specifically, the EA ignored factors such as dispersion, adsorption, volatilization, biodegradation, chemical degradation, and travel time of groundwater contaminants.

5. The EA ignored typical or normal range of background levels for organic and inorganic chemicals in the soils.

6. The EA does not address whether off-site surface soil contamination is from sources other than LDI.

7. The assumption of the number and frequency of children and adults entering the site, and offsite exposure in the nature area is unrealistic.

8. The EA does not address land use limitations in the area; specifically, the potential for homes being built in the floodplain or wetlands is not addressed.

9. The EA does not consider other potential sources of stressed vegetation off-site.

10. The assumption of future ingestion of downgradient groundwater is not appropriate since the upper aquifer has been classified as unusable by the Macomb County Health Department.

11. The EA did not follow the procedures in the Superfund Public Health Evaluation Manual.

12. Phenol, methylene chloride, 2-butanone, and toluene should not have been included as indicator chemicals.

13. The validity of the data presented in some EA tables cannot be determined.

14. The source of data for the assumption of future groundwater ingestion is not noted. Therefore, the validity of these concentrations for use in the EA cannot be determined.

15. The EA uses data with estimated concentrations to calculate exposure to indicator chemicals. The use of estimated values is not authorized by the Superfund Public Health Evaluation Manual and contravenes accepted scientific methodology.

Response:

Contrary to the Steering Committee and PRP comments, U.S. EPA would not classify the shallow aquifer as a Class III aquifer. Contaminants from the LDI site have been released to the shallow aquifer, making it unacceptable for drinking water use. Without contamination from the LDI site, water from the aquifer could be potable. The EA therefore illustrated the impact of site contaminants to the shallow aquifer with a scenario in which humans drink the contaminated ground water. Since the aquifer would be usable if not contaminated by the LDI site, such an ingestion scenario is an appropriate means to evaluate human health and environmental risks posed by the site. This scenario illustrated that the site posed unacceptable risks.

In determining an appropriate cleanup action for ground water at LDI, U.S. EPA has selected a remedial action consistent with the direction given in Sections 104 and 121 of CERCLA as amended by SARA. The selected groundwater remedy provides adequate protection of public health, welfare and the environment. Cleanup levels were chosen based on a risk calculation consistent with the procedure outlined in the Superfund Public Health Evaluation Manual (Page 50 of the FS). The ground water cleanup levels were chosen to assure adequate protection of public health and the environment.

According to 40 CFR 264 Subpart F, when there is a release of hazardous waste from a facility, U.S. EPA is authorized under Subtitle C of RCRA to require cleanup of that ground water to background, MCLs (if greater than background), or Alternate Concentration Limits. If background concentrations are greater than other ARARs, the clean up levels for those particular constituents are the background levels.

Furthermore, the selected ground water remedial action is one in which the mobility, toxicity, and volume of the hazardous substances is permanently and significantly reduced. Such treatment remedies are preferred over those remedial actions not involving treatment (Section 121).

The EA provided an adequate analysis of site conditions and an adequate measure of threat to public health as a result of site conditions in the absence of remedial action. This information was adequate to develop and evaluate remedial alternatives. Chemical transport and transformation pathways of contaminants are discussed in Section 7.4 of the RI. Factors such as adsorption, degradation, and chemical reaction for organic contaminants were qualitatively discussed and travel time of groundwater contaminants was quantitatively discussed (Tables 7-3 and 7-4). Adsorption and fixation considerations for inorganic contaminants are presented on page 7-17 in the RI Report. The scenario was appropriate for evaluating impacts of the site to human health and the environment, and was useful in developing and evaluating remedial alternatives. The exposure scenarios used in the EA were developed based on the present contaminant concentrations in both onsite and offsite downgradient groundwater. The present conditions were assumed to reflect the concentrations which have been detected in ground water already offsite, based on someone ingesting these waters. The future conditions reflect existing conditions beneath the site which are likely to migrate offsite in the future without remedial measures being taken. Since we cannot know whether the concentration of chemicals in the contaminated plumes are adequately reflected by the existing monitoring well data, it is not an unreasonable assumption to look at the concentrations currently under the site and assume these could represent future concentrations migrating offsite. When representing worst case conditions, looking at the highest existing concentrations is not necessarily incorrect or inappropriate.

The EA was done as directed by the Superfund Public Health Evaluation Manual (SPHEM). Chapter 7 of the RI and Chapters 1, 2, and 3 of the FS present the baseline public health evaluation and the remedial alternatives performance goals, respectively.

Indicator compounds were chosen based on the four step process outlined on pages 7-2 and 7-3 of the RI. While it is true that the EA did not utilize the worksheets provided in the SPHEM to quantitatively score the indicator chemicals, professional judgement, based on knowledge of the chemicals' physical/chemical characteristics, relative toxicities, concentration detected in various media, and representation of various approximate mobility categorizations were used to identify the indicator chemicals. The selection process for indicator chemicals as outlined in the SPHEM is a general guideline which considers these same characteristics and allows one to assign a quantitative score to the chemicals found at a particular site. This process is consistent with the guidance provided in the SPHEM, and resulted in the inclusion of phenol, methylene chloride, 2-butanone and toluene as four of the chemicals of concern or indicator chemicals at the LDI site.

All of the data that were used in the LDI EA were determined to be acceptable for use. A portion of the acceptable data was qualified as estimated because it did not entirely meet all of the rigorous quality assurance and quality control requirements of the U.S. EPA Contract Laboratory Program. The specific reasons for qualifying the data are documented in the LDI administrative record and was considered before data were used. The SPHEM does not preclude the use of acceptable estimated data.

The purpose of the LDI RI and EA was to determine the nature and extent of contamination at the site and to define the public health and environmental hazards posed by the site (p. 2-3 of the RI). Hazards from the LDI site have been determined to exist due to contamination from the site that has remained within the property boundaries, and contamination from the site that has migrated off the property boundaries. Although it is recognized throughout the RI report that other potential sources of environmental contamination exist near the LDI site, the LDI RI and EA did not quantify and evaluate these other sources. Such an exercise was not within the scope of the LDI RI and EA and was not necessary to evaluate remedial actions for the site. However, background soil contamination and upgradient ground water quality was quantitatively assessed.

A proper quantification of the LDI contaminant contribution to the environment (groundwater and soil) was done by comparing contaminant concentrations in the groundwater and soil unaffected by the site ("background") to contaminant concentrations in groundwater and soil affected by the site. When apparent, contaminant contributions from other sources were identified. Likely transport mechanisms of contamination from the LDI site were also presented in the RI and EA.

To determine background soil concentrations, soil samples were drilled in areas suspected to be unaffected by the site and analyzed for organic and inorganic constituents (p. 6-21 and 6-22 of RI). Information was gathered concerning common concentration ranges for inorganic constituents of natural soils and established extreme ranges for inorganic constituents in natural soils (p. 6-22 of RI). It was also determined in the RI, through the examination of hand auger sampling results, that background levels of naturally occurring organic chemicals were very low (page 7-18 of RI).

These background soil concentrations were compared to analyses of soil from onsite and offsite soils likely affected by the LDI site. Such comparison helped determine a release from the site. The data were also evaluated in light of site usage and transport of contaminants from the site. Although onsite soil contamination was very complex, the chemicals found at specific locations were usually indicative of activities that took place at those locations (pages 6-96 and 6-98 of the RI). Offsite soil contamination was found in areas likely affected by LDI due to transport mechanisms such as surface runoff, deposition of airborne contaminated soil particles (incinerator discharge) and groundwater seepage (pages 6-98 and 7-19 of the RI).

To determine contaminant contribution from the LDI site to the groundwater, background groundwater quality was compared to downgradient groundwater quality in the shallow aquifer. The RI hydrogeologic investigation established groundwater flow directions and rates in the site vicinity. The background groundwater analyses suggest that upgradient groundwater contamination sources do exist (p. 6-101 of RI). Much information does, however, establish that LDI is contributing to shallow groundwater contamination. That information includes: 1) concentrations are higher in downgradient wells than upgradient wells; 2) the wells with the poorest water quality are directly downgradient from, and in close proximity to, LDI; 3) there is a significant increase in the number of chemicals from upgradient to downgradient wells (page 6-101 of RI), and 4) the chemicals found downgradient from LDI are also found, to serious degrees, in the sub-surface material at LDI.

While it is the opinion of the PRP Steering Committee and their consultants that the exposure scenarios presented in the LDI Endangerment Assessment are unrealistic, the U.S. EPA maintains that such scenarios were appropriate for the LDI site specific evaluation of the no action alternative or baseline risk assessment. Consistent with the U.S. EPA approach to EAs, the baseline risk assessment was done assuming no corrective action and no restrictions for future use of the site. Current site usage and surrounding populations and area usages were carefully considered (page 7-35 of RI) by the U.S. EPA in the configuration of the LDI EA exposure scenarios.

Although the PRP Steering Committee maintains that types of institutional controls are adequate to protect public health, U.S. EPA maintains that such means are not necessarily protective. Although the State or local government may have some type of "institutional control" to discourage parties from installing a water supply well, we are not convinced that institutional controls are permanently enforceable. More often than not, we must depend on town planning officials or water department officials to discourage well drilling. Even if Macomb County classified the aquifer as unusable, the contamination from the LDI site must be addressed. Section 121 of SARA states that remedial actions that permanently reduce the mobility, toxicity or volume of contaminants are preferred over those that do not, i.e., those that rely on institutional controls. We are also required to meet ARARs.

The shallow aquifer has not been classified as unpotable by the Macomb County Health Department. This comment by the Steering Committee appears to be a misinterpretation of the RI Report, which stated that the upper aquifer was not protected, and ground water in the bedrock aquifer has been reported to be salty. In fact, it is known that the upper aquifer is currently used by some residents in Shelby Township.

According to 40 CFR 264 Subpart F, when ther is a release of hazardous waste from a facility, U.S. EPA is authorized under Subtitle C of RCRA to require cleanup of that groundwater to the appropriate levels as defined in Part 264.94. In addition, specific U.S. EPA policy in Region V is not to waive RCRA requirements solely because ther are no current or projected plans or intentions to use the aquifer as a source of drinking water.

The assumptions used in the EA about the population exposed to contaminants at the site are reasonable yet conservative estimates. These assumptions were determined based on best professional judgement, knowledge about the site, and the U.S. EPA Public Health Evaluation Manual. The baseline study is an analysis of site conditions in the absence of remedial action. The fact that a flood plain or wetland presently exists near the site, although hopefully considered, does not preclude people from building in such an area. The baseline analysis does not attempt to absolutely define or predict the numbers of people exposed.

The stressed vegetation was properly discussed on page 7-49 of the RI. The clear connection between LDI leachage seep north of the site and the stressed vegetation is presented. The reason for stressed vegetation NE of LDI is less clearly due to site conditions. Chemicals from the LDI site, runoff containing road salt or oil, and changes in the wetland water levels, are presented as potential causes for the stress.

Issue: The Steering Committee submitted an Endangerment Assessment (EA), prepared by Fred C. Hart Associates Inc. (Hart), for the Liquid Disposal, Inc. site.

Response:

The Agency is not obligated to review and comment on the Hart EA, but only to respond to comments on the Agency EA. However, the Agency did review the Hart EA, and because of significant differences in the conclusions of the two, is providing comments regarding inadequacies in the Hart EA.

The authors attempted to follow guidance presented in U.S. EPA's Superfund Public Health Evaluation Manual (SPHEM); however, several inconsistencies and omissions are noted which materially affect conclusions drawn in the document.

1. Data Base for the EA. The authors reported that they used only data validated by their own QA/QC audit. Reported maximum concentrations for various contaminants differ from those in the Remedial Investigation (RI) report prepared by E.C. Jordan. Hart did not use data flagged with "J" or estimated values. Nothing in the SPHEM or U.S. EPA guidance directs the PHE preparer to disregard estimated data.

In another section of the document (p. 25), groundwater results are summarized using only data generated when all monitoring wells were sampled. No clear rationale is presented as to why other data cannot be utilized as representative of maximum and average concentrations. A worst case scenario, inherent in the PHE process, cannot be calculated by arbitrarily eliminating data; nor can risks associated with short-term exposure to contaminants at their highest calculated concentrations be properly evaluated, if data are omitted.

2. Indicator Chemical Selection. Hart presented a data table (Table 2-3) that summarized the indicator chemical selection process outlined in the SPHEM. Worksheets 3-2 through 3-4 from which the summary table was prepared are not part of the document and should be. We cannot comment on the acceptability of the chosen indicator chemicals without them. Indicator chemicals, by their very nature, understate overall risk because not every chemical present on the site is evaluated. Incorrect selection of indicator chemicals can further magnify this problem.

3. Exposure Pathways. This is the least complete section of the EA. There is no attempt by the authors to integrate site history and disposal operations into possible exposure pathways. The exposure pathways are overly simplified; e.g., the term "Direct Contact" in the context of contaminated soils is not defined. One cannot determine if the term refers to dermal absorption and direct ingestion versus dermal absorption alone. The air exposure pathway is similarly vague. One cannot determine if the pathway describes only on-site conditions, or both on and off-site conditions. Hart's review of the site has ignored the fact that the subsoils will continue to be a source of leaching contaminants to the ground water, which will allow the additional migration of contaminants from the LDI site.

The most significant deficiency is the elimination of the groundwater pathway. The authors eliminate this pathway by citing the existence of institutional controls. This argument overlooks potential future uses or a worst case scenario. The U.S. EPA's Groundwater Protection Strategy regarding Class III aquifers is also cited as a reason the aquifer will never be used as a drinking water source. This statement made here and repeated often in the document is in error and demonstrates complete misunderstanding of the groundwater strategy. An aquifer is not classified either upgradient or downgradient of any source, but is classified instead on naturally occurring background parameters, such as total dissolved solids. Clearly there are upgradient users of the aquifer as reported on page 53 of the document. A more probable classification of the aquifer is, therefore, Class 2A - current use but not a sole source drinking water aquifer. The authors fail to note that the probable source of the high concentrations of total dissolved solids is the LDI site. Hart's emphasis on institutional controls precluding placement of downgradient drinking water wells ignores their own assessment that chemicals of concern have migrated offsite and interact with the atmosphere both at the base of the hill downgradient from LDI and with surface water in the Clinton River. Both mechanisms provide unacceptable cross-media transfer of contaminants from the site, which was not considered by Hart.

4. Surface Water Model. The surface water model was well developed in the document. However, Hart's reliance on analysis results from MW4M as the only possible contaminants downgradient of the site is flawed. We cannot depend upon results from just one point downgradient from an unpredictable contaminant source such as a landfill/hazardous waste disposal facility. Also, Table 3-3 inappropriately compares model results with drinking water standards. The appropriate standards would be Ambient Water Quality Criteria.

5. Calculations of Body Dose Levels. Table 3-4 presents the parameters and assumptions used to calculate body dose levels. U.S. EPA notes the following differences in assumptions from the PHE prepared by E.C. Jordan:

a. Contaminants in off-site soils south of the site were eliminated because they were attributed to auto salvage yard operations.

b. Frequency of exposure was reduced for both child and adult in both the most probable and realistic worst case scenarios although the duration of exposure was longer.

c. The skin surface area for children and adults in contact with contaminants is reduced, yielding much less amounts of soil absorbed. No rationale is presented for this variable by the authors and there is no guidance for it in the U.S. EPA Exposure Assessment Manual.

6. Risk Characterization. The authors have multiplied each exposure point concentration by 0.15, severely reducing doses based on an unsupported reference (Hawley, 1985). This is not U.S. EPA guidance nor is it found anywhere in the SPHEM or Exposure Assessment Manual. Soil matrix effects, which the reference cites, are already considered by using specific skin absorption rates for different classes of chemicals. It is extremely unlikely that a board certified toxicologist would make such an assumption for every type of contaminant at the site.

7. Risk Management. No such section belongs in the EA or PHE. Instead, efforts should be concentrated on assessing the human and environmental impacts of the site.

In summary, the Fred C. Hart, Inc. EA is flawed. While some sections follow U. S. EPA guidance, other sections do not, are incomplete, are missing or go beyond the scope of a public health evaluation. The E.C. Jordan EA remains an acceptable characterization of the risk posed by the LDI site.

Issue: The Steering Committee commented that there is no definition of a permanent remedy in CERCLA as amended, and that in-situ containment is a permanent remedy, and preferable to soil solidification.

Comments:

1. The soil solidification process is undefined, therefore, the preference for solidification is arbitrary and capricious.

2. The only choice supported by the record is soil containment.

3. In-situ containment is a permanent remedy since it significantly reduces the mobility of any contaminants at the site.

Response:

The soil soldification process is described in the FS. Containment using only a cap is not protective, since contaminants in soil and/or ground water will still be able to migrate off-site. Also, such an alterative does not meet the preferences for treatment or permanence, and only reduces the mobility of soil contaminants. Solidification agents such as pozzalan, fly ash, and proprietary additives were discussed. During remedial design, bench scale and/or pilot tests will be performed to determine the best type(s) of solidification/fixation agent to use for the LDI site.

The preference for solidification is not arbitrary and capricious since CERCLA as amended by SARA, prefers remedies utilizing treatment to permanently and significantly reduce mobility, toxicity or volume of the contaminants to the maximum extent practicable, and directs that in assessing alternatives, the potential for future remedial action costs be evaluated if the alternative in question were to fail.

The selected alternative is not considered permanent because hazardous substances will remain at the site. By the same token, containment alone would not be considered permanent. However, the selected alternative is more protective, and more preferable, than containment alone because it will reduce both the mobility and toxicity of the contaminants, versus only mobility when containment is used alone. Additionally, although slurry wall containment is considered a proven technology, long term effects of untreated hazardous substances on the slurry wall are not known. Therefore, a greater potential for future remedial action costs exists if containment is used without treatment of the contaminants.

Issue: Ground water treatment and discharge

Comments:

1. The decision to include onsite groundwater treatment in all the alternatives is inappropriate as the Agency failed to adequately consider the availability of a publicly owned treatment works (POTW) system to treat the groundwater.

2. One representative of an environmental organization requested that groundwater discharge not be to the Clinton River.

Response:

Discharge to a POTW was mentioned as an option on page 3 of the FS Executive Summary. The FS developed cost estimates for discharge to the Clinton River since a higher level of treatment (and thus a more detailed analysis) was assumed to be required for a river discharge. U.S. EPA believes that discharge to a POTW may be a viable alternative. Therefore, this option will be further evaluated during the remedial design phase of the project. The requirements of the Detroit Water and Sewerage Department for discharge of water to the municipal system will be met if their POTW is used. Nevertheless, the on-site treatment options examined in the FS are still appropriate since the POTW would require pretreatment prior to accepting discharged ground water.

The discharge of treated groundwater to the Clinton River if chosen must also meet the substantive requirements of the National Pollution Discharge Elimination Systems (NPDES) program established under the Clean Water Act (CWA). These limitations were created to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The water must be treated using the best available technology (BAT) and/or must not exceed water quality based standards. We fully expect that the treatment technology will be adequate to remove contaminants from the water so as not to exceed these limits. The treated water will be monitored to assure removal of contaminants of concern.

Issue: The PRPs commented that the statutory provisions and agency remedy selection procedures have resulted in denial of the PRP's right to due process under the law.

Comments:

1. U.S. EPA proceedings provide no avenues for PRPs to be heard on the administrative record, except for an opportunity granted the general public at large, to submit written statements to U.S. EPA and attend a public meeting prior to the final decision.

2. U.S. EPA has failed to submit to PRPs sufficient information necessary for them to provide comments in a meaningful and timely manner before remedy selection.

3. The only portion of the Administrative Record made available to the PRPs is the draft RI/FS, the RI/FS and the U.S. EPA Proposed Plan.

4. The PRPs have sent a Freedom of Information Act request for all information in the administrative record but have not been provided all of the information.

5. For the PRPs to be afforded the opportunity to be heard at a meaningful time and in a meaningful manner, the PRPs must be given the opportunity to: a) review all evidence and data collected by U.S. EPA in its decision-making process; b) submit independent documentary and oral evidence; c) depose and examine government witnesses involved in remedy selection procedures and studies; and d) present oral and written arguments to a neutral and detached decision maker.

6. The PRPs contend they have not been able to have an expert observe the drilling, development and installation of monitoring wells and collection of groundwater and soil samples.

7. The short comment period will neither allow PRPs sufficient time to perform their own studies and analysis, nor to submit independent evidence.

Response:

U.S. EPA procedures allow all members of the public the opportunity to be heard via the Administrative Record. Section 117 of CERCLA requires U.S. EPA to provide for public participation. The PRPs, as members of the public, are afforded the same opportunity to comment at the public meeting and to submit written comments as the rest of the public. However, CERCLA also provides PRPs with additional opportunities to negotiate with U.S. EPA regarding the private undertaking or the financing of the remedial action selected by U.S. EPA after consideration of public comments. The negotiation procedures are detailed in Section 122 of CERCLA.

U.S. EPA has responded to approximately one hundred (100) Freedom of Information Act (FOIA) requests from PRPs and their insurers regarding the LDI site. Moreover, U.S. EPA and MDNR have provided one representative of the PRP Steering Committee with all non-privileged technical data related to the RI/FS. Also, in September 1987, U.S. EPA placed the Administrative Record in the repository at the Shelby Township Library for public review. The Administrative Record contains approximately one hundred fifty documents, and, as stated above, the PRPs were provided previously with RI/FS documents.

The procedures provided in CERCLA, and followed by U.S. EPA regarding LDI, do provide PRPs with due process under the law and a meaningful opportunity to participate in the remedy selection process. The PRPs are provided with the opportunity to participate in the building of the Administrative Record, upon which the remedial action is selected and judicial review will be based. Section 113(k)(2)(B) of CERCLA provides that such participation is to include, at a minimum, the following:

(i) Notice to potentially affected persons and the public which shall be accompanied by a brief analysis of the plan and alternative plans that were considered;

(ii) A reasonable opportunity to comment and provide information regarding the plan;

(iii) An opportunity for a public meeting in the affected area, in accordance with Section 117(a)(2) (relating to public participation);

(iv) A response to each of the significant comments, criticisms, and new data submitted in written or oral presentations; and,

(v) A statement of the basis and purpose of the selected action.

U.S. EPA has followed each of these procedures which afford the public and thus the PRPs, with a meaningful opportunity to participate in the decision making process.

Moreover, §113(k)(2)(e) provides that the development of an Administrative Record and the selection of response action under CERCLA shall not include an adjudicatory hearing, and the procedures of 113(k)(2)(b) outlined above do not include the right to depose government witnesses.

The PRPs have had the opportunity to observe a substantial amount of the field work at LDI, including observation of drilling activities performed by Ecology and Environment. The following personnel from Fred C. Hart Associates have observed field work conducted by MDNR/U.S. EPA:

1.	Mr. Triolo	12/19/85
2.	Matthew Brill	1/15 - 1/17/86
3.	Jim Braun	1/21 - 1/22/86 and 1/27 - 1/31/86
4.	Vanessa DeVillez	1/22 - 1/24/86

As stated above in Section 2, U.S. EPA originally provided the public with a 21-day public comment period, which is the length of time required by the NCP. However, in response to PRP's requests for additional time for public comment and to site specific circumstances, U.S. EPA, on September 2, 1987, extended the period to an amount beyond that required by the NCP. Comment was extended from 21 to 30 days, with the period thus ending on September 18, 1987.

Issue: The PRPs assert that U.S. EPA, in its remedy selection process, has failed to follow current statutory procedures for the selection of a remedy.

Comments:

1. U.S. EPA has not followed the procedures for public participation which are found at §113(k)(2)(B) (i)-(v) cited above, particulary by announcing the proposed plan without significant input from anyone but its contractors and employees.

2. The PRPs assert that denial of access to the decision making process is contrary to U.S. EPA policy on public participation.

3. The PRPs request an additional public comment period and technical exchanges between U.S. EPA and PRPs.

4. The time period for public comment is wholly inadequate and unreasonable.

Response:

U.S. EPA has provided the PRPs with all the procedures specified for public participation in §113(k)(2)(B)(i)-(v), and in so doing has afforded the PRPs with an opportunity to participate in the decision making process. Specifically, on August 19, 1987, U.S. EPA provided the PRPs, as members of the public, with notice of the proposed plan and alternatives considered. In fact, to hasten PRP receipt of the FS report, U.S. EPA sent the PRPs' contractor a copy of the report by overnight mail on August 19, 1987. U.S. EPA provided the PRPs with an analysis of the proposed plan in a written submittal received by the PRPs in August 1987, in oral presentations at a public meeting held August 27, 1987, and at a meeting of U.S. EPA and PRPs on September 8, 1987.

U.S. EPA has provided the PRPs with a reasonable opportunity to comment and provide information regarding the proposed plan in a 30-day public comment period. As stated above, the public comment period was originally to be 21 days, the length specified in the NCP. However, in response to PRP requests and site specific circumstances, U.S. EPA extended the public comment period to 30 days, with the period thus closing on September 18, 1987. An additional period of time beyond the extension already granted is not feasible because of U.S. EPA and MDNR's mutual desire to begin remediation of LDI as soon as practicable, and Congress' desire to expedite cleanups, as evidenced by the cleanup schedules of Section 116 of CERCLA. U.S. EPA held a public meeting regarding the Feasibility Study and the proposed plan on August 27, 1987.

This document includes U.S. EPA responses to each of the significant comments, criticisms and new data submitted in the public comment period. The statement of the basis and purpose of the selected remedial action is included in the Record of Decision. Thus, U.S. EPA has complied with all requirements for public participation [§113(k)(2)(B)]. Regarding technical exchanges between the PRPs and U.S. EPA, U.S. EPA is willing to discuss the Record of Decision, and design and implementation of the remedial action with the PRPs and their technical consultants.

Contrary to their assetion, the PRPs are afforded an opportunity to participate in the decision-making process when U.S. EPA announces the proposed plan prior to formal public comment. The decision-making process is not completed at the time of announcement of the proposed plan. Rather, announcement of the proposed plan signals the initiation of a significant phase in the decision making process, that of public comment, to be followed by U.S. EPA consideration of, and response to, those comments. Regarding LDI, the decision on remedy selection has been made only after soliciting comments from PRPs and other members of the public, and after considering such comments.

Moreover, involvement of the PRPs in the decision-making process at the time of public comment is wholly consistent with U.S. EPA policy on public participation. For LDI, U.S. EPA has in fact set forth the alternatives at hand and sought public comment on them before a decision was made on a proposed plan.

Issue: The Steering Committee, their technical consultant and other PRPs commented that the remedy selection process in the FS ignores the requirement for considering cost-effectiveness, and that improper alternatives were analyzed.

Comments:

1. Vacuum extraction evaluated in alternative 5 is illogical and not cost-effective since the technology was not required in alternative 7.

2. The FS does not explain why Alternative 5 requires a "clean cover" after solidification, while Alternative 7 requires a slurry wall and a RCRA cap with a synthetic liner.

3. Alternative 2 provides the same environmental benefits as Alternatives 3, 4, 5, 6, and 7.

4. Soil flushing should have been considered further.

5. Solidification plus a slurry wall and containment system is unnecessary duplication.

6. Alternative 2 meets the goals of SARA because it reduces the mobility of soil contaminants. Also, Alternative 7 may release volatile contaminants, and therefore may not actually meet the preference for reduced mobility, toxicity, or volume.

Response:

The FS followed the procedures outlined in the U.S. EPA's "Guidance on Feasibility Studies under CERCLA." This process included the identification of response objectives, technology screening, selection of target cleanup levels, and alternatives development, screening and detailed analysis (see the Summary of Remedial Alternative Selection). The appropriate extent of remedial action and of alternative selection is discussed in the NCP, 40 CFR Part 300.68(j), and in Section 121 of SARA.

The Steering Committee, their technical consultant, and other PRPs disagree with the findings of the EA, particularly with the ground water exposure assessment. This has led to the PRPs' conclusion that ground water remedial action is unnecessary since they believe no human exposure pathway exists. U.S. EPA maintains that the exposure scenarios detailed in the E.C. Jordan EA are appropriate. (See the discussion in this Responsiveness Summary and Chapter 7 of the RI Report). The FS therefore evaluated remedial alternatives for ground water as well as for soil/waste. Remedial action is necessary to protect public health and the environment.

Vacuum extraction was included in Alternative 5 as a means of pre-treating VOC contaminated soils prior to solidification/fixation. Due to the relatively low mass of VOCs in soil, it was felt that solidification/fixation would be effective by itself. The comparison of the two alternative treatment schemes helped U.S. EPA to make a determination that alternative 7 was cost-effective and protective of human health and the environment. Neither the NCP nor CERCLA (as amended by SARA) requires that only cost-effective alternatives be evaluated, but rather that a cost-effective alternative be selected.

The slurry wall and impermeable cap have been combined with solidification/fixation in alternative 7 in order to provide an effective treatment and containment remedy. Solidification/fixation of soil/waste alone was not recommended since ground and surface water could potentially, over time, reduce the effectiveness of the technology. The slurry wall/containment system will reduce the likelihood of degradation, as well as provide an extra measure of protection against off-site contaminant migration.

Alternative 7 requires an impermeable cap in order to maintain the effectiveness of the slurry wall. Without such a cap, the volume of material within the confines of the slurry wall would need to be dewatered for an indefinite time period. The addition of an impermeable cap reduces the dewatering operation to an estimated three years.

Soil flushing was not carried through to the detailed screening process since it requires pumping, collection, and circulation of large quantities of ground water. The upgradient ground water is slightly contaminated, and would have an unknown effect on the system local ground water system (see p. 80 of the FS). Furthermore, as pointed out on page 45 of the FS prepared by the Steering Committee's technical consultant, soil flushing would be difficult to implement during cold weather conditions in the area.

The FS states that alternative 2 provides, "...environmental benefit similar to other alternatives (except no action), but has fewer adverse environmental effects than alternatives involving on-site excavation or groundwater dewatering, due to the reduced potential for soil erosion and destruction of wetlands habitat." The Steering Committee argues that, since alternative 2 is less costly than alternatives 3, 4, 5, 6, and 7, alternative 7 should not be the recommended remedy. Alternative 2 is beneficial from the standpoint of reduced on-site excavation risks, but does not meet the preferences for treatment and permanence discussed in SARA. Specifically, alternative 2 does not utilize any treatment of soil/waste, which is counter to the preference for treatment as a principal element, and the preference for permanent solutions and alternative treatment technologies to the maximum extent practicable.

Alternative 7 meets the preference for treatment mandated by SARA since it will significantly reduce the mobility and toxicity of contaminants in soil/waste, and significantly reduce the mobility, toxicity, and volume of the contaminants in ground water.

In summary, alternative 7 has been developed and evaluated pursuant to the NCP, CERCLA as amended by SARA, and appropriate Agency guidance and policy.

Issue: The PRPs submitted a Feasibility Study (FS), prepared by Fred Hart, Inc., for the Liquid Disposal, Inc., site.

Response: U.S. EPA has reviewed the subject document and includes the following comments:

The public comment period is intended for receipt of public comments on the Agency's proposed remedial action so that the comments may be considered in the decision making process. The Agency is not obligated to review and comment on the Hart FS, but only to respond to comments on the Agency FS. However, the Agency did review the Hart FS, and, because of significant differences in the conclusions of the two, is providing comments regarding inadequacies in the Hart FS.

The objectives of the LDI remedial action as stated in the Hart FS on page 10 are incomplete. It is the determination of U.S. EPA that existing and future potential threats to public health and the environment are posed by leachate and ground water, as well as on-site and off-site soils. (see pages 29-30 of E.C. Jordan FS). The Hart FS is incomplete in that response objectives for ground water and leachate are not presented.

Furthermore, the level of cleanup for soils that is presented in the Hart FS in Appendix A is not adequate for protection of public health and the environment. U.S. EPA maintains that soils cleanup levels shall be to a) concentrations of carcinogenic compounds such that cummulative cancer risk will not exceed 10^{-6}, and b) concentrations of noncarcinogens will be such that the risk ratio is less than one, utilizing the reasonable, yet conservative, soil ingestion scenario presented in the E.C. Jordan EA. Furthermore, all soils for which the LDI site is the source of contamination will be remediated, regardless of proximity to active junkyards or other uncontrolled areas in the vicinity of LDI.

The identification and screening of remedial technologies presented for soils alone (pages 11-18 of the Hart FS) are inadequate. A number of potential soils remediation technologies are not presented, particularly treatment remediation technologies including biological processes, physical processes, chemical processes, and thermal processes. However, Table 3-1 of the E.C. Jordan FS presents a comprehensive list of potential technologies.

The criteria for screening the technologies in the Hart FS, however, are not explained. Screening of technologies based on reliability, constructability, implementability, and applicability is done in Table 2-2 of the Hart FS, but no definition of these screening criteria is presented. An evaluation of the Hart FS, Table 2-2, for example, reveals that the reliability screening criteria were not applied to the remedial action goal stated earlier in the Hart FS. Reliability for different, less protective goals, are discussed in Table 2-2 (Hart).

Furthermore, at the conclusion of the Hart technologies screening, it is not clear which technologies are screened out and which are acceptable for further consideration.

The alternatives array process on pages 19-21 of the Hart FS is done without regard to recent U.S. EPA guidance and the rationale for assembling the alternatives is not given. Because it is not clear which technologies are considered appropriate from the previous technologies screening section, the assembling of the alternatives in Section 2.3 (Hart FS) appears arbitrary.

The E.C. Jordan FS, on the other hand provides an explanation of the technologies screening criteria on page 42 and properly applied in Section 3.2. In addition, the arrayed alternatives in the three types of remediation categories are described on pages 72-73: no action, containment, and treatment. This is as directed in the Interim Guidance on Superfund Selection of Remedy, December 24, 1986 OSWER Directive #9355.0-19. The screening of technologies (Section 3.2) is comprehensive and clear. The alternatives array rationale (pages 73 to 80) is also clear.

The alternatives assembled in the Hart FS are described and evaluated in Section 3, pages 22-34. The descriptions of the alternatives do not provide adequate detail for evaluation criteria for these alternatives. Furthermore, the evaluation criteria are not presented or described in the Hart FS. The cost information presented on the alternatives in Section 4.0, pages 35-42, of the Hart FS is inadequate. The estimated accuracy of the cost estimates is not stated. The data used to determine the cost estimates is not referenced. The level of detail needed for evaluating alternatives for the LDI site is presented in Section 5, pages 82-158, of the E.C. Jordan FS.

Finally, the summary statements presented in Section 5.0, pages 43-46, of the Hart FS do not equitably reflect the screening criteria presented in its study (technical evaluation, institutional requirements, public health evaluation, environmental evaluation, and cost). The environmental evaluation consideration of soils excavation and associated organic vapor and dust generation is emphasized. A statement of comparative public health protection, technical feasibility, and institutional requirements is not presented in the Hart FS. A determination of an appropriate cost-effective remedial action is not possible with such an asymmetric evaluation of the evaluated alternatives.

In contrast, Section 5.9, pages 158-166, of the E.C. Jordan FS presents a summary and comparative analysis of all developed remedial alternatives in light of all utilized evaluation criteria (engineering evaluation, public health evaluation, environmental evaluation, ARARs evaluation, and cost).

The comprehensive evaluation by E.C. Jordan leads to recommendation of Alternative 7 as the appropriate cost-effective remedy.

Issue: The Steering Committee commented that the Feasibility Study (FS) applies inappropriate and irrelevant requirements, which has resulted in a remedy that is not cost-effective and is inconsistent with U.S. EPA policy.

Comments:

1. The selection of remedial action must be guided by applicable and relevant or appropriate requirements (ARARs).

2. The recommended remedy is not cost-effective, as required by the National Contingency Plan (NCP).

3. Maximum Contaminant Levels (MCLs), Cancer Assessment Group (CAG) numbers, and Risk Reference Doses (RFDs) are not ARARS for the site.

4. The upper aquifer downgradient of the site is not, and will never be a source of drinking water. Therefore, it should be classified as a Class III aquifer, and thus drinking water standards are not ARARs.

Response:

Section 121(d) of CERCLA requires that the level of cleanup at a site attain ARARs. The selected remedial action at LDI is protective of human health and the environment and attains all ARARs.

As described in the Record of Decision, the groundwater cleanup level will be such that under a reasonable yet conservative groundwater ingestion scenario. Concentrations of carcinogenic compounds will be such that the cumulative cancer risk will not exceed 10^{-6}, and concentration of non-carcinogens will be such that the risk ratio (as described in the EA) will be less than or equal to one. The soil cleanup level will be based on a reasonable yet conservative soil dermal contact scenario. The resultant concentrations of carcinogens in unremediated soils will be such that the cumulative cancer risk will be less that 10^{-6} and concentrations of noncarcinogens in unremediated soils will be such that the risk ratio will be less than or equal to one. Maximum Contaminant Levels (MCLs), Cancer Assessment Group (CAG) numbers, and Risk Reference Doses (RFDs) are all used to help determine protectiveness for the site.

As explained above, contrary to PRP and Steering Committee comments, U.S. EPA would not classify the shallow aquifer as a Class III aquifer. The quality of the water in this aquifer, if not affected by the site, would be such that the groundwater could be potable. For this reason, U.S. EPA based cleanup levels for this aquifer on a reasonable yet conservative human ingestion scenario of the groundwater.

The selection of the remedy is based on a number of evaluation criteria. Compliance with ARARs is one of these criteria. Other criteria include effectiveness, engineering constructability, engineering implementability, engineering reliability, public health evaluation, environmental impacts evaluation, and cost (page 82 and 83 of the FS). Section 121 of CERCLA also states a preference for remedies which provide permanent and significant reduction of mobility, toxicity, or volume of hazardous substances. The selected alternative will provide protection of public health and the environment, and provides the best balance of strengths relative to the above evaluation criteria. This remedy also provides for reduction of mobility, toxicity, and volume of hazardous substances at the site. The public health and environmental benefits yielded from this remedy justify the costs of the remedy. The selected alternative is cost-effective.

Issue: One citizen requested a different ground water treatment scheme.

Comments:

1. The private citizen suggested that activated carbon, rather than air stripping, be used for ground water treatment.

Response:

In regard to changing Alternative 7, groundwater treatment, to using carbon adsorption rather than air stripping, we have reviewed both treatment methods.

Although both methods of treatment would be effective at the LDI site, air stripping was selected primarily because it is expected to be equally as effective as activated carbon at a lower cost. Each system will require activated carbon, but the annual operation and maintenance (O & M) cost of the vapor phase carbon for the air stripper is estimated to be less than the O & M cost for water phase activated carbon. This is because the vapor phase carbon would be treating strictly stripped contaminants, while the water phase carbon would act as a filter for ground water contaminants of concern as well as other chemicals present. Over the life of the project (estimated to be 9 years), the cost of frequent changes of water phase carbon could be significant.

Issue: Hydro-Geo Chem, Inc. under contract to Hexcel Corporation, submitted an alternative for U.S. EPA consideration.

The essential features of the alternatives were described by Hydro-Geo Chem, Inc. as:

1) debris decontamination and off-site land disposal to address debris/equipment

2) on-site treatment with vacuum extraction, soil flooding, excavation and relocation of off-site soils and capping to address soil/waste; and

3) on-site treatment with carbon absorption and flocculation/precipitation to address groundwater.

Response:

The alternative presented by Hydro-Geo Chem, Inc. (HGC) has been reviewed. The alternative contains elements already evaluated in detail in the FS, as well as a new element, soil flushing, to address the response objectives enumerated in the FS.

On-site disposal of debris/equipment was selected primarily because it was felt to be the most cost-effective method. The estimated capital costs were $79,750 for on-site disposal versus $247,500 for off-site disposal.

Vacuum extraction was not recommended because of disfavorable site conditions. The heterogeneous nature of the soil/waste would make vapor extraction difficult to design and implement.

The relative merits of air stripping versus carbon adsorption are discussed elsewhere in this Summary. Ion exchange ($130,100) was deemed to be more cost-effective than flocculation/precipitation ($284,000), since both technologies could meet the response objectives.

Soil flushing (flooding) was not examined in detail for reasons explained on page 80 of the FS. Also, the Steering Committee's consultant noted that cold weather conditions would make this technology difficult to implement.

Hydro-Geo Chem has formulated a reasonable alternative that utilized similar components of E.C. Jordan alternative number 5. U.S. EPA believes that, when all appropriate remedy selection factors have been weighed, Alternative 7 remains the most cost-effective (see Summary of Remedial Alternative Selection).

Issue: Comments from U.S. Fish and Wildlife Service

Comments:

1. It is the opinion of the U.S. Fish and Wildlife Service that the 1 mg PCB/KG soil dry weight TCL is too high and if implemented will lead to direct and adverse impacts to resident and migratory wildlife at the site. In consideration of bioaccumulation by invertebrates (earthworms) and other organisms on up the food chain, the TCL should be set at 0.1 mg PCB/Kg soil dry weight and, to provide for a margin of safety,the value should be changed to 0.05 mg PCB/Kg soil dry weight.

2. U.S. Fish and Wildlife Service expressed concern that inappropriately high detection levels were employed in analysis of on-site soil samples for polychlorinated dioxins/furans. They also suggested that off-site soil samples for polychlorinated dioxins/furans be taken.

Response:

U.S. EPA believes that the RI evaluated the potential releases of polychlorinated dioxins/furans adequately. The analytical detection limits for dioxin/furan isomers were at, or below, 1 ug/kg in soils. While significantly lower detection limits are achievable in water samples, it is difficult to routinely analyze for dioxins/furans in soils below the 1 ug/kg level.

Soil samples analyzed for dioxins/furans were collected from on-site areas expected to have the highest potential for contamination. The analyses did not reveal the presence of significant releases of these contaminants. Consequently, extensive off-site sampling efforts were not deemed necessary.

The U.S. Fish and Wildlife Service (FWS) has raised a valid concern regarding bioaccumulation of PCBs by invertebrates as a rationale for proposing a more stringent TCL. The issue of appropriate clean up levels for PCBs in soils has been debated extensively within, and outside, the Agency. The Agency has evaluated the health and environmental impacts of PCBs. The U.S. EPA Office of Health and Environmental Assessment (OHEA) developed draft health advisories for PCBs in soils. The OHEA assessment concludes that a level of 1 to 6 ppm PCBs in soil could be associated with a 1 x 10-5 level of oncogenic risk in humans. The placement of a 10 inch cap of clean soil on top of soil containing 1 to 6 ppm PCBs could reduce the oncogenic risk by an order of magnitude. The Agency strives to consistently provide this level of protection, if practicable and cost-effective.

While there are uncertainties regarding the environmental impacts of PCBs in soils, the Agency does not feel that more stringent clean up levels are justifiable. The soils on site will be capped with a RCRA compliant cap. Off-site soils, once they are excavated to the target clean up level, will be backfilled with clean soil and compacted. These measures are designed to afford protection of human health, and significantly reduce the likelihood of exposure of resident and migratory wildlife.

Issue:

One PRP commented that it was his understanding that U.S. EPA and MDNR were withholding information.

Comments:

1. U.S. EPA and MDNR have technical information which concludes that there is no realistic risk from soil exposure and no risk of exposure down gradient from the site. U.S. EPA was requested to review all allegedly withheld information prior to the Record of Decision and justify why such data was not considered for the selection of Alternative 7 or other alternatives beyond what has already been accomplished at the site.

Response:

U.S. EPA has not withheld information regarding the selection of the LDI remedy. All available chemical data relevant to this Record of Decision have been made a part of the administrative record. The data have been used to analyze the alternatives discussed in the FS. The risks from soil and groundwater exposure are discussed in the Endangerment Assessment (Chapter 7 of the RI Report). U.S. EPA is unaware of any other technical information which would indicate that there is no realistic risk from soil exposure and no risk of exposure downgradient of the site.

Issue: The Steering Committee and its technical consultant commented that the risks and benefits of excavation and solidification have not been adequately compared.

Comments:

1. The FS did not consider the risks due to: 1) disturbance of soil and release of chemicals into the air; 2) exposure of wastes to increased precipitation which could increase migration of chemicals from the site; 3) volatilization of chemicals from the dewatering operation; 4) exposure of workers to chemicals during excavation; and 5) risk of accidents during the operation of heavy equipment.

2. The process by which soil solidification is to take place is not defined. Therefore, the decision to use this technology is arbitrary and capricious.

Response:

Chapter 5 of the FS qualitatively discussed the risks of exposure from excavation of soil/waste in those alternatives requiring such activity (Nos. 3, 4, 5, 6, and 7). In order to insure protection of public health during excavation, a bench and/or pilot scale test will be performed during remedial design. The purpose of this test is to identify the proper solidification/fixation agent and to evaluate the potential for the release of chemicals into the air during excavation and solidification/fixation. Based on information gathered during these tests, the Agency will implement excavation and solidification to minimize any adverse impacts. In addition, Occupational Safety and Health Administration requirements for worker protection and safety will be followed.

As discussed in the FS, as well as elsewhere in this Responsiveness Summary, the specific details of the process by which soil solidification will occur will be determined during Remedial Design. The Agency's selection of soil solidification as part of the remedy, with specifying all engineering aspects, is neither arbitrary nor capricious. Due process has been afforded the PRPs as well as the public to comment on the treatment technology for the site. The Agency is not required to fully engineer and design each alternative prior to selecting an appropriate remedy. In enacting SARA, Congress specifically recognized in Section 117 that the Agency would make adjustments and changes during the implementation of Records of Decision. To the extent that significant changes which negatively impact any of the selection criteria arise during design or implementation, the Agency will seek additional public comment. All other changes occuring during design and implemenation will be handled in accordance with the provisions of Section 117(c).

Issue:

An affidavit by a former E.C. Jordan employee was included in the Steering Committee's comments regarding a November 5, 1986 meeting between U.S. EPA, MDNR, and E.C. Jordan. It states that the U.S. EPA and MDNR instructed E.C. Jordan to change their assumptions in the EA in order to justify remedial action. (Note: Technical comments in the affidavit have been addressed elsewhere in this Summary).

Comments:

1. A former E.C. Jordan employee claims that U.S. EPA and MDNR told E.C. Jordan not to include a list of naturally occurring organic chemicals in the EA because it would not help justify remedial action at the site, and that U.S. EPA and MDNR also stated that they did not want to further weaken the case for remedial action since so much removal activity had taken place.

2. A former E.C. Jordan employee claims that U.S. EPA instructed E.C. Jordan to assume exposure so that more work could be done at the site.

Response:

U.S. EPA and MDNR did instruct the former E.C. Jordan employee to change his assumptions in the EA. However, the rationale for U.S. EPA and MDNR's instructions is quite different from that represented by the former E.C. Jordan employee. Contrary to the assertion of the former E.C. Jordan employee, U.S. EPA and MDNR requested changes in the EA because the former E.C. Jordan employee had greatly mischaracterized the present and future potential risks associated with the site. In particular, U.S. EPA and MDNR requested that assumptions be changed for the following reasons:

1) E.C. Jordan's assumption of no exposure to site contaminants would not provide adequate protection of human health and the environment.

2) The Superfund Public Health Evaluation Manual provides that potential exposure to contaminants in the environment may be assumed to present an adequate assessment of risk. To do otherwise could seriously underestimate the risk of human contact with contaminants, and thus human endangerment.

U.S. EPA is unaware of any request to not include a list of naturally occurring organic chemicals in the EA. In fact, the background concentrations of organics were evaluated in the FS in order to determine the appropriate extent of remedial action.

Finally, U.S. EPA is unaware of any statements made by U.S. EPA or MDNR personnel, regarding the need for certain assumptions in the endangerment assessment, solely for the purpose of justifying remedial action.

SUMMARY OF PUBLIC MEETING COMMENTS

On August 27, 1987, the Michigan Department of Natural Resources and the U.S. Environmental Protection Agency held a meeting in Shelby Township, Michigan, to receive comments on a draft Feasibility Study for the Liquid Disposal, Inc. Superfund site. The following represents a summary of major comments and suggestions made at that meeting or received in writing:

Comments:

1. Concern was expressed over the presence of contaminants in the deep aquifer at the site and the possible ways that the aquifer became contaminated.

2. Commenter recalled operational practices at LDI that appeared to allow air emissions to bypass the air pollution control equipment. Can we prosecute the owners and operators for violations of this sort? It was suggested that the Shelby Township Police Department and local courts probably have documentation of complaints and violations.

3. Commenter was concerned about "shortcuts" being taken in the construction of the proposed slurry wall in order to cut costs. Commenter questioned both EPA and DNR staff on whether or not EPA was being pressured to reduce spending in the Superfund programs below funding levels allocated by Congress.

4. Commenter was worried, as a taxpayer, that the public is paying twice for other's mistakes; in the form of health effects and secondly in paying for site cleanup. Is the EPA aggressively pursuing responsible parties to pay for cleanup?

5. A number of commenters were concerned about the proposed discharge to the Clinton River of the purged and treated ground water. The Clinton River is too easily viewed as the catch-all for all pollutants. If a surface water discharge is established, strict and appropriate discharge limits must be set in an NPDES permit. Suggestion was made to fully investigate the cost-effectiveness of the proposed groundwater treatment system with discharge to the Clinton vs. discharge to the Detroit sewer system with reduced or no treatment.

6. It was suggested that, rather than solidifying the contaminated soils at the site now, to merely contain the contaminants with the slurry wall and cap. In a few years, as technologies such as biodegradation advance, the government could go back and fully treat the soils to remove or detoxify contaminants. Solidifying solids seems to eliminate any future option for a more permanent remedy.

7. How will the integrity of the proposed clay cap be protected, especially in light of the problems being experienced with the cap at the G&H Landfill?

8. The carbon adsorption system for groundwater treatment proposed in alternative #3 would be a better choice than the air stripping system proposed in alternative #7. Commenter suggests that the low levels of organics present

in the groundwater would be effectively removed and since the carbon can be reclaimed, the additional cost would be negligible.

9. Commenter is concerned about community reaction to her working with school children in the Shadbush Environmental Center east of the LDI site, and wanted a letter stating that it was safe to use the site.

Response:

1. The deeper aquifer does indeed show some contamination, principally by brine. The presence of the brine is not fully understood. Brine is naturally occurring in that aquifer and the bedrock aquifer has likely been unaffected by surface waste sources. However, the public has stated its concern that past injection of hazardous substances into the deeper aquifer from an LDI production well could have occurred. In order to respond to public concerns and definitively characterize the bedrock aquifer, confirmation sampling will be performed during remedial design.

2. EPA enforcement has focused primarily on identifying parties that might bear responsibility under Superfund for site cleanup. EPA is now negotiating with over 800 separate parties which sent waste to LDI. We hope that as a result of these negotiations, private parties will pay for the site cleanup and reimburse the State and Federal government for money spent to date. Prosecution for permit violations is difficult under air pollution control statutes and would be especailly difficult many years after a facility is closed.

3. Staff were not aware of any such problem and cited examples that would contradict the assertion of footdragging on spending.

4. Yes; currently EPA is negotiating with over 800 companies for cleanup of the site.

5. We recognize the concern over the proposed discharge to the Clinton River, especially in light of the heavy recreational use made of the River. The possibility of discharging treated groundwater to the Detroit sewer system will be fully investigated in the design phase of this project. The Detroit Water and Sewerage Department has been contacted, and that office has provided certain guidelines and requirements that would affect such a discharge.

6. The proposed soil cleanup approach--solidifying and isolating--is considered a permanent remedy. Land use restrictions may need to be in place for many years. Leaving the soils untreated as suggested seems presumptuous with regard to how technologies will advance and with regard to the availability of funding at a later date to pay for further remedial work.

7. The clay cap proposed at LDI will be significantly different from the "cap" at G&H. The cap proposed at LDI will consist of a series of clay and artificial liners, all designed and installed with detailed specifications. Top soil will be placed on top of the cap, and a vegetative cover will be established.

8. U.S. EPA has evaluated both air stripping and carbon adsorption as potential methods for treating the groundwater. Both carbon adsorption and air stripping can meet the response objectives. The estimated capital costs of air stripping and carbon adsorption are $146,000 and $72,100, respectively. However, the operation and maintenance costs are $43,800 and $72,600, respectively. Since the system is expected to operate for about nine years, U.S. EPA believes that air stripping will be the most cost-effective method for treating extracted ground water in the long run.

9. The Michigan Department of Public Health, Center for Environmental Health Sciences is reviewing the data on soil contaminants and will provide the letter concerning the use of the site. The letter will detail any restrictions on use or precautinary measures that should be taken.