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RECORD OF DECISION SUMMARY

BOWERS LANDFILL

CIRCLEVILLE, OHIO

March 24, 1989

U.S. Environmental Protection Agency

Region V

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DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Bowers Landfill Site
Circleville, Ohio

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Bowers Landfill site in Circleville, Ohio, developed in accordance with CERCLA, as amended by SARA, and the National Contingency Plan. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

The State of Ohio concurs with U.S. EPA's remedy selection. A letter of concurrence is attached to this Record of Decision.

Description of the Selected Remedy

The primary role of the Bowers Landfill RA is:

1. To properly close the site that has evidence of hazardous waste disposal; and

2. To address potential site risks.

Since the site has a very poor cover, site records indicate evidence of hazardous waste disposal and low levels of contamination were found, the site will be closed in accordance with Ohio Sanitary Landfill Closure standards. This will include installing a 4 ft. thick clay and soil cover over the landfill. Erosion and flood control measures, and drainage improvements will be included.

Potential risks are posed by ground water immediately downgradient of the site and exposure to contaminated soils on or near the landfill. The selected remedy will address the ground water threats by restricting future ground water use between the landfill and the Scioto river and by installing a clay cap that will reduce infiltration, reducing the likelihood of future ground water

contaminants. Additionally, because wastes will remain on-site, the selected remedy will provide for long term ground-water monitoring and corrective action measures should monitoring indicate unacceptable risks due to increased contamination. The selected remedy will address the soil threats by capping contaminated soils and limiting access to the landfill area.

The major components of the selected remedy are:

- Monitoring ground water
- Restrict site use and access
- Manage surface debris
- Improve erosion control, flood protection and drainage
- Install natural clay cover over landfill

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. Because treatment of the principal threats of the site was not found to be practicable, however, this remedy does not satisfy the statutory preference for treatment as principal element of the remedy.

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

Frank M. Covington

for Valdas V. Adamkus, Regional Administrator
U.S. Environmental Protection Agency, Region V

3/31/89

Date

RECORD OF DECISION SUMMARY
BOWERS LANDFILL
CIRCLEVILLE, OHIO

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Bowers Landfill is located in rural Pickaway County, Ohio, approximately 2.5 miles north of the City of Circleville. The site is just northwest of the intersection of Island Road and Circleville - Florence Chapel Road, on the east side of the Scioto River Valley. The landfill lies within the Scioto River floodplain. Its northwestern and southern-most points abut the Scioto River (Figure 1).

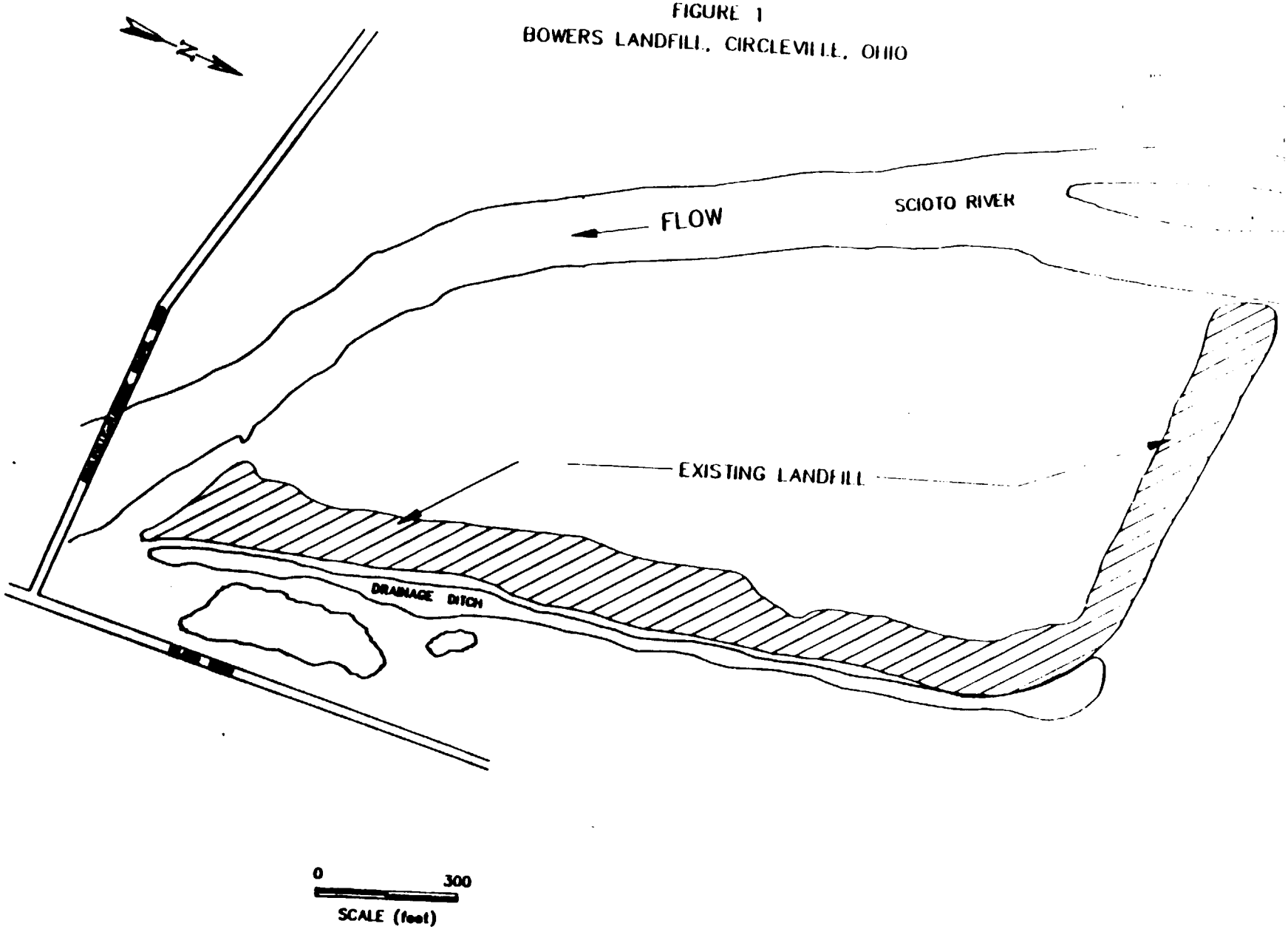
The landfill occupies about 12 acres of a 202-acre tract owned by the estate of Dr. John M. Bowers. The landfill was constructed as a berm approximately 4,000 feet long with an average width of 125 feet and a top height of approximately 10 feet above grade. The reported waste volume of the landfill is approximately 130,000 cubic yards. The landfill has an established cover of vegetation, including small trees, but miscellaneous debris is exposed where the landfill surface has been eroded. The area east of the site is a natural topographic high with the elevation on Island Road about 50 feet higher than the landfill. This topography has been modified by quarrying activities to the east and northeast of the site. The north and west sides of the landfill are bordered by agricultural fields.

Since the landfill lies within the Scioto River floodplain, it is flooded regularly. The field west of the landfill is inundated an average of 29 days per year, and parts of the landfill are overtopped by flood waters an average of every 2 years. Flood waters and precipitation generally flow west and south toward the Scioto River. A drainage ditch lies immediately east of the landfill. Water in this ditch flows through a pipe under the southern end of the landfill and discharges to the Scioto River. A ditch on the west side of the landfill is not well developed and does not discharge to the river. Water in this ditch tends to pond near the southern end of the landfill.

The site area is rural, with 15 houses located within a ½-mile radius of the landfill. Houses in this area largely depend on private wells for water supply. However, no downgradient wells are within 1 mile of the site. The City of Circleville's water supply wells are located about 1-1/2 miles south of the site.

A more complete description of the site can be found in the Remedial Investigation Report (dated August 22, 1988) and the Feasibility Study Report (dated February 3, 1989).

FIGURE 1
BOWERS LANDFILL, CIRCLEVILLE, OHIO



2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Dr. Bowers began operating the landfill in 1958. Little information is available on the types and quantities of wastes disposed of at Bowers Landfill. Much of the information was supplied by interviews with individuals familiar with landfill operations. However, these interviews were conducted 15 to 20 years after site operations ended. Information from Ohio EPA (OEPA) files indicates that residential type waste, collected by private haulers in and around Circleville, accounts for most of the material in Bowers Landfill. No industrial dumping at the site was reported before 1963. Between 1963 and 1968, in addition to general domestic and industrial refuse, the site received chemical wastes originating from local industries, including E.I. DuPont deNemours & Company (DuPont) and Pittsburgh Plate Glass, Inc. (now PPG Industries, Inc.). DuPont and PPG reported sending 6,000 and 1,700 tons of waste, respectively, to Bowers Landfill between 1965 and 1968.

Waste disposal practices consisted largely of dumping waste directly onto the ground and covering it with soil. However, there are some indications that the southern part of the landfill may have been excavated for waste disposal. Waste was also burned at the site; the extent and dates of waste burning are not known. Landfilling at the site ended around 1968. The site was not secured when landfilling ended, and the cover material of sand, gravel, and some topsoil was characterized as "not sufficient" during a 1971 inspection by the Pickaway County Health Department.

In 1980, U.S. EPA collected and analyzed surface water samples from the site area; the results indicated that some contaminants were being released from the landfill. U.S. EPA subsequently required Dr. Bowers to commission an environmental study of the site. During the study, three wells were installed to monitor ground-water quality. These and a number of existing private wells and surface water points near the site were sampled. Volatile organic compounds (VOC), including ethylbenzene, toluene, and xylene, were found in downgradient monitoring wells immediately west of the site. However, no VOCs were detected in an upgradient well east of the site.

In 1982, based on the levels of organic contaminants measured in water samples from the site, Ohio EPA (OEPA) requested that the site be placed on the National Priorities List (NPL) as a Superfund site. In 1985, U.S. EPA and OEPA signed a consent order with DuPont and PPG, two of the potentially responsible parties (PRP). This order outlined the scope and schedule for a remedial investigation (RI) and feasibility study (FS) at Bowers Landfill. DuPont and PPG have assumed responsibility for the site investigation. Dames & Moore, under contract to the PRPs, conducted the RI and FS.

RI field activities began in July 1986 and included two phases, a first phase to characterize contaminant levels at the site and a second phase to answer questions raised by the first phase. During the first phase, 18 monitoring wells were installed at or near the landfill and sampled twice. Ground water from four off-site residential wells was sampled once. Sediment and surface water were sampled twice, and surficial soils were sampled once. This first phase of sampling was completed in May 1987. The second phase of the RI was conducted during February and March 1988. The major purposes of the second phase were (1) to assess ground-water flow direction in the deeper of the two aquifers that underlie the site and (2) to collect additional ground-water and soil samples. Two additional monitoring wells were installed during the second phase, and five wells (including the two new wells) were sampled. In addition, soil samples were collected from 10 locations. Dames & Moore prepared a Remedial Investigation Report (dated August 22, 1988) describing these activities.

Dames & Moore began the FS in early 1988. The FS was based on the results from the RI and also on the results of an endangerment assessment (EA) prepared by a U.S. EPA contractor. Nine remedial alternatives for Bowers Landfill, including the "no action" alternative, were evaluated in the FS. Dames & Moore prepared a Feasibility Study Report (dated February 3, 1989) to describe the development and evaluation of these alternatives.

Following completion of the RI and FS, U.S. EPA sent a special notice letter to the PRPs on March 1, 1989. This letter indicates U.S. EPA's willingness to allow the PRPs to carry out the design and implementation of U.S. EPA's preferred remedial alternative for Bowers Landfill. During the FS process, both U.S. EPA and OEPA reviewed the PRPs' preference for a remedial alternative. However, for reasons outlined in this decision summary, U.S. EPA has selected a different alternative. Technical discussions between the agencies and the PRPs, concerning the selection of a remedial alternative, are summarized in the Administrative Record for Bowers Landfill.

3.0 COMMUNITY RELATIONS HISTORY

U.S. EPA has conducted an extensive community relations program in conjunction with the Bowers Landfill RI/FS. Between November 7, 1985, and November 2, 1988, 12 meetings of the Bowers Landfill Information Committee were held in Circleville, Ohio. The Information Committee consists of representatives from U.S. EPA, OEPA, the PRPs, local (city and county) government, and citizens' groups. These meetings were held at regular intervals to keep the public informed of progress during the RI/FS and to discuss upcoming events. During the meetings, U.S. EPA, OEPA, and the PRPs made formal presentations to the committee on topics

such as well installation and sampling methods; sampling results for soil, ground water, surface water, and sediment; endangerment assessment results; applicable or relevant and appropriate requirements (ARARs); and remedial alternatives developed in the FS. Following the presentations, U.S. EPA, OEPA, and the PRPs discussed these topics with the committee and answered questions from committee members.

As part of its community relations program, U.S. EPA has maintained an information repository at the Pickaway County District Library, 165 East Main Street, Circleville, Ohio. All formal reports submitted by the PRPs during the Bowers Landfill RI/FS are available at this location. The information repository also contains reports prepared by U.S. EPA, such as the Endangerment Assessment Report and Proposed Plan for Bowers Landfill.

On September 14, 1988, U.S. EPA held a formal public meeting to present the results of both the Remedial Investigation and Endangerment Assessment Reports. This meeting was held at the Circleville High School Cafeteria, 380 Clark Drive, Circleville, Ohio.

Finally, U.S. EPA notified the local community, by way of the Proposed Plan, of the preliminary selection of a remedial alternative for Bowers Landfill. To encourage public participation in the selection of a remedial alternative, U.S. EPA scheduled a public comment period from February 14 to March 16, 1989. Additionally, U.S. EPA held a public meeting on February 28, 1989, to discuss the preferred remedial alternative, other alternatives evaluated in the FS, and any other documents previously released to the public. A transcript of this meeting is included as part of the Administrative Record for Bowers Landfill. U.S. EPA's responses to comments received during this public meeting and to written comments received during the public comment period are included in the Responsiveness Summary.

4.0 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy for Bowers Landfill was developed by combining aspects of source control, site access restrictions, drainage improvements, and long-term monitoring. In summary, the selected remedy will include removing surface debris and vegetation from the landfill, installing a 4-foot-thick clay and soil cap on the landfill top and side slopes, instituting erosion control and drainage improvements, fencing the site perimeter and restricting site use, and conducting long-term ground-water monitoring. The components of the selected remedy are described in greater detail in Section 10.0.

The principal threats that the landfill poses are exposure to ground water immediately downgradient of the site and exposure to contaminated soils on or near the landfill. The selected remedy will address these threats by capping contaminated soils, limiting access to the landfill area, and restricting future ground-water use between the landfill and the Scioto River. Because wastes will remain on-site, the selected remedy will provide for long-term monitoring and corrective action measures should monitoring indicate increased contamination or threats. Also, as required by Section 121(c) of CERCLA, the site will be reevaluated each 5 years to determine whether the selected remedy is effective.

5.0 SITE CHARACTERISTICS

The remedial investigation (RI), consisting of on-site scientific studies and laboratory analyses to determine the nature and extent of contamination at the site, has been completed. The first phase investigation took place from July 1986 to May 1987. A second phase investigation was conducted in February and March 1988. During the RI, samples were taken of ground water, surface water, sediment, and soil. The results of the RI are summarized below.

5.1 Ground Water

The Bowers Landfill site is underlain by 40 to 100 feet of glacial deposits, which overlie shale bedrock. These glacial deposits are part of an extensive aquifer system that underlies the Scioto River floodplain. In the site area, glacial deposits thicken to the south and west of the site, and are thinnest at the northeast portion of the landfill. The glacial deposits include two water-bearing zones -- (1) a brown sand and gravel deposit that lies approximately 10 feet below the land surface and (2) a gray sand deposit with lesser amounts of gravel that lies just above the bedrock. These two zones are considered the upper and lower aquifers over most of the site and are separated by a low-permeability silt-clay deposit. However, the two aquifers may be hydraulically connected at some site locations. The bedrock below the glacial deposits is considered an aquiclude and is not used locally for water supply. Figure 2 illustrates an east-to-west geologic-cross section of the site area.

Dames and Moore installed 20 ground-water monitoring wells at the site. These included 10 shallow wells, 5 intermediate wells, and 5 deep wells (Figure 3). Shallow wells were screened at the water table near the top of the upper aquifer. Intermediate wells were screened within the lower portion of the upper aquifer. Deep wells were screened within the lower aquifer. A comparison of ground-water levels for each series of wells (shallow, intermediate, and deep) indicated that ground water near the site is moving west or southwest.

FIGURE 2

GEOLOGIC CROSS-SECTION OF THE SITE AREA

BOWERS LANDFILL - CIRCLEVILLE, OHIO

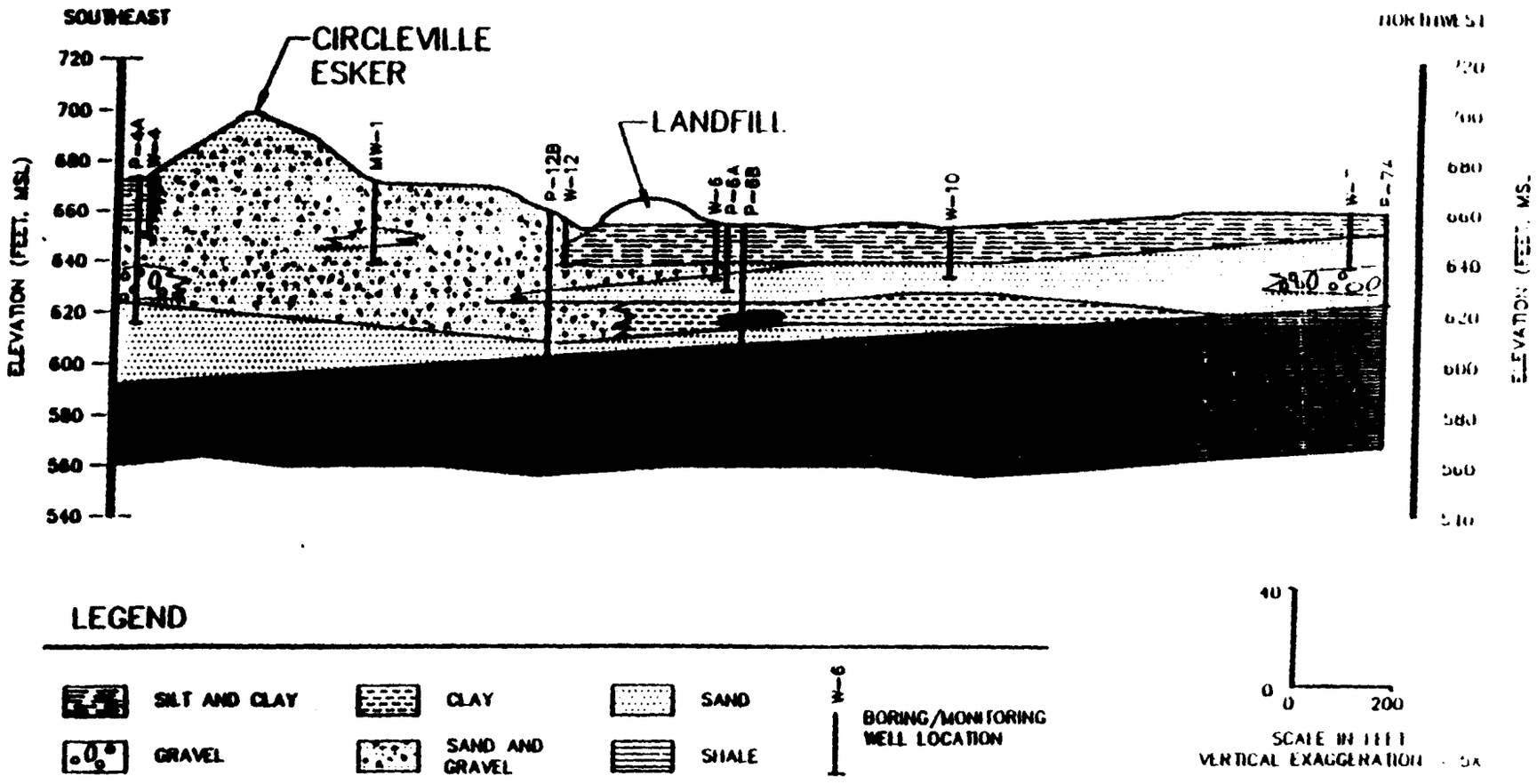
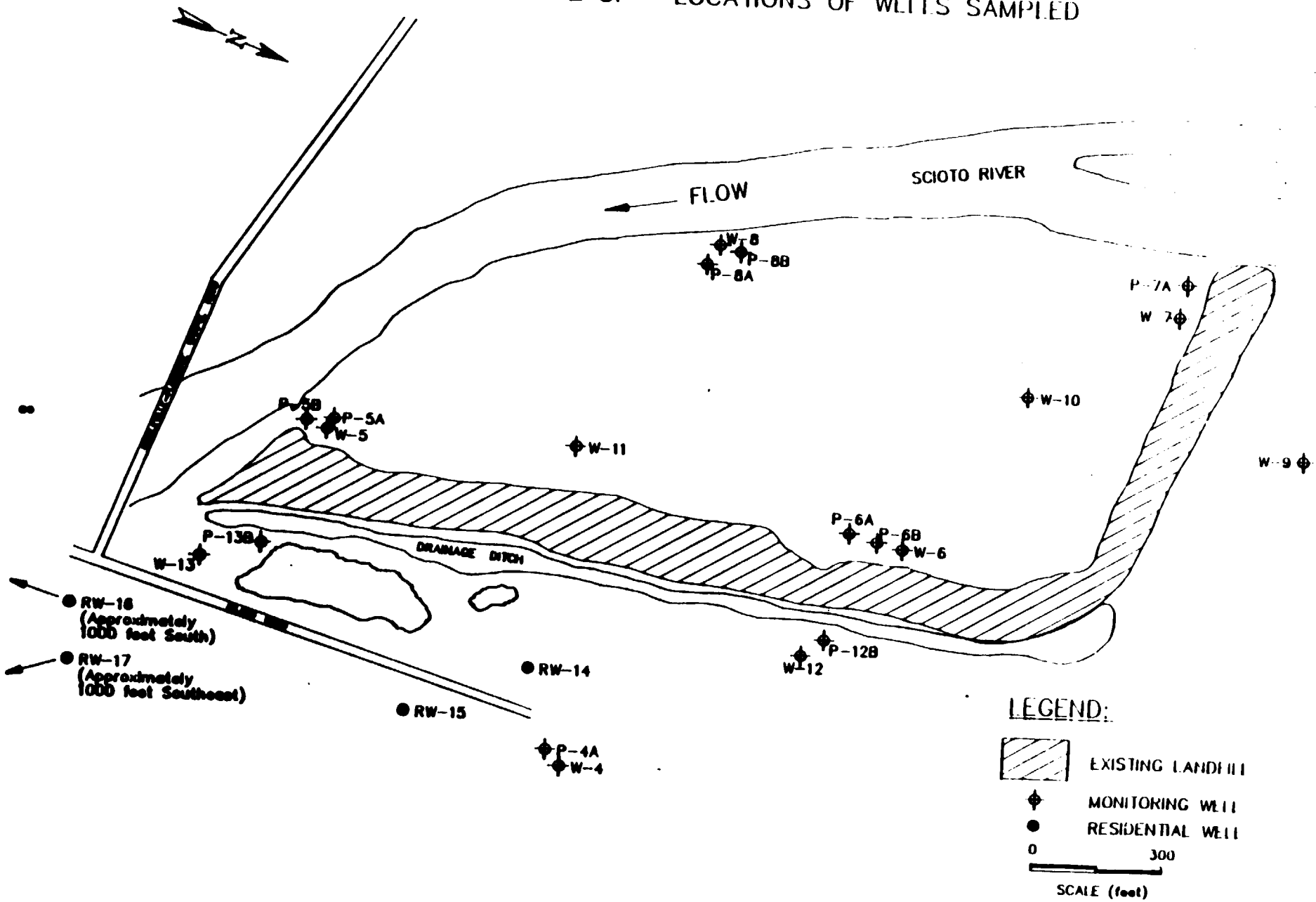


FIGURE 3. – LOCATIONS OF WELLS SAMPLED



Ground-water samples were collected from 18 monitoring wells in February 1987 and May 1987 (Figure 3). Samples were also collected from four residential wells in February 1987. Two additional monitoring wells were installed in February 1988. These wells and three of the original 18 wells were sampled in March 1988. All samples were analyzed for VOCs, semivolatile organic compounds (SVOC), pesticides, polychlorinated biphenyls (PCB), metals, and cyanide. Samples collected in February and May 1987 were also analyzed for dioxin.

VOCs including acetone, methylene chloride, tetrachloroethene, and benzene were detected at low concentrations in some ground-water samples taken from monitoring wells at or near the site. In all, 9 of the 20 monitoring wells contained VOCs in at least one sample. Most of these positive results were due to acetone and methylene chloride, common laboratory contaminants. Benzene and tetrachloroethene were found in one well each. Benzene was found in well P-6B, downgradient of the landfill, in two of three sampling rounds. The highest concentration detected was 6 µg/L, slightly above the U.S. EPA drinking water standard of 5 µg/L. Tetrachloroethene was found in upgradient well W-12 both times this well was sampled. The maximum concentration detected was 5.3 µg/L.

Bis(2-ethylhexyl)phthalate, a SVOC, was detected in several ground-water samples. Three other SVOCs, di-n-butyl phthalate, 2-methylnaphthalene, and n-nitrosodiphenylamine, were found in one sample each. All of these chemicals except one (bis(2-ethylhexyl)phthalate at 21 µg/L in well P-7A) were identified at levels below U.S. EPA-specified detection limits. No SVOCs were detected in residential well samples.

A number of metals were also detected in ground-water monitoring and residential wells. All levels except those for barium were below U.S. EPA drinking water standards. Barium was detected above drinking water standards in all three samples collected from well P-5B. This well is screened in the lower aquifer near the south end of the site. Since barium was detected in all ground-water samples, including samples from residential wells, some portion of the barium found in well P-5B may be due to natural sources.

Residential wells do not appear to be affected by releases from the site. Methylene chloride, a common laboratory contaminant, was the only organic compound found in residential wells, and no metals were detected above drinking water standards. In addition, sampling results from the Circleville municipal well field, located 1-1/2 miles south of the landfill, show that the well field has not been affected by Bowers Landfill. Ground-water contamination resulting from the landfill appears to be confined to the area between the landfill and the Scioto River. The Scioto River is the likely discharge point of these contaminated ground waters. Thus, the impact of contaminated ground water appears limited.

5.2 Surface Water and Sediment

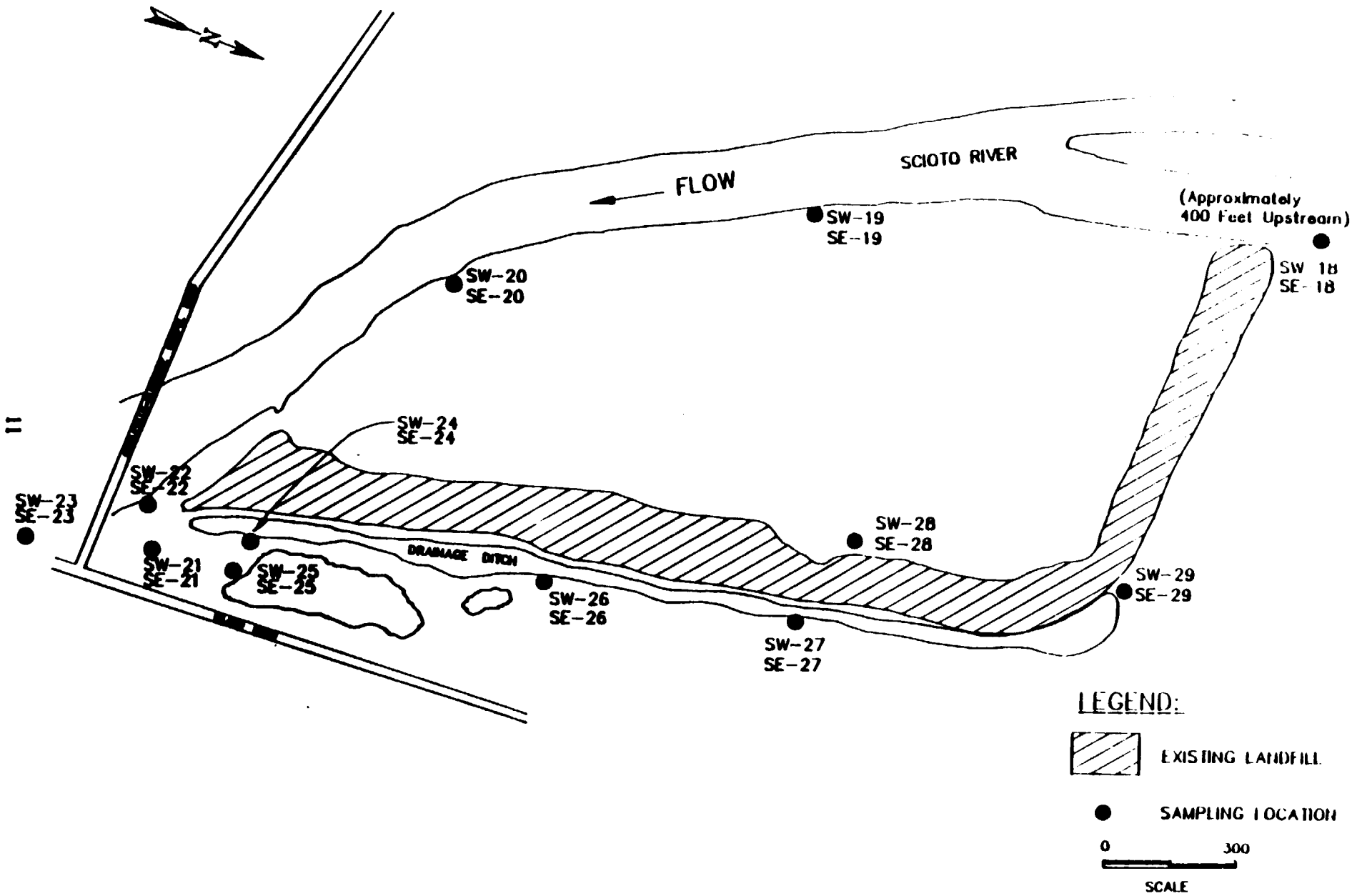
Surface water and sediment samples were collected from 12 locations in the Scioto River and nearby surface water bodies. These samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, cyanide, and dioxin. Samples were collected from all locations shown on Figure 4 during two sampling events.

Methylene chloride (5 samples), tetrachloroethene (3 samples), and 1,2-dichloroethane (2 samples) were found at low levels (up to 5.7 µg/L) in the river downstream of the landfill or in drainage ditches near the landfill. However, methylene chloride and tetrachloroethene were found at similar concentrations in upstream background samples. Aroclor-1260, a PCB, was found in two surface water samples collected from the Scioto River, one upstream and one downstream. Several metals were also detected in surface water samples. However, many of these metals occur naturally. Aluminum, barium, chromium, and mercury were found above upstream background concentrations in at least one sample each.

Several SVOCs were detected in sediment samples collected from the Scioto River and drainage ditches near the site. These include polynuclear aromatic hydrocarbons (PAH), phthalate compounds, 4-methylphenol, chlordane, and PCBs. PAHs and phthalates were also found at similar concentrations in upstream background samples. PCBs were detected at three locations in drainage ditches adjacent to the landfill (SE-27, SE-28, and SE-29) and appear to have originated from the site. The maximum concentration detected was 2,300 µg/kg. Chlordane, a pesticide, was found at concentrations ranging from 120 to 200 µg/kg in three locations. All three locations (SE-20, SE-21, and SE-22) were in or adjacent to the Scioto River, near the southern end of the landfill. While chlordane may be associated with landfilling, the occurrence of this pesticide could also be due to agricultural activities in the field west of the landfill. The occurrence of 4-methylphenol appears to be concentrated near the southern end of the landfill and the drainage ditch to the east. This SVOC was found in seven sampling locations, with a maximum concentration of 8,600 µg/kg at SE-22.

Several metals were found above background levels in sediment samples. These include aluminum, barium, cadmium, chromium, lead, mercury, vanadium, and zinc. However, these metals were found at elevated levels in only a few (no more than four) sampling locations at various locations on the landfill.

FIGURE 4. – SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS



5.3 Soils

Surface soil samples were collected from 22 locations in September 1986. These samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, cyanide, and dioxin. Additional soilsamples were collected in March 1988 as part of the second phase of the RI. Ten locations were sampled, including seven new locations. This second round of soil samples was analyzed only for arsenic and lead. In all, 29 locations were sampled, including 7 off-site locations. Figure 5 shows the soil sampling locations.

Three pesticides (ß-BHC, dieldrin, and chlordane) were found in soil samples. The pesticides were found at two locations in the field west of the landfill (SO-7 and SO-11), one location at the western end of the landfill (SO-35), and one location south of the landfill (SO-44). The maximum concentration detected was 210 µg/kg of chlordane at locations SO-35 and SO-44. The presence of these pesticides in the field west of the landfill could be due to past agricultural activities.

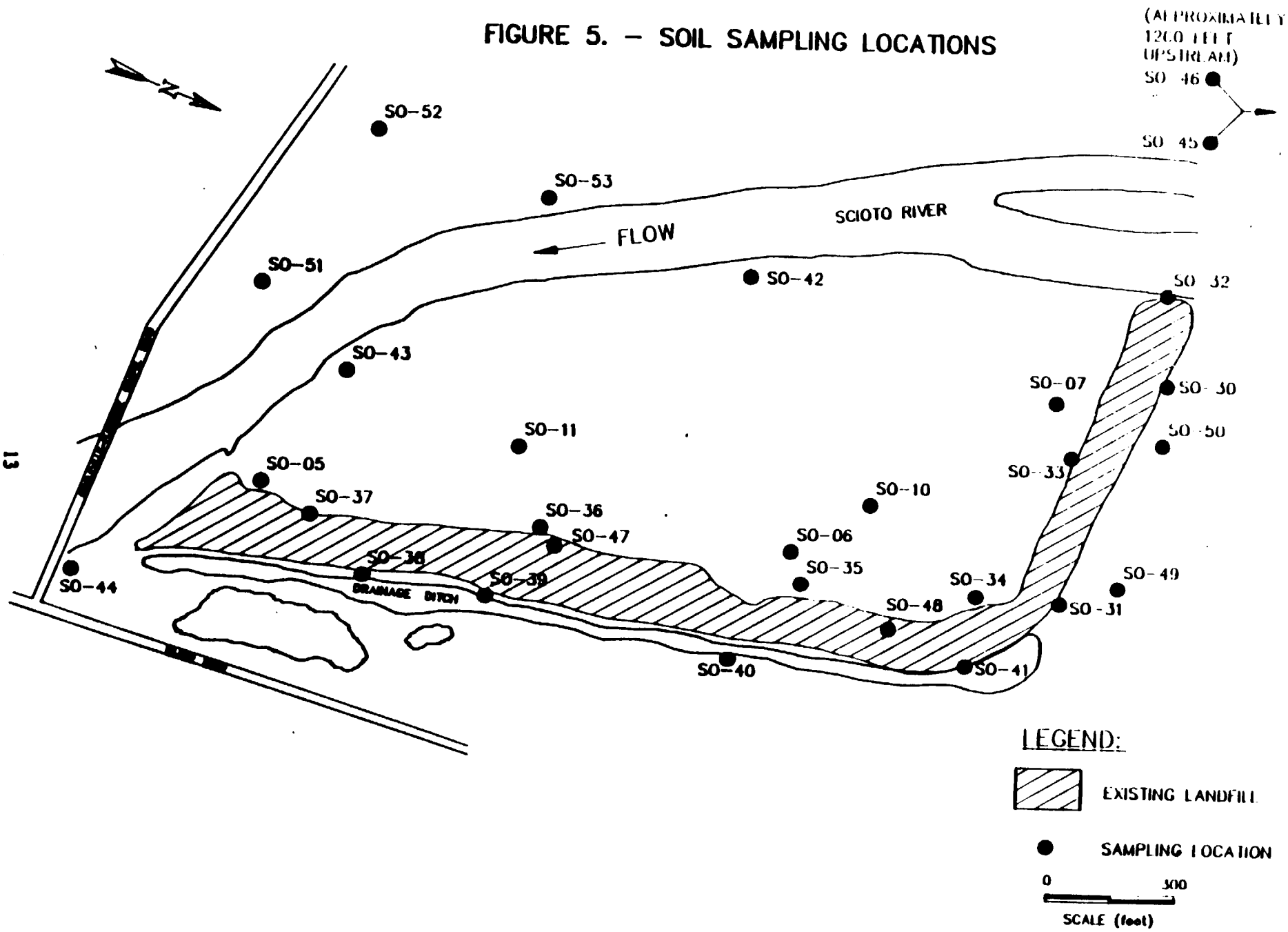
Three PCB compounds (Aroclors 1242, 1248, and 1254) were detected in soil samples at nine locations. Eight of these locations are on or directly adjacent to the landfill, with six of the locations clustered near the northeast corner of the landfill. Thus, the presence of PCBs appears to be related to landfilling activities. The highest concentration, 3,600 µg/kg, was found at location SO-34.

In the first round of soil samples, several metals were found near the landfill at concentrations higher than off-site background levels. These include aluminum, arsenic, cobalt, lead, vanadium, and zinc. A second round of soil samples was collected and analyzed for arsenic and lead to determine whether these metals might be related to landfilling activities. The combined results from the two rounds indicated that soil arsenic levels were similar for samples collected on the landfill, in the agricultural fields directly west and north of the landfill, and from locations west of the Scioto River. However, the results for lead indicated that soil samples collected from the landfill had slightly higher concentrations. The maximum lead concentration, 179 mg/kg, was found at location SO-35.

5.4 Air

No quantitative air samples were collected during the RI at Bowers Landfill. Thus, the extent of air contamination at the site is not known. However, air monitoring was conducted during the RI for VOCs, radiation, and combustible gases. On-site concentrations were not elevated above background levels.

FIGURE 5. – SOIL SAMPLING LOCATIONS



Bowers Landfill has a low potential for VOC emissions to air because very few VOCs were found in surface soils, surface water, or sediments. Other contaminants found in surface soils, such as PCBs, PAHs, and metals, could become airborne if dust is released from the landfill surface. However, the site is currently covered with vegetation and has very little exposed soil.

6.0 SUMMARY OF SITE RISKS

PRC Environmental Management, Inc., under contract to U.S. EPA (No. 68-01-7331), conducted an endangerment assessment (EA) for Bowers Landfill. This section summarizes the findings of the EA and characterizes site risks.

6.1 Indicator Chemicals

The EA used standard U.S. EPA procedures, as outlined in the Superfund Public Health Evaluation Manual, to identify indicator chemicals for Bowers Landfill. The EA focused on potential exposure to and risks from these chemicals. The indicator chemicals were generally those contaminants that exhibited the most toxic properties, were found in several environmental media, or were detected at the greatest frequency.

The indicator chemicals included three metals (barium, lead, and mercury); two VOCs (benzene and tetrachloroethene); two SVOCs (4-methylphenol and PAHs); PCBs; and one pesticide (chlordane). The EA evaluated PAHs as a class of chemicals, focusing on those PAHs that are known or suspected carcinogens. Tables 1 through 4 identify the detection frequencies and concentrations (mean and maximum) of indicator chemicals in samples collected during the RI. Results are organized by environmental medium (ground water, surface water, sediments, and soil).

6.2 Exposure Assessment and Risk Characterization

The indicator chemicals identified in various environmental media during the RI were evaluated to determine the level of risk they pose to public health and the environment. The EA identified 10 potential exposure scenarios for contaminants at or released from Bowers Landfill. Potential risks for each scenario were characterized for human and animal populations that could become exposed.

The EA concluded that potential risks existed under 5 of the 10 scenarios evaluated. These exposure scenarios include ingestion of ground water; ingestion of surface water; ingestion

TABLE 1

DETECTION FREQUENCIES AND CONCENTRATIONS OF INDICATOR CHEMICALS IN GROUND WATER NEAR BOWERS LANDFILL

	Upgradient Wells				Downgradient Wells				Residential Wells			
Compound	Frequency of Detection[1]	Adjusted Frequency of Detection[2]	Geometric Mean (ug/L)	Maximum Concentration (ug/L)	Frequency of Detection	Adjusted Frequency of Detection	Geometric Mean (ug/L)	Maximum Concentration (ug/L)	Frequency of Detection	Adjusted Frequency of Detection	Geometric Mean (ug/L)	Maximum Concentration (ug/L)
Barium	16/16	16/16	185	368	37/37	37/37	330	2070	5/5	5/5	112	[130]
Lead	2/16	1/15	1.2	7.0	8/37	1/27	1.2	6.9	0/5	—	—	—
Mercury	2/16	0/16	—	—	0/37	—	—	—	0/5	—	—	—
Benzene	0/16	—	—	—	3/37	3/37	0.70	6.0	0/5	—	—	—
Tetrachloroethene	3/16	3/16	0.89	5.3	0/37	—	—	—	0/5	—	—	—
Chlordane	0/16	—	—	—	0/37	—	—	—	0/5	—	—	—
PCBs	0/16	—	—	—	0/37	—	—	—	0/5	—	—	—
4-Methylphenol	0/16	—	—	—	0/37	—	—	—	0/5	—	—	—
PAHs	0/16	—	—	—	0/37	—	—	—	0/5	—	—	—

Notes:

[ ] Estimated value; compound found at concentration below U.S. EPA required detection limit

— Not calculated

1 Frequency of detection is defined as a/b, where –
a = number of times a compound was detected
b = total number of samples
Sample results which were identified by the laboratory as due to blank contamination are not counted in either a or b.

2 Adjusted frequency of detection omits samples from which results were questionable due to QA/QC problems; only samples included in this column were used to determine geometric mean and maximum concentrations.

TABLE 2

DETECTION FREQUENCIES AND CONCENTRATIONS OF INDICATOR CHEMICALS IN SURFACE WATER NEAR BOWERS LANDFILL

	Spring River - Upstream				Spring River - Downstream				Drainage Ditches			
Compound	Frequency of Detection[1]	Adjusted Frequency of Detection[2]	Geometric Mean (ug/L)	Maximum Concentration (ug/L)	Frequency of Detection	Adjusted Frequency of Detection	Geometric Mean (ug/L)	Maximum Concentration (ug/L)	Frequency of Detection	Adjusted Frequency of Detection	Geometric Mean (ug/L)	Maximum Concentration (ug/L)
Barium	2/2	2/2	56	[60]	9/9	9/9	54	[60]	19/19	19/19	101	[199]
Lead	1/2	0/1	—	—	4/9	0/5	—	—	4/19	1/15	1.3	8.6
Mercury	0/2	—	—	—	2/9	1/3	0.13	0.20	1/19	1/5	0.12	0.27
Benzene	0/2	—	—	—	0/9	—	—	—	0/19	—	—	—
Tetrachloroethene	1/2	1/2	0.74	1.1 J	2/9	2/9	0.59	1.1 J	0/19	—	—	—
Chlordane	0/2	—	—	—	0/9	—	—	—	0/19	—	—	—
PCBs	1/2	1/2	0.77	1.2	0/9	—	—	—	1/19	1/19	0.55	2.6
4-Methylphenol	0/2	—	—	—	0/9	—	—	—	0/19	—	—	—
PAHs	0/2	—	—	—	0/9	—	—	—	0/19	—	—	—

Notes:

[ ], J Estimated value; compound found at concentration below U.S. EPA required detection limit

— Not calculated

1 Frequency of detection is defined as a/b, where –
a = number of times a compound was detected
b = total number of samples
Sample results which were identified by the laboratory as due to blank contamination are not counted in either a or b.

2 Adjusted frequency of detection omits samples from which results were questionable due to QA/QC problems; only samples included in this column were used to determine geometric mean and maximum concentrations.

TABLE 3

DETECTION FREQUENCIES AND CONCENTRATIONS OF INDICATOR CHEMICALS IN SEDIMENTS NEAR BOWERS LANDFILL

Compound	Sims Run – Upstream				Sims Run – Downstream				Dynamer Ditches			
	Frequency of Detection[1]	Adjusted Frequency of Detection[2]	Geometric Mean (mg/kg)	Maximum Concentration (mg/kg)	Frequency of Detection	Adjusted Frequency of Detection	Geometric Mean (mg/kg)	Maximum Concentration (mg/kg)	Frequency of Detection	Adjusted Frequency of Detection	Geometric Mean (mg/kg)	Maximum Concentration (mg/kg)
Barium	2/2	2/2	113	118	9/9	9/9	106	312	19/19	19/19	128	227 B
Lead	2/2	2/2	31	38	9/9	8/8	34	39	19/19	15/15	39	104
Mercury	2/2	1/1	—	0.40	9/9	4/4	0.48	0.59	10/19	6/15	0.14	1.4
Chlordane	0/2	—	—	—	2/9	2/9	0.067	0.200	2/19	2/19	0.055	0.140
PCBs	0/2	—	—	—	0/9	—	—	—	5/19	5/19	0.105	2.300
Benzene	0/2	—	—	—	0/9	—	—	—	0/19	—	—	—
Tetrachloromethane	0/2	—	—	—	0/9	—	—	—	0/19	—	—	—
4-Methylphenol	0/2	—	—	—	2/9	2/9	0.069	8.600	7/19	7/19	0.091	8.100
PAHs												
Benzo(a)anthracene	2/2	2/2	0.415	0.420 J	8/9	8/9	0.256	3.600	11/19	11/19	0.072	0.400 J
Benzo(a)pyrene	2/2	2/2	0.408	0.450 J	9/9	9/9	0.217	0.370 J	11/19	11/19	0.077	0.400 J
Benzo(b)fluoranthene	2/2	2/2	0.900	0.910	9/9	9/9	0.451	0.750	13/19	13/19	0.137	1.000
Chrysene	2/2	2/2	0.519	0.550	9/9	9/9	0.287	0.480	12/19	12/19	0.095	0.710 J
Dibenzo(a,h) anthracene	2/2	2/2	0.116	0.160 J	1/9	1/9	0.030	0.130 J	1/19	1/19	0.027	0.092 J
Indeno(1,2,3-cd) pyrene	2/2	2/2	0.275 J	0.290 J	5/9	5/9	0.064	0.250 J	8/19	8/19	0.049	0.270 J

Notes:

J Estimated value; compound found at concentration below U.S. EPA required detection limit

B Concentration is estimated due to presence of interference during analysis

— Not calculated

1 Frequency of detection is defined as a/b, where –
a = number of times a compound was detected
b = total number of samples
Sample results which were identified by the laboratory as due to blank contamination are not counted in either a or b.

2 Adjusted frequency of detection omits samples from which results were questionable due to QA/QC problems; only samples included in this column were used to determine geometric mean and maximum concentrations.

TABLE 4

DETECTION FREQUENCIES AND CONCENTRATIONS OF INDICATOR CHEMICALS IN SOILS NEAR BOWERS LANDFILL

Compound	Background Locations				Locations On or Adjacent to the Landfill				Agricultural Areas			
	Frequency of Detection[1]	Adjusted Frequency of Detection[2]	Geometric Mean (mg/kg)	Maximum Concentration (mg/kg)	Frequency of Detection	Adjusted Frequency of Detection	Geometric Mean (mg/kg)	Maximum Concentration (mg/kg)	Frequency of Detection	Adjusted Frequency of Detection	Geometric Mean (mg/kg)	Maximum Concentration (mg/kg)
Barium	2/2	2/2	152	156	15/15	15/15	189	287	7/7	7/7	121	198
Lead	5/5	5/5	47	74 E	21/21	21/21	78	179	11/11	11/11	59	102 E
Mercury	2/2	0/2	—	—	15/15	15/15	0.27	0.43	7/7	2/2	0.48	0.58
Chlordane	0/2	—	—	—	2/15	2/15	0.015	0.210	1/7	1/7	0.014	0.110
PCBs	0/2	—	—	—	9/15	9/15	0.238	3.600	1/7	1/7	0.063	0.240
Benzene	0/2	—	—	—	0/15	—	—	—	0/7	—	—	—
Tetrachloroethene	0/2	—	—	—	0/15	—	—	—	0/7	—	—	—
4-Methylphenol	0/2	—	—	—	0/15	—	—	—	0/7	—	—	—
PAHs												
Benzo(a)anthracene	2/2	2/2	0.130	0.140 J	14/15	14/15	0.116	4.300	6/7	6/7	0.081	0.210 J
Benzo(a)pyrene	2/2	2/2	0.134	0.150 J	12/15	12/15	0.115	4.300	5/7	5/7	0.088	0.230 J
Benzo(b)fluoranthene	2/2	2/2	0.265	0.280 J	11/14	11/14	0.178	8.600	7/7	7/7	0.204	0.510
Chrysene	2/2	2/2	0.160	0.160 J	14/15	14/15	0.169	5.200	7/7	7/7	0.136	0.240 J
Dibenzo(a,h) anthracene	0/2	—	—	—	1/15	1/15	0.026	0.960 J	0/7	—	—	—
Indeno(1,2,3-cd) pyrene	1/2	1/2	0.047	0.110 J	11/15	11/15	0.073	2.600	4/7	4/7	0.054	0.160 J

Notes:

J Estimated value; compound found at concentration below U.S. EPA required detection limit

E Concentration is estimated due to presence of interference during analysis

— Not calculated

1 Frequency of detection is defined as a/b, where –
a = number of times a compound was detected
b = total number of samples
Sample results which were identified by the laboratory as due to blank contamination are not counted in either a or b.

2 Adjusted frequency of detection omits samples from which results were questionable due to QA/QC problems; only samples included in this column were used to determine geometric mean and maximum concentrations.

of aquatic animals; ingestion of soils; and direct contact with surface water. The first four scenarios apply to humans living near Bowers Landfill while the fifth scenario applies to aquatic species living in the Scioto River near the landfill. The potential risks associated with each scenario are summarized in Table 5 and discussed below.

6.2.1 Ingestion of Ground Water

The EA identified a potential risk from drinking ground water immediately downgradient of the landfill. The area included in this scenario is the field between the landfill and the Scioto River. Ground water in this area contains barium (a noncarcinogen) and benzene (a carcinogen) at concentrations above U.S. EPA Maximum Contaminant Levels (MCL) for drinking water. However, each contaminant exceeded the standard in only one well; samples from all other wells contained barium and benzene concentrations well below MCLs.

The EA assumed that a 70-kg adult would drink 2 liters of ground water per day over a 70-year lifetime. Probable case doses from this exposure were calculated using average barium and benzene concentrations in downgradient ground water (Table 1). Worst case doses were calculated from maximum concentrations. The EA then used these doses to estimate potential risks. Noncarcinogenic risks were estimated by calculating a Hazard Index (HI), the ratio of the exposure dose to the acceptable chronic intake for barium. This ratio was 1.04 for the maximum barium concentration, indicating that the estimated dose exceeded the acceptable dose. Probable case risks were much lower, with the HI equal to 0.17. Carcinogenic risks for benzene were estimated by multiplying the exposure dose by the carcinogenic potency factor (CPF). For worst case exposure conditions, this risk was 9×10^{-6}; the probable case risk was 1×10^{-6}.

Although these risks are significant, exposure is unlikely to occur. Ground water downgradient of the site, between the landfill and the Scioto River, is not currently used as a drinking water source. Further, this area is often flooded and is not a likely location for future drinking water wells.

In addition to these potential future risks, the EA looked at risks to current users of ground water near Bowers Landfill. All existing residential wells near the site are upgradient. Four residential wells were sampled during the RI and showed no effects of the landfill on water quality (Table 1). The City of Circleville water supply is also of concern. Circleville obtains its municipal water supply from a wellfield approximately 1½ miles south of the site. However, the RI study of the area south of the landfill was limited. The EA considered the possibility of regional ground-water flow to the south, along the Scioto River basin. To investigate this possibility, the EA reviewed water quality sampling data submitted by the city to the Ohio

TABLE 5

SUMMARY OF POTENTIALLY SIGNIFICANT RISKS IDENTIFIED FOR BOWERS LANDFILL

Exposure Route	CA/NCA[1]	Contaminants	Risk Assessment	Comments
1. Ingestion of Ground Water	NCA	Barium	Hazard Index[2] = 1.04	While based on the maximum barium concentration, the hazard index only slightly exceeds unity. Therefore, the actual noncarcinogenic risk via this scenario is probably very small.
	CA	Benzene	Incremental Carcinogenic risk = 9×10^{-6} (worst case), 1×10^{-6} (probable case)	The incremental carcinogenic risks for benzene are within the target range of 10^{-4} to 10^{-7} (see footnote No. 3).
2. Ingestion of Surface Water	CA	PCBs	Maximum PCB concentration in the drainage ditches (2.6 ug/L) exceeds the ambient water quality criterion (AWQC) for consumption of drinking water. This AWQC (0.013 ug/L) corresponds to a 10^{-6} cancer risk.	The AWQC for PCBs assumes lifetime exposure while this scenario assumes infrequent incidental ingestion, therefore, this comparison overestimates the actual risk.
3. Ingestion of Aquatic Animals	NCA	Mercury	The maximum mercury concentration (0.2 ug/L) exceeds the AWQC based on ingestion of aquatic animals (0.146 ug/L).	Tissue samples have not been taken to verify the extent of this exposure. However, average mercury concentrations were below the AWQC and mercury was found in only one surface water sample from the Scioto River. Thus, this risk is limited.
4. Ingestion of Soils	NCA	Lead	Hazard Index = 3.20	This hazard index may overestimate the actual risk because it assumes both the maximum lead concentration and a worst case soil ingestion rate. Further, lead levels in on-site soils are below Centers for Disease Control (CDC) guidelines for residential areas.
	CA	Total PAHs[4]	Incremental Carcinogenic Risk = 2×10^{-6}	These two risks may overestimate the actual risk because they are based on maximum concentrations and a worst case soil ingestion rate. See also Footnote No. 3.
		PCBs	Incremental Carcinogenic Risk = 7×10^{-7}	
5. Direct Contact with Surface Water by Aquatic Animals	NCA	Mercury	Maximum mercury concentration (0.2 ug/L) exceeds the 4-day AWQC for protection of aquatic life (0.012 ug/L).	Actual risk may be negligible based on average mercury concentrations. Further mercury was found in only one surface water sample from the Scioto River.

Notes:

1 CA = Carcinogenic
NCA = Noncarcinogenic

2 The hazard index (HI) is calculated as the ratio of exposure dose to acceptable dose; an HI > 1 indicates a potentially significant risk.

3 U.S. EPA guidance describes a target carcinogenic risk range of 10^{-4} to 10^{-7}. Risks greater than 10^{-4} are considered "significant", while risks $< 10^{-7}$ are considered insignificant. Risks between 10^{-4} and 10^{-7} are within the target range; their significance will, in general, reflect site specific factors.

4 Calculations included the following carcinogenic PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene. The incremental carcinogenic risk for total PAHs was calculated by multiplying the maximum concentration of each PAH other than benzo(a)pyrene by a relative potency factor to benzo(a)pyrene. The adjusted concentrations were then summed along with the concentration of benzo(a)pyrene itself and, finally, multiplied by the carcinogenic potency factor for benzo(a)pyrene. Details of this calculation process are described in the Endangerment Assessment Report for Bowers Landfill.

Department of Health over an 8-year period from 1980 to 1987. Based on this review, there is no evidence that Bowers Landfill has affected Circleville's water supply. Table 6 summarizes the data reviewed.

6.2.2 Ingestion of Surface Water

The EA identified a potential risk from ingestion of contaminated surface water. This exposure scenario was based on accidental ingestion of surface water near Bowers Landfill. Access to the landfill is not restricted, and exposure could occur if people waded in or fell into drainage ditches or the Scioto River near the landfill. The EA evaluated potential risks by comparing maximum surface water concentrations with U.S. EPA guidelines for acute or short-term exposure. Of the indicator chemicals found in surface water, only PCBs exceeded a guideline. The maximum PCB concentration of 2.6 μg/L (Table 2) was higher than the long-term ambient water quality criterion (AWQC) of 0.0126 μg/L. However, the AWQC is based on lifetime consumption of 2 liters of PCB-contaminated water per day. Thus, the AWQC is not directly applicable to the infrequent exposure and small amounts of water ingested under this exposure scenario. The EA concluded that risks from ingesting contaminated surface water were limited.

6.2.3 Ingestion of Aquatic Animals

The EA identified a potential risk from ingestion of aquatic animals from near Bowers Landfill. This exposure scenario was based on ingestion of fish and other aquatic species taken from the Scioto River. The EA compared downstream surface water concentrations (Table 2) to AWQCs for ingestion of aquatic species. Only one indicator chemical, mercury, was found above background (upstream) concentrations in the Scioto River near Bower Landfill. The maximum mercury concentration in river water (0.2 μg/L) slightly exceeded the AWQC (0.146 μg/L); the average mercury concentration was below the AWQC. This AWQC was developed by U.S. EPA to protect persons who consume 6.5 grams per day of aquatic organisms taken from mercury-contaminated water. The EA characterized risks from this scenario as limited for two reasons. First, mercury was found in only one sample from the Scioto River. Second, the mercury concentration in this sample only slightly exceeded the AWQC.

6.2.4 Ingestion of Soils

The EA identified a potential risk from ingesting contaminated soils at or near Bowers Landfill. Access to the site is not restricted, so small children could reach the site and ingest contaminated soil. The EA assumed that a 20-kg child would eat contaminated soil 10 days per

TABLE 6

SUMMARY OF WATER QUALITY SAMPLING RESULTS FOR THE CITY OF CIRCLEVILLE
DEPARTMENT OF PUBLIC UTILITIES, WATER SUPPLY SYSTEM, 1980-1987
(CONCENTRATIONS OF INDICATOR CHEMICALS IN ug/L)

Location:	114 W. Franklin	#1 Well	#2 Well	#3 Well	Wells 1, 2 and 3	663 Hamle Rd.
Dates:	08/24/87	06/19/86	06/19/86	06/19/86	12/05/85	04/27/83
Compound						
Barium	160	<300	<300	<300	<300	—
Lead	1	ND	<5	<5	<5	—
Mercury	<0.2	<0.5	<0.5	<0.5	<0.5	—
Chlordane	—	—	—	—	—	ND
PCBs	—	—	—	—	—	ND
Tetrachloroethene[b]	—	—	—	—	—	<0.5
PAHs	—	—	—	—	—	ND

Notes:

Compiled from results submitted to Ohio Department of Health, 1980-1987.

a Only the results for samples that were analyzed for at least 1 indicator chemical other than tetrachloroethene are presented; see footnote b.

b 34 additional samples within this time period were analyzed for tetrachloroethene; all the results were negative.

ND Compound was analyzed for but not detected.

— Compound was not measured.

year over a 3-year period, and that 50 percent of the contaminants in the soil would be absorbed by the body. Probable case doses from this exposure were calculated based on ingesting 0.1 g/day of soil containing average contaminant levels. Worst case doses were calculated based on ingesting 1.0 g/day of soil containing maximum contaminant levels. The EA calculated doses only for those indicator chemicals found at or adjacent to the landfill at concentrations higher than background. These chemicals included barium, lead, mercury, chlordane, PCBs, and PAHs (Table 4).

The EA used the resulting doses to estimate potential risks. Noncarcinogenic risks were estimated by calculating a Hazard Index (HI), the ratio of the exposure dose to the acceptable chronic intake. Under worst case conditions, the total HI was 3.48, indicating that the estimated dose for all noncarcinogenic indicator chemicals exceeded the acceptable dose. Most of the HI was attributable to lead (HI = 3.20). However, the highest measured lead concentration at the site (179 mg/kg) was well below Centers for Disease Control (CDC) guidelines for acceptable lead values in residential soils. These guidelines suggest that lead values between 500 and 1,000 mg/kg are unacceptable.

Cancer risks were estimated by multiplying the average lifetime exposure dose by the CPF. For worst case exposure conditions, the total cancer risk for all chemicals was 3×10^{-6}. Most of this risk was attributable to ingestion of PAHs (2×10^{-6}) and PCBs (7×10^{-7}), with only a small portion due to chlordane. The probable case cancer risk was 5×10^{-9}.

6.2.5 Direct Contact with Surface Water by Aquatic Animals

The EA also identified a potential risk to aquatic species living in the Scioto River. The EA evaluated risks from this exposure scenario by comparing river water concentrations to AWQCs for protection of aquatic life. Only one of the indicator chemicals, mercury, exceeded an AWQC. The maximum mercury concentration of 0.2 µg/L (Table 2) was higher than the 4-day (chronic) AWQC for aquatic species of 0.012 µg/L. This comparison most likely overstates potential risks, since mercury was found in only one sample collected from the Scioto River.

6.3 Potential Future Risks

Even though contaminant concentrations measured during the RI are relatively low, the landfill represents a potential threat of future contaminant releases that may endanger public health, welfare, and environment. A major remedial action objective for the site is to reduce this threat of future contaminant releases in addition to reducing current risks identified in the EA. Several factors contribute to the potential threat of future releases.

First, portions of the landfill are poorly covered. The lack of adequate cover is described in inspection reports by the Ohio Department of Health (February 1967) and the Pickaway County Health Department (April 1971). These inspections were conducted shortly before and shortly after waste disposal at Bowers Landfill ended. The lack of adequate cover was confirmed by more recent measurements made in November 1988 as part of the feasibility study. These measurements showed that wastes lie less than 1 foot below the cover in some areas of the landfill.

Second, although operating records for Bowers Landfill are poor, evidence exists that hazardous substances were placed in the landfill. Responses by DuPont and PPG to a 1978 House Subcommittee on Oversight and Investigation estimated that these companies sent approximately 6,000 and 1,700 tons of waste, respectively, to Bowers Landfill from 1965 to 1968. The wastes contained a variety of organic and inorganic chemicals. More recent 1988 responses by DuPont and PPG to information requested under Section 104(e) of CERCLA confirmed the disposal of hazardous substances at landfill. However, these responses contained little additional information on the amounts and types of wastes.

Finally, semiannual flooding of the Scioto River, usually in the spring and winter, also contributes to the threat of contaminant releases. Based on flood stage data for the river and the height of the landfill, portions of the landfill are overtopped by 2-year floods. The entire landfill would be covered by a 50-year flood. Flooding, in combination with trees growing on the landfill side slopes, presents two significant concerns. First, tree roots most likely penetrate directly into waste materials because of the shallow cover depth. These root systems provide a direct pathway for flood waters and precipitation to contact wastes and increase the likelihood of future ground-water contamination. Second, as the trees on the side slopes grow larger over time, they represent a threat to the stability of the side slopes. The combination of flood conditions, saturated soil, and high winds could cause larger trees to topple over, removing portions of the side slopes and exposing the wastes underneath.

7.0 DOCUMENTATION OF SIGNIFICANT CHANGES

This Record of Decision selects Alternative 4, as described in the Proposed Plan, as the preferred remedial alternative for Bowers Landfill. U.S. EPA has reviewed and responded to all comments received during the public comment period. Comments concerned Alternative 4 and other remedial alternatives. U.S. EPA has not made any significant changes to Alternative 4 based on public comments.

Alternative 4 includes the following components: long-term ground-water monitoring; site restrictions and a perimeter fence to limit site access and use; removal of debris and vegetation from the landfill surface; placement of a low-permeability clay cap (consisting of a clay layer, topsoil layer, and vegetation) over the entire landfill surface; drainage improvements to convey rainfall and flood waters away from the landfill; and erosion and flood control measures on areas of the landfill subject to damage from flood waters.

8.0 DESCRIPTION OF ALTERNATIVES

In response to the findings of the EA, the FS identified three potential risks that should be addressed by remedial response actions at Bowers Landfill. These risks are associated with ingestion of ground water immediately downgradient of the landfill, ingestion of soil from the landfill, and future releases from the landfill.

The FS identified technologies that could reduce risks for each of these media. These technologies were assembled into media-specific remedial alternatives. The FS then screened these media-specific alternatives based on effectiveness in reducing risks, implementability, and cost. Media-specific alternatives remaining after the screening process were assembled into nine site-wide remedial alternatives for detailed evaluation. This screening process was carried out according to procedures specified by U.S. EPA in CERCLA, the NCP, and U.S. EPA guidance documents including "Interim Guidance on Superfund Selection of Remedy" (OSWER Directive No. 9355.0-19, December 24, 1986) and "Draft Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (OSWER Directive No. 9355.3-01, March 1988).

The alternatives evaluated in detail include a no action alternative and eight alternatives that rely on containment of waste, with little or no treatment, to reduce site risks. The FS looked at alternatives involving treatment as a principal element to reduce the toxicity, mobility, or volume of site wastes. However, these alternatives were screened out, based on implementability, prior to the detailed analysis. The FS did not develop any remedial alternatives for source control that would eliminate the need for long-term management, including monitoring. Treatment alternatives of this type were not considered feasible because of the large volume and diverse nature of the waste materials in Bowers Landfill.

Each of the nine remedial alternatives evaluated in detail is described briefly below. The descriptions include containment components, institutional controls, estimated time for implementation, cost, overall protection, and compliance with applicable or relevant and

appropriate requirements (ARARs). Section 9.0, which describes the comparative analysis of alternatives, includes additional detail on these subjects.

8.1 Alternative 1

Alternative 1 is the no action alternative. CERCLA requires that the no action alternative be considered at every site. Under this alternative, no further action would be taken at Bowers Landfill to reduce risks or to control the sources and migration of contaminants. The no action alternative will not modify the landfill in any way. Thus, it has no associated costs, and no time would be required to implement this alternative.

Capital Cost	$ 0
Present Worth Operation & Maintenance (O & M) Costs:	$ 0
Total Costs:	$ 0
Time to Implement	None

8.2 Alternative 2

Alternative 2 includes the following components:

- Ground-water monitoring
- Site restrictions

Under Alternative 2, a long-term monitoring program would be implemented to monitor contaminant concentrations and migration. This program would include the installation of additional monitoring wells south of Bowers Landfill (between the landfill and the Circleville municipal wellfield) and west of the landfill (between the landfill and the Scioto River). These new wells, existing monitoring wells, and possibly residential wells near the landfill would be sampled. The monitoring program would be designed to protect the Scioto River by sampling ground water that discharges to the river. Additionally, the program would sample water from the upper and lower aquifers that may flow under the river and join regional ground-water flow. At a minimum, the program would meet the substantive requirements for ground-water monitoring under the Resource Conservation and Recovery Act (RCRA) as described in 40 CFR 264, Subpart F.

The installation of three additional ground-water monitoring well clusters is necessary to develop a ground-water monitoring program that would adequately detect potential future releases of contaminants. These well clusters would consist of three wells; a shallow well that would be located in the upper portion of the saturated alluvial aquifer, an intermediate well that would be located between the water table and the bedrock, and a deep well that would be located

just above the bedrock. Two of these well clusters would be installed west of the landfill. One cluster would be installed between well location 5 and well location 6 and the other between well W-10 and the bend of the landfill (see Figure 3). The third well cluster would be installed off-site between the landfill and the Circleville municipal wellfield. The installation of well clusters in addition to these may also be considered.

The monitoring wells would be sampled on a bimonthly basis for the first year and quarterly for years 2 through 4. During the first year, samples would be analyzed for the full Target Compound List (TCL). A reduced TCL may be considered after the first year. If the levels of contaminants in ground water did not increase over this time period, the sampling schedule would be reevaluated and a reduction in the frequency of sampling may be considered. A statistical test would be developed to determine when a significant increase in the level of contaminants had occurred.

Should a significant increase in the levels of contaminants occur, it would automatically trigger a RCRA corrective action. If the levels of contaminants in ground water exceeded MCLs, where available, or health-based levels, where MCLs are not available, resampling would occur within 14 days. (Health-based levels are concentrations corresponding to a cancer risk of 10^{-6} for carcinogenic contaminants and a hazard index (HI) greater than 1 for noncarcinogenic contaminants.) If the resampling verified that there had been a significant increase in the levels of contaminants, a corrective action program would be implemented. Corrective action may include such measures as the establishment of alternate concentration limits (ACLs), the collection and treatment of ground water, or the removal of the source of contamination.

The surface water in the drainage ditch to the east of the landfill would be sampled on a quarterly basis as part of the monitoring program. Monitoring would verify that discharges from the ditch are in compliance with Ohio Water Quality Standards, as described in the Ohio Administrative Code (OAC) 3745-01. A corrective action program would be implemented if contaminant levels in the ditch exceeded these standards.

Efforts will be made to procure deed restrictions prohibiting ground-water extraction in the field west of the landfill and restricting disturbance of the landfill surface. The viability of continued farming immediately west of the landfill would be evaluated, and, if shown to be necessary, efforts would be made to prohibit such farming by imposition of deed restrictions. A 6-foot fence would be placed around the landfill, the drainage ditch to the east, and the field to the west to limit site access.

Alternative 2 relies entirely on institutional controls and monitoring to reduce risk and does not include any containment or treatment components. Restricting ground-water use

immediately downgradient of the site should be effective in eliminating risks from drinking this ground water. However, while fencing is identified as a means for limiting exposure, contaminated soils would remain uncovered. Exposure could still occur through dispersal of soil by erosion and by direct contact if persons enter the site despite the fence. Potential future risks, as described in Section 6.3, would not be reduced. Further, Alternative 2 does not meet State of Ohio closure requirements for solid waste landfills, which has been identified as an ARAR.

The costs of Alternative 2 and the estimated time for implementation are as follows:

Capital Cost:	$ 173,700
Present Worth O & M Costs:	$ 295,100
Total Costs:	$ 468,800
Time to Implement:	1 Month

8.3 Alternative 3

Alternative 3 includes the following components:

- Ground-water monitoring
- Site restrictions
- Management of surface debris
- Local repairs to existing landfill cover
- Erosion control and drainage improvements

Alternative 3 incorporates ground-water monitoring and site restrictions already described under Alternative 2. The additional components of this remedial alternative are discussed below.

The landfill area and its immediate vicinity would be cleared of surface debris. Nonhazardous debris would be disposed of at a nearby sanitary landfill, and any waste items determined to be hazardous would be disposed of at a suitable hazardous waste landfill.

After surface debris has been removed, areas showing signs of erosion would be identified. These areas would be cleared of vegetation and repaired with natural clay soil to be uniform with the surrounding surface. Drainage patterns on the landfill would be surveyed, and areas showing erosion would be repaired with fill. Areas prone to ponding would be regraded to provide a uniformly sloping surface that would drain water off the landfill. The existing vegetation cover of trees on the landfill would be maintained. As part of the maintenance program, the cover would be inspected on a regular basis for structural integrity and vegetative growth.

The drainage ditch east of the landfill would be improved to allow water to drain from the field north of the landfill through this ditch. The pipe that runs under the southern end of the landfill from this ditch would be replaced by a 36-inch-diameter corrugated metal pipe.

Erosion protection would be provided on those landfill areas prone to erosion due to swift-flowing water from the river. This protection would include armor stone (riprap) in areas that abut the river. Stone would also be placed on the north-facing slope of the western edge of the landfill and at the southern edge of the landfill to dissipate the energy of river flow.

Alternative 3 addresses some containment aspects for contaminated soils by providing limited repairs to the existing landfill cover. However, since repairs would be made on a visual basis, this alternative cannot ensure that all areas of contaminated soil would be covered. The landfill would remain largely unchanged and susceptible to erosion and infiltration of precipitation and surface water during flood events. Trees would not be removed from the landfill surface, further increasing the potential for infiltration. As noted for Alternative 2, this alternative does not address Ohio closure requirements for solid waste landfills.

The costs of Alternative 3 and the estimated time to implement this alternative are:

Capital Cost:	$ 1,427,300
Present Worth O & M Costs:	$ 741,000
Total Costs:	$ 2,168,300
Time to Implement:	3 Months

8.4 Alternative 4

Alternative 4 includes the following components:

- Ground-water monitoring
- Site restrictions
- Management of surface debris
- Natural clay cover over landfill
- Erosion control and drainage improvements

Alternative 4 contains the same site restrictions as described for Alternative 2. In addition, the ground-water monitoring program would be identical to the program described under Alternative 2. Erosion and drainage control improvements would be similar to those described for Alternative 3. However, instead of limited repairs to the landfill cover, Alternative 4 includes a clay cover over the entire landfill surface. All trees and other vegetation would be cut down to the surface, and steps would be taken to prevent their growth through the new cover. Precautions would be taken to minimize exposure of buried waste during removal of vegetation.

The new cover would consist of a well-compacted, low-permeability clay cover at least 24 inches thick. A top soil layer at least 24 inches thick would be placed over the clay cover. This top soil layer would be planted with grasses or other shallow-rooted plant species. The cover would exceed Ohio closure requirements for solid waste landfills, which call for only a well-compacted 24-inch cover of suitable material. The clay layer would have a maximum permeability of 10^{-7} cm/sec and would limit infiltration to less than 10 percent of precipitation.

Prior to cover installation, a detailed geotechnical investigation would be conducted to measure the properties of the soil and clay used to construct the cover. The purpose of this investigation would be to determine the stability of these materials under flood conditions. The cover would then be constructed with side slopes flat enough to protect the landfill from damage due to flooding. Construction would be done in such a manner as to minimize potential harm to the floodplain, as required by 40 CFR 6, Appendix A, Statement of Procedures on Floodplain Management and Wetlands Protection. In addition, the cap would be constructed, operated, and maintained to prevent washout of any hazardous wastes by a 100-year flood, as required by RCRA General Facility Standards in 40 CFR 264.18. These regulations have been identified as a location-specific ARARs.

The cap and fence would be inspected on a quarterly basis and repairs of any significant damage would begin within 30 days. The landfill would also be inspected for leachate and methane gas production on a quarterly basis. If leachate production occurred that could potentially adversely affect public health or the environment, a leachate collection system would be installed and the leachate would be collected and treated. If methane gas production occurred that could potentially adversely affect public health or the environment, a gas venting system would be installed.

The drainage ditch adjacent to the east side of the landfill would be improved by removing sediments as necessary. The pipe that runs under the landfill from the southern end of the ditch would be replaced by a 36-inch-diameter corrugated metal pipe. These improvements would allow water to drain from the field north of the landfill through the ditch and into the Scioto River. During the design of this alternative, the feasibility of removing contaminated sediments from the drainage ditch would be evaluated. These sediments could be dewatered as necessary and placed on the landfill surface prior to installing the clay cap. The drainage ditch, which is contiguous with the eastern side slope of the landfill, can be considered part of the landfill. Therefore, movement of sediments from the ditch to the landfill would consolidate hazardous wastes within a single disposal unit. This would not constitute "land disposal" under RCRA Subtitle C, so RCRA land disposal restrictions in 40 CFR 268 would not be ARARs. Sediment removal, in conjunction with capping, would reduce the possibility of contaminated surface water discharges from the ditch to the Scioto River.

Alternative 4 uses site restrictions to reduce risks from ingestion of ground water. Soil ingestion risks would be greatly reduced because the entire landfill surface, where highest soil contamination levels were found, would be covered. Long-term risks would be reduced by the application of a cover that reduces infiltration through the landfill.

The costs and time to implement Alternative 4 are listed below:

Capital Cost	$ 3,173,000
Present Worth O & M Costs:	$ 1,094,500
Total Costs:	$ 4,267,500
Time to Implement	10 Months

8.5 Alternative 5

Alternative 5 includes the following components:

- Ground-water monitoring
- Site restrictions
- Management of surface debris
- Natural clay cover over landfill
- Erosion control and drainage improvements
- Leachate collection system
- Gas venting system

Alternative 5 is identical to Alternative 4, except that the landfill cover would incorporate gas venting and leachate collection systems. The gas venting system would consist of a network of perforated pipe, approximately 6 inches in diameter, laid at 100-foot intervals in a 12-inch layer of gravel over the landfill surface. The gravel layer would have a geotextile fabric placed over the top to prevent spaces in the gravel layer from clogging. A 24-inch clay cover would be placed over the gravel layer, followed by a 24-inch soil and vegetation cover. Gas vents would connect to the perforated pipe and exit vertically through the clay and soil covers. Gases containing high concentrations of VOCs could be passed through a vapor phase carbon adsorption system to remove these contaminants.

The leachate collection system, located at the toe of the landfill, would consist of a perforated PVC pipe in a trench filled with granular drainage material. The pipe would catch and direct leachate to a collection point. From there, the leachate would be pumped to a temporary holding tank, treated, and discharged.

Alternative 5 would provide slightly greater protection than Alternative 4 because of the added leachate and gas collection systems. It would also comply with ARARs and would exceed Ohio solid waste landfill closure requirements.

The costs and time to implement Alternative 5 are as follows:

Capital Costs:	$ 4,341,200
Present Worth O & M Costs:	$ 2,374,600
Total Costs:	$ 6,715,800
Time to Implement:	10 Months

8.6 Alternative 6

Alternative 6 includes the following components:

- Ground-water monitoring
- Site restrictions
- Management of surface debris
- Natural clay cover over landfill
- Drainage improvements
- Leachate collection system
- Gas venting system
- Flood protection dike

Alternative 6 is identical to Alternative 5, except that additional flood protection would be provided by constructing a flood protection dike. The dike would extend around the west and north sides of the landfill. A concrete wall would be constructed at the south and northwest corners of the landfill, where there is insufficient space for a dike between the landfill and the river. The core of the flood dike would be constructed of an impervious clay material, and the side slopes would be constructed from clean soil. The sides of the dike along the river would be protected against surface water erosion by concrete riprap or rock fill. Stormwater within the flood control dike and the ditch east of the landfill would be collected through a gravity drainage system that discharges water to the river through check valves.

Alternative 6 addresses all site risks, including the potential risk of future releases from the landfill. The flood protection dike would provide additional protection to the landfill, once the new clay cover is installed. Alternative 6 would exceed Ohio solid waste closure requirements and would comply with ARARs for construction in floodplains.

The costs and implementation time for Alternative 6 are as follows:

Capital Costs:	$ 9,094,300
Present Worth O & M Costs:	$ 3,060,000
Total Costs:	$ 12,154,300
Time to Implement:	18 Months

8.7 Alternative 7

Alternative 7 includes the following components:

- Ground-water monitoring
- Site restrictions
- Management of surface debris
- Synthetic membrane cap over landfill
- Drainage improvements
- Leachate collection system
- Gas venting system
- Flood protection dike

Alternative 7 is similar to Alternative 6 except that a synthetic membrane cap would be placed over the landfill rather than a clay cap. The design of the landfill cap would be similar to the design specified in the Resource Conservation and Recovery Act (RCRA). A permeable geotextile fabric would be placed over the gas collection and venting system, followed by a 2-foot-thick layer of compacted clay with a permeability of 10^{-7} cm/sec. A 20-mil (minimum) synthetic membrane would be placed directly on the compacted clay layer. Finally, a 12-inch drainage layer with a hydraulic conductivity of at least 10^{-3} cm/sec would be placed over the synthetic liner, followed by a 24-inch-thick vegetated soil cover. The FS estimates that this cap would reduce infiltration through the landfill to less than 1 percent of precipitation. In addition, the flood protection dike would minimize the chance of flood waters contacting the landfill surface.

Alternative 7 addresses all site risks, including the potential risk of future releases from the landfill. This alternative would exceed Ohio solid waste closure requirements and would comply with ARARs for construction in floodplains.

The estimated costs and implementation time for Alternative 7 are:

Capital Costs:	$ 10,367,400
Present Worth O & M Costs:	$ 3,449,300
Total Costs:	$ 13,816,700
Time to Implement:	18 Months

8.8 Alternative 8

Alternative 8 includes the following components:

- Ground-water monitoring
- Site restrictions
- Management of surface debris
- Synthetic membrane cap over landfill
- Erosion control and drainage improvements
- Leachate collection system
- Gas venting system

Alternative 8 is similar to Alternative 7, without the flood protection dike. Instead of the dike, this alternative provides erosion control at the ends of the landfill using riprap as described under Alternative 3. All other components of this alternative have been described previously and are not repeated here.

The synthetic membrane cap over the landfill would cover most contaminated soils and would reduce long-term risks by reducing infiltration through the landfill cover to less than 1 percent of precipitation. This alternative would exceed Ohio solid waste closure requirements and would comply with ARARs for construction in floodplains.

The estimated costs and implementation time for Alternative 8 are:

Capital Costs:	$ 6,228,500
Present Worth O & M Costs:	$ 2,328,400
Total Costs:	$ 8,556,900
Time to Implement:	10 Months

8.9 Alternative 9

Alternative 9 includes the following components:

- Ground-water monitoring
- Site restrictions
- Management of surface debris
- Natural clay cover over top of landfill
- Improvements to landfill side slopes
- Erosion control and drainage improvements

Alternative 9 is similar to Alternative 3, except that a natural clay cover would be placed on the top of the landfill. This clay cover would be similar to the cover installed over the entire

landfill surface in Alternative 4. Under Alternative 9, side slopes would not be covered, but would be repaired as necessary. These repairs would be made to increase the depth of the cover and provide continuously sloping surfaces. The tree cover on the landfill side slopes would be thinned out, but most trees would be left in place.

Drainage patterns would be surveyed, and areas such as erosion rifts and terraces would be filled and regraded to match adjacent contours. The fill applied to the side slopes would be compacted. Where side slopes are steep, additional stabilization would be accomplished by placing riprap or by supporting the slopes using sheet piling or soil cement.

Drainage control berms would be constructed at the top of the landfill to collect stormwater runoff. The water collected by the berms would be directed to the base of the side slopes by drainage chutes. The collection and drainage system would help reduce infiltration through the side slopes by limiting the area contacted by runoff from the top of the landfill.

Alternative 9 addresses some containment aspects for contaminated soils by covering the top of the landfill and providing limited repairs to the side slopes. However, this alternative cannot ensure that all areas of contaminated soil would be covered. The landfill side slopes would remain largely unchanged and susceptible to erosion and infiltration of precipitation and surface water during flood events. Trees would not be removed from the landfill surface, further increasing the potential for infiltration. This alternative would not meet Ohio closure requirements for solid waste landfills because of the incomplete repairs to side slopes.

The costs of Alternative 9 and the estimated time to implement this alternative are:

Capital Costs:	$ 2,483,500
Present Worth O & M Costs:	$ 955,900
Total Costs:	$ 3,439,400
Time to Implement:	8 Months

9.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

U.S. EPA used the following nine criteria to evaluate each of the alternatives identified in the FS report. The remedial alternative selected for the site must represent the best balance among the evaluation criteria.

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy adequately protects human health and the environment and whether risks are properly eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with Applicable or Relevant and Appropriate Requirements** addresses whether a remedy meets all state and federal laws and requirements that apply to site conditions and cleanup options.

3. **Long-Term Effectiveness and Permanence** refers to the ability of a remedy to reliably protect human health and the environment over time once cleanup goals have been met.

4. **Reduction of Toxicity, Mobility, or Volume** are three principal measures of the overall performance of an alternative. The 1986 Superfund Amendments and Reauthorization Act (SARA) emphasizes that, whenever possible, U.S. EPA should select a remedy that will permanently reduce the level of toxicity of the contaminants at the site, the spread of contaminants away from the site, and the volume, or amount, of contaminants at the site.

5. **Short-Term Effectiveness** refers to the likelihood of any adverse impacts to human health or the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the remedy.

7. **Cost** includes capital and operation and maintenance costs of implementing a remedy.

8. **State Acceptance** indicates whether, based on its review of the RI, EA, FS, and Proposed Plan, the State of Ohio (OEPA) concurs with, opposes, or has no comment on the alternative U.S. EPA is proposing as the remedy for the site.

9. **Community Acceptance** indicates whether the public concurs with the remedy presented in U.S. EPA's proposed plan.

After evaluating all the remedial alternatives developed in the FS, using the nine criteria just described, U.S. EPA has selected Alternative 4 to address contamination at the Bowers Landfill Superfund site. The rationale for this selection is provided below.

9.1 Overall Protection of Human Health and the Environment

Alternative 4 would protect both human health and the environment. This alternative would reduce potential risks from ingestion of contaminated soil by installing a fence around the site and by covering the most highly contaminated soils with 4 feet of clay and soil. The FS estimates that probable case risks for soil ingestion would be reduced to zero. Some residual risk would remain due contaminated soils in the field west of the landfill. To estimate exposure to this remaining contamination, the FS assumed that (1) 50-kg teenagers would scale the fence surrounding the site 10 times per year over a 5-year period, (2) these teenagers would ingest 200 mg of contaminated soil per visit, and (3) 50 percent of the contaminants in ingested soil would be absorbed by the body. Based on these assumptions and the maximum soil contaminant concentrations in the areas not affected by the cover, the HI for noncarcinogenic risks would be reduced from 3.48 to 0.24. The carcinogenic risk, based on average lifetime exposure, would be reduced from 3×10^{-6} to 4×10^{-8}. Risk reductions for Alternatives 5 through 8, which cover the same areas of soil contamination, would be identical. In contrast, Alternatives 2, 3, and 9 do not cover the entire landfill surface and would provide a smaller risk reduction. The FS estimates that these alternatives would result in an HI of 0.28 for noncarcinogenic effects and a carcinogenic risk of 5×10^{-7}.

Alternative 4 would reduce risks from ingestion of ground water by placing access restrictions on the area west of the landfill. These restrictions would prevent the use of this area as a future ground-water source. In addition, the clay and soil cap would reduce infiltration to less than 10 percent of precipitation, reducing the likelihood of future ground-water contamination. Alternatives 5 and 6, which have a similar cap, would also reduce infiltration to less than 10 percent. Alternatives 7 and 8, which include a synthetic membrane cap, would provide much greater reductions in infiltration.

Ground-water users farther from Bowers Landfill would be protected by the monitoring program included as part of Alternative 4. This program would include installing and sampling additional wells south and west of the landfill. Expansion of the monitoring network to the south would detect any future migration of ground-water contamination toward the City of Circleville's wellfield, 1½ miles south of the landfill. Alternative 4 would include a corrective action program that would allow prompt response to any significant increases in ground-water contamination that might occur in the future.

Overall, Alternative 4 would be more protective of human health and the environment than Alternatives 1, 2, 3, and 9. These alternatives include either no modifications or limited modifications to the existing landfill surface.

Alternative 4 would be somewhat less protective than Alternatives 5, 6, 7, and 8, which include more extensive remediation. For example, Alternative 7, the most protective alternative, also includes a synthetic membrane cap, a flood protection dike, a leachate collection system, and a gas venting system. The overall effect of these additional measures would not increase protection with respect to ingesting contaminated soils or ground water. The flood protection dike included in Alternatives 6 and 7 may prolong the effective life of the landfill cap due to less erosion from surface water. However, the cap installed under Alternative 4 would be designed and constructed to resist flood damage or washout of wastes by a 100-year flood and would have a minimum 30-year lifetime. The multilayer cap included in Alternatives 7 and 8 might provide greater reductions in infiltration, thus providing greater protection against the generation of contaminated leachate and future ground-water contamination. However, there is little evidence of a leachate problem at Bowers Landfill, and current levels of ground-water contamination are low. Therefore, the low-permeability clay cap constructed under Alternative 4 would provide adequate protection of ground water.

9.2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 4 would comply with applicable or relevant and appropriate state and federal requirements (ARARs). These requirements include action-specific ARARs related to closure of Bowers Landfill, location-specific requirements related to the location of the landfill within the 100-year floodplain of the Scioto River, and chemical-specific ARARs for contaminants identified in environmental media at the landfill.

Alternative 4 is primarily a closure plan for Bowers Landfill, and the major action-specific ARARs to be considered are those related to landfill closure. Waste disposal at Bowers Landfill ended around 1968, before the effective date of RCRA. Thus, RCRA Subtitle C requirements for the treatment, storage, and disposal of hazardous wastes are not applicable to remedial actions at the landfill. Additionally, the wastes in Bowers Landfill contain large volumes of low-toxicity material, widely dispersed over a large area that bears little resemblance to the discrete units regulated under RCRA Subtitle C. Nevertheless, portions of RCRA Subtitle C requirements can be considered relevant and appropriate.

The preamble to proposed revisions to the National Contingency Plan (53 Federal Register, December 21, 1988) describes several options for closure of Superfund sites, based on RCRA requirements. One option is "closure with wastes in place." This option requires a final cover over the contaminated materials and post-closure care, including maintenance of the cover, ground-water monitoring, and corrective action if ground-water protection standards are exceeded in the future. A second option is "alternate land disposal closure." Under this option, landfill cover requirements are relaxed because (1) the cover will reduce risks due to direct contact with wastes and (2) the wastes appear to pose a limited threat to ground water.

Alternative 4 falls between these two options, but closer to the first option. The clay cap installed as part of this alternative would have a permeability of 10^{-7} or less. This cap would meet the requirements for the clay layer at the bottom of a hazardous waste landfill, as described in 40 CFR 264.301. Because current ground-water contamination levels at Bowers Landfill suggest a limited threat to ground water, a synthetic membrane layer is not considered a necessary component of the cap. On the other hand, Alternative 4 would exceed the relaxed cover requirements for "alternate land disposal closure." These requirements are more similar to State of Ohio closure regulations for solid waste landfills, which call for a "well compacted layer of final cover material . . . to a depth of at least two feet." Alternative 4 would substantially exceed this requirement by providing a 4-foot-thick cover, including a 2-foot layer of low-permeability clay.

Alternative 4 would also comply with location-specific ARARs. Because Bowers Landfill is located within the 100-year floodplain of the Scioto River, construction within the floodplain is unavoidable. However, Alternative 4 would be constructed in a manner that would minimize potential harm to the floodplain, as specified by floodplain management requirements in 40 CFR 6. In addition, the cap would be constructed, operated, and maintained to prevent washout of any hazardous wastes by a 100-year flood, as required by RCRA General Facility Standards in 40 CFR 264.18.

Alternative 4 would attain chemical-specific ARARs for ground water by reducing infiltration of precipitation and floodwaters through the landfill waste. Ground-water results from the RI showed that benzene slightly exceeded the MCL of 5 µg/L in one sample from well P-6B. Levels in other samples from this well were below the MCL, and benzene was not detected in any of the remaining 12 downgradient wells. Barium also exceeded the MCL in three samples collected from a single well, well P-5B. However, the average barium concentration was well below the MCL. The ground-water monitoring program implemented under Alternative 4 would require regular and systematic sampling and would meet the substantive requirements for

ground-water monitoring under RCRA in 40 CFR 264, Subpart F. The monitoring program would include provisions for corrective action should contaminant levels significantly increase in the future.

Additionally, the monitoring program proposed for Alternative 4 would include collecting surface water samples from the ditch east of Bowers Landfill. Surface water monitoring would verify that discharges from the ditch are complying with Ohio Water Quality Standards as described in OAC 3745-01.

Alternatives 5 and 6 would comply with ARARs to the same extent as Alternative 4. Alternatives 7 and 8, by including a synthetic membrane layer in addition to the low-permeability clay layer, would come closer to meeting RCRA requirements for closure with hazardous wastes in place.

Alternatives 1, 2, 3, and 9 would leave some or all of the current soil and vegetation cover intact. These alternatives would not comply with relevant and appropriate portions of RCRA closure regulations or with Ohio closure standards for solid waste landfills. Further, these alternatives would not meet location-specific ARARs because they would not be constructed, operated, and maintained to prevent washout of hazardous wastes by a 100-year flood. Also, Alternatives 1, 2, 3, and 9 would not significantly reduce infiltration of precipitation and flood waters through the landfill, and may not result in attainment of MCLs in ground water.

9.3 Long-Term Effectiveness and Permanence

Because of the large amount of material within Bowers Landfill, the small known percentage of hazardous waste, and the limited risks identified in the EA report, it was not feasible to develop a permanent remedy for Bowers Landfill. However, the low-permeability clay cap specified by Alternative 4 would be designed for a minimum 30-year lifetime. The long-term effectiveness of Alternative 4 would be ensured by ground-water monitoring and maintenance of the clay cap. Monitoring wells downgradient of the landfill would be sampled on a regular basis to determine if contaminant concentrations in ground water are increasing significantly over time. The monitoring program would also include a corrective action component, requiring further remedial action if a significant increase in ground-water contamination is detected. The maintenance program for Alternative 4 would include regularly mowing the vegetation on the cap; inspecting the surface for cracks, settlement, ponding, and erosion; completing appropriate repairs to the cap; and repairing the fence as necessary. In addition to regularly scheduled inspections, additional inspections would be made after floods.

Similar monitoring, inspection, and maintenance would be needed to maintain the long-term effectiveness of Alternatives 5, 6, 7, and 8. These alternatives include additional components, such as a synthetic membrane cap or a flood protection dike, that may increase long-term effectiveness. However, the additional components would not greatly increase long-term effectiveness compared to Alternative 4. Current landfill conditions, 20 years after disposal ceased, indicate that Alternative 4 would be sufficiently protective in the long-term. Thus, the slightly higher long-term effectiveness of Alternatives 5, 6, 7, and 8 does not justify the substantially higher costs of these alternatives.

In contrast, Alternatives 1, 2, 3, and 9 would be much less effective in the long term. Alternatives 1 and 2 do not include any repairs to the existing landfill cover. Alternatives 3 and 9 make limited repairs, but would not cover the entire landfill surface. Alternatives 1, 2, 3, and 9 would also leave trees on the landfill side slopes. These alternatives would allow greater infiltration of precipitation and flood waters than Alternatives 4 through 8 because of the incomplete cover and because tree roots probably penetrate into waste materials below the cover. These alternatives would also have a greater potential for long-term failure of the landfill side slopes. Over time, the combination of saturated soil conditions during flooding and high winds could result in complete uprooting of trees, exposing underlying waste materials.

9.4 Reduction of Toxicity, Mobility, or Volume

None of the remedial alternatives evaluated in the FS report involves treating source materials from Bowers Landfill. Thus, none of the alternatives would reduce the toxicity or volume of hazardous constituents within the waste. Treatment alternatives for the source materials were considered but were not evaluated in detail for several reasons. First, most of the estimated 130,000 cubic yards of waste material in Bowers Landfill consists of general refuse and municipal solid waste. Although the exact amount of hazardous waste placed in the landfill is not known, it is probably a small percentage of the total waste volume. The large volume and variable composition of wastes makes treatment impractical. Second, no operating records exist for the landfill. Thus, it is not feasible to identify locations where hazardous wastes might have been placed. Third, the relatively low levels of contamination found during the RI would not be effectively reduced by treatment.

Alternatives 5, 6, 7, and 8 include provisions for installing a leachate collection and treatment system, which is a treatment alternative. This system may reduce the volume and mobility of leachate if leachate contains hazardous constituents. However, ground-water analyses from the RI did not indicate significantly elevated contaminant levels in the upper aquifer, which

would be the first target of a leachate plume. Additionally, the low-permeability clay cap installed under Alternative 4 should greatly reduce future leachate generation by reducing infiltration through the landfill. For these reasons, the installation of a leachate collection system was considered but then rejected.

Similarly, Alternatives 5, 6, 7, and 8 include a collection system for gases generated by the landfill. Collected gases could be treated, if necessary. However, Alternative 4 does not include gas collection and treatment for the following reasons. First, air monitoring results from the RI showed that air concentrations of volatile organic compounds (VOCs) at Bowers Landfill are similar to off-site background concentrations. Second, the landfill has a low potential to emit VOCs to air because of the low concentrations of VOCs in soils, sediments, and surface water on or adjacent to the landfill. Finally, because of the age of the landfill, most of the potential gas generation may already have taken place. These gases would have readily escaped through the highly permeable soil that now covers the landfill.

Alternative 4 would reduce the mobility of waste materials within the landfill. The FS report estimates that the low-permeability clay cap included in this alternative will reduce direct infiltration into the landfill surface by over 90 percent. This is much more effective than the current soil and vegetation cover. Reducing the amount of water that contacts waste materials within the landfill should reduce the mobility of these materials. Alternatives 5 and 6, which also include a clay cap, would provide similar reductions in infiltration. Alternatives 7 and 8, which include a synthetic plastic liner and a clay cap, would further reduce infiltration (estimated in the FS report as greater than 99 percent). However, these much greater reductions do not appear warranted by current levels of ground-water contamination at Bowers Landfill.

In contrast, Alternatives 1 and 2 (no repairs to the existing cover), Alternative 3 (limited repairs to the cover), and Alternative 9 (application of a partial clay cover) would provide either no reduction or less reduction in infiltration. Each of these alternatives would leave trees on the landfill side slopes. Root systems of these trees would provide a direct path between flood waters or precipitation and the underlying waste materials.

9.5 Short-Term Effectiveness

The FS report estimates that Alternative 4 could be constructed within 10 months; the alternative would effectively protect human health and the environment immediately upon completion. This construction period is longer than the 1 month required for Alternative 3, which includes only limited repairs to the existing landfill cover. Alternatives 5, 8, and 9 would require construction periods similar to that for Alternative 4. However, Alternatives 6 and 7 would require approximately 18 months to complete due to the more extensive construction activities.

Alternative 4 and the other alternatives could be constructed without significant adverse impacts on the environment and people living near Bowers Landfill. However, all the alternatives, with the exception of those requiring no construction, would present general safety-related risks to construction workers. In addition, earth moving activities could generate dust from the landfill surface that could potentially affect workers and surrounding populations. However, these effects could be minimized by using standard dust suppression methods, such as watering. Additionally, air monitoring would be conducted to measure contaminants released during construction. Construction practices would be modified as necessary to prevent unacceptable releases.

A major impact of Alternative 4 on the surrounding community would be increased truck traffic near the site. The FS report estimates that approximately 8,000 truckloads of material would enter and leave the site during construction. Over a 10-month period, this figure corresponds to an average of 40 trucks per work day. This could inconvenience local residents, adversely affect local roads, and present a slightly greater risk of traffic accidents near the site. Increased truck traffic is also a component of other construction alternatives. The estimated total number of trucks varies from 1,225 for Alternative 3 to 12,000 for Alternatives 6 and 7.

9.6 Implementability

Alternative 4, and all other alternatives evaluated in the FS report, could be implemented using standard earth moving equipment and construction techniques. However, the primary problem of flooding could affect the implementation of all alternatives except Alternative 1 (no action). Construction activities would have to be scheduled around flood events, since the area adjacent to the landfill is inundated approximately 30 days per year. Construction of Alternatives 4 through 9 is estimated to require 8 to 18 months to complete. Thus, remedial action would have to be segmented into work areas. Work on one area of the landfill would be

completed before construction of the next area began. This method would minimize the area of the landfill exposed to any particular flood event.

A second implementation problem, common to Alternatives 3 through 9, is the availability of low-permeability clay near the landfill. These alternatives would require substantial amounts (up to 50,000 cubic yards) of clay for construction. The FS report assumes that a suitable clay source can be found locally. However, if a local source cannot be found, increased transport of clay would be required, resulting in increased costs.

A third implementation problem affects Alternatives 3 through 9. These alternatives would require removing existing vegetation from all or part of the landfill. This activity, especially the removal of large trees, could expose underlying waste materials. Precautions would be taken to minimize this possibility.

None of the alternatives appears to present any major administrative problems that would affect implementation. However, the flood protection dike included in Alternatives 6 and 7 would involve substantial construction in the Scioto River floodplain. Construction of the dike would remove approximately 80 acres of land from the 100-year floodplain, since the dike would prevent floodwaters from covering this area. This would increase the height of floodwaters upstream and downstream of the landfill and may cause additional areas to flood. Because of this potential problem, Alternatives 6 and 7 may be administratively more difficult to implement.

9.7 Cost

The estimated total present worth cost for Alternative 4 is approximately $4.3 million. This estimate includes capital costs of approximately $3.2 million for fencing, drainage improvements, erosion and flood control measures, and installation of the landfill cap. Annual operation and maintenance (O&M) costs for this alternative are estimated at approximately $116,000 and include expenses related to ground-water monitoring and general maintenance of the fence, drainage system, erosion and flood control measures, and landfill cap. The present worth of annual O&M costs (over a 30-year period at a 10 percent interest rate) is approximately $1.1 million.

Alternative 4 would be more expensive to implement than Alternatives 1, 2, 3, and 9. However, these alternatives would not provide the degree of overall protection offered by Alternative 4. Alternatives 5, 6, 7, and 8 would provide somewhat greater protection than Alternative 4, but at a much greater cost. Estimated total present worth costs for these

alternatives range from $6.7 million to $13.8 million. Increased costs are associated with more sophisticated technologies such as a leachate collection system and gas venting system (Alternatives 5 through 8), a flood protection dike (Alternatives 6 and 7), and a landfill cap with a synthetic liner (Alternatives 7 and 8).

The total cost of Alternative 5 is approximately 50 percent higher than Alternative 4 ($6.7 million compared to $4.3 million), while Alternatives 6 through 8 involve much greater costs ($12.2 million, $13.8 million, and $8.6 million respectively). Although these alternatives may offer increased long-term protection, the relative cost increase outweighs the expected benefits. For example, the installation of a gas venting system does not appear necessary. Several factors indicate that gas generation is not a problem at Bowers Landfill. Such factors include the age of the landfill, the porous nature of the current landfill cover, the frequent flooding of the landfill, and the lack of elevated VOC and gas levels during the RI. Likewise, the installation of a leachate collection system does not appear justified because of little evidence that leachate is significantly affecting the upper aquifer. The low-permeability clay cap installed under Alternative 4 would further reduce leachate generation. The installation of a RCRA cap and flood protection dike are likewise not justified. A RCRA cap would decrease infiltration to less than 1 percent of precipitation. However, at a much lower cost, the clay cap included in Alternative 4 would decrease infiltration to less than 10 percent of precipitation. With respect to the flood protection dike, the landfill's north side appears to be stable under current conditions. It should be possible to install a new landfill cover that will resist flood damage without the added expense of a flood protection dike.

U.S. EPA has made minor revisions to remedial alternatives based on comments received during the public comment period. As a result, costs may be slightly higher than the estimates presented in this section.

9.8 State Acceptance

The State of Ohio has concurred with U.S. EPA's selection of Alternative 4 as the preferred remedial alternative for Bowers Landfill. A letter of concurrence is attached to this Record of Decision.

9.9 Community Acceptance

U.S. EPA's preferred remedial alternative for Bowers Landfill was presented at the start of the public comment period through distribution of a fact sheet, publication of display

advertisements in the Cirvleville, Ohio, Herald, and placement of the proposed plan in the site information repositories. A formal public meeting to discuss the proposed plan was held in Circleville on February 28, 1989. Comments received indicate that many residents are concerned about U.S. EPA's preferred alternative.

These comments focus on three general areas. First, several residents commented that U.S. EPA appears to be closing Bowers Landfill as a solid waste landfill, with no consideration of the hazardous wastes that were disposed of at the site. These residents prefer Alternatives 7 and 8, which include additional protective measures such as a synthetic liner (in addition to the clay cap) and a flood protection dike. U.S. EPA has pointed out in this Decision Summary that relevant and appropriate portions of hazardous waste regulations in RCRA Subtitle C have been adequately considered in the design and selection of Alternative 4. This issue is discussed further in the Responsiveness Summary.

Second, several residents expressed concern about U.S. EPA's proposed ground-water monitoring plan for Bowers Landfill. These concerns are directly related to protection of public drinking water supplies -- specifically, the City of Circleville's wellfield located 1½ miles south of the landfill. To address these concerns, the ground-water monitoring program will include installing and sampling additional monitoring wells south of Bowers Landfill. Further, U.S. EPA will require that corrective action program options be developed as part of the monitoring program. This will allow prompt response if ground-water contaminant levels exceed levels of concern at any compliance point in the monitoring system.

Finally, several residents expressed concern that U.S. EPA's preferred alternative represents a conceptual design, specific elements of which will be determined later with limited input from local residents. To address this concern, U.S. EPA will consider extending the Bowers Landfill Information Committee (see Section 3.0) through the remedial design/remedial action phase of this project.

10.0 THE SELECTED REMEDY

After evaluating all the feasible alternatives, U.S. EPA is selecting a remedy that consists of five components: (1) ground-water monitoring; (2) site access restrictions; (3) management of surface debris; (4) erosion control and drainage improvements; and (5) a natural clay cover over the landfill. These five components are described in detail below.

10.1 Ground-Water Monitoring

Under Alternative 4, a long-term program will be implemented to monitor contaminant concentrations and migration. This program will include installing additional monitoring wells south of Bowers Landfill (between the landfill and the Circleville municipal wellfield) and west of the landfill (between the landfill and the Scioto River). These new wells, existing monitoring wells, and possibly residential wells near the landfill will be sampled regularly. At a minimum, the program will meet the substantive requirements for ground-water monitoring under RCRA as described in 40 CFR 264, Subpart F.

The installation of three additional ground-water monitoring well clusters is necessary to develop a ground-water monitoring program that will adequately detect potential future releases of contaminants. These well clusters will consist of three wells; a shallow well that will be located in the upper portion of the saturated alluvial aquifer, an intermediate well that will be located between the water table and the bedrock, and a deep well that will be located just above the bedrock. Two of these well clusters will be installed west of the landfill. One cluster will be installed between well location 5 and well location 6 and the other between well W-10 and the bend of the landfill (see Figure 3). The third well cluster will be installed off-site between the landfill and the Circleville municipal wellfield. The installation of well clusters in addition to these may also be considered.

The monitoring wells will be sampled on a bimonthly basis for the first year and quarterly for years 2 through 4. During the first year, samples will be analyzed for the full Target Compound List (TCL). A reduced TCL may be considered after the first year. If the levels of contaminants in ground water do not increase over this time period, the sampling schedule will be reevaluated and a reduction in the frequency of sampling may be considered. A statistical test will be developed to determine when a significant increase in the level of contaminants has occurred.

Should a significant increase in the levels of contaminants occur, it will automatically trigger a RCRA corrective action. If the levels of contaminants in ground water exceed MCLs, where available, or health-based levels, where MCLs are not available, resampling will occur within 14 days. (Health-based levels are concentrations corresponding to a cancer risk of 10^{-6} for carcinogenic contaminants and a hazard index (HI) greater than 1 for noncarcinogenic contaminants.) If the resampling verifies that there has been a significant increase in contaminant levels, a corrective action program will be implemented. Corrective action may include such measures as establishing alternate concentration limits (ACLs), collecting and treating ground water, or removing the source of contamination.

The surface water in the drainage ditch to the east of the landfill will be sampled on a quarterly basis as part of the monitoring program. Monitoring will verify that discharges from the ditch are in compliance with Ohio Water Quality Standards, as described in the Ohio Administrative Code (OAC) 3745-01. A corrective action program will be implemented if contaminant levels in the ditch exceed these standards.

10.2 Site Access Restrictions

Efforts will be made to procure deed restrictions prohibiting ground-water extraction in the field west of the landfill and restricting disturbance of the landfill surface. The viability of continued farming immediately west of the landfill will be evaluated, and, if shown to be necessary, efforts would be made to prohibit such farming by imposition of deed restrictions. A 6-foot fence will be placed around the landfill, the drainage ditch to the east, and the field to the west to limit site access. The location of the fence is shown on Figure 6.

10.3 Management of Surface Debris

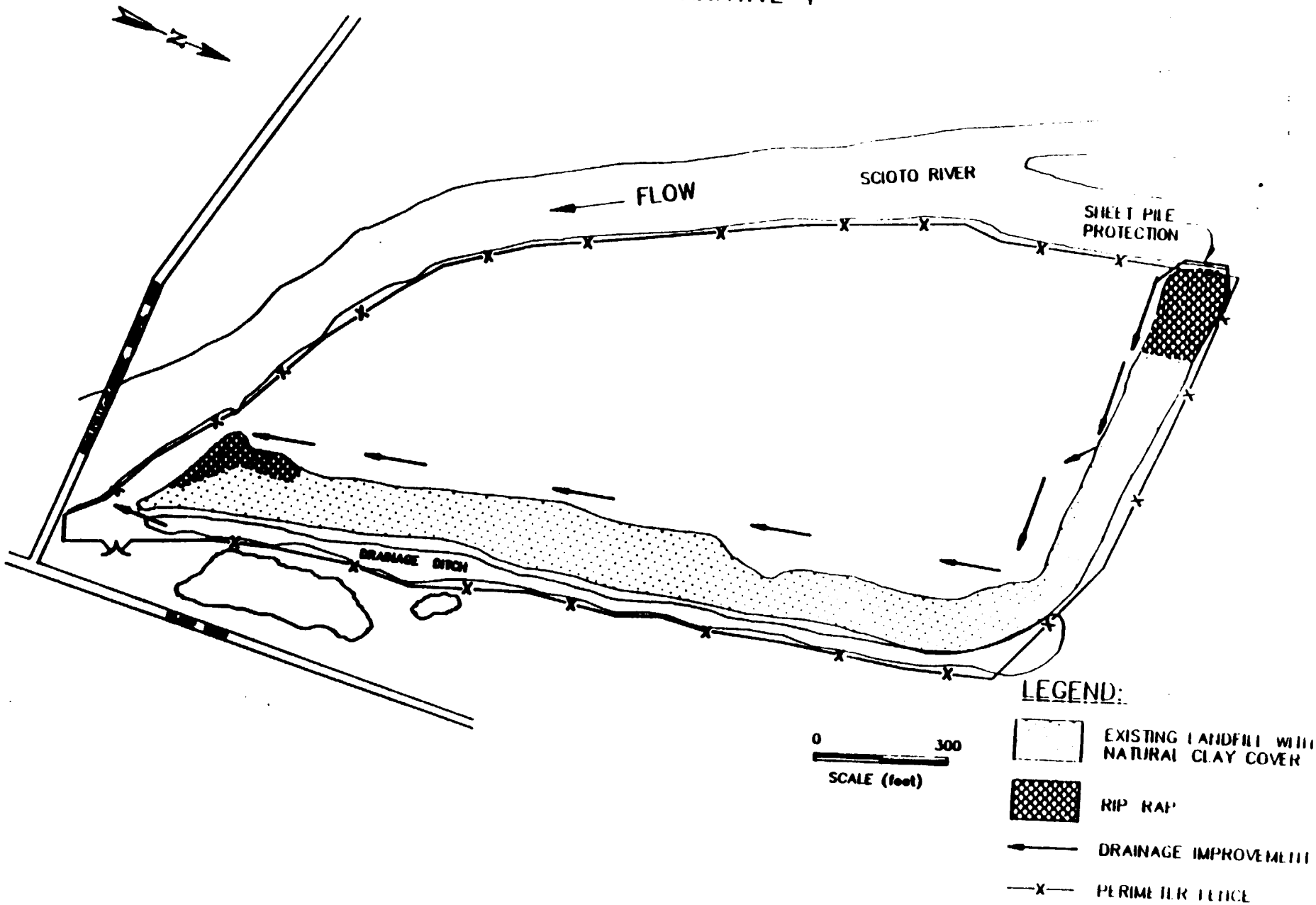
The landfill area and its immediate vicinity will be cleared of surface debris. Most of the currently exposed material consists of shredded or rolled plastic film, but rusted and partially decomposed remains of appliances, discarded tires, domestic waste, and empty drums are also evident. The visible waste items will be removed from the site by a front-end loader, placed in a lined truck, and transported to a suitable hazardous waste landfill. If the debris is determined to be nonhazardous, it will be disposed of in a solid waste landfill.

Trees on the landfill will be cut down with chain saws, and tree stumps will be ground down to the land surface. Smaller vegetation, less than 2 feet in diameter, will be cut down with mechanical equipment such as bush hogs. As much subsurface vegetation as feasible will be removed, without exposing significant amounts of waste. Exposed cover will be treated as necessary to prevent tree growth through the new cover. All vegetative material will be hauled to a local landfill unless tissue samples indicate that materials are potentially hazardous. If potentially hazardous, this material will be disposed of in an approved off-site hazardous waste disposal facility.

10.4 Erosion Control and Drainage Improvements

Erosion control will be provided for those areas of the landfill prone to the scouring effects of flood waters. The areas most likely to be subjected to these effects are the northwest

FIGURE 6. – SITE ALTERNATIVE 4



and southeast portions of the landfill that abut the Scioto River. A system of armor stone (riprap) will be used in these areas to supplement the erosion resistance provided by the new cover. This riprap will be placed on the landfill in areas shown on Figure 6. If riprap cannot be effectively placed on steeper slopes, sheet piling will be used to anchor the riprap. If sheet piling proves ineffective, a concrete wall may be used.

Site drainage will be improved to prevent ponding of water against the landfill. The area between the landfill and the river will be regraded to allow water to drain away from the landfill. The site will also be regraded to allow for drainage flow from north to south to the river.

The drainage ditch on the eastern side of the landfill will also be improved. Where necessary, side slopes will be improved to prevent erosion. The high point between the north end of this ditch and the open field north of the landfill will be cut down to prevent ponding of water against the northern part of the landfill during high-water conditions. High points within the ditch will also be cut down to allow water to drain through the ditch. Sediments removed during this process, and possibly other contaminated sediments, could be dewatered as necessary and placed on the landfill surface prior to installing the clay cap. Removal of contaminated sediments will reduce the possibility of contaminated surface water discharges from the ditch to the Scioto River. The discharge pipe at the southern end of the drainage ditch will be replaced with a larger one. A 36-inch-diameter corrugated metal pipe will be placed under the southern end of the landfill and will discharge to the river. The point where the ditch meets the pipe will be lined with compacted clay and reinforced with riprap. The pipe will have a 2 percent slope to prevent blockage with sediments.

10.5 Natural Clay Cover Over Landfill

Prior to construction of the landfill cover, a detailed geotechnical investigation will be conducted to measure the properties of the existing landfill surface and of soil and clay used for the cover. The purpose of this investigation will be to determine the stability of these materials under flood conditions. The cover will then be constructed with side slopes flat enough to provide adequate stability when the Scioto River floods. Although there is no apparent need for a landfill gas collection system, this determination could be reevaluated as part of the geotechnical investigation. A soil gas study of the landfill could verify that VOCs are not present in sufficient quantities to warrant collection.

The landfill cover will be constructed in segments to minimize potential damage due to flooding during construction. Work on one area of the landfill will be completed before construction of the next area begins. After each landfill segment has been prepared, a well

compacted clay layer, at least 24 inches thick, will be placed on the landfill cap and side slopes. The clay will be added in lifts, not exceeding 6-inches, and compacted before more clay is added. The clay layer will have a maximum permeability of 10^{-7} cm/sec. Each lift will be tested according to a stringent quality assurance program to verify that this specification is met.

A top soil layer at least 24 inches thick will be placed over the clay layer (Figure 7). This layer will also be applied and compacted in 6-inch lifts. The final cover will have sufficient horizontal-to-vertical side slopes so as to prevent failure during worst case flooding conditions. The entire surface of the completed cover will be reseeded, fertilized, and watered to assure plant growth. The plant species used will have root systems that are not expected to penetrate below the upper 24 inches of cover.

The cover will be inspected and maintained on a quarterly basis. The maintenance program will include regularly mowing the vegetation on the cap; inspecting the surface for cracks, settlement, ponding, and erosion; completing appropriate repairs to the cap; and repairing the fence. Repairs to all significant damage will begin within 30 days. In addition to regularly scheduled inspections, additional inspections will be made after flood events.

The landfill will also be inspected for leachate and methane gas production on a quarterly basis. If leachate production occurs that could potentially adversely affect public health or the environment, a leachate collection system will be installed and the leachate will be collected and treated. If methane gas production occurs that could potentially adversely affect public health or the environment, a gas venting system will be installed.

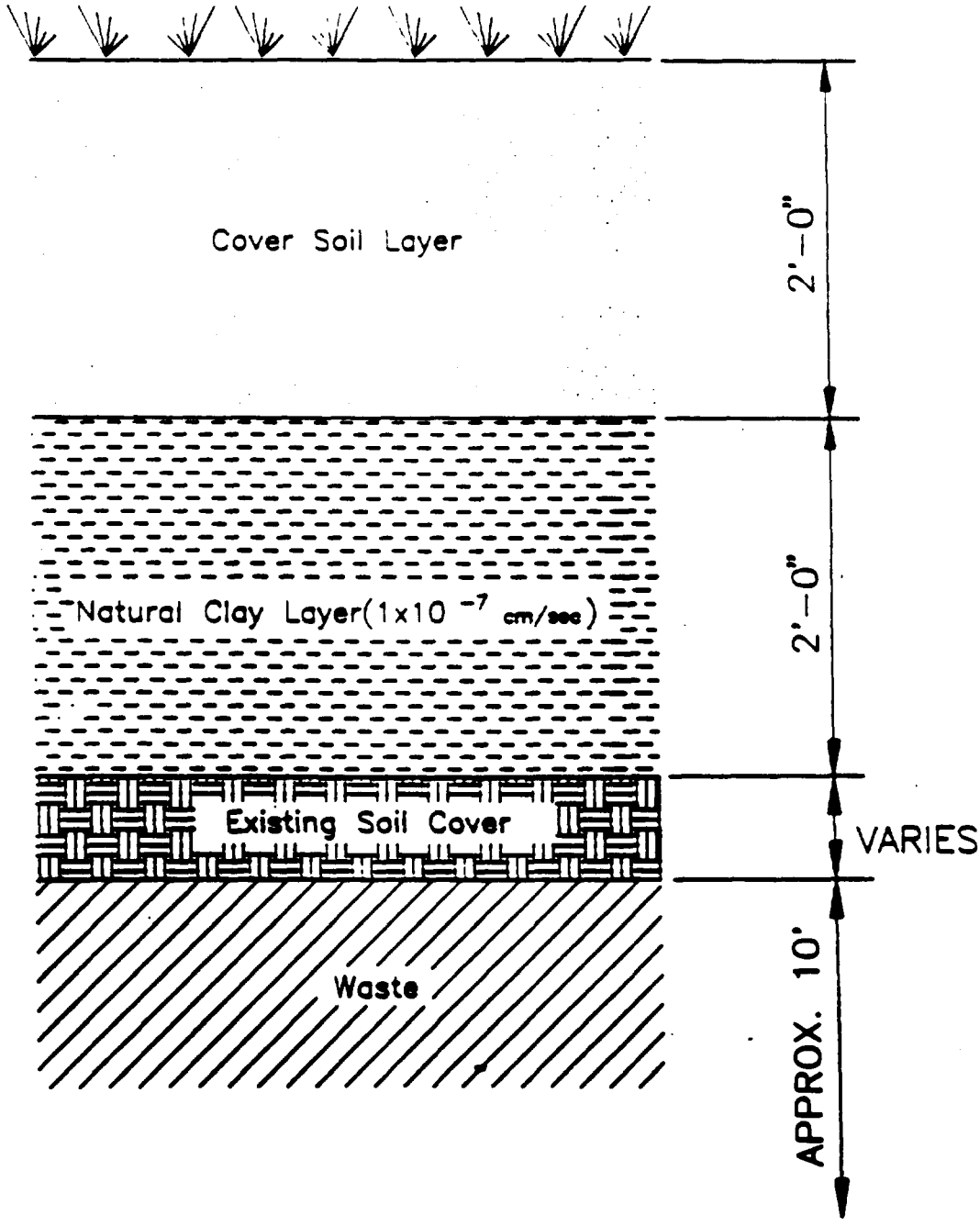
10.6 Reduction of Site Risks

The selected remedy addresses the major risks for Bowers Landfill as identified in the EA. Risks from ingesting contaminated soils will be reduced by covering the landfill (thus covering most highly contaminated soils) and by restricting access to the site. Soils in the field west of the landfill that contain lesser amounts of contamination will not be covered. The residual risks from ingesting these soils include an insignificant noncarcinogenic risk (HI of 0.24) and a carcinogenic risk of 4×10^{-8}. Risks from ingesting contaminated ground water immediately downgradient of the landfill will be reduced to zero by future ground-water use restrictions.

Alternative 4 also reduces potential long-term risks associated with the landfill. The low-permeability clay cover will greatly reduce infiltration of precipitation and flood waters, compared to the current cover. Thus, the mobility of contaminants remaining in the landfill will

FIGURE 7

DETAIL OF NATURAL CLAY COVER



be reduced. The cover will isolate waste within Bowers Landfill under a minimum 4-foot thickness of cover material and will be designed to provide long-term stability during floods.

11.0 STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Bowers Landfill site satisfies the statutory requirements of CERCLA Section 121. The selected remedy is consistent with the NCP, protects human health and environment, attains ARARs, and is cost-effective. The selected remedy does not satisfy the statutory preference for a permanent solution in that it leaves untreated waste on-site. Nor does the selected remedy reduce the toxicity or volume of wastes. However, source control and containment components of the selected remedy should significantly reduce the mobility of contaminants from the landfill.

11.1 The Selected Remedy is Protective of Human Health and the Environment

The remedial alternative selected for Bowers Landfill will reduce current and potential future risks to human health and the environment by the following means:

- Preventing exposure to contaminated soils by covering contaminated soils with a 4-foot-thick impermeable clay and soil cap and by fencing the site area. The cap and fence will be maintained on a regular basis, with an increased inspection schedule during floods.
- Preventing exposure to contaminated ground water by restricting access to downgradient property. Efforts will be made to obtain deed restrictions to prohibit extraction and use of ground water from this area.
- Limiting future ground-water contamination by reducing infiltration through contaminated soils and the landfill. The effectiveness of the cover will be evaluated by a long-term ground-water monitoring program. The program will require regular and systematic sampling of monitoring wells west and south of the landfill and possibly from residential wells south of the landfill.
- Reducing potential future exposure to wastes in Bowers Landfill by constructing a stable cover designed to withstand frequent flooding of the Scioto River.
- Reducing potential sources of surface water contamination for the Scioto River by removing contaminated sediments from the drainage ditch that is contiguous with the east side of Bowers Landfill. Discharges from the ditch will be monitored for compliance with Ohio Water Quality Standards.

11.2 The Selected Remedy Attains ARARs

The selected remedy will meet or attain all applicable or relevant and appropriate federal and state requirements. These requirements include:

- Ohio requirements for the closure of solid waste landfills (OAC 3745-27-09 and OAC 3745-27-10). The final landfill cover will exceed the required thickness of 2 feet and will meet all other substantive requirements within these regulations.

- Relevant and appropriate portions of RCRA requirements for closure of hazardous waste landfills with wastes in place. The low-permeability clay layer (maximum of 10^{-7} cm/sec) will comply with portions of the cover requirements in 40 CFR 264.301. The ground-water monitoring program will meet the substantive requirements of 40 CFR 264, Subpart F. The program will include a corrective action component that will be triggered if ground-water protection standards are exceeded at any point of compliance in the monitoring system.

- U.S. EPA requirements for floodplain protection, as described in 40 CFR 6, Appendix A, Statement of Procedures on Floodplain Management and Wetlands Protection. This regulation requires that construction in floodplains be done in such a manner as to minimize harm to the floodplain. Construction within the Scioto River floodplain is unavoidable in implementing a remedial alternative for Bowers Landfill.

- RCRA requirements for construction, operation, and maintainance of hazardous waste landfills in 100-year floodplains. The cover installed during remedial action will be designed and engineered to prevent washout of any hazardous wastes by a 100-year flood, as required by RCRA General Facility Standards in 40 CFR 264.18.

- Maximum Contaminant Levels (MCL) promulgated under the Safe Drinking Water Act. MCLs apply to public drinking water supplies serving 25 or more people. While not applicable to ground water immediately downgradient of Bowers Landfill, MCLs are relevant and appropriate for assessing ground-water contamination levels. Current contaminant levels exceed MCLs in two monitoring wells -- benzene in one well and barium in a second well. However, average ground-water concentrations were well below MCLs. By reducing infiltration of precipitation and flood waters through the landfill, Alternative 4 should eventually reduce contaminant concentrations below the MCLs in all downgradient wells.

- Ohio Water Quality Standards listed in OAC 3745-01. Discharges to the Scioto River from the drainage ditch east of the landfill will be monitored to verify compliance with these standards.

11.3 The Selected Remedy is Cost-Effective

Alternative 4 represents a cost-effective remedial alternative for Bowers Landfill. This alternative attains the same reductions in current risks from soil ingestion and ground-water ingestion as Alternatives 5 through 8, which are considerably more expensive. Alternative 4 also provides an adequate degree of long-term protection, compared to these more expensive

alternatives. Although Alternatives 5 through 8 may offer slightly increased long-term protection, the relative cost increases outweigh the expected benefits. Additional components of these alternatives, such as a gas venting system, leachate collection system, synthetic membrane cap, or flood protection dike, do not increase the effectiveness of these alternatives in proportion to the increased costs. These additional measures are not justified based on current site conditions and contamination levels.

Alternative 4 has a higher cost than Alternatives 3 and 9. However, these alternatives do not achieve either the short-term risk reductions or long-term protection offered by Alternative 4. By providing a degree of protection that cannot be achieved by less costly means, Alternative 4 is cost-effective.

11.4 The Selected Remedy Utilizes Permanent Solutions and Alternate Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

Alternative 4 is not a permanent solution to the public health and environmental problems identified for Bowers Landfill during the RI. It was not technically feasible to develop a permanent remedy for this site for several reasons. First, most of the material in Bowers Landfill consists of general refuse and municipal solid waste. Although the exact amount of hazardous waste placed in the landfill is not known, it is probably a small percentage of the total waste volume. Second, no operating records exist for the landfill. Thus, it is not feasible to identify locations where hazardous wastes might have been placed. Third, the relatively low levels of contamination found during the RI would not be effectively reduced by treatment.

Because the selected alternative is not a permanent solution and will leave wastes in place at the Bowers Landfill, the effectiveness of this remedial action must be reviewed at least once every 5 years.

11.5 The Selected Remedy Reduces Toxicity, Mobility, or Volume of Waste Materials as a Principal Element

Alternative 4 will not reduce the toxicity or volume of contaminants within Bowers Landfill. However, this alternative will reduce the mobility of waste materials within the landfill. The FS report estimates that the low-permeability clay cap included in this alternative will reduce direct infiltration into the landfill surface by over 90 percent. This is much more effective than the current soil and vegetation cover. Reducing the amount of water that contacts waste materials within the landfill should reduce the mobility of these materials and the likelihood of future ground-water contamination.

RESPONSIVENESS SUMMARY

BOWERS LANDFILL

CIRCLEVILLE, OHIO

March 24, 1989

U.S. Environmental Protection Agency

Region V

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RESPONSIVENESS SUMMARY
BOWERS LANDFILL
CIRCLEVILLE, OHIO

1.0 INTRODUCTION

The U.S. Environmental Protection Agency held a public comment period from February 14 to March 16, 1989, to provide interested parties an opportunity to comment on the Agency's Proposed Plan for Bowers Landfill. The purpose of this Responsiveness Summary is to identify major comments raised during the public comment period and to provide U.S. EPA's responses to these comments. U.S. EPA has considered all comments summarized in this document before selecting a remedial alternative for Bowers Landfill.

The Responsiveness Summary includes five sections plus three appendices. Section 2.0 briefly states public reaction to U.S. EPA's Proposed Plan. Section 3.0 contains a brief history of community interest and involvement with the Bowers Landfill site. Section 4.0 summarizes written and oral comments received by U.S. EPA during the public comment period. Comments were received from local citizens, environmental groups, local officials, state officials, and potentially responsible parties. Section 4.0 also includes U.S. EPA's responses to these comments. Section 5.0 identifies and summarizes issues that may continue to be of concern to the community during the design and implementation of U.S. EPA's selected remedy for Bowers Landfill. U.S. EPA will address these concerns during the Remedial Design and Remedial Action (RD/RA) phase of the cleanup process.

The first attachment to the Responsiveness Summary is a list of community relations activities conducted by U.S. EPA at Bowers Landfill, both before and during the public comment period. The second attachment includes copies of all written comments on the Proposed Plan received during the public comment period. Oral comments, which were recorded at a public meeting on February 28, 1989, are included within the transcript for that meeting. The transcript is part of the Administrative Record for Bowers Landfill.

2.0 OVERVIEW

U.S. EPA's preferred alternative for the Bowers Landfill site was presented at the start of the public comment period through distribution of a fact sheet, publication of display advertisement in the Circleville Herald, and placement of the formal Proposed Plan in the site

information repositories. The Proposed Plan was also presented and discussed during a public meeting in Circleville on February 28, 1989. The recommended alternative addressed potential ground-water contamination problems near the site, the risk of ingesting contaminated on-site soils, and long-term risks from future contaminant releases.

The preferred alternative specified in the Proposed Plan consists of monitoring ground water at and near the site; restricting the use of the site so that drinking water wells cannot be placed between the site and the Scioto River; placing a 6-foot-high fence around the site perimeter to prevent potential trespassers from entering the site area; and installing a new clay cap on the landfill to minimize the amount of contaminants that could potentially be carried into the ground water beneath the site. Erosion control and drainage improvements would be made, and riprap and sheet piling would be placed on the north and south ends of the landfill to improve flood protection.

The comments received during the comment period indicated that residents have some concerns about U.S. EPA's preferred remedial alternative. Some residents felt additional flood protection measures were needed at the site. Concerns were also raised regarding the proposed ground-water monitoring program and response contingencies. Specific details of such a program are usually resolved in the remedial design phase. Several residents indicated concern that they would have limited future opportunities for input into the cleanup process after the Record of Decision (ROD) is signed. These residents strongly requested the continuation of the Bowers Landfill Information Committee (see Section 3.2).

All written comments received by U.S. EPA are included in Appendix A to this Responsiveness Summary. Verbal comments recorded at the February 28, 1989, public meeting are contained in the transcript of that meeting, which is part of the Administrative Record for Bowers Landfill.

3.0 BACKGROUND ON COMMUNITY INVOLVEMENT

3.1 Early Involvement

Community interest in Bowers Landfill dates back to the early 1960s when residents complained to the Pickaway County Health Department about odors and fires at the landfill. Sporadic complaints from residents continued throughout the 1960s and 1970s.

Local media covered the site during the early 1980s after Superfund was enacted and U.S. EPA became involved at the site. In April 1984, Columbus television station WMCH (Channel 4) mistakenly reported that Bowers Landfill was possibly contaminated with dioxin. The report resulted in increased interest and concern about the site. Since that time, community interest and involvement have been high. This level of interest was maintained during the remedial investigation and feasibility study (RI/FS). Appendix B to this Responsiveness lists community relations activities that U.S. EPA has conducted in response to this interest.

In early 1985, a consent order, allowing the potentially responsible parties to conduct the RI/FS, was drafted. U.S. EPA held a public comment period on the draft consent order and received written and verbal comments covering a wide range of environmental health and public involvement issues. U.S. EPA responded to these comments in July 1985. The document containing these responses (Response to Public Comments on Consent Order for the Bowers Landfill, Circleville, Ohio, July 1985) is included as Appendix C to this Responsiveness Summary.

Many of the comments on the consent order indicated an interest in greater community involvement during RI/FS process. Residents and officials wanted to be kept well informed. Some wanted representation in the decision-making process. In response to these comments, U.S. EPA established the Bowers Landfill Information Committee.

3.2 Bowers Landfill Information Committee

The Bowers Landfill Information Committee was established in November 1985. The committee consisted of representatives from U.S. EPA, OEPA, the PRPs, local (city and county) government, and citizens' groups (ACTION and L-ECHOS). The committee met regularly to discuss progress during the RI/FS and upcoming events. Draft reports were also provided to the committee for review and discussion. Committee meetings were open to any interested observers. Twelve meetings were held between November 1985 and November 1988. The committee had several major functions:

- To disseminate reports, data, and other information related to the Bowers Landfill RI/FS. During the meetings, U.S. EPA, OEPA, and the PRPs made formal presentations to the committee on topics such as well installation and sampling methods; sampling results for soil, ground water, surface water, and sediment; endangerment assessment results; applicable or relevant and appropriate requirements (ARARs); and remedial alternatives developed in the FS.
- To act as liaison between the agencies and the rest of the community.

- To provide input to U.S. EPA and OEPA on issues related to the site. However, the committee was not a decision-making body and had no authority to override agency decisions.

U.S. EPA and OEPA distributed draft versions of several documents to the committee for review and discussion. These documents were generally distributed at least one week (and often earlier) before the committee meeting at which the document was to be discussed. Site reports reviewed and discussed by the committee included:

- Work Plan
- Site Safety Plan
- Biological Survey Report
- RI Report
- Endangerment Assessment Report
- FS Report
- QA/QC Plan
- Geophysical Survey Report
- Technical Memoranda for Sampling Results
- Alternatives Array Document

3.3 Concerns Raised During the RI/FS

The following community concerns were raised during the RI/FS. Many of these concerns were expressed by the members of the Bowers Landfill Information Committee.

1. Concerns were raised by the information committee about the health and safety aspects of the RI field work. The concerns regarded coordination between agencies, PRPs, and local emergency officials should an emergency occur.

   U.S. EPA Response: U.S. EPA and OEPA officials met with local fire, police, hospital, and other officials to explain the roles of the RI participants and to better understand the jurisdictions and response capabilities of the local agencies. Response plans were developed for the unlikely event of an emergency.

2. Members of the information committee expressed a desire to physically observe on-site field activities.

   U.S. EPA Response: Due to liability concerns, this request was denied. However, slides taken during RI field activities were shown at information committee meetings.

3. Residents expressed concern that the site should be fenced to restrict site access during RI field activities.

U.S. EPA Response: The U.S. EPA Emergency Response Team evaluated Bowers Landfill in May 1985 to determine whether site access posed an immediate health threat. U.S. EPA determined that a fence was not necessary because the only unnatural materials observed at the site were empty drums and plastic nonhazardous materials. The site was almost completely covered by vegetation (grasses, shrubs, and trees). However, as a result of this evaluation, U.S. EPA installed additional warning signs at the site, particularly near the southernmost access point along Island Road.

Before the start of RI field work, a fenced area was constructed near the entrance to the landfill. Equipment used during field activities was stored inside this fenced area when not in use. The area also contained a support trailer for field activities.

4. Concerns were raised regarding the differences between the RI results and the results obtained by Burgess and Niple in 1981.

U.S. EPA Response: U.S. EPA believes that the data obtained during the RI most accurately represents current conditions at and near the landfill. The agency also feels that the level of data quality assurance in 1981 was not as high as is present quality assurance programs offer. Therefore, the 1981 results may be less reliable than the RI results. The differences between current and 1981 results may also be explained by changes in contaminant levels due to flooding at the site or volatilization of the chemicals. Chemicals that migrated to the Scioto River would have been diluted to much lower concentrations. This issue is addressed in greater detail in Section 4.7 of this Responsiveness Summary.

5. U.S. EPA was requested to provide the results of private well sampling to the appropriate homeowners.

U.S. EPA Response: U.S. EPA provided the results of water testing to the appropriate homeowners. The results were sent to the information repository and are also included in the RI and EA reports.

6. Residents were concerned that the Circleville water supply might be contaminated.

U.S. EPA Response: OEPA, a party to the consent order, responded that the City of Circleville must periodically test its water supply for the presence of hazardous chemicals. OEPA placed copies of test results from 1980-1987 in the information repository.

Summaries of these test results are also included in the EA report. The results indicate that the Circleville water supply is of high quality and has not been adversely affected by contamination from Bowers Landfill. This issue is discussed further in Sections 4.2, 4.6, and 4.7 of this Responsiveness Summary.

7. Members of the group ACTION requested a formal 90-day public comment period on the RI report.

U.S. EPA Response: While a formal comment period on the Bowers Landfill RI report was not held, U.S. EPA pointed out that citizens may comment on technical activities at any time during the RI/FS process. Any comments would be included in the Bowers Landfill Administrative Record. In addition, comments on the RI submitted to U.S. EPA by members of Bowers Landfill Information Committee were included as an addendum to the RI report. A major function of the information committee has been to provide opportunities for citizen input during the technical activities at the site, particularly during the development of the work plan, and during the review of the RI, EA, and FS reports.

4.0 SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

This section of the Responsiveness Summary summarizes comments received during the public comment period for Bowers Landfill and provides U.S. EPA's responses to these comments. The Agency received comments from local citizens, environmental groups, local officials, state officials, and potentially responsible parties. These comments concerned the preferred remedial alternative (Alternative 4), as stated in the Proposed Plan, and other remedial alternatives developed in the Feasibility Study (FS). U.S. EPA also received comments on work conducted earlier in the RI/FS process, including the RI and endangerment assessment.

Attachment 2 to this Responsiveness Summary includes copies of all written comments received during the public comment period. Oral comments, which were recorded at a public meeting on February 28, 1989, are included within the transcript for that meeting. The transcript is part of the Administrative Record for Bowers Landfill. Where several individuals or organizations submitted similar comments, a single response is provided. U.S. EPA has grouped the comments according to subject.

4.1 Remedial Alternative Preferences

1. Two residents asked why a flood protection dike was not included as part of the preferred remedial alternative.

   U.S. EPA Response: Based on discussions with the U.S. Army Corps of Engineers, U.S. EPA believes that the landfill cap installed under Alternative 4 can be designed and constructed to resist flood damage or washout of wastes by a 100-year flood. Alternative 4 would include flood protection, in the form of riprap, on the ends of the landfill most prone to flood damage. Where necessary, sheet piling would be added to provide additional stability. Landfill side slopes would be designed to prevent failure during flood conditions. A safe horizontal-to-vertical ratio for the side slopes would be determined by geotechnical studies of the landfill surface and the soil and clay used for the cover. Wastes would be covered by at least 4 feet of new cover material and would be isolated from flood waters. Any minor damage to the cap caused by flooding would be repaired promptly as part of an ongoing operation and maintenance program.

   The additional protection offered by the flood dike is not proportional to the cost of the dike. Although the dike would provide additional long-term protection from floods, it would provide no additional reduction in infiltration of precipitation through the landfill, compared to the clay cap. The FS estimates the cost of the flood protection dike as approximately $5.5 million. This additional component would more than double the cost of Alternative 4 while providing only slightly increased long-term effectiveness.

   Further, construction of the dike would remove approximately 80 acres of land from the 100-year floodplain of the Scioto River, since the dike would prevent floodwaters from covering this area. This would increase the height of floodwaters upstream and downstream of the landfill and may cause additional areas to flood.

2. Several residents wanted to know why hazardous waste landfill closure requirements were not applied to Bowers Landfill. A citizen representing ACTION, a local environmental group, asked: "The feasibility study states that Alternative 4 would comply with current State of Ohio closure standards for solid waste landfills. Since hazardous waste was dumped at Bowers, I would like to know if any of the alternatives comply with State of Ohio closure standards for hazardous waste facilities. If not, why not?"

U.S. EPA Response: Ohio hazardous waste regulations are modeled after U.S. EPA hazardous waste regulations. The Resource Conservation Recovery Act (RCRA), as amended by the 1986 Hazardous and Solid Waste Amendments, regulates active hazardous waste facilities. Hazardous waste facilities that were not operating after November 19, 1980, are not required to comply with RCRA. Because of this, RCRA is not applicable to remedial actions at Bowers Landfill.

U.S. EPA believes that site conditions, as currently defined by the RI, do not justify closure of Bowers Landfill in compliance with state or federal regulations for active hazardous waste landfills. The landfill was used primarily for domestic waste, nonhazardous industrial waste, and construction debris. Based on site conditions and the relatively low levels of contaminants in ground water, closure as a hazardous waste landfill is not justified.

Nevertheless, the remedial alternative chosen for Bowers Landfill takes into account several RCRA requirements for hazardous waste landfills. The low-permeability clay layer installed over the landfill will have a maximum permeability of 10^{-7} cm/sec. This cover would meet RCRA requirements for the clay liner at the bottom of a hazardous waste landfill, as described in 40 CFR 264.301. In addition, the cover will meet RCRA General Facility Standards in 40 CFR 264.18. The cover will be constructed, operated, and maintained to prevent washout of hazardous wastes by a 100-year flood. Finally, the long-term monitoring program for Bowers Landfill will comply with the substantive requirements for ground-water monitoring under RCRA in 40 CFR Subpart F.

3. Members of ACTION expressed concern that "containment techniques are unproven and unreliable technologies with specific implementation problems." Concerns were raised that containment remedies depend on expert installation, and even if properly installed, clay or synthetic membrane caps will eventually leak.

U.S. EPA Response: Capping, with either clay or synthetic membrane layers, is a standard procedure for closing land disposal units that have reached capacity. The cap serves two main purposes -- preventing direct contact and exposure to waste materials and preventing ground-water contamination by reducing infiltration of water through the wastes. The low-permeability clay cap proposed for Bowers Landfill will serve both purposes. The cap will prevent direct contact with and ingestion of contaminated soils.

The clay layer of the cap will have a permeability of 10^{-7} cm/sec or less and should reduce infiltration of precipitation and floodwaters to less than 10 percent.

U.S. EPA will take several measures to increase the effectiveness of the cap and reduce the likelihood of cap failure. First, the clay layer will be designed and installed under a strict quality assurance program. The clay will be installed in 6-inch increments (or lifts). Each lift will be compacted and tested for permeability before the next lift is added. Second, the horizontal-to-vertical ratio of the side slopes will be designed to prevent failure during worst case flooding conditions. Third, the cap will be inspected and maintained according to a regular schedule, with additional inspections scheduled after floods. If the cap leaks even after these precautionary measures are taken, the long-term ground-water monitoring program, included as part of remedial action, will detect increases in ground-water contamination before the contamination moves off-site.

4. Several residents were concerned that treatment technologies were not considered for Bowers Landfill.

U.S. EPA Response: Treatment technologies were considered in the FS, but were screened out due to effectiveness, implementability, and cost considerations. Thus, treatment technologies were not included in any of the remedial alternatives evaluated in detail. The Superfund Amendments and Reauthorization Act (SARA) of 1986 expresses a preference for remedial alternatives that include treatment as a principle element. However, treatment is not always practical, especially at sites that have large volumes of low-concentration waste materials.

Three specific factors make treatment impractical at Bowers Landfill. First, much of the estimated 130,000 cubic yards of waste material in the landfill consists of general refuse and municipal solid waste, rather than hazardous waste. Second, no operating records exist, so it is not possible to identify specific locations along the 4000-foot length where hazardous wastes may have been deposited. Third, the relatively low levels of contamination found during the RI would not be effectively reduced by treatment.

5. The potentially responsible parties commented that Alternative 3 (limited repairs to landfill cover) was adequately protective of public health and the environment, and that the selection of Alternative 4 (clay cover over the landfill) was not warranted.

U.S. EPA Response: U.S. EPA's rationale for selecting Alternative 4 over Alternative 3 is clearly stated in the ROD Decision Summary. Briefly, Alternative 3 does not meet the two threshold criteria for selection as a remedial alternative. Alternative 3 does not provide adequate protection of human health and the environment and does not comply with ARARs.

6. One resident stated that cost should not be a factor in choosing a remedial alternative for Bowers Landfill. He felt that the most expensive technologies should be chosen because they are the most protective. He stated that "EPA's rightful job at this point is to cleanup the Bowers site to the best of its ability, notwithstanding cost." This resident believed that the remedial alternative should include a synthetic membrane cover for the landfill, construction of the most sophisticated drainage system possible, and construction of a flood control dike.

U.S. EPA Response: SARA specifically requires U.S. EPA to select remedial actions that are cost-effective. Cost-effectiveness cannot be used to justify the selection of a nonprotective remedy. However, U.S. EPA is required by law to closely evaluate the costs required to implement and maintain a remedy and to select a protective remedy whose costs are proportionate to its overall effectiveness.

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) provides the regulatory framework for Superfund. Under the currently proposed revisions to the NCP, cost is one of five primary balancing criteria for evaluating remedial alternatives. Other balancing criteria include long-term effectiveness; reduction of toxicity, mobility, or volume; short-term effectiveness; and implementability. To select a remedial alternative, U.S. EPA must first determine that the alternative meets the two threshold criteria -- the alternative must adequately protect human health and the environment and the alternative must comply with applicable or relevant and appropriate requirements (ARARs). U.S. EPA must then consider the balancing criteria and choose the remedial alternative that represents the best combination of these criteria. Thus, U.S. EPA must consider cost in this analysis.

7. One member of ACTION stated that a fence around Bowers Landfill, a component of U.S. EPA's preferred alternative, should be erected as soon as possible. This measure would limit exposure primarily to those who choose to become exposed.

U.S. EPA Response: U.S. EPA agrees that installing a fence around Bowers Landfill will limit exposure to those who choose to become exposed. Fencing was included in all remedial alternatives (except No Action) evaluated during the FS. Fencing will be implemented on a priority basis once remedial action begins.

4.2 Technical Concerns Regarding Remedial Alternatives

1. One member of ACTION, a local environmental group, asked about maintenance procedures for the preferred alternative. He stated that the feasibility study report did not adequately describe maintenance procedures.

U.S. EPA Response: The February 3, 1989, draft of the Feasibility Study Report, page 4-25, states:

> Maintenance of the cover would involve mowing the vegetation, inspecting the surface for cracks, settlement, and ponding of water, and making appropriate repairs. Maintenance requirements for the cover can be expected to be greater than the present cover after flood events due to the limited subsurface stabilizing capability of the grass. Damage to the cap could occur from erosion, from plant roots breaking through the surface, from subsidence due to decaying roots, from penetration by burrowing animals, or from vandalism. Direct exposure to wastes as a result of damage is unlikely because waste materials would be isolated at least 4 feet below the surface. If repairs to the clay or reseeding were required, this would be carried out immediately. Repairs to the clay would consist of patching with fresh clay.
>
> The minimum effective design life of caps is generally 20 years (K. Wagner et al, Remedial Action Technology for Waste Disposal Sites, Noyes Data Corporation, Park Ridge, N.J, 1986, pp. 19 et seq.). Proper maintenance can maintain the former effectiveness. If well maintained, there would be virtually no long-term threat to public health or the environment.
>
> The maintenance program would also include inspection of the cover for structural integrity on a regularly scheduled basis. Following periods of flooding, the landfill cover would be inspected for signs of erosion and repaired as necessary. This program would include repair of riprap protection, as necessary, and inspection for damage from scouring, wave action, and debris, together with repair as necessary.

U.S. EPA believes that the intent of the maintenance program is clearly stated in the above text. The purpose of a feasibility study (FS) is to provide a general description of remedial action technologies and to summarize the implementation methods. Specific

operational guidelines that would include inspection logs, inspection schedules, inspection methods, and descriptions of corrective actions will be detailed in the remedial design (RD). The RD is intended to be a blueprint for implementation while the FS is a broader conceptual study of remedial options for the site.

2. Several residents, ACTION, the Circleville City Council, and the City of Circleville Water Department expressed concerns about long-term ground-water monitoring at the site. These concerns are related to protection of the city's water supply, which is obtained from a wellfield approximately 1½ miles south of the landfill. Specifically, commenters requested that new monitoring wells be installed between the landfill and the city's wells. Commenters also wanted to know how the proposed monitoring program would detect and prevent off-site migration of ground-water contamination. Finally, some commenters felt that testing of private wells south of the landfill and testing of the city's wells should also be included in the monitoring program.

U.S. EPA Response: Long-term ground-water monitoring will be conducted at Bowers Landfill as part of the remedial alternative. As noted above, the monitoring program will be based on RCRA ground-water monitoring requirements for active hazardous waste facilities. The monitoring program will include installing additional monitoring wells south of Bowers Landfill (between the landfill and the Circleville municipal wellfield) and west of the landfill (between the landfill and the Scioto River). The program may also include sampling of private residential wells south of the site.

Testing of the city's wells is required by federal law. Testing was conducted quarterly during 1988 for a large list of volatile organic compounds (VOCs), including eight VOCs for which there are federal drinking water standards. None of these VOCs were detected in samples from the Circleville wells. In addition, none of the VOCs found in ground-water samples from Bowers Landfill were found in the Circleville water supply. After reviewing the quarterly sampling results for 1988, OEPA informed the City that "no repeat monitoring schedule has been established by the Ohio Environmental Protection Agency (Ohio EPA) but, it is anticipated that the submittal of quarterly VOC samples will be required again in 1991."

U.S. EPA believes that the combination of these two programs (long-term ground-water monitoring at Bowers Landfill plus testing of the Circleville water supply by the City of Circleville) will result in monitoring that is protective of human health and the

environment and sufficient to identify any future releases to ground water from the landfill.

3. Several residents requested that U.S. EPA provide additional details about the proposed ground-water monitoring program (for example, number and locations of wells sampled, frequency of sampling, and chemicals measured).

U.S. EPA Response: As noted above, ground-water monitoring will require regular and systematic sampling. The monitoring program will meet the substantive requirements for ground-water monitoring under the Resource Conservation and Recovery Act (RCRA) as described in 40 CFR Subpart F.

The installation of three additional ground-water monitoring well clusters is necessary to develop a ground-water monitoring program that will adequately detect potential future releases of contaminants. These clusters will consist of three wells -- a shallow well located in the upper portion of the upper aquifer, an intermediate well located between the water table and the bedrock, and a deep well located just above the bedrock. Two well clusters will be installed west of the landfill, one cluster between well location 5 and well location 6 and the other between well W-10 and the bend of the landfill. The third well cluster will be installed off-site between the landfill and the Circleville municipal wellfield. The installation of additional well clusters may also be considered.

The monitoring wells will be sampled bimonthly for the first year and quarterly for years 2 through 4. During the first year, samples will be analyzed for the full Target Compound List (TCL). A reduced TCL may be considered after the first year. If ground-water contaminant levels do not increase over this 4-year period, the sampling schedule will be reevaluated and the frequency of sampling may be reduced.

4. Several residents requested additional information on the steps U.S. EPA would take if long-term monitoring results showed increases in ground-water contaminant levels.

U.S. EPA Response: The monitoring proposed as part of the remedial alternative for Bowers Landfill will be designed to detect increases in ground-water contaminant concentrations due to the landfill. A statistical test will be developed to determine when a significant increase in ground-water contamination has occurred.

Should a significant increase in the levels of contaminants occur, the increase will automatically trigger a RCRA corrective action. If the levels of contaminants in ground water exceed MCLs, where available, or health-based levels, where MCLs are not available, resampling will occur within 14 days. (Health-based levels are concentrations corresponding to a cancer risk of 10^{-6} for carcinogenic contaminants and a hazard index (HI) greater than 1 for noncarcinogenic contaminants.) If the resampling verifies that there has been a significant increase in contaminant levels, a corrective action program will be implemented. Corrective action may include such measures as establishing alternate concentration limits (ACLs), collecting and treating ground water, or removing the source of contamination.

U.S. EPA will make every effort to minimize delays, should corrective action be needed in the future at Bowers Landfill. Details on the scheduling, timing, and nature of possible corrective actions will be addressed during remedial design.

5. One resident wanted to know the estimated costs for excavating the landfill.

U.S. EPA Response: Excavation costs at hazardous waste sites vary according to the type of excavation equipment used, levels of worker protection required, and other site-specific factors. However, a typical cost estimate for excavation in Level B protection is approximately $60 per cubic yard. Using this figure, the total cost to excavate all of the estimated 130,000 cubic yards of waste in Bowers Landfill would be approximately $8 million. This estimate does not include additional costs for removing excavated wastes from the site, packing the wastes for removal, or treating the wastes.

6. Several residents expressed concerns that while a clay cap would reduce infiltration through the top of the landfill, leakage was more likely to occur through the bottom. Because no borings were drilled through the landfill, U.S. EPA cannot be sure that there is an adequate confining layer below the wastes.

U.S. EPA Response: An 8- to 15-foot-thick layer of silt or clay was observed at all borings completed adjacent to the landfill. These borings indicated that a natural layer of low-permeability material was present at the time of landfill construction. Information available to U.S. EPA indicates that most waste materials were deposited directly on this layer, although some portions of this layer may have been excavated during landfilling activities.

Because Bowers Landfill does not have an engineered liner below the wastes, there is a potential for leaching from the bottom of the landfill. However, the major driving force in producing leachate is infiltration of water. The low-permeability clay cap (10^{-7} cm/sec or less) will greatly reduce the infiltration of both precipitation and floodwaters that might create leachate. Another factor that U.S. EPA considered was that leachate, when generated, would first enter the upper portion of the aquifer downgradient of the landfill. Ground-water testing during the RI showed that contaminant levels in this aquifer were very low and did not identify a leachate plume.

For these reasons, U.S. EPA believes that capping should be the first step in lessening the potential for leachate production. Capping will be coupled with frequent monitoring for hazardous constituents in site ground water. Should further ground-water testing identify leachate as a problem, then source reduction techniques, such as leachate collection and treatment, will be implemented as part of a corrective action program.

7. One member of ACTION felt that U.S. EPA's preferred remedial alternative was "the equivalent of doing nothing while waiting for rainfall and floods to flush the contaminants into the surface and groundwater."

U.S. EPA Response: As discussed in the previous response, U.S. EPA believes that the remedial alternative selected for Bowers Landfill represents an active measure to contain contaminants within the landfill, rather than allowing these contaminants to be flushed out by rainfall and floods.

8. One resident asked under "what circumstances have gas venting and leachate collection systems been recommended and how do these circumstances differ from the Bowers Site?"

U.S. EPA Response: Gas can be generated within a landfill by microbial degradation of organic materials or by volatilization of organic liquids. The period of active gas generation within a landfill can vary widely depending on site-specific conditions such as temperature, pH, moisture content of the refuse, oxygen content, and refuse composition.

In the absence of a low-permeability layer above the waste materials, most landfill gases will escape through the top of the landfill. This is most likely the case with Bowers Landfill. Wastes have been in place from 20 to 30 years and are covered with a thin layer of highly permeable soil. Further, because wastes were piled on the ground, rather than placed in the ground, the landfill has a large surface area (relative to the waste volume)

for gases to escape. These observations, plus the low organic vapor concentrations measured during the RI, suggest that Bowers Landfill is not actively generating significant quantities of gas.

Gas collection and venting systems are normally installed when landfills actively generating gas are capped with low-permeability materials. Capping prevents gases from escaping through the top of the landfill and forces the gases to move more slowly in a lateral direction. Typically, collection systems are installed at the perimeter of the landfill to prevent gases from migrating off-site. However, collection systems can also be installed in the interior of the landfill. Because Bowers Landfill does not appear to be actively generating gas, a gas collection system was not included as part of the selected remedial alternative.

Leachate collection systems are required for new hazardous waste landfills as part of the bottom liner. These systems collect and drain leachate, preventing the leachate from reaching the bottom liner, penetrating the liner, and contaminating ground water below the landfill. Such a system cannot be constructed under the wastes already in Bowers Landfill.

The leachate collection system proposed for Bowers Landfill in the FS report differs from this design and would be much less effective. The leachate collection system would consist of a 1-foot-thick drainage layer of high-permeability sand and gravel. This layer would be placed on the landfill surface, before the clay cap is applied. At the edges of the landfill, where this drainage layer meets the existing land surface, a 2-foot deep trench would be dug. The drainage layer would extend into this trench.

This type of a leachate collection system would collect most of the precipitation and floodwater that passed through the landfill cap. However, only a small fraction of this water would infiltrate the low-permeability cap. The collection system would not extend down to the water table and would not collect ground water moving away from the landfill. Thus, U.S. EPA has determined that the addition of a leachate collection system would only marginally increase the effectiveness of the landfill cap.

9. One resident commented that U.S. EPA's proposed plan "fails to address the fact that a large diameter natural gas transmission line crosses the northeast corner of the site."

U.S. EPA Response: U.S. EPA is aware of this gas transmission line. However, the Agency does not believe that the presence of this line will interfere with remedial construction activities. U.S. EPA will review this issue further during remedial design. Prior to construction, U.S. EPA will conduct a field survey to confirm the actual location of the gas transmission line, as well as other underground utilities that might be present.

10. The City of Circleville commented that "both the sheetpiling protection and the amount of riprap to be installed is not sufficient given the fact that during severe floods the entire north leg of the landfill is at risk." The City also commented that "sheetpiling needs to be installed" at the south end of the landfill "to prevent undermining of the riprap in this area and the riprap itself needs to be extended considerably."

U.S. EPA Response: U.S. EPA will consider the need to extend erosion protection in greater detail during remedial design. Appendix D of the FS report contains a preliminary erosion protection analysis. This analysis identifies several areas (including those identified by the City of Circleville) that may require erosion protection beyond that included in the conceptual design of the remedial alternative. A more detailed erosion protection analysis will be conducted prior to designing and constructing the erosions protection system for the landfill cap.

4.3 Public Participation Process

1. Several residents requested that the Bowers Landfill Information Committee, which met regularly during the RI/FS process, be continued during design and implementation of the remedial alternative selected for Bowers Landfill.

U.S. EPA Response: U.S. EPA plans to continue the Bowers Landfill Information Committee during remedial design and remedial action (RD/RA). However, the makeup of the committee will vary depending on how design and construction is conducted. Three possible options are:

- Federal-lead, with the RD/RA conducted by the U.S. Army Corps of Engineers or by a U.S. EPA contractor
- PRP-lead, with the RD/RA conducted by the potentially responsible parties (PRPs) under a Consent Decree
- PRP-lead, with the RD/RA conducted by the PRPs under a Unilateral Order

Under the second and third options, U.S. EPA would oversee the RD/RA. The format of the Information Committee will be determined by the option that is chosen. U.S. EPA expects this to occur during the summer or fall of 1989.

2. One resident expressed concern that the public comment period of 30 days was not adequate and that additional time was needed for the public to review and comment on U.S. EPA's proposed plan.

U.S. EPA Response: U.S. EPA believes that a 30-day public comment period on the proposed plan is sufficient for Bowers Landfill due to the long-term involvement of citizens and citizens' groups in the RI/FS process. The public comment period began on February 14, 1989, shortly after the release of the Proposed Plan, and extended to March 16, 1989. Most of the comments received by U.S. EPA have come from individuals and organizations that have attended the Information Committee meetings, commented throughout the RI/FS, and been kept abreast of technical issues concerning Bowers Landfill.

U.S. EPA offers the following information to support the adequacy of a 30-day comment period. The Agency conducted an extensive community relations program in conjunction with the RI/FS. This program included 12 meetings of the Bowers Landfill Information Committee, where U.S. EPA, OEPA, technical representatives of the PRPs, local government officials, and citizens' groups met to keep the public informed of progress during the RI/FS. During all of these meetings, individuals from the community were allowed to ask questions through representatives on the Bowers Landfill Information Committee. U.S. EPA has responded to these questions and concerns on an ongoing basis. A draft of the FS, on which U.S. EPA based its selection of a remedial alternative, was released to the Information Committee in September 1988. Results of the FS were discussed at a committee meeting in November 1988, several months before the Proposed Plan was released.

3. One resident expressed concern that the public comment period did not offer the Circleville community "a genuine opportunity to change the EPA's position."

U.S. EPA Response: As noted above, the public has been actively involved in all aspects of the RI/FS process. U.S. EPA has received a number of comments and has seriously considered these comments. Several comments have resulted in minor changes to the preferred remedial alternative. These changes include:

- Expanding proposed ground-water monitoring at Bowers Landfill to meet the substantive requirements of RCRA.

- Installing additional monitoring wells south and west of Bowers Landfill and possible inclusion of residential wells as part of the long-term monitoring program.

- Including surface water monitoring as part of the long-term monitoring program to verify that the landfill is not affecting the Scioto River via surface water discharges.

- Lowering the permeability of the clay layer of the landfill cover to 10^{-7} cm/sec. This revised permeability is based on requirements for clay layers installed as components of RCRA landfill liners.

4.4 Costs And Funding Issues

1. Local residents expressed concern about the liability of potentially responsible parties (PRPs) for implementation, monitoring, and maintenance of remedial actions at Bowers Landfill. Specifically, residents wanted to know how this liability would be transferred if PRPs were acquired by other companies or filed for bankruptcy.

   U.S. EPA Response: Superfund liabilities are treated in much the same way as any other corporate liability. If a company with liability for a hazardous waste cleanup is sold, the buyer may or may not agree to take on the seller's liability. The debt, however, is not extinguished by the transfer of other assets. Similarly, a restructuring does not release a company from liability.

   Bankruptcy may relieve a company or individual of certain debts. Debts owed to the federal government for costs incurred during the cleanup of hazardous waste sites, however, are given a high priority among bankruptcy claims. Any funds not recoverable from the PRPs, for cleanup or operation and maintenance, would be provided from Superfund monies or by the State of Ohio.

2. A Pickaway County Commissioner expressed concern that the county did not have the funding to pay for remedial action at Bowers Landfill.

   U.S. EPA Response: U.S. EPA does not consider Pickaway County to be a PRP for Bowers Landfill at this time. If the county is not a PRP, it will not be required to fund any portion of remedial action costs.

3. One member of ACTION wanted to know who would be financially responsible should the chosen remedial alternative eventually fail.

U.S. EPA Response: The potentially responsible parties (PRPs) for Bowers Landfill would most likely be financially responsible should the chosen remedial alternative eventually fail. Section 122(f) of the Superfund Amendments and Reauthorization Act (SARA) allows U.S. EPA to grant PRPs a release from future liability at the completion of remedial action. In granting such a release, U.S. EPA would consider such factors as the effectiveness and reliability of the remedial action, the nature of remaining risks, and the extent to which the remedial action represents a permanent remedy for the site. Because the remedial action for Bowers Landfill is not a permanent remedy and leaves wastes in place, U.S. EPA would not likely grant a release from liability.

4. One member of ACTION stated that cost estimates in the FS "do not take into account the potential for astronomical increases when these impermanent remedies eventually fail."

U.S. EPA Response: The purpose of the RI/FS is to study current conditions of a hazardous waste site, to evaluate the potential effects of contaminant releases from the site, and then to propose remedial alternatives for the site that protect human health and environment. While conditions may change in the future, the purpose of the RI/FS process is to select a remedial alternative that will succeed in providing long-term protection, rather than a remedy designed to fail. Thus, the use of theoretical future conditions as a basis for estimating costs of remedial alternatives is not the intent of Superfund.

4.5 Enforcement Issues

1. One member of ACTION expressed concern that the potentially responsible parties were allowed to write the feasibility study for Bowers Landfill.

U.S. EPA Response: Section 104(a) of SARA gives U.S. EPA the authority to allow PRPs to conduct a remedial investigation and feasibility study (1) if the PRPs demonstrate their qualifications to do the work and (2) if U.S. EPA oversees and reviews the work. By allowing the PRPs to conduct the RI/FS at their own expense, U.S. EPA is able to save Superfund monies for sites where no PRPs can be identified.

The Bowers Landfill RI/FS was conducted under such an arrangement. In 1985, U.S. EPA and OEPA signed a Consent Order with E.I. DuPont deNemours & Company (DuPont) and PPG Industries, Inc. (PPG), two of the PRPs. While Dupont and PPG

conducted the RI/FS, all phases of the work were reviewed and overseen by U.S. EPA and OEPA.

4.6 Remedial Investigation Issues

1. Several residents expressed concern about the adequacy of the source investigation. Specifically, they wanted to know why the amounts and locations of hazardous wastes in Bowers Landfill remain unknown. Without this information, U.S. EPA does not have the technical data to support its choice of a remedial alternative.

U.S. EPA Response: U.S. EPA believes that data in the RI and EA reports adequately support the choice of a remedial alternative for Bowers Landfill. During the RI, a large number of samples were collected from soil, sediment, surface water, and ground water directly adjacent to the landfill. The results of all samples indicated relatively low levels of contamination, and no clearly identifiable "hot spots." Sampling results from this first phase of the RI indicated minimal migration of contaminants from the landfill. Thus, U.S. EPA determined that a second phase of the RI, which would involve collecting samples of landfilled material, was not warranted.

U.S. EPA used a variety of sources, other than sampling, to obtain information about wastes disposed of in Bowers Landfill. These sources included historical aerial photographs, information from OEPA files, information provided by PRPs, and interviews with former owners, operators, and users of the landfill. A complete inventory of materials deposited in the landfill cannot be prepared because accurate, documented records of landfilling activities do not exist. Additionally, interviews with former owners, operators, and users were conducted 15 to 20 years after landfilling ended. Thus, the information obtained from these interviews may not be completely accurate.

Persons interviewed stated that Bowers Landfill accepted industrial wastes, including barrels containing liquids and liquids from tank trucks. Some of these liquids may have been hazardous substances. Nevertheless, much of the industrial waste accepted by Bowers Landfill consisted of general trash and other nonhazardous wastes. Information from OEPA files (formerly the Ohio Department of Health) states that the majority of materials placed in the landfill consist of residential wastes collected by private haulers in the Circleville area.

In response to a 1978 investigation by the U.S. House of Representatives Subcommittee on Oversight and Investigation, DuPont and PPG reported disposal of 6,000 and 1,700 tons of waste, respectively, in Bowers Landfill between 1965 and 1968. U.S. EPA requested additional information from DuPont and PPG in 1988 under Section 104(e) of CERCLA. Both companies stated that they did not retain waste shipment records from the 1960s and that previous estimates of waste volumes represented the best information available. Each company interviewed employees who worked at the Circleville plants during the 1960s to obtain additional information on waste disposal from that period. DuPont stated that most of the 6,000 tons of wastes sent to Bowers Landfill consisted of Mylar polyester film. PPG responded that wastes sent to Bowers Landfill may have included defective resin products, used filter materials, resin-saturated phosphate salts, spent cleaning materials, and caustic solutions.

2. U.S. EPA received several questions and comments related to the potential migration of ground-water contamination south of Bowers Landfill. These comments included statements by several members of ACTION that one reason for the difference between RI/FS results and the 1981 findings of Burgess and Niple may, in part, be the off-site migration of a contaminant plume to the south. Since the City of Circleville's water supply wells are located 1½ miles south of the landfill, residents were concerned about this possibility. Residents were particularly concerned with movement of water in the lower aquifer at the site, and suggested that it is unlikely that water from this aquifer discharges upward into the Scioto River.

U.S. EPA Response: The RI investigated two water bearing aquifers below the site. These two units are separated west of the landfill by a low-permeability layer. Ground water in the upper aquifer flows west toward the Scioto River and probably discharges into the river. Ground water in the lower aquifer flows southwest toward the river. The potentiometric surface (the level to which the water will rise) of the lower aquifer is higher than that of the upper aquifer and about the same as the water level in the Scioto River. Thus, ground water in the lower aquifer may move upward toward the river. However, the low-permeability layer that separates the two aquifers may underlie the river and restrict upward movement of ground water into the river. In this case, ground water from the lower aquifer will continue to move southwest. This ground water may eventually flow southward along the Scioto River, which is likely a ground-water divide. If the low-permeability layer is not continuous, ground water in the lower aquifer would likely discharge upward into the Scioto River.

Circleville's water supply comes from a wellfield, located 1½ miles south of Bowers Landfill. A number of private wells and the Sturm and Dillard quarry are located between the site and the city's water supply. Two private wells, located between the site and the quarry, were sampled during the RI. No contamination was detected in these wells. These wells and four additional wells, including three wells at the Sturm and Dillard quarry, were sampled during the 1981 Burgess and Niple study. Although the validity of the Burgess and Niple data is not completely known, no organic contaminants were detected in samples from these wells. In addition, the City of Circleville has analyzed samples from its drinking water supply wells from 1980 to the present. These results were reviewed as part of the EA. None of the results indicate that Bowers Landfill has impacted the city's water supply.

3. One member of ACTION stated that the remedial investigation was conducted "in the middle of the worst drought to affect this area in the past 60 years." He felt that these conditions could have affected the results and conclusions of the RI.

U.S. EPA Response: Climatological data from the Circleville area does not support this statement. Data from the National Weather Service in Columbus, Ohio, approximately 25 miles north of Bowers Landfill, indicate an average annual precipitation of approximately 36.97 inches. For the years 1985 through 1988, annual precipitation at Columbus was 38.67, 35.04, 26.70, and 36.57 inches, respectively. These data do not suggest extreme drought conditions, and, with the exception of 1987, precipitation in the area near Bowers Landfill was near average values.

The first round of ground-water, surface water, and sediment sampling was conducted in February 1987; the second round was conducted in April and May 1987; and the supplemental round was conducted in March 1988. None of these events occurred following periods of abnormally low precipitation. The first round of sampling actually followed a period of relatively high precipitation, as the landfill was flooded in December 1986. Additional information on precipitation and river stage data during sampling events is presented in Drawings 3-15 and 3-16 of the RI report.

4. One resident asked why the ground-water study during remedial investigation was confined to the site vicinity and did not study regional ground-water flow. Residents also asked why the remedial investigation did not include (1) testing of wells south of Bowers Landfill and (2) installation and testing of wells on the west side of the Scioto River.

U.S. EPA Response: The RI was not strictly limited to studying the site. Off-site residential wells, including two wells south of Bowers Landfill (between the landfill and the City of Circleville water supply), were sampled. Samples from these wells, as well as samples from ground-water monitoring wells, showed very little contamination. As a result, the monitoring well network was not extended south or west during the RI.

U.S. EPA will extend the monitoring well network as part of the remedial action for Bowers Landfill. The extended network will include additional monitoring wells south of the landfill, additional wells between the landfill and the Scioto River, and, if necessary, additional wells west of the river.

5. One member of ACTION questioned a statement in the RI report about potential sources of tetrachloroethene in an upgradient monitoring well.

U.S. EPA Response: Tetrachloroethene was found in two ground-water samples collected from upgradient well W-12. Contaminants found in this well are not likely to have been caused by the landfill. The RI report (page 5-8) speculated that the tetrachloroethene found in these samples may have originated from equipment maintenance activities associated with the nearby sand and gravel quarrying operations. Tetrachloroethene is a common solvent and is widely used as a degreaser for metal machine parts.

6. One member of ACTION asked why the RI report did "not speculate what will happen to groundwater flow and the contaminants the water contains should adjacent quarrying operations reach below the water table as they have south of the site."

U.S. EPA Response: U.S. EPA does not believe that quarrying activities near Bowers Landfill are likely to affect regional ground-water flow. Quarrying activities are continuing east and northeast of the site. At the time of the RI, these quarrying activities had reached the water table northeast of the landfill. Potentiometric surface maps of the upper aquifer indicate that flow is west toward the Scioto River, in spite of the quarrying activities to the northeast.

Monitoring wells east and north of the landfill will be included in the long-term ground-water monitoring program for Bowers Landfill. Water level measurements from these and other wells in the monitoring network will detect any potential changes in ground-water flow direction caused by future quarrying activities.

7. One member of ACTION asked why ground-water samples were not collected from monitoring wells that exhibited elevated organic vapor readings in the well casings.

U.S. EPA Response: During the RI, a flame ionization detector (FID) was used to measure organic vapor concentrations at the top of each well casing, prior to purging or sampling the well. This procedure was used primarily to protect the health and safety of workers sampling the wells.

Only one well, P-6B, showed elevated organic vapor readings. This well was sampled in February 1987, April 1987, and March 1988. Only three organic compounds were found during these sampling rounds: benzene (2 sampling rounds, maximum concentration of 6 $\mu g/L$); acetone (2 sampling rounds, maximum concentration of 64 $\mu g/L$), and 2-methylnaphthalene (1 sampling round, maximum concentration of 2.8 $\mu g/L$).

8. One member of ACTION suggested that "background" samples for surface water and sediment were collected from locations that could have been affected by runoff from the landfill during heavy rains or flooding.

U.S. EPA Response: Background samples for surface water and sediment were collected from the east side of the Scioto River, upstream of Bowers Landfill. Sample results from these locations are not likely to have been influenced by the landfill. Surface water samples were not collected during flooding, but at a time when water was flowing from the background sampling location toward the landfill. Past floods could possibly have carried contaminated soil from the landfill, contaminating sediments away from the landfill. However, the background location would have been affected by this process only if substantial back-mixing of flood waters (flow in the upstream direction) occurred. U.S. EPA considers this unlikely.

9. During the remedial investigation, the Bowers Landfill Information Committee requested that additional deep monitoring wells be installed to clarify ground-water flow direction in the lower aquifer at the site.

U.S. EPA Response: U.S. EPA responded to the information committee's request and required the installation and sampling of two additional deep wells (P-12B and P-13B). These wells were installed in February 1988 and sampled in March 1988. Information

from these two wells and other previously installed deep wells indicated that ground water in the lower aquifer flows southwest from the landfill.

4.7 Endangerment Assessment Issues

1. Two members of ACTION asked why the endangerment assessment (EA) did not consider previous sampling results from 1981. These comments focused on a 1981 study of Bowers Landfill conducted by Burgess and Niple. Ground-water samples collected during this study showed high levels of toluene, xylene, and ethylbenzene immediately downgradient of the landfill. Commenters were concerned that inclusion of these results would greatly affect the conclusions of the EA report.

U.S. EPA Response: As discussed on page 1-14 of the EA report, U.S. EPA did not evaluate the Burgess and Niple data for two reasons. First, the data were collected 6 years prior to the remedial investigation. While these data may represent past site conditions, the RI data more accurately assess current site conditions. Second, U.S. EPA could not assure the quality of the Burgess and Niple data.

Superfund endangerment assessments should be based only on validated sample results. The Burgess and Niple results were not validated and were, in some cases, contradictory. For example, samples collected from downgradient well MW-2 on July 17, 1981, showed high levels of ethylbenzene, toluene, and xylene when analyzed by gas chromatography (GC). Concentrations of these three chemicals were 66.8, 43.4, and 27 mg/L, respectively. However, when the same samples were analyzed by a different method, gas chromatography/mass spectroscopy (GC/MS), concentrations were much lower. Ethylbenzene and toluene concentrations measured by GC/MS were 2.48 and 2.53 mg/L, respectively, or 15 to 25 times lower than the GC results. (Xylene was either not measured, not detected by GC/MS, or not reported.

However, even if the EA had included the Burgess and Niple data, the conclusions of this report would not have been affected. The data would still show a potential risk from using ground water between the landfill and the Scioto River as a drinking water supply. If the highest of Burgess and Niple's results were considered, risk levels would be somewhat higher than those estimated in the EA. The hazard index, reflecting noncarcinogenic risks, would increase from 1.04 to approximately 29. Worst-case carcinogenic risks would increase from 9×10^{-6} to 3×10^{-5}.

An EA based on the Burgess and Niple results would still conclude that off-site residential wells were unaffected by the landfill. Burgess and Niple sampled six private wells south of Bowers Landfill shortly after high levels of ethylbenzene, toluene, and xylene were found in on-site wells. The private well results showed no evidence of contamination.

2. One member of ACTION wanted to know why U.S. EPA has compromised public safety by allowing a cancer risk of 1 in 10,000 for the site, a level "up to 100 times greater risk than that generally accepted."

U.S. EPA Response: This question appears to be based on a misunderstanding of information presented in the EA Report. U.S. EPA has not allowed a cancer risk of 1 in 10,000 for the site. The EA report stated that recent U.S. EPA guidance suggests that a target range for carcinogenic risks of 10^{-4} (1 cancer per 10,000 people exposed) to 10^{-7} (1 cancer per 10 million people exposed) should be considered at Superfund sites. Within this range, a risk of 10^{-6} (1 cancer per 1 million people exposed) is generally considered a benchmark for determining whether site conditions pose a significant risk. However, U.S. EPA policy is to evaluate risk levels at each Superfund site based on site-specific conditions.

In the case of Bowers Landfill, the EA report estimated that worst case risks (based on maximum contaminant concentrations and maximum exposure levels) were within the target range. Carcinogenic risks were estimated at 9×10^{-6} for ingestion of ground water adjacent to the site and 3×10^{-6} for ingestion of on-site soils. The remedial alternative proposed for Bowers Landfill should eliminate cancer risks from ground-water ingestion. By covering most contaminated soils, the alternative should reduce cancer risks from soil ingestion to 4×10^{-8}.

3. One resident was concerned that while the EA report evaluated health effects of individual chemicals, the report did not evaluate the effects of combinations of chemicals, particularly synergistic effects.

U.S. EPA Response: Approximately 60 chemicals have been identified in samples collected from various environmental media at Bowers Landfill. Because of this large number, it is not possible to identify and characterize all possible interactions of these chemicals, whether the interactions are synergistic, antagonistic, or otherwise. The EA was conducted according to established U.S. EPA guidance. This guidance requires that

was conducted according to established U.S. EPA guidance. This guidance requires that when chemical interactions cannot be adequately characterized, additivity should be assumed. That is, the combined effects of two chemicals should be estimated as the sum of the individual effects of each chemical. The EA followed this procedure. For each exposure route, the effects of exposure to multiple contaminants were estimated by summing the risks for each individual contaminant.

4. One member of ACTION expressed concern that the endangerment assessment did not consider the possibility "that flooding might distribute contaminants and contaminated soil from the landfill."

U.S. EPA Response: Contaminants from Bowers Landfill, particularly those in site soils and sediments, could be distributed to off-site areas by flooding. However, transport and distribution of these contaminants by large volumes of floodwaters would greatly reduce concentrations compared to on-site levels. Risks to human health and the environment off-site would be correspondingly reduced compared to on-site risks.

The EA estimated on-site risks at relatively low levels, even under worst case exposure conditions. Off-site risks, due to possible contaminant distribution by floods, should be substantially less and well below levels of concern.

5. One member of ACTION stated that worst case exposure scenarios evaluated in the endangerment assessment weren't "really worst cases." Inhalation or ingestion of dusts while farming the field next to the landfill and ingestion of water from ditches next to the landfill were mentioned as specific concerns.

U.S. EPA Response: The EA evaluated human exposure to contaminants at or released from Bowers Landfill under probable case and worst case conditions. Exposure scenarios were developed to reflect exposure conditions that might reasonably be expected to occur at or near Bowers Landfill. This was done to identify a realistic range of risks to human health posed by the landfill. "Really worst cases" could be developed which would result in greater exposures and larger estimated risks to human health than for the realistic worst cases presented in the EA. However, such exposure scenarios are highly unlikely to occur.

For example, extensive swimming in or lifetime ingestion of surface water from on-site drainage ditches is theoretically possible. However, the ditches are shallow and

Ohio EPA
State of Ohio Environmental Protection Agency
P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43266-0149

Richard F. Celeste
Governor

Re: Bowers Landfill Site
Circleville, Ohio
Record of Decision

Mr. Valdas V. Adamkus
Regional Administrator
U.S. EPA, Region V
230 South Dearborn Street
Chicago, Illinois 60604

March 31, 1989

Dear Mr. Adamkus:

The Ohio Environmental Protection Agency (Ohio EPA) has reviewed the draft Record of Decision (ROD) for the Bowers Landfill site in Circleville, Ohio. This draft ROD was prepared pursuant to the terms of the Administrative Consent Order signed in 1985 by U.S. EPA, Ohio EPA, E.I. DuPont de Nemours and Co. and PPG Industries, Inc.

Changes to the draft ROD which addressed Ohio EPA's concerns were discussed with your Remedial Project Manager, Erin Moran, on March 29, 1989. On March 30, 1989, we received from your contractor a revised draft ROD which incorporated those changes. With these changes, the Ohio EPA concurs with this unsigned, undated draft ROD, a copy of which is enclosed herewith and incorporated herein by reference for identification purposes.

Please feel free to contact me at (614) 644-2927 if you have any questions or comments regarding this matter.

Sincerely,

Richard L. Shank

Richard L. Shank, Ph.D.
Director

cc: Maury Walsh, Deputy Director
cc: Kathy Davidson, OCA
cc: Deborah Strayton, CDO
cc: Jack Van Kley, OAG
cc: Paul Hancock, OAG
cc: Mary Gade, Office of Superfund
cc: Erin Moran, Office of Superfund
cc: Malcolm Petroccia, PPG
cc: Bernard Saydlowski, DuPont

Appendix D: Written comments and transcript of March 14 public meeting

(NOTE: The transcript includes only those portions with public comments; a complete copy of the transcript is available from EPA.)

APPENDIX C: LIST OF COMMENTERS

Oral comments were received at the March 14, 1985 public meeting from:

1. David Cannon, PPG Industries, Inc.
2. Cynthia Gillen, ACTION
3. Linda J. King
4. Garry Betts, ACTION & self
5. Ralph E. Dunkel, ACTION & self
6. Mary Anne Edsall
7. Mark Scarpitti, Soil Conservation Service
8. Marsha Schneider
9. William A. Myers, M.D., Pickaway County Health Commissioner

Written comments were received from:

1. Linda King (December 22, 1984 letter regarding split samples)
2. William A. Myers, M.D. (January 9, 1985 letter regarding split samples)
3. Linda King, Mary Anne Edsall, and Cynthia Gillen, ACTION
4. Pastor Alfred Krebs, Trinity Lutheran Church
5. Muriel Wright
6. John. A. Jordan, City of Circleville, Department of Public Utilities
7. Donald E. Strous and Ralph W. Ankrom, Pickaway County Board of Commissioners

APPENDIX B: RESPONSE TO COMMENTS ON SPLIT SAMPLING

In addition to the comments received during the comment period on the consent order, U.S. EPA received a petition from Circleville residents and a letter from William A. Myers, M.D., Pickaway County Health Commissioner, requesting that split samples be provided to the residents.

As allowed under the consent order, U.S. EPA will provide a representative of the Pickaway County Board of Health, a set of split samples. Dr. Myers offered his assistance in facilitating the provision of split samples from U.S. EPA.

U.S. EPA and Ohio EPA request that the analysis of these split samples strictly adhere to all the requirements of the Quality Assurance Project Plan for this site, which has been approved by EPA's Quality Assurance Office. The Respondents' samples and U.S. EPA and Ohio EPA's samples must also adhere to the requirements of the QAPP. The QAPP contains highly sophisticated, state of the art technical requirements which must be observed so that contamination at and from the site can be successfully classified. EPA will acknowledge only those samples that have followed the QAPP for this site.

ACTION further requested that industry assume financial responsibility for the citizen's splits. Respondents are only required to undertake the measures that EPA would undertake if EPA was conducting the RI/FS with federal money. EPA does not fund citizens' split samples because the scientific quality of the project is ensured by a QAPP, and citizen samples are redundant. EPA will not require the Respondents to finance the citizens' samples.

We will make available second drafts (ie. after U.S. and Ohio EPA have reviewed) of the following:

RI report
Exposure Assessment (EPA will actually do this report)
Feasibility Study (this is always made available for public comment)

Raw data. We cannot provide raw data that has not been through quality assurance/quality control procedures. Attached is an October 4, 1984 memo from William Ruckelshaus, then administrator of the agency, which describes the Agency's policy regarding the release of unreviewed material. This policy is still in effect. Once the data from the site has been through the required quality assurance/quality control procedures, the agency can provide all data and not just summaries.

Representation on the project team. Several of the comments asked that citizens be put on the "project team." The information committee is in lieu of that request because U.S. EPA and Ohio EPA cannot put a citizen on the project team for the following reasons:

Members of the "project team" as defined by the consent order are authorized to 1) take samples or direct sampling, 2) stop work, 3) make minor changes in field work, 4) observe, record or photograph the work, and 5) review records, files and documents.

We are not able to give citizens the authority for numbers 1,2,3. Number 4 could be allowed only at a distance, as we are not able to allow citizens on the site for safety and liability reasons. Number 5 will be accommodated by the information committee.

5. Quarterly public meetings. ACTION requested that the agencies hold quarterly public meetings to inform the community of the progress at the site. If there appears to be need for the meetings, they will be held. However, it may be that the more regular meetings with the information committee will fulfill that function. In addition, U.S. EPA will provide regular written updates to the community.

APPENDIX A: RESPONSE TO COMMENTS ON COMMUNITY INVOLVEMENT

Many of the comments received on the Bowers consent order concern citizen involvement in the investigation. The county commissioners requested that U.S. EPA and Ohio EPA include citizen representation on the "research project team." The citizens' group, ACTION, had several comments. They requested: prior notification of changes in any plan and in sampling points, quarterly public meetings, representation on the project team (they prefer a rotating membership), and all raw data. Other commenters suggested the public be involved in the project to the extent possible.

Both U.S. EPA and Ohio EPA believe that community involvement is a critical element in the success of a Superfund project. The agencies discussed the comments at great length, and have developed the following plan for fulfilling the residents' desire to be informed and involved in the project, and the agencies' obligation to keep the project scientific, on schedule and consistent with agency policies:

Information committee. U.S. EPA and Ohio EPA will develop a committee representing the county, city , citizens' groups ACTION and L-ECHOS to meet regularly with project staff and to provide documents for discussion and review. The meetings would occur at least every other month in Circleville, and would be open to anyone else who wished to observe.

Purpose: To disseminate reports, data, and progress reports related to the remedial investigation and feasibility study of the Bowers Landfill. To provide liaison function with the rest of the community. To provide input to U.S. EPA and Ohio EPA, although the committee will not be a decision-making body and will not have authority to override any agency decision.

Structure: One member should represent the Pickaway County Board of Commissioners, the city of Circleville, the Pickaway County Board of Health, ACTION, and L-ECHOS, Ohio EPA, U.S. EPA, the Respondents and perhaps one at-large position. Each organization would choose its member, but for the purposes of consistency and effectiveness, the agencies ask that the same member (and a designated alternate, if desired) serve throughout the life of the project.

Format: Throughout an RI/FS a number of documents and reports are generated that generally are not reviewed by the community. However, U.S. EPA and Ohio EPA are able to disseminate the documents under certain conditions. We anticipate that we would provide them to and discuss them with the committee. The following are documents that the Respondents will be required to provide to the government, and that EPA would then provide to the committee:

Work plan
QA/QC plan
site safety plan
geophysical survey
biological survey

-more-

the spread of contaminants already in the groundwater or soil. That problem would be addressed with another option.

12. Page 116-117 David Cannon. If U.S. EPA shares split samples with the community, provisions should be made for adequate quality control so the results will be useful.

    RESPONSE: Addressed in attachment on split sampling.

13. Page 117 Mary Anne Edsall. The public comment period should be extended.

    RESPONSE: The public comment period was extended by 30 days.

14. Page 121 Linda King. Will incineration be considered as a cleanup option if local laws prohibit incineration?

    RESPONSE: All viable alternatives must be considered in evaluating the best method for cleaning up a hazardous waste site. Even if incineration is considered, it doesn't mean it will be chosen for this site. We can't speculate on future local laws that may come into effect, but every effort will be made to accommodate local concerns, and to clean up the site in a safe and environmentally responsible manner.

7. Page 92-93 Mary Anne Edsall. Citizens will be exposed to contaminants during drilling.

RESPONSE: Contaminants during drilling are very unlikely to reach any citizen not actually on the site near the drilling. See also response to written comment on page three.

8. Page 95 Marsha Schneider. The order should include provisions to protect the rights and property of adjacent land owners.

RESPONSE: Under the consent agreement, the respondents are responsible for contacting the landowners and making arrangements with them for access to their property. By signing the consent agreement, the respondents have no more rights than they had previously concerning access to any land, including the Bowers Landfill itself.

9. Page 96-98 Dr. William Myers. 1) The County Health Department offers its assistance to U.S. EPA and Ohio EPA in conducting the investigation; 2) a full investigation is necessary; 3) the agencies didn't provide enough information to the public up to this point.

RESPONSE: 1) U.S. EPA and Ohio EPA appreciate the offer of assistance, and hope to work cooperatively with the health department throughout the Superfund project; 2) the agencies agree that a full investigation is vital to determining the type and extent of contamination at the site; 3) during negotiations with responsible parties, the agencies are unable to provide information that may have to be used for litigation if the negotiations should fail to result in a consent agreement.

10. Page 98 Cynthia Gillen. Judy Beck of U.S. EPA's Region V community relations staff said the region had successfully dealt with sites in floodplains. Ms. Gillen requests a list of the sites and how they were handled.

RESPONSE: Ms. Beck was responding by telephone in February 1985 to members of ACTION who were very concerned that the Bowers site was flooding. Ms. Beck indicated that unfortunately many landfills were put into wetlands and floodplains, so that the region has several cases of flooding Superfund sites. In saying that we had successfully dealt with the sites, Ms. Beck meant on an emergency basis, such as erecting berms or dikes, draining a site, or diverting water, in cases where contaminants threatened a water supply. Examples are Seymour and Enviro-Chem in Indiana, and A&F Materials in Illinois.

11. Page 99-100 Mark Scarpitti. 1) The gravel pitting should be taken into consideration when cleanup options are considered; 2) a clay cap might be "putting a lid on a bucket with a hole in it."

RESPONSE: 1) The need to take action on the gravel pitting will be based on results of the remedial investigation; 2) a clay cap may be considered as a remedial alternative during the feasibility study. Usually the purpose of a clay clap is to prevent rainwater, etc. from pushing contaminants further downward into groundwater, not to prevent

ORAL COMMENTS RECEIVED AT PUBLIC MEETING, MARCH 14, 1985

Most comments received at the public meeting were repeated in the written comments, and so are addressed in the preceding pages. The following comments were presented at the meeting, but not in writing:

1. *Page 42, Cynthia Gillen. Ohio EPA should send ACTION results from previous sampling.

   RESPONSE: Ohio EPA sent Ms. Gillen copies of sampling results from Circleville and Earnhart Hill Water District.

2. Page 79 Linda King. Will dioxin be tested for?

   RESPONSE: Dioxin will be sampled for in the first round of soil, sediment and groundwater testing.

3. Page 86, David Cannon. It is appropriate to extend the comment period by 30 days.

   RESPONSE: U.S. EPA and Ohio EPA extended the public comment period by 30 days.

4. Page 87-88, Linda King. Air monitoring should be addressed in the agreement.

   RESPONSE: Monitoring of air quality will be performed while investigators are onsite. This is primarily for the safety of onsite workers because of their close proximity to site contaminants, especially during well drilling and other activities that disturb existing conditions. However, the air quality monitoring will also be applicable to evaluating conditions that could affect the safety of nearby residents.

   The air quality monitoring consists of measuring volatile organic gases and explosive mixtures of gas. All soil borings will be monitored for volatile organic gases, as specified in the Work Plan, page 11.

5. Page 89 Gary Betts. Although some people distrust government and industry, he believes people will support an effort to get sites such as Bowers cleaned up.

   RESPONSE: U.S. EPA and Ohio EPA's goal is to get the site investigated and cleaned up if necessary, and we appreciate everyone's support.

6. Page 90 Ralph Dunkle. There is evidence that material is still being disposed of at the site.

   RESPONSE: U.S. EPA and Ohio EPA have no evidence that dumping is still occurring at the site, but any information to the contrary should be reported immediately to one of the agencies.

* page numbers refer to the pages of the official transcript

7. The CAPP says organic gases came off ponded water along the western edge of the waste berm. When was this done and what were the results?

   RESPONSE: During a site visit by U.S. EPA, OEPA, CH2M Hill, and Warzyn on February 23, 1984, an HNU photoionizer detected low levels (2.2 parts per million) of volatile organic gases immediately above a leachate seep on the west side of the north south landfill berm. No other readings above background were reported during the site visit.

8. Will U.S. EPA split samples with Pickaway county, and if so, who will do analyses?

   RESPONSE: Addressed in attachment on split sampling.

9. Has U.S. EPA abandoned theory of one upgradient and three down gradient monitoring wells?

   RESPONSE: The three downgradient, one upgradient well is a requirement for monitoring sites under the Resource Conservation and Recovery Act. The quanity and location of wells installed during remedial investigations of CERCLA sites is based on the scope of investigation needed to identify a remedy for the site.

10. What will the monitoring wells be cased with?

    RESPONSE: All monitoring wells, except W-12 and W-13, will be constructed of threaded PVC well casings and stainless steel well screens. Monitoring wells W-12 and W-13 will be constructed with stainless steel.

11. The City wants a list of detection limits for samples.

    RESPONSE: The list is attached.

PICKAWAY COUNTY BOARD OF COUNTY COMMISSIONERS
DONALD STROUS, RALPH ANKROM

1. The county wants to submit names for citizen representation on the research project team.

   RESPONSE: Addressed in attachment on community involvement

2. Split sampling should be conducted during the testing.

   RESPONSE: Addressed in attachment on split sampling.

PRC Environmental Management, Inc. to represent Ms. Moran on site during all field activity to ensure that the Respondents comply with the consent agreement and the National Contingency Plan.

4. The city should have access to test data as it becomes available, particularly groundwater analyses. Who will do analyses for the agencies, and other parties.

RESPONSE: Addressed partially in attachment on community involvement. U.S. EPA and Ohio EPA contract with labs to perform the analyses. Other parties can have any lab that follows the Quality Assurance Project Plan for the site perform their analyses.

5. What steps will be taken to ensure that the monitoring wells don't contaminate the city's wells? Are 100 ft. wells deep enough? Will there definitely be a third round of sampling if information from the first two rounds is contradictory or inconclusive?

RESPONSE: Well drilling causes only very localized turbidity in the groundwater; any disturbance would be right at the installation point. Drilling wells through the landfill could potentially make conduits for contamination, so no wells will be drilled through the site.

Based on existing information on the site's hydrogeology and predominant types of contamination, the contaminated groundwater from the site is probably flowing into the Scioto River near the landfill. The proposed monitoring well system is designed to detect contamination going that way. There is a potential for contaminants that are heavier than water, such as chlorinated organic compounds, to sink within the groundwater flow system beneath the site. To ensure that this type of situation is adequately investigated, the Work Plan and Quality Assurance Project Plan will be modified to change the location and depth of the deep wells. Monitoring well P4B will become P5B at the southern tip of the landfill. All of the deep monitoring wells (P5B, P6B, and P8B) will be drilled to the underlying shale formation instead of to the 100 foot depth limit. The well screens will be placed just above the shale unless contaminated zones are detected above the shale as noted in the Work Plan and QAPP.

If sampling results are inconclusive or contradictory or are insufficient to allow the agencies to develop a plan for remedial action at the site, additional sampling will be required.

6. The Quality Assurance and Sampling Plan (pg 2, paragraph 2) incorrectly says the City maintains an infiltration gallery approximately one mile downstream from the site on the west bank of the river. That gallery was abandoned.

RESPONSE: The infiltration gallery was abandoned since the site Workplan was written. The plan will be changed to reflect this comment.

saves public monies for those sites where no potentially responsible parties can be found. However, the agency still maintains control over the objectivity of the investigations. The parties enter into a legal agreement with U.S. EPA (and in this case, Ohio EPA also) that requires them to perform the work using plans approved by the agencies, to follow EPA quality assurance guidelines, and to submit all information to the agencies for approval.

MURIEL WRIGHT

1. Work should begin as soon as possible on the investigation of the Bowers Landfill, so the comment period should not be extended 30 days.

   RESPONSE: U.S. EPA and Ohio EPA extended the comment period on the consent agreement because of numerous comments received that 30 days was insufficient time to evaluate the complex workplans. The agencies determined that extending the comment period would not significantly affect the investigation schedule.

CITY OF CIRCLEVILLE, DEPT OF PUBLIC UTILITIES
JOHN A. JORDAN

1. Who will actually be doing site work needs clarification.

   RESPONSE: The work will be done by a contractor or contractors hired by PPG and duPont. As soon as the names of the specific contractors are known, they will be made public.

   CH2M Hill and Warzyn have contracts with the federal government, and have worked on this project until the present time. Another U.S. EPA contractor, Camp, Dresser, McKee, and PRC Environmental Management, Inc. will function as consultants to U.S. EPA and Ohio EPA as the agencies overview the work performed by the respondents and their contractors.

2. Has U.S. EPA received permission from property owners to do testing on the site and adjoining areas?

   RESPONSE: Under the consent agreement, Part II, the Respondents are required to gain access to the property to do the required work. Access to the landfill has been achieved, and that agreement is attached to the consent agreement in Appendix A. The Respondents also are required to obtain any agreements necessary to provide access to U.S. EPA, Ohio EPA and their authorized representatives.

3. Who will be on the project team?

   RESPONSE: Erin Moran is the Remedial Project Manager for U.S. EPA for the Bowers Landfill project. Lundy Adelsburger is the project manager representing Ohio EPA. Also, U.S. EPA has contracted with the firm

project managers to seek assistance from a number of hydrogeologists, biologists, chemists or soil scientists, for example, to aid in a site investigation. At the March public meeting, Ms. Moran deferred questions to the hydrogeologist present because some citizens had specifically requested that a hydrogeologist attend the meeting. The region believes that Ms. Moran is able to fulfill the demanding job of project manager.

24. The gravel pitting operations around the landfill should be sampled, and if the gravel is contaminated, the pitting should be stopped. Signs should be placed around the perimeter of the landfill, and a gate should be placed at the SE entrance.

RESPONSE: A steel cable with U.S. EPA warning signs has been placed at the southern entrance to the site, which limits access to the Bowers Landfill and to Quarry B. OEPA has observed the site, and has determined that the cable prevents removal of gravel from the site. Because the gravel pit is upgradient of the fill, it is unlikely that the gravel is contaminated by the site. To be sure, the RI/FS workplan calls for one surface water sample to be taken from the quarry east of the site.

25. EPA shouldn't be able to override local and state laws when choosing remedial actions. The community should be given 60 days to comment on the final remedial action, and a public meeting should be held.

RESPONSE: The National Contingency Plan requires U.S. EPA to solicit public comments on its recommended remedial action for a site, and to consider those comments in making a final decision. EPA guidelines suggest a three week public comment period; however, the region can provide more time at its discretion, if it won't significantly interfere with the agency being able to take action at the site. A public meeting definitely will be held to discuss and take comments on the various cleanup alternatives.

U.S. EPA and OEPA are required under law to dispose of hazardous waste in a safe and proper manner, and both agencies will go beyond what is minimally required to be sure hazardous wastes are disposed of properly.

26. A public meeting should be held to explain decisions made on the basis of the comments.

RESPONSE: A public meeting will be held to describe the final consent agreement, and to explain how the comments have been responded to.

TRINITY LUTHERAN CHURCH
ALFRED KREBS

1. The industries responsible for the toxic waste problems at Bowers cannot be trusted to perform an honest investigation.

RESPONSE: The Superfund law allows U.S. EPA to have the parties considered potentially responsible for hazardous materials at a site to pay for and conduct investigations and clean ups under the close supervision of EPA. In fact, the agency is required to try to recover any money it spends from private parties. Having the responsible parties conduct the investigations

19. Raw data should be provided to ACTION and the county health department at the same time EPA and industry receive it. Prior notice should be provided of any changes to the various plans.

RESPONSE: Addressed in the attachment concerning community involvement.

20. What are the standards for treating volatile samples?

RESPONSE: Volatile organic analysis of water samples must be performed within 7 days of the sampling date, and soil sample analysis must be performed within 10 days of the sampling date. Acid and base neutral extractable compounds, pesticdes and PCB water samples must be extracted within 5 days (10 days for soil) of sampling date and completely analyzed within 40 days of extraction. The holding time for low and medium concentration inorganic compounds, along with sample handling requirements, are listed in Appendix B, Table I of the Quality Assurance Project Plan.

A holding time is the period in which a sample remains stable enough to be analyzed, and therefore can be used to represent its source. "Not established" means the time is not a clearly defined number or a universally agreed upon number. In those cases, the agencies require that samples be analyzed in a timely manner that will allow the project to progress.

All samples will be taken, preserved, shipped and packed as indicated in Appendix B, Table I of the QAPP, as noted in the consent agreement.

21. Work should not continue unless EPA project directors are onsite. If not, industry should pay for a citizen representative to be onsite.

RESPONSE: As a result of this comment, and others received, U.S. EPA has arranged to have a representative from PRC Environmental Management, Inc. onsite overviewing all field activities to ensure that the PRPs comply with the Administrative Order and the National Contingency Plan. One representative will be on site during all field activities. An additional person will be on site when samples are taken. Ohio EPA plans to have a representative onsite during important field activities.

22. ACTION questions the U.S. EPA project manager's expertise.

RESPONSE: Erin Moran has an excellent educational and professional technical background, and is one of the senior members of Region V's Superfund staff. The role of the Remedial Project Manager is to manage and coordinate a number of technical projects and evaluations that are needed to successfully investigate a site. For specific parts of an investigation, the project manager may call upon the expertise of specialists who have specific training for that part and who can spend a great deal of time on that particular aspect. This is especially true for complex sites. It is not at all unusual for EPA

15. There are discrepancies regarding the size of the landfill in various agency and legal documents. Also, the age of the landfill is referred to differently in various documents.

RESPONSE: The area to be investigated is the area of the property that was used for disposal of waste. That area is 12 acres, according to site records. On the long leg of the "L" shaped site, the landfill is 3000 ft north/south; it is another 1000 ft. in length on the short leg, which totals 4000 feet. The other dimensions are approximately 120-125 ft and 10-15 ft. The agencies consider 1958 or 1959 to be the year the site began operating, and 1968 as the year the site became inactive, although new information appears to show that the site closed in 1969.

16. The site should be fenced under the emergency criteria of the NCP because the site is being used for hunting, children's play and dirt biking.

RESPONSE: As a result of this comment, Region V's Emergency Response team evaluated the site in May 1985 to determine whether site access does pose an immediate health or environmental threat as defined by the National Contingency Plan. They determined that a fence is not necessary because:
1) the only unnatural material observed at the site was drums which all appeared to be empty, and plastic nonhazardous material, and
2) the site held a full spread of vegetation, which indicates that the topsoil may not be contaminated.

U.S. EPA will erect additional warning signs at the site, particularly at the small access paths along the west side of the site.

17. What is meant by trade secret? What types of information does this include? What recourse do citizens have to obtain information classified as CBI. All data should be released to ACTION.

RESPONSE: No information is being withheld regarding the site because it is considered a trade secret or business confidential, and we do not expect that any information generated during the RI/FS would meet the criteria for business confidentiality. The regulations explaining these concepts can be reviewed under Section 2.201-2.215 of the Code of Federal Regulations, and Section 149.43 of the Ohio Revised Code.

18. Any place the word "memorandum" is mentioned in the consent agreement, it should be replaced by "reports, documentation or sampling data."

RESPONSE: Whether a document is described as a memorandum or a report does not affect its confidentiality or make it exempt from disclosure. A document is judged on its content and not on its title. U.S. EPA does not withhold information only because it is labeled "memorandum."

10. There should be quarterly public meetings.

RESPONSE: Addressed in attachment on community involvement.

11-13. There should be more than $11,000 allocated to implement the community relations plan. Monies not spent on community relations in one fiscal year, should be moved to the next. Community relations will not be performed if funds are not increased. Industry should cover the costs of community relations activities.

RESPONSE: As part of the administration of the Superfund program, Region V has resources (ie. staff time, travel budget) allocated to conduct community relations. Because there are so many sites, the Agency has contractors to assist the region's community relations staff. The contractors primarily prepare fact sheets, graphics aids for public meetings, etc. The $11,000 budget for contractor support for the Bowers site is separate from the RI/FS budget, and has already been obligated. Money not used one fiscal year is carried over to the next year. In our experience, $11,000 is more than adequate to supply the community with materials; the typical budget is $9,000. If more funds are needed, the region can request supplemental funds from Washington, or the work can be supplemented by in-house writers and graphic artists. The region has not found it appropriate to give the Respondents responsibility for producing community informational materials. It is U.S. EPA's policy to attempt to recover all costs for a site, including community relations funds.

14. There should be an evacuation plan and a warning system for the surrounding residents.

RESPONSE: Investigators from the Region's Emergency Response Section visited the site in May 1985 to assess whether any immediate threat may be posed by the site. The Agency concluded that there isn't a need for an evacuation plan during the RI/FS portion of the project. This decision is based on the following:

1) no air contamination was detected with specialized equipment used during the recent investigation;
2) the large distance on the downgradient side of the landfill between the drilling locations and the residences;
3) all drilling will occur outside the landfill boundaries so that any containerized material will not be affected;
4) because any gases encountered in the subsurface during drilling will be uncontained they will dissipate;
5) if any gases are released to the surface during drilling, the wide open area in which the landfill is situated allows for sample dissipation of gases, and
6) during drilling, the air will be continuously monitored.

A specialized Health and Safety Plan will be prepared for the site which will include an evacuation plan for site workers, consultation with the closest fire department, hospital, etc. A copy of the site-specific plan will be made available when it is completed.

5. The activities are strung-out over to long a time period. The activities should be scheduled simultaneously.

RESPONSE: Some activities are overlapped to limit the amount of time the study will take. Our experience shows that it's difficult to complete a remedial investigation in less time than is currently scheduled, and we believe the schedule is realistic in light of the complex nature of the work.

6. Sampling should be required to obtain baseline data prior to the start of the RI.

RESPONSE: Background samples (baseline data) are part of the proposed investigation. Surface water and sediment samples will be taken from the Scioto River upstream from the landfill. At least one monitoring well (W-9) will be located upgradient of the landfill site, from which soil and groundwater samples will be collected. Private wells located in the area also will be sampled. 25 soil samples, a number of which are located away from the landfill, should provide a reasonable basis to determine background soil inorganic concentrations near the site.

Most of the organic contaminants of concern at the site do not occur naturally. Therefore, any occurrence of the manufactured chemicals would be above natural background levels. If upgradient sampling locations are also significantly affected by these contaminants, then further investigation might be warranted to differentiate the site-related contaminants.

7. Split samples should be provided to the community.

RESPONSE: Addressed in attachment on split sampling.

8. Citizens must be notified prior to changes in sampling points, and should be able to provide input.

RESPONSE: Addressed in attachment on community involvement

9. There are descrepancies between the Hazardous Substance List, the detection limits list, and the list of chemicals to be sampled at the Bowers site. Why aren't specific compounds being analyzed?

RESPONSE: The Consent Agreement contains the correct CAS numbers for vinyl chloride and dichloroethane. The most recent Hazardous Substance List, and the detection limits for those substances, is attached. All parties analyzing samples during the site investigation will be required to use this most recent list. In addition to the substances listed, dioxin will be sampled for, using detection limits of 100 ppt for water, sediments and soil. O-xylenes will be analyzed under total xylenes. Endosulfan I and II are listed as Endosulfan alpha and beta, respectively, on the HSL. Clorodibromomethane is listed on the HSL as dibromochloromethane. 1,2 diphenylhydrazine won't be analyzed because it breaks down easily during extraction so results aren't meaningful. Analytical methods for acrolein and acrylonitrile are not effective. Flurotrichloromethane (referred to as dichlorodifbronomethane in the comment) does not appear in water samples. All samples will be disposed of according to applicable state and federal laws.

Comments from ACTION

1. Contaminant plumes may have moved off site, and so would not be detected in the sampling plan as proposed.

   RESPONSE:
   It is unlikely that the contaminant plumes have moved entirely off the site, so the sampling sites in the immediate vicinity of the landfill are appropriate for this stage of the investigation. However, if the investigation should indicate a need for sampling farther off-site, the workplan allows for that. (See pages 4 and 15 of the workplan dated 5/29/84, which say that additional monitoring wells or surface water sampling can be added. The Quality Assurance Project Plan of 8/15/84, page 4 also says further investigation may be needed to define the extent of contamination. The need for further investigation will be determined as part of the RI report.)

2. Contamination could be over looked during droughts, so sampling should be required in the spring. Year-round sampling would give a better idea of the overall extent of contamination.

   RESPONSE: The workplan (page 15) requires sampling during low and moderate flows, so that samples will not be taken during drought conditions. The agencies want to find maximum levels of contaminants, so it isn't advisable to sample during flood times when contaminants would probably be diluted. Also, the sampling points may be inaccessible during flood times. However, if the initial rounds of sampling indicate a need for sampling during the spring, and the sampling points are accessible, that will be required.

3. Why isn't long-term sampling included in the agreement?

   RESPONSE: The consent agreement covers only the work needed during the remedial investigation/feasibility study phase of the project. The RI is intended to characterize the contamination from a site so that a decision can be made about the best actions to take at the site. By necessity, the investigation is limited in time. However, long-term monitoring is a very important consideration for the future, and will be considered during the feasibility study.

4. ACTION believes that a $400,000 ceiling has been placed on the cost of the RI/FS, and that the private parties don't have to pay for any costs beyond the original scope of the agreement.

   RESPONSE: There is no ceiling of $400,000 placed upon the cost of the RI/FS. The respondents' obligation is to complete a remedial investigation and perform a feasibilty study of the site in accordance with the RI/FS workplan.

INTRODUCTION

This report contains U.S. EPA Region V and Ohio EPA's response to public comments received on the consent order between U.S. EPA, Ohio EPA, E.I. du Pont de Nemours and Company, and PPG Industries, Inc., under which Du Pont and PPG will perform a Remedial Investigation and Feasibility Study of the Bowers Landfill in Circleville Ohio.

Included are the public comments received during the comment period, and the Agencies' responses to them. The comments are condensed and paraphrased in Section I for clarity or to combine similar comments. The full text of each written and verbal comment is included in Appendix D. Because numerous detailed comments were received on the subjects of community involvement and splitting samples, specifically, the Agencies' response to those are detailed in Appendices A and B.

As called for in the consent order, a 30-day public comment period was held. The comment period began February 22, 1985. In response to requests to extend the comment period, written comments were accepted until April 24, 1985. A public meeting was held on March 14, 1985 in Circleville, at which oral comments were received.

CONTENTS

Section I	-	Agency response to comments
Appendix A	-	Response to comments on community involvement
Appendix B	-	Response to comments on split sampling
Appendix C	-	List of commenters
Appendix D	-	Written comments and transcript of March 14 public meeting
Appendix E	-	U.S. EPA memo of 10/84 regarding release of unreviewed data, and Hazardous Substances List

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF

RESPONSE TO PUBLIC COMMENTS ON CONSENT ORDER FOR THE BOWERS LANDFILL CIRCLEVILLE, OHIO

JULY 1985

APPENDIX C

RESPONSE TO PUBLIC COMMENTS ON CONSENT ORDER FOR BOWERS LANDFILL CIRCLEVILLE, OHIO

JULY 1985

- U.S. EPA developed and distributed a fact sheet explaining the preliminary results of the RI (June 1988).

- U.S. EPA developed and distributed a fact sheet explaining the final RI results and the results of the endangerment assessment (EA) (September 1988).

- U.S. EPA held a public meeting in Circleville to discuss results of the RI and EA. Approximately 70 people attended (September 14, 1988).

- U.S. EPA released the FS report and Proposed Plan for public review and comment (February 1989).

- U.S. EPA held a public comment period on the FS and Proposed Plan (February 14 to March 16, 1989).

- U.S. EPA prepared and distributed a fact sheet on the FS and Proposed Plan (February 1989).

- U.S. EPA held a public meeting in Circleville to present the results of the FS, describe the Agency's preferred remedial alternative for Bowers Landfill, respond to citizens' questions, and record public comments on the FS and Proposed Plan. Approximately 70 people attended this meeting. A transcript of the meeting is available in the information repository (February 28, 1989).

COMMUNITY RELATIONS ACTIVITIES AT BOWERS LANDFILL

Community relations activities conducted at Bowers Landfill to date have included the following:

- U.S. EPA conducted community interviews with local officials and interested residents (March 1983).

- U.S. EPA established an information repository at the Pickaway County District Library in Circleville, Ohio (July 1984).

- U.S. EPA held a public meeting to discuss and solicit public comments on the consent order (March 1985).

- U.S. EPA held a comment period on the consent order (February 22 to March 25, 1985).

- U.S. EPA prepared a community relations plan (May 1985).

- U.S. EPA developed a response to public comments (responsiveness summary) on the consent order (July 1985).

- U.S. EPA held a public meeting to discuss the responsiveness summary (August 1985).

- U.S. EPA distributed an update on activities at Bowers Landfill (November 1985).

- The Bowers Landfill Information Committee was established. Twelve meetings were held before and during the remedial investigation and feasibility study (RI/FS) (November 1985; January, March, June, August, and October 1986; March, June, and September 1987; and January, June, and November 1988).

- U.S. EPA developed and distributed a glossary and other materials to assist people with non-technical backgrounds in understanding sampling results presented in RI technical memoranda (May 1987).

- U.S. EPA developed and distributed a fact sheet on applicable or relevant and appropriate requirements (ARARs) (April 1988).

APPENDIX B

COMMUNITY RELATIONS ACTIVITIES AT BOWERS LANDFILL

DU PONT STATEMENT ON BOWERS LANDFILL (Continued)

While the cost of Alternative No. 4 is higher than that of Alternative No. 3, our main concern is not the cost but the environmental intrusion that Alternative No. 4 might cause. In our opinion, removing existing vegetation does not appear to be warranted; will disrupt the ecological system currently in place; will have a detrimental effect on the stability of the fill side slope; and will create a continuing, long-term maintenance problem.

The remedial investigation indicates that there is no continuing release of contaminants from the site. The study does not indicate that the landfill presents a substantial threat which would require the severe remedial measures called for in Alternative No. 4. Based on currently available data, securing the site and providing regular, long-term monitoring is all that is called for at the site. In the unlikely event that monitoring indicates that a problem is developing, prompt remedial action can be taken.

Although there is no imminent health or environmental risk posed by the site, we feel it is prudent to monitor the site to assure that there is no future problem. We feel that Alternative No. 3 is a more than adequate method to assure that the health and environment of the community is protected.

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(2[illegible]/ah)-2
2/28/89

CONTACT:

Ron Berlin, Site Services Superintendent
Du Pont Circleville Plant
Phone: 614-474-0240

* * * * * *

DU PONT STATEMENT ON BOWERS LANDFILL

From 1965 to 1968 we disposed of Mylar® polyester scraps and rolls that didn't meet customer specification in the landfill. We also disposed of Mylar® polymer, which amounts to the same material solidified in large pieces. Mylar®, as you probably already know, is a thin sheet of film with a variety of everyday uses such as food wrap and packaging. Chemically, Mylar® is the same as the polyester fiber that is in much of our clothing.

Small quantities of materials such as paint, degreasers, lab chemicals, and maintenance supplies have gone to the landfill, but the bulk of our materials in the landfill [illegible]

When concerns developed over the landfill, we felt it was important that a study be done to determine whether the landfill presented any threat to health or the environment. For that reason, we agreed along with PPG to jointly fund the $700,000 feasibility study.

The feasibility study lists nine alternatives for dealing with the landfill. EPA has already stated that it prefers Alternative No. 4. We feel Alternative No. 3 is the more appropriate method to address any concerns about the landfill. Let me remind you of the provisions of the two alternatives. Both of the alternatives call for groundwater monitoring, restricting use of and access to the site, managing surface debris, and improving erosion control, flood protection and drainage.

In addition, Alternative No. 3 calls for areas of the existing landfill cap which shows erosion to be identified and repaired with natural clay soil. Additional clay would be filled in to prevent surface water from forming in ponds. Maintenance and improvements to the existing vegetation cover would be made to inhibit erosion. The cover would be inspected regularly for sti[illegible] Alterna[illegible] No. 4, pr[illegible] by the EPA, calls for cutting down trees and similar vegetation that have grown up over the last 20 years and installing a new clay cap over the landfill.

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
CIRCLEVILLE, OHIO 43113

March 15, 1989

Ms. Georgette Nelms
Community Relations Coordinator
Office of Public Affairs
US EPA Region 5
230 South Dearborn
Chicago, Illinois 60604

Dear Ms. Nelms:

Enclosed is a copy of the remarks I made regarding the Bower's Landfill during the public meeting held at the [illegible] High School, [illegible], Circleville, Ohio on March 28, 1989.

If you have any questions, please contact me.

Sincerely,

R. E. Berlin
Site Services Superintendent
Du Pont Circleville Plant

[illegible]/sh
Enclosure

Comments from Potentially Responsible Parties

OhioEPA

State of Ohio Environmental Protection Agency

Central District Office
P.O. Box 1049 1800 WaterMark Dr
Columbus, Ohio 43266-0149
(614) 644-2055

Richard F. Celeste
Governor

March 15, 1989 RE: Bowers Landfill

Georgette Nelms
Office of Public Affairs (5PA-14)
U. S. EPA, Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Ms. Nelms:

Enclosed are the originals of the comment letters that Ohio EPA sent to you by FAX on March 15, 1989. These letters include Ohio EPA's comment letter on the Proposed Plan and State Senator Jan Michael Long's comment letter on the Feasibility Study and the Proposed Plan for Bowers Landfill.

If you have any questions, please contact me at (614) 644-2055.

Sincerely,

Deborah J. Strayton

Deborah J. Strayton
Office of Corrective Actions
Central District Office

AFTER FIVE DAYS, RETURN TO
PICKAWAY COUNTY
BOARD OF COMMISSIONERS
BASEMENT, COURT HOUSE
CIRCLEVILLE, OHIO 43113

PM
15 MAR
1989

SAVE
YOUR VISION
WEEK

Georgette Nelms
Community Relations Coordinator
USEPA Region 5
Office of Public Affairs
5PA-14
230 South Dearborn Street
Chicago, Illinois 60604

COMMISSIONERS
GEORGE H. HAMRICK
JOHN F. FISSELL
RUTH NEFF

CLERK-ADMINISTRATOR
TERRENCE J. BERRIGAN
Telephone 614-474-6083
614-474-6084
614-474-6085

PICKAWAY COUNTY

BOARD OF COUNTY COMMISSIONERS

ROOM 5, COURT HOUSE

CIRCLEVILLE, OHIO 43113

In closing, the Pickaway County Board of Commissioners urges you to not commit to one plan of action until all these matters have been publicly addressed in greater detail.

Sincerely,

THE PICKAWAY COUNTY BOARD OF COMMISSIONERS

John F. Fissell
Ruth E. Neff
George H. Hamrick

jm

COMMISSIONERS
GEORGE H. HAMRICK
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PICKAWAY COUNTY
BOARD OF COUNTY COMMISSIONERS
ROOM 5, COURT HOUSE
CIRCLEVILLE, OHIO 43113

March 15, 1989

Georgette Nelms
Office of Public Affairs
Chicago, Illinois 60604

Ms. Nelms,

After reviewing the EPA's planned response to the Bowers Landfill problem, we feel it is our obligation to offer our comments for the public record.

Many citizens of Pickaway County have devoted a great deal of time and effort in studying the technical aspects of the EPA's studies and recommendations.

They have presented to us their concerns and after considering the information, we would strongly request the USEPA Region 5 and the Ohio EPA to postpone a Record of Decision until the following four major areas of concern are re-considered:

1. We have received conflicting accounts as to the direction of the groundwater flow. If the USEPA did not study groundwater flow outside the immediate area of the site, an inaccurate assumption of the potential risk to our water supply could be made.

2. According to reports, tests to discover the contaminants have generally been restricted to around the site. Without testing larger areas around the landfill, no evidence of off-site migration could be determined.

3. We have been informed that landfills can exhaust methane gas as a by-product. If so, without a gas venting system, surrounding homes would be exposed to a risk of methane gas contamination.

4. Concerns have been raised that the EPA is planning to use cleanup standards based on "current Ohio solid waste landfill closures standards." We also share those concerns as solid waste closure laws are not appropriate for hazardous waste sites.

The Proposed Plan also does not adequately describe the ground water monitoring program that will be established as part of the preferred remedial alternative. Therefore, the ROD needs to specify which wells will be sampled, how often the wells will be sampled, and for what parameters the wells will be sampled. The wells should be sampled on a monthly or bimonthly basis for the first year and on a quarterly basis for the next two to five years. If the levels of contamination in the ground water do not increase over this time period, then a reduction in the frequency of sampling may be considered. The samples from the wells should be analyzed for all target compounds each time the wells are sampled.

The installation of additional ground water monitoring wells is also necessary to develop a monitoring well system that will adequately detect potential future releases of contaminants from the site. Well clusters should be installed in the following locations:

1. Between Well Location 5 and Well Location 6.

2. Between Well W-10 and the bend of the landfill.

3. Offsite, between the landfill and the Circleville municipal well field.

Because of flooding of the Scioto River and uncertainty about the amount, composition, and mobility of wastes in the landfill, conditions at Bowers Landfill are likely to change. In order to fully comply with State law and protect the environment, the ROD must have a contingency plan that can be easily and rapidly implemented and a ground water monitoring system that will adequately detect any potential future releases of contaminants.

Sincerely,

Deborah J. Strayton

Deborah J. Strayton
Office of Corrective Actions
Central District Office

cc Erin Moran, U.S. EPA, Region V
Maury Walsh, OEPA, Deputy Director
Dave Strayer, OEPA, OCA
Kathy Davidson, OEPA, OCA
Cindy Hafner, OEPA, Legal
Jack Van Kley, OAG
Chris Korleski, OAG
Jan Michael Long, Ohio Senate

OhioEPA
State of Ohio Environmental Protection Agency
Central District Office
P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43266-0149
(614) 644-2055

Richard F. Celeste
Governor

March 15, 1989

RE: Comments on Proposed Plan for Bowers Landfill

Georgette Nelms
Office of Public Affairs
U. S. EPA, Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Ms. Nelms:

Ohio EPA has several comments on the Proposed Plan for Bowers Landfill, Circleville, Ohio. Because of uncertainties not addressed or answered in the Remedial Investigation (RI) or Feasibility Study (FS), Alternative 4 may be viewed as an interim action rather than a final remedy. State ARAR's will only be met by Alternative 4 if the conditions at the site remain stable. If the conditions change, State ARAR's may not be met by this alternative. Therefore, a more detailed contingency plan for emergency removal and a more detailed ground water monitoring program are necessary if the selected remedy is to be accepted as the remedial action.

A detailed contingency plan and a more extensive ground water monitoring program must be included in the Record of Decision (ROD). Because U. S. EPA maintains that the States have only those rights set forth in Sections 113 and 121 of CERCLA and that the States are somehow precluded from enforcing State laws at NPL sites, addressing these issues during the design phase will not afford the State of Ohio substantial meaningful involvement in the initiation, development, and selection of the remedial action or insure that the remedy complies with State law. Given the limited role assigned to the State by U. S. EPA, considerable detail in the remedial alternative must be agreed to immediately if Ohio EPA is to concur with the ROD.

The Proposed Plan does not describe the contingency plan that will be implemented should the preferred remedial alternative fail. Therefore, the ROD should address these situations (e.g. detection of ground water or surface water contamination, erosion of the cap, damage to the fence, production of leachate or gas) that will trigger the implementation of the contingency plan. The ROD should also address the levels of contamination that will trigger the implementation of the contingency plan, the actions that will be taken as part of the contingency plan, and identify those who will carry out the contingency plan.

My opinion is that additional monitoring wells need to be drilled and an appropriate monitoring program be devised so that these two sites would be adequately protected from any migration of materials from the Bowers Landfill. I would suggest that the construction of additional monitoring wells and adequate monitoring wells and a sufficient monitoring program be developed as part of the work to be done on whichever alternative that the USEPA selects as to the suggested solution to the problems at Bowers Landfill. The City of Circleville will want to be involved in the review and development of such an addendum to the proposed plan.

If you should have any questions regarding the above concerns, please do not hesitate contacting me.

Very truly yours,

Michael E. Logan
Mayor of Circleville

Since the south end of the landfill is immediately adjacent to the Florence Chapel Road bridge over the Scioto River, the entire flow of water in the Scioto River must pass beneath this bridge and serious scouring problems may occur to the edge of the landfill at this location under serious flood conditions. The City's viewpoint is that additional sheetpiling needs to be installed in this area to prevent the undermining of the riprap and the riprap itself needs to be extended considerably in order to provide adequate protection in this area.

A major interest of the City of Circleville concerns the lack of specific recommendations for a ground water monitoring system that will serve to protect the City of Circleville's public water supply. The City's existing well field is located adjacent to the water treatment plant approximately 1 1/2 miles south of the Bowers Landfill. Approximately eight years ago the City of Circleville undertook an engineering investigation to establish whether a future well field could be located at the old pumping station site on the west side of the Scioto River, off of River Road. The site is identified on drawing number 1 on the Vincinity Map as "Pumping Station". The City's report implied that the area around the old pumping station, part of which is currently still owned by the City of Circleville would serve adequately as a future well field site for the Circleville water treatment plant. There exists a 16" watermain that runs from the old pumping station site to the current water treatment plant on Island Road.

I would like to stress that the City is extremely concerned in having adequate monitoring for both of these locations in order to sufficiently protect the City of Circleville's public water supply. The City strongly suggests that monitoring wells be installed off site of the Bowers Landfill in such a manner that would detect any migration of hazardous materials in the direction of these facilities.

City of Circleville
MICHAEL E. LOGAN, MAYOR
CITY HALL, 127 SOUTH COURT STREET
CIRCLEVILLE, OHIO 43113-1611
TELEPHONE (614) 477-2551

March 15, 1989

Ms. Erin Moran
Remidial Project Manager
Remidial and Enforcement Branch (EHS-11)
US Environmental Protection Agency
230 South Dearborn Street
Chicago, IL. 60604

Dear Ms. Moran:

This letter is regarding the City of Circleville's comments on the Feasibility Study for Bowers Landfill, Circleville, Ohio dated February 3, 1989.

The first paragraph on page 1-5 stating the majority of waste materials deposited on the site consisted of residential refuse collected by the City of Circleville as well as by several private haulers in the Circleville area is not correct. I would like to emphasize the City of Circleville does not collect residential refuse with City crews and vehicles nor does the City contract such work. Residential refuse collection within the City of Circleville has been and continues to be the responsibility of each individual property owner and each individual property owner makes arrangements with private haulers to haul their refuse.

The City's position concerning erosion control and drainage improvements is that both the sheetpiling protection and the amount of riprap to be installed is not sufficient due to the fact that during severe flooding the entire end of the dike is at danger. The City requests that the sheetpiling protection to be extended to the east on the up river side and that the length of the riprap to be extended extensively to protect the north end of the landfill that protrudes out into the flood plain area.

CIRCLEVILLE, OHIO

The south end of the landfill is designed to have stone riprap on the end that protrudes into the floodplain. Since this area is immediately adjacent to the Florence Chapel Road bridge (Red River Bridge) over the Scioto River the entire flow of water in the Scioto River must past underneath this bridge and severe scouring problems may occur to the edge of the landfill at this location under severe flood conditions. The City's position is that sheetpiling needs to be installed in this area to prevent the undermining of the riprap in this area and the riprap itself needs to be extended considerably in order to provide adequate protection in this area.

The final major area of concern of the City of Circleville with the report involves the lack of specific recommendations for a ground water monitoring system that will serve to protect the City of Circleville's public water supply. The City's existing well field is located adjacent to the water treatment plant approximately 1 1/2 miles south of the Bowers Landfill. Approximately eight years ago the City of Circleville undertook an engineering investigation to determine whether a future well field could be located at the old pumping station site on the west side of the Scioto River off of River Road. The site is identified on Drawing Number 1 Vicinity Map as "Pumping Station". The City's report indicated that the area around the old pumping station, which is currently still owned by the City of Circleville would serve adequately as a future well field site for the Circleville water treatment plant. There exists a 16" watermain that runs from the old pumping station site to the current water treatment plant on Island Road that could transmit raw water to the treatment plant.

The City feels that it is absolutely essential that adequate monitoring for both of these locations is necessary in order to adequately protect the City of Circleville's public water supply. The City is of the opinion that additional monitoring wells need to be installed off site of the Bowers Landfill and an appropriate monitoring program be devised so that these two sites would be adequately protected from any migration of hazardous materials from the Bowers Landfill. I would suggest that the construction of additional monitoring wells and and an adequate monitoring program be developed as part of the work to be done on whichever alternative the USEPA selects as to the proposed solution to the problems at Bowers Landfill. The City of Circleville will want to be involved in the development and review of such an addendum to the proposed plan.

If you have any questions on the above matters, please do not hesitate contacting me.

Very truly yours,

Atwood P. Jones, P.E.
Director of Public Service

The City of Circleville

DEPARTMENT OF PUBLIC UTILITIES
114 WEST FRANKLIN STREET
P.O. BOX 209
CIRCLEVILLE, OHIO 43113
TELEPHONE (614) 477-2551

MICHAEL E. LOGAN
MAYOR

ATWOOD P. JONES, P.E.
DIRECTOR OF PUBLIC SERVICE

March 15, 1989

Ms. Erin Moran
Remedial Project Manager
Remedial and Enforcement Branch (EHS-11)
US Environmental Protection Agency
230 South Dearborn Street
Chicago, IL 60604

Dear Erin:

This letter will serve to notify the USEPA of the City of Circleville's comments on the "Feasibility Study for the Bowers Landfill, Circleville, Ohio" dated February 3, 1989.

On page 1-5 of the report the first paragraph states "According to information on file with the OEPA, the majority of waste materials deposited on the site consisted of residential refuse collected by the City of Circleville as well as by several private haulers in the Circleville area." That part of the statement referring to refuse being collected by the City of Circleville is incorrect. The City of Circleville has never collected residential refuse with City crews and equipment nor has the City contracted such work to private contractors. Residential refuse collection within the City of Circleville has been and continues to be the responsibility of each individual property owner and as such each property owner makes arrangements with individual haulers to haul their trash.

On page 3-38 under the paragraph entitled "Erosion Control and Drainage Improvements" the report discusses the installation of sheet-piling protection at the north end of the landfill adjacent to the Scioto River in order to provide containment for the stone riprap to be installed at that location. The City's position is that both the sheetpiling protection and the amount of riprap to be installed is not sufficient given the fact that during severe floods the entire north leg of the landfill is at risk. According to a report prepared in October 1966 by the Department of the Army, Huntington District, Corps of Engineers entitled "Flood Plain Information, Scioto and Olentangy Rivers, Ohio, Main Report", the 100 year flood elevation at the Bowers Landfill site is approximately 675 feet above mean sea level (msl). This 100 year flood will be over the top of the existing landfill by approximately 10 feet. The City requests that the sheetpiling protection be extended to the east on the up river side and that the length of the riprap be extended considerably to protect the north leg of the landfill that protrudes out into the flood plain area.

Thus, considering all of the unknown and unanswered variables in this very complex problem, I would strongly urge the US EPA to postpone any record of decision until these questions are satisfactorily examined and answered.

Again, thank you for allowing me the opportunity for this additional public comment.

Having attended the hearing on the public comment and question session some two weeks ago, there were some matters that came to my attention and that raised some concerns on my part. For example, the Bowers landfill is perhaps one of the most toxic and hazardous in this state, if not in the United States. Yet, the closure standards that would be applied to the Bowers Landfill would be those closure requirements that govern the closure of a solid waste site. It is my understanding that this is acceptable because of the technical requirements of the law as it relates to the time of the last use of Bowers Landfill. Certainly, if the landfill contains materials that would qualify it as a hazardous or toxic waste landfill in 1989, then it seems to only make sense that the closure should be made pursuant to the guidelines and regulations governing hazardous waste landfills. The mere fact that termination of use was some two decades ago should not remove the closure from the hazardous waste closure requirements.

Secondly, it was my understanding at the public hearing that the alternatives for closure need only satisfy a thirty-year life span requirement. From the public safety standpoint, as well as from the public funding standpoint, it seems as though a permanent solution should be pursued and not one that may require additional closure remedies in twenty or thirty years. As a legislator who is most concerned with funding issues, I can assure you that I would applaud efforts that deal with one time permanent costs, as opposed to future potential unknown monetary costs for intermedial work.

Next, I would like to comment on areas that appear to not have been thoroughly examined in the initial alternative proposals. The issues that should be more thoroughly studied and further data collected, would be issues dealing with the groundwater flow outside the immediate area of the site. Perhaps the installation of monitoring wells between the site and the city wells would adequately address this issue. Additionally, there appears to have been limited if any, testing at areas outside the site to determine the location of any migrating waste. Before we can talk about total containment, it would be helpful to fully understand the extent of the contamination.

Finally, the threat of methane gas migration seems to be one that has not been adequately examined in the process of formulating these porposals. The question of the absence of gas venting systems to prevent lateral migration of methane gas should be addressed.

Jan Michael Long
State Senator

Ohio Senate
17th District

MEMORANDUM

TO: Ohio Environmental Protection Agency
United States Environmental Protection Agency

FR: Jan Michael Long
State Senator
17th District Ohio Senate

RE: Bowers Landfill Super Fund Sight/Public Comment

DATE: March 14, 1989

Thank you for the opportunity to allow me to submit to you this date my public comment for the record and to be reviewed by the respective Environmental Protection Agencies in their consideration of rendering a record of decision on the closure and cleanup of the Bowers Landfill Super Fund Sight. I submit these comments not only as the State Senator who represents the geographic area known as Circleville and Pickaway County in the 17th Ohio Senate District, but also as a citizen of the City of Circleville.

While our community and indeed our state is most interested in forging a remedy to the Bowers Landfill problem, all of us want to assure ourselves that such a cleanup is one that is safe, protects the environment for present generation, as well as future generations, and also is one that we will not have to revisit in the near future. Based on these underlying premises, my public comment is a request for the US EPA region 5 and the Ohio Enviornmental Protection Agency to withhold or postpone any records of decision on the Bowers Landfill closure until some major areas of concern are addressed and satisfactorily examined by a thorough study of additional information necessary to make a permanent environmentally sound decisions.

Jan Michael Long
State Senator
Ohio Senate
Statehouse
Columbus, OH 43266-0604
614-466-8156

Scott E. Elser
Legislative Aide
Pam Spangler
Secretary

Committees:
Education and Retirement
(Ranking Minority Member)
Finance

Georgette Nelms
Community Relations Coordinator
U.S. EPA Region 5
230 S. Dearborn Ave.
Chicago, Ill. 60604

March 9, 1989

Dear Ms. Nelms:

The point of this letter is not necessarily to communicate my disagreement over the method in which the EPA has recommended to "remedy" the problem at the site of the Bowers Landfill as much as it is to express my displeasure over the manner in which the alternative was presented to local citizens.

I feel the EPA was ill-prepared to fully respond to many of the questions posed by members of the community who attended the public information meeting on Feb. 28, 1989 at Circleville High School.

As a Circleville city councilman, I feel taxpayers deserve and should expect better response from governmental bodies than what they received from the EPA. In particular, inquiries concerning the decision not to physically remove waste from the site were met with the response that total removal of the waste was simply not one of the options investigated.

The remedy recommended by the EPA has some merit but I feel it doesn't go far enough to provide for the future safety of the 13,000+ citizens who depend on the Circleville water supply. Many members of this community, including myself and other councilmen, feel additional monitoring precautions should be included in your remedy.

One such precaution would be to locate ground water test wells at strategic points between the landfill and Circleville's water field. As your plan presently states, most test wells are in the immediate area of the landfill.

I realize the EPA becomes involved in battles on many fronts when making decisions that may satisfy some groups but could cost others millions of dollars. Nevertheless, it is important not to misjudge the impact your decision will have on those who live and raise their families here. It is hoped your final solution reflects at least some of this community's interests.

Sincerely,

David M. Crawford

David M. Crawford
Circleville City Councilman
431 N. Court St.
Circleville, Ohio 43113

ROBERT N. PHILLIP . D.D.S., INC.
147 PINCKNEY STREET
CIRCLEVILLE, OH 43113

PM
8 MAR
1989

Forward Helms Community Bkr.
Office of Public Affairs
US EPA Region 5
230 S. Dearborn
Chicago IL IL 60604

[illegible] COUNCIL
TUESDAY 7 MARCH 1989

[illegible]

3/28 USEPA-CHS

To: The President and members of City Council,
Circleville, Ohio

Whereas, in the opinion of many concerned informed citizens, it has not been conclusively demonstrated that the well field which supplies water for the City of Circleville is completely safe from contamination by hazardous wastes deposited in the Superfund Site known as the Bowers Landfill, I strongly urge that the President of City Council write the Ohio and U.S. Environment Protective Agencies expressing our concern, and requesting that adequate ground monitoring wells be placed in locations appropriate to assuring protection of our water supply, i.e. between our well bed and the Landfill, and that this action be taken as part of that remedial action which is eventually selected.

Such written comment must be submitted to the U.S. EPA by March 16, 1989.

Respectfully submitted,

Robert N. Phillips
Councilman, First Ward

Georgette Nelms
Community Relations Coordinator
Office of Public Affairs

U.S. EPA Region 5
230 South Dearborn
Chicago, Il 60604

Comments from Government Agencies and Officials

Circleville folks rap EPA landfill plan

By Don Baird
Dispatch Staff Reporter

CIRCLEVILLE, Ohio — The federal government's proposed program to clean up a toxic waste dump at this city's western edge was criticized by Pickaway County residents yesterday as poorly planned and inadequate.

"I'm painfully disappointed," said John Stolarz of Circleville.

When Stolarz asked whether others among the 65 people who showed up to comment on the plan felt the same way, most raised their hands and some applauded or cheered.

Stolarz spoke at a public hearing held by the U.S. Environmental Protection Agency at Circleville High School yesterday to measure the community's acceptance of its plan to cap the abandoned Bowers Landfill with 4 feet of clay and topsoil.

SINCE 1983, the landfill has been on the Superfund National Priorities List as one of the nation's worst uncontrolled and abandoned hazardous waste sites.

The landfill is on 12 acres a mile northwest of Circleville and about 25 miles south of Columbus.

Most people who spoke criticized the EPA's choice of remedies, which carries an estimated price tag of $4.2 million.

The EPA chose its cleanup plan, which calls for fencing Bowers Landfill and monitoring ground water with at least 18 test wells, from among nine alternatives — from zero cost for taking no action to more than $13 million for a more expensive plan that included a flood protection dike.

The preferred plan also includes restricting access to the landfill, management of surface debris, improvement in erosion control, flood protection and drainage, and using clay to cover the landfill.

STOLARZ SAID he thought the toxic wastes dumped at the landfill should be dug out and destroyed or treated to render them harmless.

The landfill, northwest of Island and Circleville-Florence Chapel Roads, opened in 1968 and closed in 1985. It accepted chemical and industrial waste as well as domestic refuse.

In 1985, the EPA identified PPG Industries and E.I. du Pont de Nemours & Co. as partly responsible for contamination in the landfill.

Measurements at the site indicate "the overall risk posed by the site is low," an EPA report said. Earlier tests rated toxicity of the landfill at only slightly lower than that of the infamous Love Canal near Niagara Falls, N.Y.

Cynthia Gillen, a spokesman for Activists Concerned With Toxics in Our Neighborhood, said the EPA plan leaves too many questions unanswered, including the question of what happened to contaminants measured in earlier tests.

"Basically, I think they're going through the motions," Gillen said. "They haven't been convincing."

SHE SUGGESTED toxic material detected earlier may have leaked from the landfill and be making its way via ground water to Circleville's municipal wells, fewer than 2 miles south of the landfill.

She said an EPA consultant admitted during the hearing that he could not rule out such a possibility.

She also said the EPA admits that if Bowers Landfill had operated after new laws had been put into effect, it would have been subject to stricter cleanup requirements as a hazardous waste site instead of being treated as a solid waste landfill.

"In written comments submitted to the EPA, Gillen said, "It would appear that U.S. EPA has conducted a useless study that has no conclusive data."

Plan to clean up Circleville dump prompts doubts

Some wonder how city water supply might be affected

By Don Baird
Dispatch Staff Reporter

CIRCLEVILLE, Ohio — Some people here, including Mayor Michael E. Logan, are questioning a federal cleanup plan proposed for a controversial toxic waste dump.

The U.S. Environmental Protection Agency will seek public comments on the plan at a 7 p.m. hearing Tuesday in Circleville High School.

The EPA wants to cap the abandoned Bowers Landfill with 4 feet of clay and topsoil, fence the site and monitor ground water with test wells. The landfill is within 2 miles of Circleville's four municipal water wells.

The EPA has estimated the cleanup would take 18 months and cost $4.2 million.

THE EPA once rated the toxicity of the landfill at only slightly lower than that of the infamous Love Canal area near Niagara Falls.

Since 1983, the Bowers Landfill has been on the Superfund National Priorities List of the worst uncontrolled and abandoned hazardous waste sites.

Logan wants to know who will pay to monitor the ground water after the EPA finishes the cleanup. He also questions the EPA's assertion that the landfill poses no threat to city wells.

"It could cost us $20,000 a year to monitor those (test) wells," Logan said. "We want them monitored, but the city doesn't need to absorb the cost."

The EPA report concludes that municipal wells are safe from contamination because ground water from the landfill flows west toward the Scioto River, instead of south toward the wells.

"I don't think anybody understands that aquifer," Logan said.

The mayor said he is withholding judgment on the EPA plan. "I want to see what comes out of the meeting," he said.

Physician Gary L. Gillen and others in a citizens group, Activist Concerned with Toxics in Our Neighborhoods, have filed a written objection, saying the plan is inadequate. They plan to speak at the hearing.

"It falls short," Gillen said. "Everybody who's looked at these problems prefers some treatment that would permanently protect the site."

THE EPA plan does not call for removing all toxic material, and it would not protect the landfill from flooding, which occurs annually, he said. A dike should be built around the landfill, he said.

Bowers Landfill is northwest of Island and Circleville-Florence Chapel roads and west of Rt. 23. It opened in 1968 and closed in 1982.

Gillen accused the EPA of attempting "to minimize hazards to avoid frightening local residents, and to minimize problems to avoid putting too much economic strain on the responsible parties."

"Any containment plan is doomed to fail, and ... such plans must be reinforced to the maximum and monitored carefully to discover the failure when it occurs," he said.

The EPA said, "the overall risk is low."

waste closure laws are not relevant and appropriate for hazardous waste sites.

The Superfund law states that the remedy must comply with any state environmental or facility law that is not less stringent than any federal law for the hazardous substance or release in question. Solid waste closure laws are not relevant and appropriate for hazardous waste sites. This site should not set a precedent for other hazardous waste sites, such as the Barthelmas Landfill, to be treated like solid waste sites.

USEPA and OEPA are using solid waste laws because they are relevant and appropriate for what they want to do to the site. Using solid waste laws for a hazardous waste site is not in compliance with the Superfund law requirement that a first criteria should be the overall protection of the public health and the environment.

In summary, a final cleanup decision cannot rely on a study that makes major assumptions based on speculation or such limited data. USEPA states their remedy addresses a worst case senario situation. A worst case scenario situation would not ignore major conflicting evidence or unanswered areas of concern. It is not surprising that such little or poor oversight of the work at Bowers occurred with the constant turnover of personnel at both USEPA and OEPA. Our community offered a major need for continuity to this process. However, if USEPA had been receptive to our community's suggestions during this study, we could have had a more credible study and be confidant about moving forward to resolve the potential problems presented by Bowers.

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113 1-614-474-1240

What is happening to the Bowers Landfill Superfund site? The USEPA and the potentially responsible parties, PPG and DuPont, have just completed a study that cost approximately $700,000 and are unable to give us anymore conclusive information about the site. Volumes of data have been generated and a containment remedy proposed which still ignore potential threats presented by this hazardous waste site. The USEPA has stated that a final cleanup decision will likely be made by March 31.

1. GROUNDWATER FLOW. According to the EPA study, groundwater flow under the site is determined to be to the west toward the Scioto River and, therefore, the Circleville municipal well field located 1.5 miles south is not expected to be affected by potential groundwater contamination.

The District Soil and Water representative, Mark Scarpitti, has presented information from a Department of Natural Resources study which presents valid conflicting evidence about groundwater flow off-site. Since the groundwater moves from the uplands to the Scioto River valley, it is probably combining at the river and flowing south toward the wells and to fill in the depression created by the heavy industrial pumping in the Circleville area. The USEPA did not study groundwater flow outside the immediate area of the site and could be making a serious inaccurate assumption about potential risks to our water supply. They have ignored and have not refuted this evidence and have no plans to install monitoring wells between the site and the city wells.

2. LOCATION OF WASTES. Previous testing at the site showed high levels of contaminants in leachate and groundwater in 1980 and 1981. Present test results generally show low levels of contaminants. The EPA study states that about 40% of the waste was generated by various industries operating in the area, including PPG and DuPont, among others. Responses by PPG and Dupont to a federal survey in 1978 indicate they dumped 1700 and 6000 tons of material respectively. Other local industries evidently did not respond to the survey.

USEPA has not drilled into the site or installed monitoring wells outside the site to determine the location of wastes but is proposing a remedy to contain something. One major area ignored by this study is that this site floods frequently which has presented great potential for contaminant migration since its closure in 1968. In a 1985 meeting with local citizens, Mr. Roger Hannahs of OEPA acknowledged this concern and promised that "OEPA will require testing further out from the site until contaminants are located if not located at the initial test sites." Where is Mr. Hannahs now?

3. METHANE GAS. The EPA study negates any threat from methane gas and the need for any gas venting system since this site has been closed for 20 years. However, specific air tests for methane gas were not performed at the site.

According to an Army Corp of Engineers report (January, 1984), landfill sites can give off methane gas for 50 years or more after closure, especially sites constructed prior to 1970, like Bowers, that had no gas venting systems. The proposed containment with no gas venting could cause methane gas to migrate laterally, carry contaminants to nearby homes and present a public health emergency. An example in our own state is the Industrial Excess Landfill site in Uniontown where methane gas was found to be migrating laterally and under nearby homes.

4. THE SUPERFUND LAW AND CLEANUP STANDARDS. USEPA and OEPA have interpreted the Superfund cleanup standards for Bowers to mean meeting "current Ohio solid waste landfill closure standards". However, [illegible]

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road (rear), Circleville, Ohio 43113
(614)474-1240

ACTION is a public interest environmental organization formed in September, 1984, for the specific purpose of working on the Bowers and Barthelmas Landfills which threaten to contaminate the Teays Aquifer, our water supply, and the Scioto River. Since ACTION's origin, we have become involved in addressing all potential environmental problems within our county. ACTION's projects and services include but are not limited to the following: Bowers Landfill Superfund site, Barthelmas landfill, sewage/sludge application on farmland, water and soil monitoring in coordination with the Student Environmental Health Project of Vanderbilt University, PPG's regional hazardous waste incinerator, PPG's plant site groundwater contamination, solid waste management and recycling, school programs, and the ACTION office which has extensive environmental resources including news articles, books, videotapes, magazines, legislative bills, government publications, and newsletters from other environmental organizations.

ACTION has worked hard to bring a greater awareness to our community of our environmental problems and the many threats to the county's air, water and soil. By attending environmental conferences, speaking to the young people in the schools who will eventually inherit these problems, working with the EPA, industry and other government officials for more citizen participation, and speaking to area organizations, we think we are making a significant impact for good in Pickaway County.

ACTION's members are highly motivated and dedicated to cleaning up existing problems and from preventing other problems from ever materializing by making government responsible to those people who are most affected by pollution. Environmental impacts need to be a major consideration when planning growth for our community in order to not jeopardize our present or future economy. Industry can be a responsible and considerate neighbor by our insisting that the laws be enforced and that new laws be passed that give incentives for elimination of both solid and hazardous wastes by safe methods such as waste exchange, neutralization, source reduction, bacterial treatment, and recycling.

ACTION NEEDS YOUR HELP! We need you in this immense task. We need your time and contributions to continue and further our work.

I WANT TO JOIN ACTION

Complete this form and mail to ACTION, 111 Island Road, Circleville, Oh 43113
(To be a voting member, you must be a Pickaway County resident.)

Name_____

Address_____

Phone_____Confidential Membership (check here) _____

Membership fee per year - Please make checks payable to ACTION.
(Includes three newsletters a year)

Single.....$10 Family.....$15.00

Sponsor.....$25 Benefactor.....$50 & above

Corporate.....$200

Retired, Student or Limited Income.....$ 5.00

I want to be an ACTION volunteer (check here)

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113 1-614-474-1340

PRESS RELEASE - BOWERS LANDFILL SUPERFUND SITE - PROPOSED "CLEANUP"

We believe the only conscientious approach to the potential problems presented by our neighborhood Superfund site, the Bowers Landfill, should be as follows:

First and foremost, a fence around the site and monitoring wells between the site and the City's well field should be installed immediately regardless of any cleanup decision. Common sense tells us these public protective measures should have been installed five years ago prior to any Superfund study.

A final decision about the cleanup at Bowers Landfill should be postponed until serious questions are answered regarding groundwater flow, location and nature of wastes, and methane gas. In addition, any "cleanup" decision made using Ohio solid waste laws is not in compliance with the Superfund law requirement that protection of the public health and the environment should be a first priority. Solid waste laws are not relevant and appropriate for hazardous waste sites.

We believe permanent cleanup treatments could be considered if these major areas of concern were addressed. This request is not made lightly. We want a final solution as much as anybody. The problem is that there are many reasons to question the sensibility of EPA's plan. We are not questioning EPA's decision just to be difficult and our position is not unique as is evident in the Office of Technology Assessment study about the ineffectiveness of the Superfund program.

We feel strongly that EPA should answer all intelligent questions and overcome the many contradictions in their study rather than leave us with a faulty "cleanup" at Bowers. Nobody in this county wants to be fighting this battle again in 15 years. EPA's proposed remedy does not give us the least risk possible and we think their decision is influenced by cost. Pickaway Countians should not sacrifice their quality of life for economics.

We have not heard from anyone in the County who likes the EPA's proposed decision. Senator Jan Long, the Pickaway County Commissioners and several City officials and councilmen have similar concerns and are submitting their statements to USEPA. Ohio EPA representatives even agreed that all our concerns are valid in a meeting on Tuesday with Senator Jan Long and ACTION representatives. In fact, they stated their comments about the proposed plan would include similar concerns. However, it appears they are resigned to working within the inadequacies and politics of the system and succumbing to USEPA's haste to meet its half-year report deadline of March 31, 1989.

We think USEPA should reassess their priorities - a first being to address adequately the cleanup of Superfund sites. We think OEPA should reassess their priorities - a first being to insist that the Superfund work as the law intended.

As Pickaway County residents, we will not sacrifice our environment to become another statistic for another study about the ineffectiveness of the Superfund program. We will not stand by while poor decisions cost us misery and money in the future.

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Dimelevillo, Ohio 43113

4. THE SUPERFUND LAW AND CLEANUP STANDARDS. USEPA and OEPA have interpreted the Superfund cleanup standards for Bowers to mean meeting "current Ohio solid waste landfill closure standards". However, solid waste closure laws are not relevant and appropriate for hazardous waste sites.

The Superfund law states that the remedy must comply with any state environmental or facility law that is not less stringent than any federal law for the hazardous substance or release in question. Solid waste closure laws are not relevant and appropriate for hazardous waste sites. This site should not set a precedent for other hazardous waste sites, such as the Barthelmas Landfill, to be treated like solid waste sites.

USEPA and OEPA are using solid waste laws because they are relevant and appropriate for what they want to do to the site. Using solid waste laws for a hazardous waste site is not in compliance with the Superfund law requirement that a first criteria should be the overall protection of the public health and the environment.

In summary, a final cleanup decision cannot rely on a study that makes major assumptions based on speculation or such limited data. USEPA states their remedy addresses a worst case scenario situation. A worst case scenario situation would not ignore major conflicting evidence or unanswered areas of concern. It is not surprising that such little or poor oversight of the work at Bowers occurred with the constant turnover of personnel at both USEPA and OEPA. Our community offered a major need for continuity to this process. However, if USEPA had been receptive to our community's suggestions during this study, we could have had a more credible study and be confidant about moving forward to resolve the potential problems presented by Bowers.

For A Cleaner Environment,

Cynthia Gillen

Cynthia Gillen, March 10, 1989

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113

I am submitting the additional following comments for the public comment period of the Bowers Landfill Superfund Site.

What is happening to the Bowers Landfill Superfund site? The USEPA and the potentially responsible parties, PPG and DuPont, have just completed a study that cost approximately $700,000 and are unable to give us anymore conclusive information about the site. Volumes of data have been generated and a containment remedy proposed which still ignore potential threats presented by this hazardous waste site. The USEPA has stated that a final cleanup decision will likely be made by March 31.

1. GROUNDWATER FLOW. According to the EPA study, groundwater flow under the site is determined to be to the west toward the Scioto River and, therefore, the Circleville municipal well field located 1.5 miles south is not expected to be affected by potential groundwater contamination.

The District Soil and Water representative, Mark Scarpitti, has presented information from a Department of Natural Resources study which presents valid conflicting evidence about groundwater flow off-site. Since the groundwater moves from the uplands to the Scioto River valley, it is probably combining at the river and flowing south toward the wells and to fill in the depression created by the heavy industrial pumping in the Circleville area. The USEPA did not study groundwater flow outside the immediate area of the site and could be making a serious inaccurate assumption about potential risks to our water supply. They have ignored and have not refuted this evidence and have no plans to install monitoring wells between the site and the city wells.

2. LOCATION OF WASTES. Previous testing at the site showed high levels of contaminants in leachate and groundwater in 1980 and 1981. Present test results generally show low levels of contaminants. The EPA study states that about 40% of the waste was generated by various industries operating in the area, including PPG and DuPont, among others. Responses by PPG and Dupont to a federal survey in 1978 indicate they dumped 1700 and 6000 tons of material respectively. Other local industries evidently did not respond to the survey.

USEPA has not drilled into the site or installed monitoring wells outside the site to determine the location of wastes but is proposing a remedy to contain something. One major area ignored by this study is that this site floods frequently which has presented great potential for contaminant migration since its closure in 1968. In a 1985 meeting with local citizens, Mr. Roger Hannahs of OEPA acknowledged this concern and promised that "OEPA will require testing further out from the site until contaminants are located if not located at the initial test sites." Where is Mr. Hannahs now?

3. METHANE GAS. The EPA study negates any threat from methane gas and the need for any gas venting system since this site has been closed for 20 years. However, specific air tests for methane gas were not performed at the site.

According to an Army Corp of Engineers report (January, 1984), landfill sites can give off methane gas for 50 years or more after closure, especially sites constructed prior to 1970, like Bowers, that had no gas venting systems. The proposed containment with no gas venting could cause methane gas to migrate laterally, carry contaminants to nearby homes and present a public health emergency. An example in our own state is the Industrial Excess Landfill site in Uniontown where methane gas was found to be migrating laterally and under nearby homes.

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113 1-614-474-1240

MEMO TO: Valdus Adamkus, Director
USEPA Region 5

FROM: Representatives of ACTION

C: WMD
CC: ORA
FREEMAN
OPA -

IN RE: Community Information Committee

DATE: February 28, 1989

We have been told by Ms. Barbara Barnett that the continuation of the Bowers Landfill Community Information Committee during the remedial action and ongoing maintenance under the Record of Decision is under consideration. We have also been told that USEPA has considered our committee to be a valuable asset for communication with the community during the Superfund process.

We, therefore, respectfully request that the Bowers Landfill Community Information Committee be continued so that we, the community, may be apprised of all work and developments at the site. The Committee should not be disbanded until a mutually agreed upon date is decided by the Committee that it is no longer needed for community communication.

RECEIVED
MAR 0 6 1989
U. S. EPA REGION 5
OFFICE OF REGIONAL ADMINISTRATOR

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113 1-614-474-1240

MEMO TO: Valdus Adamkus, Director
USEPA Region 5

FROM: Representatives of ACTION

IN RE: Community Information Committee

DATE: February 28, 1989

We have been told by Ms. Barbara Barnett that the continuation of the Bowers Landfill Community Information Committee during the remedial action and ongoing maintenance under the Record of Decision is under consideration. We have also been told that USEPA has considered our committee to be a valuable asset for communication with the community during the Superfund process.

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J. L. Chilcote
Jeanette M. Chilcote
[illegible]

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
[illegible] Island Road, Carpenterville, Ohio 45110 1-614-[illegible]-1140

SEND TO: Valerie Adams, Director
USEPA Region 5

FROM: Representatives of ACTION

IN RE: Community Information Committee

DATE: February [illegible], 1987

We have been told by Ms. Barbara Barrett that the discontinuation of the Bowers Landfill Community Information Committee during the remedial action and ongoing maintenance under the Record of Decision is under consideration. We have also been told that USEPA has considered our committee to be a valuable asset for communication with the community during the Superfund process.

We, therefore, respectfully request that the Bowers Landfill Community Information Committee be continued so that we, the community, may be apprised of all work and developments at the site. The Committee should not be disbanded until a mutually agreed upon date is decided by the Committee that it is no longer needed for community communication.

Albert J. Rose
Ann M Harr
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
Fred [illegible]
Virginia [illegible]

ACTIVISTS CONCERNED WITH ISSUES IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113 (614-474-1240

MEMO TO: Valdis Adamkus, Director
USEPA Region 5

FROM: Representatives of ACTION

IN RE: Community Information Committee

DATE: February 23, 1989

We have been told by Ms. Barbara Barnett that the continuation of the Bowers Landfill Community Information Committee during the remedial action and ongoing maintenance under the Record of Decision is under consideration. We have also been told that USEPA has considered our committee to be a valuable asset for communication with the community during the Superfund process.

We, therefore, respectfully request that the Bowers Landfill Community Information Committee be continued so that we, the community, may be apprised of all work and developments at the site. The Committee should not be disbanded until a mutually agreed upon date is decided by the Committee that it is no longer needed for community communication.

Beverly Bower
Michael Gen
Laura H. Hurd
Patricia A. Mullen
Felix Jones
Marcella A. Ramey
Jane Byard
Patricia A. Fergus
Carol J. Moore
Nancy Cook
Nancy Stallenberger
Cynthia Gillen
Carol Robertson
Arthur L. Robertson
Bruce Robertson
Gary Gillen
Elizabeth Turner
Paul W. Turner
Frances Lucas
[illegible]
Ralph E. Wenkel

National Priorities List Site

Hazardous waste site listed under the
Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA or "Superfund")

BOWERS LANDFILL
Circleville, Ohio

Conditions at listing (December 1982): Bowers Landfill, also known as Island Road Landfill, covers 80 acres about 1 mile north of Circleville, Ohio, within the Scioto River floodplain. The site is situated over a very productive aquifer (capable of yields of 1,000 gallons per minute) that supplies both industrial and domestic water. In 1958, a gravel pit started operations on the site. Shortly thereafter, a landfilling operation started in which soil from the nearby pit was used to cover refuse dumped on top of the existing surface. Little is known of the initial years of the landfill, but from 1963 to 1968, it accepted organic and inorganic chemicals and general domestic and industrial refuse. In response to a Congressional inquiry, two local chemical manufacturers stated that in excess of 7,500 tons of chemical waste (physical state and concentrations unknown) had been disposed of at this site. In July 1980, EPA identified toluene and ethylbenzene in water from the landfill. The State worked with the current owner, who hired an engineering firm to evaluate the site. The State reviewed the report and asked for additional information.

Status (July 1983): The State reviewed the additional information from the owner and is awaiting the final Remedial Action Master Plan EPA is preparing. It will outline the investigations needed to determine the full extent of cleanup required at the site.

EPA ID - OHD980509616
CONTACT - ERIN MORAN
POPULATION 11,700
CD - 7
HRS - 50.49

RAMP DEVELOPMENT - COMPLETE - EPA LEAD - $59,000
SPENT SINCE 83 - $13,142
RI/FS - EPA LEAD - $400,000 ALLOCATED - NO ACTION YET

Margaret McCue, our community relations coordinator at the time, that Ms. Moran was qualified even though she appears hesitant and unsure to respond to specific questions about our site at public meetings. At most meetings, she's appeared indifferent and somewhat sure only when she reads prepared statements. I, therefore, request that the Community Information Committee remain in existence during any remedial action and monitoring to facilitate communication with the community on a regular basis.

In conclusion, I do not believe what USEPA calls a "cleanup remedy" gives overall protection of public health and the environment. USEPA has allowed too many points to be vague and unclear in this FS which we would have appreciated the opportunity to comment on and which are evidently going to be decided by EPA in the ROD. I must agree with Senator Frank Lautenberg, head of the Senate Environment and Public Works subcommittee on Superfund and the environment, that the EPA "instead of acting as a watchdog for industry is acting as their lap dog." The 1988 OTA study verifies that "The Superfund toxic waste dump cleanup program is ineffective, inefficient, and uses pennywise, pound-foolish methods that may have to be reworked at great expense." Bowers Landfill is evidently just another statistic for another OTA study about the ineffectiveness of the Superfund program.

cc: William Reilly, USEPA
Valdus Adamkus, USEPA Region 5
Governor Richard Celeste
Senator Frank Lautenberg
Attorney General Anthony Celebrezze, Jr.
Pickaway County Commissioners
Stephen Lester, CCHW
Senator Howard Metzenbaum
Rep. Mike Dewine
Senator Jan Long
Rep. Mike Shoemaker
Mayor Mike Logan
Senator John Glenn
Peter Montague
Joel Hirschhorn, OTA
John Adkins
Mark Scarpitti

what they don't want to do at the site and to avoid putting too much economic stress on the responsible parties? There is something wrong with a system that allows the responsible parties to be directly responsible for the writing of the FS along with the contractors. Any other system would claim this as an obvious conflict of interest.

To further add to this flawed logic, a containment system is being proposed to contain unknown wastes in an unknown amount and unknown location. According to OTA, there is substantial evidence that containment techniques are unproven and unreliable technologies with significant implementation problems. An example is the RCRA clay cap at the Winthrop Landfill site in Maine which failed in September, 1987, before its construction was completed. The OTA also states "impermanent remedies, which provide less protection than permanent ones and do not assuredly meet cleanup goals, are often selected purely because they are cheaper in the short run; in the long run they are very likely to be more expensive." There are various treatment technologies available which could offer a permanent remedy but which do rely on specific identification and location of contaminants. Because of USEPA's inadequate study which failed to do either, permanent remedies which are more expensive in the short-term are not a consideration in the FS. The impermanent remedy proposed for our site is generously estimated to have a life of 30 years. The maintenance and monitoring costs of this remedy which is doomed to fail, have been grossly underestimated. No provision is made as to who will be responsible for such costs including any further cleanup. For that matter, it is not clear who is paying for the proposed remediation. We believe the responsible parties should be financially responsible for any present and future costs - not our state or county or community - and strongly object to any condition in the ROD that would remove that responsibility and liability from them.

OTA also states that "EPA is less responsive to community concerns about a remedy being impermanent than to interests which favor a lower cost impermanent remedy." The incentives for this are to keep the costs low for the responsible parties and the state that has to provide 10% of the cost if the responsible parties don't pay and because EPA wants to distribute available funds as broadly as possible and wants to obtain settlements with responsible parties to reduce calls on Superfund money.

According to OTA, "EPA pushes most ROD's to completion by the end of the fiscal year and this kind of bureaucratic pressure can lead to poor cleanup decisions. Typically, there is less than one month between the end of the public comment period and the issuance of the ROD." I was told by Ms. Nelms that the USEPA wants to make a ROD before the end of March for its quarterly report. It's evident that USEPA does not give public comment much consideration because of the time allotted - 30 days to review and comment on documents that have taken USEPA three years to study and approve. Ironically, even though EPA is familiar with the work and documents, they have rarely taken less than 90 days to review and revise them themselves during the RI/FS. Evidently, I can only assume that EPA is just going through the motions of "acting" like they want our opinion and will give it consideraion.

During this three year process, the only continuity has come from our community. We now have our 4th USEPA community relations coordinator, and the OEPA personnel assigned to our site have also changed at least twice. From the beginning, our Remedial Project Manager, Erin Moran, has not instilled us with the utmost confidence in the USEPA as an agency. At one point in the beginning of the process, we requested a different project director but were assured by Ms.

have a multimillion-dollar cleanup decision made without any technical data to support it.."

The Endangerment Assessment is not relevant because of the failure of the RI to identify and locate contaminants. It uses a cancer risk factor of 1 in 10,000. Another OTA criticism states that "Sometimes compromises are made to reduce cleanup cost by allowing a higher risk than the 1 in 1 million cancer risk commonly used in Superfund." With this study, USEPA has compromised our risk and allowed up to a 100 times greater risk than that generally accepted. Why? Again, OTA states that environmental risks seem to take a back seat to constraints imposed by seeking funds from responsible parties.

USEPA and OEPA have chosen to ignore a statement submitted by ACTION at the Community Information Committee meeting on November 3 from our District Soil and Water Conservation representative which presents valid conflicting evidence about groundwater flow. It is based upon his discussions with the Division of Water and a study done in 1975 by Stanley Norris for ODNR, Division of Geologic Survey (#96) about the groundwater situation in the Circleville area, Pickaway County. In the RI, it is determined that groundwater flow under the site is to the west downhill and toward the river. However, the geologic and groundwater conditions on the west side of the river could also be downhill and toward the river since according to Mr. Norris, ..."groundwater moves from the uplands toward the Scioto River valley" and moves in response to the regional gradient. In conclusion, groundwater on the west side of the river could be moving east and downhill to combine with the westerly flow from the east and follow the river toward the south. This would dramatically change the Endangerment Assessment and the potential for contamination of Circleville's well field, 1 1/2 miles south and downstream. The study done for ODNR was much more extensive than the present Remedial Investigation which relied only on conditions in the immediate area of the site.

Our request to do further studies off-site to better determine groundwater flow in lieu of this evidence has been ignored. Thus far, our request for monitoring wells off-site between the landfill and the city's wells has also been ignored. What is the <u>substantiated</u> reason for ignoring this evidence and for not placing these wells?

For the protection of our community and people who live near the landfill, I believe that groundwater monitoring should be done indefinitely on a quarterly basis for priority pollutants and heavy metals as long as there is any question as to the exact location, amounts and kinds of contaminants emanating from the site. There must be provisions for monitoring all potential contaminants emanating from the site and not just the few identified in the RI. This testing should be done on the residential wells near the landfill, Circleville City water wells, and monitoring wells off-site between the landfill and the City water wells in addition to those included in the FS. I don't understand why there is a reduction in monitoring after the first year. How can EPA assume there will be a sudden reduction in risk after the first year with all the unknowns in the RI? It would appear they are relying on public disinterest with time.

The FS states that alternative 4 would comply with current State of Ohio closure standards for solid waste landfills. Since hazardous waste was dumped at Bowers, I would like to know if any of the alternatives comply with current State of Ohio closure standards for hazardous waste facilities. If not, why not?

It would appear that USEPA has conducted a useless study that has no conclusive data. Could this be because the regulators and the responsible parties want to avoid finding contaminants in order to fit

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Steubenville, Ohio 43952 (614-547-1340)

MEMO TO: USEPA Region 5

FROM: Cynthia Gillen, ACTION

IN RE: Bowers Landfill Remedial Investigation & Feasibility Study

DATE: February 28, 1989

I have several concerns about what is being proposed for Bowers Landfill and the Superfund process that has transpired.

The Bowers Landfill was included as one of 13 Ohio sites on the National Priority List for Superfund cleanup in 1982. Among those sites, it had a Hazard Ranking Score or potential to cause harm of 3rd within the state. The highest hazard score was for potential groundwater contamination. In 1980, OEPA identified toluene, benzene, and ethylbenzene in leachate from Bowers Landfill. In 1981, Burgess & Niple found high concentrations of ethylbenzene, toluene, and mixed xylenes in downgradient wells.

The present study has significantly different findings from previous testing and attempts to ignore previous findings or speculate about problems with laboratory quality control and possible lab contamination of samples. This logic is flawed for several reasons. The labs doing the previous testing were both OEPA approved chemical laboratories. Burgess & Niple's work was also coordinated and approved by USEPA Region V. The kinds and amounts of contaminants found in the samples are not likely to have occurred from laboratory processing and handling. There are at least two more logical reasons which are given no consideration. There may have been significant leaching of contaminants into the groundwater at the time of the earlier studies which was quiet at the time of the present study due to local hydrogeologic factors related to the recent two year drought conditions, or the earlier findings might have been related to a migrating plume of contaminants that has now moved off-site. Will EPA be able to so easily discredit the present results also done by EPA approved companies if contamination problems occur in the future?

When the Bowers Landfill was listed on the National Priority List in December, 1982, the conditions at listing by USEPA stated the landfill covered 80 acres (attached). No explanation is given for why this site has dwindled to only 12 acres. In the same USEPA statement, it states that in excess of 7500 tons of chemical wastes were disposed of at the site. Now the present study states that the exact amount of hazardous waste placed in the landfill is unknown, and speculates that it was probably a small percentage of the total disposed material. Even if this is true - and USEPA themselves state they don't know for sure - many hazardous chemicals of the kinds dumped at Bowers have the potential to cause harm to human health and the environment in very small amounts (i.e., parts per billion or million). Flawed logic again. The present report also states that the amount of hazardous waste remaining there is unknown.

The RI has failed to locate and identify contaminants and is proposing containment while at the same time acknowledging that the location and quantity of wastes are unknown. How can one contain something without knowing the location and quantity to be contained? It sounds like a stab in the dark to me. According to an Office of Technology Assessment report of June, 1988, which assessed the Superfund Implementation, one criticism is that, "It is not uncommon to

for such speculation with contaminants poorly identified as to location and concentration. We agree that there is no reason to choose between a clay cap and a synthetic membrane cap. They are both prone to deterioration and entirely dependent upon expert installation and maintenance. Both can leak without obvious appearance, and both will leak eventually.

A cap alone will not adequately protect our site from erosion and infiltration of water during frequent floods. A flood control dike would be an important safeguard to the integrity of the remedial action.

We conclude that the Remedial Investigation, Endangerment Assessment, and Feasibility Study are flawed, inadequate, and unacceptable. They make repeated attempts to make the results fit what the regulators and responsible parties (PPG & Dupont) want to do or not do to the site. They attempt to minimize major problems thwarting clean-up at the site because the contractors and the agencies don't know what to do about it. They attempt to minimize hazards to avoid frightening local residents and to minimize problems to avoid putting too much economic stress on the responsible parties. We believe that any containment plan is doomed to fail and that such plans must be reinforced to the maximum and monitored carefully to discover the failure when it occurs and should specify who will be financially responsible when the failure occurs. We believe the responsible parties should bear the costs of containment failure and maintenance and in correcting any contamination problems.

cc: William Reilly, USEPA
Valdus Adamkus, USEPA Region 5
Governor Richard Celeste
Senator Frank Lautenberg
Attorney General Anthony Celebrezze, Jr.
Pickaway County Commissioners
Stephen Lester, CCHW
Senator Howard Metzenbaum
Rep. Mike Dewine
Senator Jan Long
Rep. Mike Shoemaker
Mayor Mike Logan
Senator John Glenn
Peter Montague
Joel Hirschhorn, OTA
John Adkins
Mark Scarpitti

3/28/89

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113 474-1240

TO: Erin Moran, Project Director, USEPA Region 5

FROM: Gary L. Gillen, M.D.
ACTION Representative on the Bowers Landfill
Community Information Committee

IN RE: Bowers Landfill Superfund Site
Comments on the Feasibility Study, Third Draft Report
Dated February 3, 1989

DATE: February 28, 1989

Most of the comments of our letter of November 2, 1988, (attached) still apply to this third draft of the Feasibility Study. I was pleased to see much better discussion of treatment options. I remain disappointed that some alternative to containment has not been identified for our site. There is better discussion of how groundwater monitoring might be done. There is still not sufficient clarification as to what will happen and who will be responsible when various contaminants are identified. I will expect these details in the Record of Decision but I would have appreciated the opportunity to comment on them in the Feasibility Study. We still believe that some monitoring wells need to be installed off-site in the direction of Circleville City's water wells. According to our local Soil and Water Conservation representative (statement attached), one cannot determine that groundwater flow from the site is only to the west without additional studies off-site to determine whether groundwater flow on the west bank of the Scioto River is coming east to combine with material from the site and then follow the river flow to the south toward the city well fields. A fence remains a protection factor which has yet to be constructed.

The discussion of the alternatives which mention a clay cap correctly observes that the cap would provide some protection from flooding by covering the landfill to prevent flood waters from eroding away the surface and that flood waters will infiltrate less if a cap is in place. There is no discussion, however, regarding maintenance of the clay cap through repeated flood events which occur at our site. I believe that the costs of maintaining a cap and ground cover through repeated flooding could make a flood control dike look much more cost effective. A flood control dike will also require maintenance but not the kinds of extensive repairs that the clay cap will require when it is overrun completely every 5 years (as reported in this study) and at least partially overrun every year. It should be kept in mind that all of the testing data and observations in this report were made early and in the middle of the worst drought to affect this area in the past 60 years.

The study continues to speculate about the possibility of "maintaining the present cover" as a containment strategy. I agree that it is an idea worthy of speculation given the known problems of clay caps and synthetic membrane caps, but our site is not a proper one

They referred me to several publications concerning the ground water flow in the Scioto River basin. One such study from the Ohio Department of Natural Resources, Division of Geological Survey is Report of Investigations No. 96. "The Ground-Water Situation in the Circleville Area, Pickaway County, South-Central Ohio". This report was written in 1975 by Stanley E. Norris, Hydrologist as a result of a study conducted of the ground water supply in the Circleville area. In this report Mr. Norris speaks of the principal source of recharge into the aquifer in the area of Circleville;

> "The principal source of recharge to the aquifer supplying the industrial wells is precipitation. Some precipitation enters the aquifer within the area underlain by the cone of depression, but most enters upgradient from the cone and flows into it in response to the regional gradient. Generally the potentiometric surface in the Circleville area is higher in upland areas. Consequently, ground water moves from the uplands toward the Scioto River valley. This component of recharge, moving in response to the regional gradient, is referred to here as underflow.
>
> Where the sand and gravel deposits are separated by a semiconfining bed, water from precipitation reaches the wells after moving downward through the semiconfining bed. Or, water may enter the lower aquifer directly in areas where the semiconfining bed is absent and move laterally beneath the semiconfining bed. Water also enters the aquifer from the Scioto River by influent seepage where the water table is below the stream..."

After talking with the Division of Water and studying the reports available, I believe the safe assumption is that hazardous chemical waste from the Bowers landfill does have the potential of contaminating downstream water supplies and any landfill clean-up efforts should consider this potential.

I am a little surprised and disappointed that the investigations conducted by EPA did not study ground water flow surrounding the landfill as well as in the immediate area of the landfill.

If you have any questions please let me know.

Sincerely,

Mark

Mark A. Scarpitti
District Conservationist

10/25/85

United States Department of Agriculture

Soil Conservation Service

Dr. Gary Gillen
Action Rep. Bowers Landfill
111 Island Road
Circleville, Ohio, 43113

October 25, 1988

Dear Dr. Gillen,

I attended the Ohio EPA Remedial Investigation public information meeting of the Bowers landfill on Sept. 14, 1988.

At that meeting the engineer representing EPA stated that according to their study, the ground water in the vicinity of the landfill on the east side of the Scioto River flowed from east to west or toward the river. It was emphasized that groundwater generally flows downhill. The conclusion was drawn that any possible seepage from the Bowers landfill would also flow toward the river and would therefore pose no threat of contamination to municipal water supplies. The municipal wells are located approximately 1.6 miles south (downstream) of the landfill adjacent to the Scioto River.

When I ask him if it was logical to assume that groundwater west of the Scioto River flowed east toward the river, he stated it was possible but that no study of groundwater movement had been conducted west of the river.

I asked him further if groundwater on each side of the river were in fact moving from the uplands to the river (downhill) wouldn't it be likely that the water would meet at the river and turn south or downstream. He stated that it was possible but the groundwater movement was not studied to that degree.

Since that meeting I have tried to research the assertion that the groundwater in the Circleville area does move from the uplands to the floodplain toward the Scioto River. And that as it approaches the river it turns in a southerly direction with the flow of the river.

I have been in contact with the Ohio Department of Natural Resources, Division of Water, Section of Ground Water. They indicated that it is common for the ground water to generally follow surface water unless restricted by some impervious layer. And that it is likely that the ground water does move toward the river. They indicated it is also likely that some of the ground water surfaces at the river while the other portion remains in the gravel aquifer under the riverbed and moves parallel with the river.

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113 474-1248

cc: Valdus Adamkus, USEPA Region 5
Richard Shank, OEPA Director
Governor Richard Celeste
Senator Frank Lautenberg
Attorney General Anthony Celebrezze, Jr.
Pickaway County Commissioners
Stephen Lester, CCHW
Lee Thomas, USEPA
Senator Howard Metzenbaum
Rep. Mike Dewine
Senator Jan Long
Rep. Mike Shoemaker
Mayor Mike Logan
Senator John Glenn
Peter Montague
Joel Hirschorn, OTA
John Adkins
Mark Scarpitti

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(2) "Hazardous Waste News #87", July 25, 1988, Environmental Research Foundation, Princeton, New Jersey.

(3) "Hazardous Waste News #86", July 18, 1988, Environmental Research Foundation, Princeton, New Jersey.

(4) "Hazardous Waste News #98", October 10, 1988, Environmental Research Foundation, Princeton, New Jersey.

(5) Are We Cleaning Up? 10 Superfund Case Studies, Office of Technology Assessment, Congress of the United States, June, 1988.

(6) Norris, Stanley E., The Groundwater Situation in the Circleville Area, Pickaway County, South-Central Ohio, ODNR, Division of Geological Survey, 1975.

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(8) Feasibility Study, Second Draft Report, Bowers Landfill, Circleville, Ohio, Job No. 00050-042-017, Dames & Moore, August 19, 1988.

(9) Island Road Landfill, Circleville, Ohio, Burgess & Niple Limited Engineers, Columbus, Ohio, December, 1981.

(10) Personal Communication, Peter Montague, Ph.D., Environmental Research Foundation, Princeton, New Jersey, October, 1988.

(11) Personal Communication, Mark A. Scarpitti, District Conservationist, United States Department of Agriculture, Soil Conservation Service, Circleville, Ohio, October, 1988.

11/2/88

site, and flooding is the major external source of water washing out the landfill, then the minimum containment method would have to protect the site from flooding. Only the proposed flood dike would do that of the methods examined which was eliminated because it was not cost effective for our site.

In their review of 100 Superfund sites, the Office of Technology Assessment published a summary report in June, 1988, (5) which was critical of EPA's frequent use of unproven technologies. The proposal to maintain the present cover on the landfill as a containment method is one such unproven technology. I must admit some discomfort in bringing up the point because the only other proposals for cover involve a clay cap or a plastic cap. Both of those have been proven to fail to permanently contain at sites where they have been used. I described this Feasibility Study proposal to Dr. Peter Montague, an expert in hazardous waste sites all over the country. He believes this sounds like a variation of several proposals happening at some sites which has been described as "natural flushing". He thought this proposal is the equivalent of doing nothing while waiting for rainfall and floods to flush the contaminants into the surface and groundwater. So, the proposal is not even a containment method, but a treatment method apparently designed to reduce some contaminants at the site by washing them away to parts unknown. In a 1961 study (7), the U.S. Public Health Service is critical of the concept that diluting groundwater will reduce concentrations. They note that often chemicals will migrate in groundwater without changing concentration as can happen in surface water. Some can even concentrate under certain circumstances. The cost estimates also do not take into account the potential for astronomical increases when these impermanent remedies eventually fail (5).

The proposal for monitoring wells is inadequate with no provision for wells further off-site and with no provision for determining when, where, and how any action might occur as a result of the monitoring or who might be responsible for the costs of further action at the site when a failure is documented. Further, there is no definition of what levels of which chemicals might be identified as a reason for further action. Will we go through more studies to determine a next step? The EPA has previously accepted such proposals for monitoring a site to detect a "failure" without defining what a failure is (5). We should not repeat that mistake.

We are pleased to see a proposal for site restriction which includes a fence as we have recommended since 1984. I suspect it will be at least 1990 before that fence exists at the site. That is unfortunate, especially for those who unknowingly wander on-site.

In the past, EPA has pushed most records of decision to meet their annual report deadlines which has led to poor cleanup decisions (5). We do not want to be another poor decision statistic. If this Feasibility Study is approved without changes, we request that the 30 day public review and comment period occur after the busy holiday season (after the first of the year). We expect our written comments to be published with the final Feasibility Study as they were with the Remedial Investigation.

11/2/89

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio [illegible] 474-1240

TO: Erin Moran, Project Director, USEPA Region 5

FROM: Gary L. Gillen, M.D.
ACTION Representative on the Bowers Landfill
Community Information Committee

IN RE: Bowers Landfill Superfund Site
Comments on the Feasibility Study, Second Draft Report
Dated August 19, 1988

DATE: November 2, 1988

Our comments on the second draft of the Feasibility Study should not be taken to imply that we have accepted the findings of the Remedial Investigation and Endangerment Assessment. We continue to find those reports seriously flawed in two main areas. First, the findings are significantly different from work done earlier at the site by Burgess & Niple and by Ohio EPA without any adequate explanation. I can suggest two possibilities that are at least as good as those given. There may have been significant leaching of contaminants into the groundwater at the time of the earlier studies which was quiet at the time of the present study due to local hydrogeologic factors related to the recent two year drought conditions, or the earlier findings might have been related to a migrating plume of contaminants that has now moved off-site. Secondly, one cannot determine that groundwater flow from the site is only to the west without additional studies off-site to determine whether groundwater flow on the west bank of the Scioto River might be coming east to combine with material from the site and then follow the river flow to the south toward the city well fields. Attached to my statement is a letter from Mark Scarpitti of our District Soil and Water Conservation Office confirming that others with training in soil and water agree that these are valid concerns not addressed in the Remedial Investigation. Specifically, Stanley Norris' report on the groundwater situation in the Circleville area (6) verifies that a southerly flow could occur in this area.

In regard to the Feasibility Study, Second Draft, presented to us, it appears that once again, as has happened frequently across the country, the contractor and the EPA are choosing a "containment" method for our site even though the law as revised in 1984 now requires the EPA to prefer permanent remedies for sites. A recent report by traditional environmental groups and the Hazardous Waste Treatment Council (1) examined 75 records of decision (ROD's) produced by EPA in 1987 and found that full waste treatment was recommended in only 6 cases, partial treatment was recommended in 18, and no treatment at all was recommended in 51 cases or 68% of the sites. They recommended a clay or asphalt cap for some, a slurry wall to contain some, or excavating the wastes and reburying them in another landfill creating a toxic merry-go-round for others. We find that the present document defines containment with even less structure (i.e., to "maintain the cover" and use rocks to "stabilize" the landfill from washing away from frequent flooding). The traditional clay cap or plastic cover are dispensed with as not "cost effective". This is interesting, because under SARA, cost effective received a new definition. Cost effective is defined now as that "in determining the appropriate level of cleanup, the President (through his agency, the EPA) first determines the appropriate level of environmental protection to be achieved and then selects a cost effective means of achieving that good". If containment is the appropriate level of protection determined for our

Name PAUL D TURNER

Address 3225 WINCHESTER RD.

ASHVILLE, OH. ZIP 43103

Affiliation ACTION

Phone 614-474-1240

Question: Why is the continuation of the Bowers Landfill Community Information Committee under consideration?

AND PLANT WILL NEVER HAPPEN - CONTAMINATING OUR HUMAN LIFE. LETS TAKE ANOTHER LOOK AT SOME ALTERNATIVES THAT ARE MORE REASONABLE ~~AND~~ FOR PREVENTATIVE REASONS AND NOT WORRY SO MUCH ABOUT WHAT THE ULTIMATE PRICE WILL BE FIRST. IF THE OWNERS ARE TO COVER THE $ AMOUNT WHY NOT DO THINGS RIGHT.

Name [illegible]

Address [illegible]

[illegible] Oh ZIP 43107

Affiliation [illegible]

Phone [illegible]

Question:

Name Amy Brown

Address 9230 Maple St

Sciotoville Oh ZIP 45154

Affiliation Concerned Mother & Citizen

Phone 474-2507

~~Question:~~ Comment: Without your health you have nothing and if you put a price on the protection of it your alternative"s/s lacking. I believe that if you go with any of your alternatives you cannot possibly monitor the leakage well enough or will not check it often enough to be able to avoid further contamination until it has gone to what we all hode

Comments Submitted at the
Public Meeting on
February 28, 1989

APPENDIX A

WRITTEN COMMENTS ON THE PROPOSED PLAN FOR BOWERS LANDFILL

Response plan for detection of contaminants in monitoring wells. Concerns were raised about the lack of a response plan if monitoring wells show increasing levels of contamination, once the clay cap has been installed on Bowers Landfill. Major issues included the contaminant levels that would trigger a response, the nature of the response, how quickly the response would occur, and who would be technically and financially responsible for the response. U.S. EPA has addressed these issues to the extent possible in the Record of Decision. Additional details will be resolved during the detailed design of the site remedy.

Operation and maintenance plan for landfill cap. Several residents expressed concern about procedures that will be used to ensure the integrity of the landfill cap. In the Record of Decision, U.S. EPA has provided a general description of operation and maintenance requirements for the cap. For example, the cap will be inspected quarterly, and repairs to all significant damage will begin within 30 days. Additional specific details must be determined after the cap is designed and constructed. Examples of such details include inspection methods and reporting procedures.

Construction of a fence around Bowers Landfill. Residents requested that a fence around the Bowers Landfill site, a component of the selected remedial alternative, be constructed as soon as possible. U.S. EPA will construct the fence on a priority basis during remedial action. However, the Agency cannot provide a specific schedule for fencing the site at this time.

Continuation of the Bowers Landfill Information Committee. Several residents requested continuation of the information committee to facilitate citizen involvement in the RD/RA process. U.S. EPA will continue the committee. However, the exact makeup of the committee will depend on negotiations with the PRPs. The results of these negotiations will determine who will be responsible for design and construction of the remedial alterative, and, thus, who will be on the committee.

U.S. EPA Response: The 12-acre figure refers to the area where wastes were deposited. This L-shaped area, shown in various site drawings, is approximately 4,000 feet long and 125 feet wide. The 80-acre figure refers to the entire site area, including the landfill, drainage ditch to the east, and the agricultural field to the west. This area will be enclosed by a fence as part of the remedial action.

2. One member of the community expressed health concerns about "a higher than normal incidence of sickness" near the landfill. Another member of the community asked whether U.S. EPA "has done any studies to see if the incidence of cancer and leukemia in the youth of Circleville is greater than in similarly sized towns elsewhere."

U.S. EPA Response: U.S. EPA has not conducted any epidemiological studies of this type at Bowers Landfill. These studies are normally conducted by the Agency for Toxic Substances and Disease Registry (ATSDR). Based on Superfund Amendments and Reauthorization Act of 1986, ATSDR is required to perform a health assessment at each Superfund site. The health assessment is conducted independently of U.S. EPA's EA and is a preliminary evaluation of risks posed by the site. Depending on the results of this assessment, ATSDR can conduct pilot studies of health effects for selected groups of exposed individuals or a full-scale epidemiological study of exposed populations. ATSDR maintains an office at U.S. EPA Region 5 headquarters in Chicago. Questions on ATSDR's role and on epidemiological studies should be directed to Louise Fabinski at that office. She can be reached at (312) 353-8228.

5.0 REMAINING CONCERNS

U.S. EPA was unable to completely address several issues during remedial planning activities associated with the Record of Decision. These issues and concerns are summarized below.

Details of the ground-water monitoring program. U.S. EPA's Record of Decision provides details on several aspects of the ground-water monitoring program. These details include approximate locations of new wells, the list of chemicals to be sampled, and the sampling frequency. Additional details, including the exact number and locations of new wells and the wells to be included in the ground-water monitoring program, will be developed during remedial design.

filled with debris, conditions that make them unattractive as a swimming location or drinking water source. Furthermore, the general public near the landfill is well aware that the ditches are adjacent to a known hazardous waste site. Therefore, the theoretical "really worst case" exposure is extremely unlikely. The infrequent and incidental exposure to these waters, as presented in the EA, is a more realistic worst case exposure scenario.

As a second example, regular exposure to large volumes of contaminated dust (generated by agricultural activities in the field west of Bowers Landfill) is theoretically possible. Soils from this field contained lead concentrations above background levels. The National Ambient Air Quality Standard for lead of 0.0015 mg/m^3 represents a safe level for the general population. However, the EA estimated that even if all agricultural land was contaminated at the highest observed lead concentration, a total dust concentration of 15 mg of dust per cubic meter of air (mg/m^3) would be needed before lead concentrations exceeded safe levels. It is highly unlikely that such dust concentrations could be generated for any length of time, and agricultural workers would be exposed only intermittently. Exposure of off-site populations would be even less because dust concentrations would decrease during transport. Thus, as with surface water, theoretical "really worst case" exposure to contaminated dusts is highly unlikely.

6. One member of ACTION asked why the endangerment assessment ignored the possibility of southward migration of ground-water contamination.

U.S. EPA Response: The EA stated that off-site residential wells or the City of Circleville public water supply wells have probably not been affected by southward migration of ground-water contamination from Bowers Landfill. However, the EA did not ignore this possibility. Table 3-1 of the EA presents water quality sampling results for Circleville's water system. These results, collected between 1980 and 1987, show that water from Circleville's wells is of high quality and has not been affected by contamination from the landfill. More recent and extensive data from 1988, unavailable when the EA report was written, confirm this conclusion. Sampling results from residential wells south of the landfill were also presented in the EA report. Samples collected from these wells in February 1987 showed no evidence of contamination.

4.8 Other Issues

1. One member of ACTION wanted to know why the size of Bowers Landfill was listed as 80 acres in 1980, but only 12 acres in subsequent reports.

Name George Hamrick

Address 420 Glenmont Ct

Circleville Oh ZIP 43113

Affiliation County Commissioner

Phone 614-474-2037

Comment: ~~Question:~~ I would hope that continued monitoring will take place.

Also if any increase in movement or degree of toxicity, action would be taken

Finally - dollars are important, our county does not have the money that you are speaking of. We need your continued help.

Name John Stelorz

Address 437 North Court St.

Circleville OH ZIP 43113

Affiliation Citizen of Circleville

Phone

Question: What are the estimated costs of excavation of Bowers Landfill?

Name [illegible]

Address [illegible]

[illegible] ZIP [illegible]

Affiliation [illegible]

Phone [illegible]

Question:

Name PAUL W. TURNER

Address 13235 WINCHESTER RD.

ASHVILLE, OH ZIP 43103

Affiliation ACTION

Phone 614-983-2172

Question: My concern is with the synergism of the contaminants. We have been told that the levels of individual chemicals are within acceptable risk.

What is the affect of the combination of these contaminants?

Name [illegible]

Address 60 Plaza Drive

Circleville, Ohio ZIP 43113

Affiliation ACTION

Phone 474-3544

Comment / Question:

1. It is my opinion that problems are much more likely to occur as a result of leakage from the bottom of the site. This problem is completely ignored by all nine "preferred alternatives".

2. In reference to the question/comment made by Cindy Gillen: due to a technicality of the law (since the fill was not in use in 1980) we are not being given a remedy to our problem of toxic waste.

Name DUNKEL RALPH E.

Address 614 ASH-FAIR-RD

ZIP 43103

Affiliation NUMEROUS

Phone 614.983.3239

Question: IT SEEMS TO ME, THAT IF SOMEWHERE DOWN THE LINE, SOME TOXIC FROM BOWERS LANDFILL GETS INTO PRIVATE OR PUBLIC WATER SUPPLIES RESULTING IN HEALTH PROBLEMS... SOMEONE SHOULD BE HELD LEGALLY AND FINANCIALLY RESPONSIBLE.. INDIVIDUALS OF THE E.P.A. (WHO PARTICIPATED IN HEARINGS. THE ENGINEERING CO. THAT CONDUCTED TESTS ETC.

Name [illegible]

Address [illegible]

ZIP [illegible]

Affiliation A C T I O N

Phone 833 3206

Question: Once contaminants from Bowers Landfill start spreading who will be paying for the clean up?

Name GARY L. GILLEN M.D

Address 6903 HAGERTY RD

ASHVILLE, OHIO ZIP 43103

Affiliation ACTION

Phone

Question:

Additional Written Comments
Submitted by Citizens
During the Public Comment Period

Name [illegible]

Address 7015 Hamilton Ave

Cincinnati, OH ZIP 45227

Affiliation Dames & Moore

Phone 513 651 3440

Question:

Name John R Adkins

Address 16125 Winchester Rd

Albrightsville Oh ZIP 43107

Affiliation Attorney

Phone 614 494 3157

Question: The alternatives inaccurately assume that the waste will be encapsulated with impermeable clay. A likelihood exists that leaching will occur therefore the most important step is a future intervention and removal of toxins to assure protection. Major plan components well testing, freq. of analysis, intervention plan have not been addressed.

Worst case scenario.

Sufficient adjacent area permanently
Liability not released
Some bureaucratic responsibility [illegible] of Fernald
Monitoring published
[illegible] to demonstrate by chemicals and pesticides

The choice of a covering mechanism essentially consists of two options: 1. A 24 inch clay cover under a 24 inch layer of top soil, or 2. The same as the first option except a synthetic membrane is installed over the clay and under the top soil. The U.S. EPA prefers the clay cover only option. I believe that the fact that the synthetic membrane option exists suggests that it is a safer, more effective method for covering the site. Therefore, without consideration of cost, the preferred option for area residents is simple - install the membrane cover.

Drainage options range from a simple drainage ditch with a new corrugated metal pipe to a leachate collection and gas venting system. The drainage pipe option should undoubtedly be much less expensive. This is the option preferred by the U.S. EPA. However, several questions are raised by the simple availability of the other options. First, where will the drainage ditch take the runoff? Does it matter? Next, what is the cost estimate for correcting a problem ten years or so from now if the gas collection problem becomes serious? What are the possible health consequences to the City? Finally, in what circumstances have gas venting and leachate collection systems been recommended and how do those circumstances differ from the Bower's Site? Again, the option most wanted by Circleville area residents is simple - construct the most sophisticated drainage system possible.

The flood control issue pertains mostly to the decision of whether or not to build a dike to protect the site from the Scioto River. The U.S. EPA does not prefer this. Building a dike would increase the cost of the cleanup considerably. Again, however, the fact that this option exists suggests that the construction of a dike improves the cleanup to some degree. Once again, without consideration of costs, the preferred option for area residents ought to be to build the dike.

It is apparent that the U.S. EPA has opted to recommend a cleanup procedure that meets the minimum standards allowed by the Superfund law and costs the least to implement. This indicates to me that their primary decision point is money, which is the least important consideration (I hope) for area residents. This difference probably encapsulates the conflict that I believe will exist at tonight's meeting.

Moving away from what appear to be the readily apparent discussion points, I would like to make some comments about my desires for the final option selected. First, with respect to the notice in the Herald, it is stated that, "Most contaminants were detected at levels considered safe...." This evokes the obvious questions concerning who did the testing and, more importantly, which chemicals were found to be unsafe. In addition to that rather frightening statement, the notice asserts that, "The endangerment assessment indicated that the overall risk posed by the site is low." It goes on to say, "The landfill does pose a threat of future contaminant release." These statements concern me.

Memo Regarding Bower's Landfill Cleanup
To: U.S. Environmental Protection Agency
From: John Payne, Area Resident
1665 Winding Road, Circleville, Ohio 43113

My name is John Payne, and I live in Circleville Township approximately 1/2 mile north of the City limits. The purpose of this letter is to state my feelings with respect to the options available to the USEPA and the USEPA's preferred option for cleaning up the Bower's Landfill Site.

The Circleville Herald recently reported the consideration by the U.S. EPA of nine cleanup options for the Bower's Site, and it also identified the option preferred by the U.S. EPA. The purpose of the reporting was to make public notice of the issue and of a public hearing to be held at 7 p.m. on February 28 in Circleville. I respectfully request that you accept my comments as part of the record of the February 28 meeting.

To respond to this issue and the cleanup options presented, I would like to begin by focusing on the issues that appear to be realistically open to discussion. To do that, I think it makes sense to eliminate options 2, 3, and 9 from consideration. These options reportedly do not comply with Ohio's landfill closure standards. I assume there was a logical explanation for including these options, but from a practical standpoint it does not make sense to discuss them. Option 1 is automatically eliminated as it is provided only as a basis of comparison.

The remaining options to be considered are numbers 4, 5, 6, 7, and 8. Within these options, the following matters appear to be the major differences which deserve further exploration:

- Cost
- Covering
- Drainage
- Flood Control.

I assume the issue of cost is very difficult to isolate. After all, I do not believe that we have had a great deal of experience in actually cleaning up hazardous waste sites as opposed to studying them. I am suggesting simply that cost should only be considered in a very general nature until evidence is presented which justifies more confidence in the numbers.

It is time for all ordinary citizens to stand up and fight. It is not what we ought to do: it is what we have to do. We must push for the most comprehensive cleanup possible. As a person like many others in this area who loves Circleville, the truth behind this issue tears at my heart - allow the Bower's Landfill Site to show dangerous levels of leakage in the future, and Circleville will die completely, not partially.

I assume the more extensive the cleanup operation is, the lower the risk. If the EPA is asking what level of risk we are comfortable with, the answer is, of course, the least possible. I also assume that the threat of future contaminant release is lessened with each additional cleanup measure adopted. Again, we are naturally most comfortable with the cleanup option that leaves us with the least threat possible. This logic should prevail among Circleville area residents, and it sort of begs the question of why we are having a hearing process at all. Are we to believe this is a genuine opportunity to change the EPA's position?

Just in case the EPA is listening, I would like to put this situation in a more personal perspective. First, my wife and son drink Circleville water (at school, stores, etc.). The value of their health to me is higher than the value of all the other alternatives the U.S. government could spend our tax dollars on. When my son takes a drink at school, am I supposed to be comforted by knowing that the chances of the water being lethal are low? On a more selfish matter, the value of my house is very important to my family as well. When I try to sell my house, am I supposed to tell prospective buyers that our neighborhood Superfund site only poses a low threat of contaminant release?

Naturally Circleville area residents are far more concerned about their local environment than with the economies of cleaning up such an extensive site. This does not mean we do not understand the many other demands being made for federal money. It simply means that we expect the health and welfare of decent, taxpaying citizens to come first. I believe that the EPA's rightful job at this point is to cleanup the Bower's site to the best of its ability, notwithstanding cost. Then the EPA should pursue settlements from the potentially responsible parties involved in this matter with great tenacity. The threat created by the EPA's enforcement activity on the financial health of local companies and area employment is diminimous compared to the threat the site poses to our health and lifestyles.

To close this letter, I would like to state, in general terms, my position as just one citizen in the Circleville area. First, I believe that the technical discussions that will take place at the February 28th public meeting regarding types of chemicals, soil content, etc. are moot. We know the Bower's Landfill Site is horrible simply by its status as a Superfund Site. I do not see how the degree of horror is pertinent. Second, I would suggest to area residents and our elected officials that this is a time for activism, not conservatism. We have an opportunity to take care of this problem the correct way, to better ensure that our grandchildren and their grandchildren do not die horrible toxic related deaths, and to better ensure that our community continues to thrive.

Ann Short
P.O. Box 307
Circleville, Ohio 43113

COLUMBUS, OH 432
1 PM
1989

Ms. Georgetta Nelms
USEPA Region 5
230 South Dearborn
Chicago, Ill. 60604

PA

Georgette Helms
USEPA Region 5
230 South Dearborn
Chicago, Ill. 60604

Dear Ms Helms,

Because I have lived in the area called Bowers Landfill before any dumping began, I am greatly concerned about clean up being done correctly for protection of the people in the Pickaway County area.

District Soil and Water representative Mark Scarpitti presented valid conflicting evidence about groundwater flow off-site. The EPA did not study groundwater flow outside the immediate area of the site and could be making a serious inaccurate assumption about potential risks to our water supply.

Montoring wells should be installed between the site and city wells. Previous testing at the site showed high levels of contaminats in leachate and groundwater in 1980 and 1981.

EPA has not drilled into this site to determine the location of wastes but is proposing a remedy to contain something. This site floods frequently which presents great potential for contaminant migration since its closure in 1968. EPA should require testing further out from the site until contaminats are located if not located at the initial test sites.

If no further testing is going to be conducted at least a flood protection dike should be installed.

Since EPA admits that if Bowers Landfill had operated after new laws had been put into effect it would be subject to stricter cleanup requirements why not use these new requirements on your own to protect the drinking water of the people in Circleville? If our local and state health departments had done their job starting in 1958 the recent testing and further testing would not be necessary now. Please do a complete job NOW!

Sincerely,

Ann Short
23 Zn 307
Circleville, Ohio
43113

M. & P. WHALEN-SHAW
7041 ZANE TRAIL RD.
CIRCLEVILLE, OH 43113

U.S. POSTAL SERVICE
PM
1989

9.

Georgette Nelms

USEPA Region 5

230 South Dearborn

Chicago, IL 60604

GFWC CIRCLEVILLE JUNIOR WOMEN'S CLUB
CONSERVATION COMMITTEE

March 12, 1989

Dear Ms. Neims,

Please take note that as a member of the Circleville Ohio community, I am very concerned about the proposal for the containment of the Bowers Landfill. I have worked with a number of the people who live close to the landfill and they all have nothing good to say about the area. They also seem to have a higher than normal incidence of sickness. If this is due directly to the landfill I cannot say for certain but from what I have read on the topic, you do not know that it is not making them more at risk.

I urge you to do everything in your power to make the clean-up of the sight, the toughest possible. In the long run, it will be cheaper to do it now than to have to pay to do it again later. It will also be cheaper do the best possible job now, then it will be to pay for the medical bills incurred down the road from the residents.

This is the only America we have and to destroy it by careless dumping and then to not take every measure to correct our mistake is really stupid. What are we leaving our children if they can't drink the water?

Sincerely,

H. Pat Whalen-Shaw

Raymond Hoff
[illegible] Dr
Cincinnati Ohio
[illegible]

Georgette Nelms
USEPA Region 5
2305 Dearborn
Chicago Ill. 60604

PA

March 12, 1989

To those it may concern,

The Action Committee of Cuckville is certainly not kidding when they tell you about the land fills in Pit. County. I have lived here for 70 years & every word they tell you is the truth. Please check out your water safety with your drilling that you have how to do

We want something done about this now.

Yours Truly -

Raymond Hott
Audrey Hott

716 North Court Street
Circleville, Ohio 43113
March 13, 1989

Georgette Nelms
USEPA Region 5
230 South Dearborn
Chicago, Illinois 60604

Dear Ms. Nelms:

In the interest of safety and good health for the citizens of Circleville, and also for property values, I feel some action should be taken to assure that the drums of chemicals that are buried in Bowers landfill should be removed. Or, possibly, some other method should be devised to make sure that the chemicals do not escape the landfill and get into our water supplies.

Has the EPA done any studies to see if the incidents

Circleville, Ohio
March 13, 1989.

Dear George + Helma,
We live near the Powers Landfill or hazardous waste site. We think that a flood protection dike should be installed at the very least. Please use every precaution possible in closing this site. We need safe water and air.

Sincerely,
Mary Short.

712 N. Court St.
Circleville Ohio 43113

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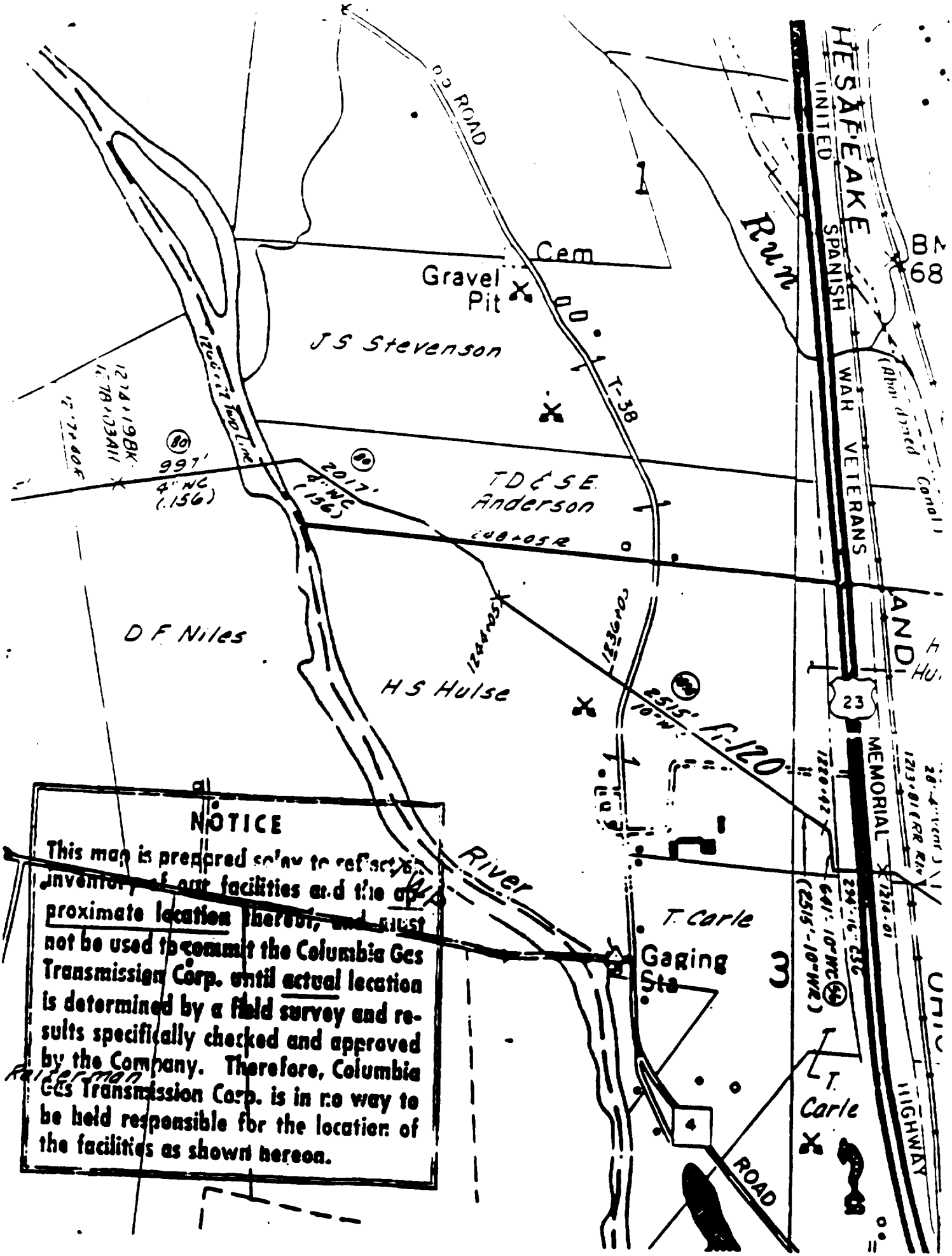
Georgette Nelms
USEPA Region 5
230 South Dearborn
Chicago, Illinois 60604

PA

of cancer and leukemia in the youth of Circleville is greater than in similarly sized towns elsewhere?

Another thought occurs to me that the first report on contamination from Bowe's landfill stated that it was almost as bad as Love Canal in New York. The later report indicates it is not nearly that serious. Was the first report done? Was the second report wrong? Or did the chemicals somehow escape? Or, is the super-fund drying up for clean-up?

Thank You,
Heather D. Lynn
HEATHER D. LYNN
Don Lynn
DON LYNN
Dorothy Lynn
Dorothy Lynn
Lonnie Smith
Lonnie Smith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NOTICE
This map is prepared solely to reflect the inventory of our facilities and the approximate location thereof, and must not be used to commit the Columbia Gas Transmission Corp. until actual location is determined by a field survey and results specifically checked and approved by the Company. Therefore, Columbia Gas Transmission Corp. is in no way to be held responsible for the location of the facilities as shown hereon.
Raiderman

JOHN E. BOWERS
ATTORNEY AT LAW
133 NORTH COURT STREET
CIRCLEVILLE, OHIO 43113
(614) 477-1361

March 13, 1989

U.S. Environmental Protection Agency
ATTN: Mr. David Wilson (5HS-11)
Remedial and Enforcement Response Branch
230 South Dearborn
Chicago, Illinois 60604

Re: Bowers Landfill site, Pickaway County, Ohio

Dear Mr. Wilson:

The following comment is submitted regarding proposed plan and feasibility study for the above referenced site:

The proposed plan fails to address the fact that a large diameter natural gas transmission line crosses the northeast corner of the site. This line is owned by Columbia Gas Transmission Corp. and is designated as Line A-120. A map indicating the location of this line is attached hereto.

Please contact me if you wish to discuss this matter further.

Yours truly,

John E. Bowers

JEB/cm

This matter lies on your shoulders to protect us from toxic water in the underground water zone wells.

We know you will help us now before its late - if it isn't already.

Thanks

March 13, 1989
271 Clark Dr.
Circleville Oh 43

Georgette Nelms
U.S EPA Region 5
230 South Dearborn Chicago Ill. 60604

Dear Georgette Nelms

We in Circleville and Pickaway County feel we are in Catch 22 with no return.

The Bowers landfill is worse than the Love Canal - toxic waste. We want from USEPA potential problems presented by our neighborhood Superfund site corrected and controlled by a fence around the site and monitoring wells between the site and the City's wells field should be immediately installed regardless of any cleaning decision - which should have been done 6 years prior to any Superfund study.

We as people of least need this protection, if it isn't already too late -

Telefax

Georgetta Nelms
U.S. Environmental Protection Agency
Region 5
Office of Public Affairs (5PA-14)
230 South Dearborn Street
Chicago, IL 60604

March 15, 1989

Dear Georgetta:

The EPA studies of the Bowers hazardous landfill site have dealt almost exclusively with the groundwater flow at the site and have failed to account for the likely event a good portion of the chemicals have moved offsite. Due to the frequent flooding of the area and due the porous nature of substratum below the dump, ie. gravel and sand, there is a high probability that large amounts of the toxics moved offsite years ago. Since the contaminants have a half life of hundreds of years and are not dilutable in water, they still exist. Additionally, these chemicals tend to bind to one another in a "plug of concentration". Where is the Bowers landfill plug of concentration?

The cleanup plan addresses the original dump site only and does not safeguard the city of Circleville's water supply from this plug of concentration. It is a mistake to consider a treatment of the original site as a solution. Circleville water wells must be safeguarded with a ring of monitoring wells around the city well fields and constant analysis of the pumped water. Without these safeguards, the physical and economic health of Circleville is in jeopardy.

Sincerely,

Timothy Kamer

Timothy Kamer
405 Ridgedale Drive
Circleville, Ohio 43113
Phone (614) 474-3092

Vera Saunders
211 Clark Dr
Circleville Ohio 43113

Georgette Nelms
USEPA Region 5
230 South Dearborn
Chicago Illinois 60604

3/15/89

Dear Mrs Weims,

Our family lives in Circleville, OH and are concerned by the EPA's plan for the clean up of Bowers Landfill.

The EPA's plan of containment is not in the interest of the people of Circleville. It is only a quick fix, the people here need a permanent remedy or Circleville will cease to exist.

The EPA has settled for a 1 in 10,000 cancer risk in Pickaway County while a 1 in 1 million cancer risk is commonly used in Superfund. Also Superfund site cleanups average $500,000 to $1 million per acre. While the proposal for Bowers Landfill is $350,000 per acre.

Bowers Landfill is near the city's water wells and the Scioto River. However, the EPA has no plans for monitoring wells or only limited monitoring that will be reduced in the future.

The EPA's attitude seems to be hasty, just to be finished with this problem. We say do it right in the beginning. We are against the EPA's plan and hope our objections will be recorded.

Thank you

Ron Lieberman

Linda J. Lieberman

Kramer
405 Ridgedale Drive
Circleville, Ohio 43113

MARCH OF

WORLD STAMP EXPO 89

Georgette Nelms
U.S. Environmental Protection Agency
Region 5
Office of Public Affairs (5PA-14)
230 South Dearborn Street
Chicago, IL 60604

Mr. & Mrs. William Bookout
673 Springfield Road
Circleville, Ohio 43113
15 March 1989

Dear Ms G. Helms:

We are writing in regards to the Bowers Landfill problem here in Circleville. Our Action Committe, thinks the EPA plan is flawed. We are in complete agreement with them.

Please give us a break and MAKE a complete cleanup of this mess. Before someone dies for our governments mistake.

Sincerely
WILLIAM F. BOOKOUT

ANNA M. BOOKOUT

Mr. & Mrs. William Bookout
573 Springmillow Road
Circleville, Ohio 43113
15 March 1983

Dear Ms G. Helms:

We are writing in regards to the Bowers Landfill problem here in Circleville. Our aAction Committe, thinks the EPA plan is flawed. We are in complete agreement with them.

Please give us a break and MAKE a complete cleanup of this mess. Before someone dies for our governments mistake.

Sincerely
William J. Bookout
WILLIAM J. BOOKOUT

ANNA M. BOOKOUT
Anna M Bookout

517 Elm Av
Cridersville, OH
43113

PM 6
15 MAR

Georgette Velms
USEPA Region 5
230 South Dearborn
Chicago, Ill 60604

PA

517 Elm Av
Cridersville, OH
43113

PM
16 MAR

Georgette Velms
USEPA Region 5
230 South Dearborn PA
Chicago, Ill 60604

March 16, 1989

To Whom It May Concern,

We, the undersigned, must strongly protest the methods by which the USEPA is deciding to "fix" the Bowers Landfill. It will not solve the problem of protecting our water supply in Circleville, Ohio. Our water must be protected at <u>any</u> costs! We <u>must</u> have monitoring wells between the site and the City well field. We <u>must</u> also have <u>more</u> monitoring at the site itself. After all, we live here, the ones involved in the USEPA don't! They don't have to worry about their children's 1 in 10,000 risk of <u>Cancer</u> that they're allowing for Pickaway County!

Mr. & Mrs. Danny L. Rose

Mr. & Mrs. Elmer Lowery

Mrs. Virginia Christman

WILLIAM BOOKOUT
6 SPRINGHOLLOW RD
RCLEVILLE OH 43113

SAVE
YOUR VISION
WEEK

GEORGETTE ILLIS
USEPA Region 5
230 South Dearborn
CHICAGO, ILLINOIS 60604

J. L. Parish
District Agent & Registered Representative

Mr. Nelms

I respectfully request that every measure possible be used to "clean up" the Bowers Landfill Superfund site in Pickaway Co. Ohio. As a life-long (48 yrs) resident of this community I'm greatly disturbed by the rising incidence of cancer. I received correspondence approx 5 yrs ago from the American Cancer Society (of which I am a member) stating that only the city of Cincinnati has a higher incidence of cancer than Pickaway County. Please help us!

Sincerely

Jerry & Barbara Parish

PO Box 255
Circleville, Ohio
43113

Georgette Nelms
USEPA Region 5,
230 South Dearborn,
Chicago,
Illinois
60604

FA

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Ohio 43113

Office Hours: Wednesday 9 a.m. - 2 p.m.
Office Phone: 1-614-474-1240
Recordaphone will answer at other times.

TO: Erin Moran, Project Director, USEPA Region 5

FROM: Gary L. Gillen, M.D.
ACTION Representative on the Bowers Landfill Community Information Committee

INRE: Bowers Landfill Superfund Site
Comments on the Remedial Investigation Report Dated 11-18-87
and Endangerment Assessment Draft Final Report

DATE: January 6, 1988

The tone of the discussion of the 1981 Burgess and Niple report strikes me as unusual. The discussion questions the validity of the findings in the Burgess and Niple report and discussed the deteriorated condition of the wells that were drilled in 1981. I have several reactions to that discussion. Burgess and Niple is known to me as a generally well respected engineering firm which Circleville City has used for their water testing. If it's that easy to question the results of a well respected firm in a study, how easy will it be to bring in question the results of the Dames and Moore report in 5 or 6 years? If all that is required is spending 3 or 4 times the money to do that, then we are looking at going through all this again in the 1990's at a cost of 1 or 2 million dollars to throw out much of what is found today. Being a generally respected firm, I also assume that Burgess and Niple took some kind of precautions that the wells they drilled were well constructed and secure to protect their reputation and our groundwater. The condition of those wells as described in the Dames and Moore report is appalling. Either their precautions were inadequate, or they were constructed in an irresponsible fashion. How do Dames and Moore's precautions compare in the construction of the new wells? How quickly will history repeat itself? Why should we not believe that elevated readings of organic vapors found in those wells represent a serious contamination problem? The water from those wells with the elevated readings was not tested.

Comments from ACTION
(a Local Environmental Group)

The section of the report on cancer risks gives a "target range" of 10^{-4} to 10^{-7} as figures for risk of additional cancers. They try to hedge by saying that these are not intended to be "acceptable levels", but if clean-up is to these levels they will have to be accepted as the result of clean-up. As I understand these discussions, the "target range" of 10^{-4} is up to 100 times greater than that "generally accepted".

In summary, we find the following:

1. We find some difficulties with the Remedial Investigation if additional testing is not done to the south of the landfill in the deep aquifer.

2. We find that inadequate explanations are offered for discrepancies between present test results and earlier testing done at the site.

3. Background levels of sediment contamination may have been affected by contaminants from the landfill.

4. We find the "target range" for risk of cancer to be higher than we would consider acceptable.

We would respectfully request that consideration be given to additional deep wells near to the site and at a distance to confirm the hypothesis that contamination has not migrated in a southern direction toward the area of potentially greatest exposure to the nearby population.

We would also request that sampling continue before and during the Feasibility Study and any proposed clean-up to protect the surrounding area from any migrating contaminants not identified in the initial examination since it differs dramatically from earlier studies at the site.

Lastly, we request that in addition to the public question/answer meeting that there be a public written formal comment period of 90 days. We are aware that public written formal comments have been allowed at other sites. At Stringfellow in California the Feasibility Study began during the written comment period for the Remedial Investigation. The residents of Pickaway County will be most affected by and have to live with what results from the Remedial Investigation and should have the opportunity to submit their comments to be part of the formal record. It is too late to expect citizens to comment on the Remedial Investigation after the Feasibility Study. If citizens' comments are given serious consideration, then they should be welcomed when they are the most relevant at each phase of the Superfund process.

1/6/88

Our other major observation about the Remedial Investigation is that well placement and groundwater flow have combined to perhaps miss major areas of contamination of the groundwater. Flow in the deeper aquifer was found to be close to straight south, but there are no sampling wells in the deeper aquifer south of the north-south leg of the landfill. This observation also has impact on the endangerment assessment in that the one route which will expose large numbers of people to a contaminant release is to the south where the city of Circleville has its well field 1½ miles from the landfill. This potential exposure is minimized in the endangerment assessment in spite of the fact that no sampling was done in that direction and flow rates are given that would place any contaminants as far as ½ to 2/3 of a mile south of the landfill.

We believe that background contamination of the Scioto River sediment probably is very bad as found in the Remedial Investigation report because of many years of pollution of the river by waste disposal practices within the city of Columbus. However, the samples done for background are close enough to the landfill that they could have been affected by run-off from the landfill during very heavy rains or flooding.

We offer the following criticisms of the Endangerment Assessment having already noted that we believe that insufficient weight is given to possible southward migration of contaminants in the groundwater to the Circleville well field in the deeper aquifer. Some of the "worst case scenarios" cited aren't really worst cases. For example, the report cites some studies of pica in children as the heaviest possible exposure by ingestion of soils, but having done some field cultivating myself, I would be reasonably sure that farming the land at the landfill could easily result in greater than 0.6 gm ingestion depending on wind speed and direction. The scenarios given also don't review the possibility of a concentrated exposure over time that might occur if a seepage would occur into the drainage ditch and a child spent some time wading, swimming in, and drinking from it. Given a sudden release of material during the frequent flooding cited, what would be the resulting exposure to areas also flooded downstream such as Circleville's well field?

The Endangerment Assessment does not address what changes might occur at the site due to graveling operations. These are occuring adjacent to the site and could cause changes in the groundwater movement if large quantities of gravel are removed.

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Oh 43113 474-1240

generally used in dry cleaning clothing and industrial applications, we doubt that it would likely occur about sand and gravel quarrying unless they were experimenting with dry cleaning the gravel. Such comments and logic cause one to pause and ponder the real motive of those doing the evaluating.

We note that this draft of the report states that extensive sand and gravel quarrying does occur about the site. The report also speculates that those exposed areas of high water permeability may aid in creating part of the hydraulic pressure moving the groundwater to the west. The report does not speculate what will happen to groundwater flow and the contaminants the water contains should those quarrying operations reach below the water table as they have at locations south of the site.

The RI states in Chapter 2 that the threat to the Circleville well fields is probably very slight because the sand and gravel at the site is very permeable and relatively unconfined, yet we are told that the Scioto River acts as a barrier to westward migration of contaminants because the groundwater discharges uphill into the river from the groundwater 20-60 feet down. That sounds far-fetched.

The report continues to document very well that the landfill is flooded frequently and further that the "clay layer" under the landfill might slow movement into the groundwater, but we still have very little comment about how that flooding might distribute contaminants and contaminated soil from the landfill. The Endangerment Assessment also gives little space to that question - even though, whatever is done to the site, it is safe to say that it will continue to be flooded very frequently after some remedy is performed on the site.

We found it very interesting that the Endangerment Assessment made a table of proposed scenarios of impact of our site of present and future dangers. Of the 10 scenarios sited, 7 were cited as possible dangers to "recreational users" of the site. The RI documented use of the site by fishermen and users of all-terrain vehicles. We have stated on numerous occasions since 1984 that the landfill should have a fence around it. A simple fence around 12 acres in 1984 would have reduced all of those exposures and future exposures to only those who were intent on being exposed at far less cost than a small fraction of what this study has cost so far. Now we have a study that we still have trouble with, and all those exposures are still continuing. We propose that the single most cost-effective procedure that could have been done to reduce past and future exposures to contaminants in the landfill would be to limit recreational use of the area by means of a fence.

We will continue to request that provisions be made to test nearby water wells, including those for the city of Circleville, on a regular basis for appropriate contaminants and that said testing should occur quarterly. We also understand that at other Superfund sites requirements of safe "clean-up" have been defined at the point of exposure. We will have great difficulty with any plan which proposes to achieve "relevant and appropriate requirements" by a mathematical formula at the Circleville well fields or nearby wells.

In summary, we find the RI and Endangerment Assessment flawed, inadequate and unacceptable by the continued attempts to make the results fit what the regulators and responsible parties want to do or not do to the site, by an attempt to minimize major problems thwarting clean-up at the site because they don't know what to do about it, by an attempt to minimize hazard to avoid frightening local residents, and by an attempt to minimize

6/2/88

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, Oh 43113 474-1248

TO: Erin Moran, Project Director, USEPA Region 5

FROM: Gary L. Gillen, M.D.
ACTION Representative on the Bowers Landfill Community Information Committee
William A. Myers, M.D., ACTION Alternate Representative

IN RE: Bowers Landfill Superfund Site
Comments on the Remedial Investigation Report Dated 4-28-88 and Endangerment Assessment Final Report

DATE: June 2, 1988

We continue to be overwhelmed by the process of evaluating and reviewing a Superfund site. Our present system relies on "adversaries" who argue opposing points of view. Each has the objective of "winning" their argument or obtaining a compromise that will come close to what they want to accomplish. Sometimes the objective is simply to prevent the "other side" from winning. An ideal system would find industry interested in identifying problems before they cause trouble and taking care of them before anyone gets hurt. A good system would have an impartial government agency that would identify a problem and see to it that those responsible for the problem did their best to take care of it. Instead, we have had a system in which industry has to avoid taking any responsibility for a problem so they are not put at an economic disadvantage or risk getting sued for admitting responsibility. The regulators have so far felt a responsibility in protecting the identified industries (potentially responsible parties) from unnecessary financial harm because of the unjustified fears of an "hysterical" public. So we have the ludicrous situation of citizens being forced to become experts in their local areas in order to adequately oversee the regulators overseeing the responsible parties. We ought to all be most interested in seeing that our various community problems are solved quickly and completely. We have many more interesting ways that we could spend this time than reviewing the 15 inches of documents so far generated or spending over 2 hours on the phone with various experts who donate their time for our benefit. There is no better way we could spend that time for the benefit of our community though.

We were gratified that additional wells were placed in the deep aquifer as we had suggested. We remain skeptical about the location and extent of sampling because of the apparent disparity in findings between the present study and earlier ones which had indicated heavier contamination than has been found in the present study. We remain unimpressed with the argument that previous studies' results should somehow be ignored because of possible inadequate quality control. The compounds (mixed xylenes, toluene, ethylbenzene) that were found in those studies in significant amounts are no ones that would likely be due to lab error or external contamination. The previous results would seriously change the results of the Endangerment Assessment. Our consultants also reviewed the data used to determine the direction of groundwater flow. The data are not totally convincing that the flow is definitely to the west. The water levels and wells are close enough to each other to make it difficult to say. The additional work plan stated there would be three additional wells drilled into the deep aquifer. Only two were done with no explanation. As we have previously suggested, wells further from the site could be helpful in that regard.

Chapter 5 of the Remedial Investigation (RI) notes that tetrachloroethene might be related to activities at the sand and gravel quarrying operation adjacent to the landfill. Since it is a solvent

ACTIVISTS CONCERNED WITH TOXICS IN OUR NEIGHBORHOODS
111 Island Road, Circleville, OH 43113 474-1240

PRESS RELEASE - Powers Landfill Superfund Site Public Meeting
Wednesday, Sept. 14, 1988, 7 p.m., Circleville High School Cafeteria
Contact: ACTION, 474-1240; Spokespersons: Paul Turner, 983-2173 and
Gary L. Gillen, M.D., 474-2126 or 474-8818 or 474-5303

We find the Remedial Investigation (RI) and Endangerment Assessment flawed, inadequate, and unacceptable by the continued attempts to make the results fit what the regulators and responsible parties want to do or not do to the site, by an attempt to minimize major problems thwarting clean-up at the site because they don't know what to do about it, by an attempt to minimize hazards to avoid frightening local residents, and by an attempt to minimize problems to avoid putting too much economic stress on the responsible parties. The following are examples of the flawed logic contained in the two reports:

1. We remain unimpressed with the argument that previous studies' results (OEPA in 1980 and Burgess & Niple in 1981) should somehow be ignored because of possible inadequate quality control. The compounds (mixed xylenes, toluene, ethylbenzene) that were found in those studies in significant amounts are not ones that would likely be due to lab error or external contamination.

2. Since tetrachloroethene is a solvent used in dry cleaning clothing and industrial applications, we doubt that it would occur in the adjacent sand and gravel quarrying as Chapter 5 of the RI states unless they were experimenting with dry cleaning the gravel.

3. The reports do not speculate what will happen to groundwater flow and the contaminants the water contains should adjacent quarrying operations reach below the water table as they have south of the site.

4. The data are not totally convincing that the groundwater flow is definitely to the west since water levels and wells are close enough to each other to make it difficult to say. As we have previously suggested, wells further from the site could be helpful in that regard.

5. In Chapter 2 of the RI we are told that the Scioto River acts as a barrier to westward migration of contaminants because the groundwater discharges uphill into the river from the groundwater 20-60 feet down. That sounds far-fetched.

6. Both reports document very well that the landfill floods frequently but neither addresses how that flooding might distribute contaminants and contaminated soil from the landfill.

7. Of the 10 present and future dangers sited, 7 were sited as possible dangers to "recreational users" of the site (fishermen and all-terrain vehicles). We have stated on numerous occasions since 1984 that the landfill should have a fence around it for this reason. The single most cost-effective procedure that could have been done to reduce past and future exposures to contaminants in the landfill would be to limit recreational use of the area by means of a fence. A costly inadequate study was certainly not necessary to determine this.

In conclusion, such comments and "logic" cause us to pause and ponder the real motives of those doing the evaluating. It appears we have a system in which the regulators feel a responsibility to protect the responsible parties from the unjustified fears of an "hysterical" public. So we have the ludicrous situation of citizens being forced to become experts in their local areas in order to adequately oversee the regulators overseeing the responsible parties. To tiptoe around obvious areas of concern will only reduce our ability to solve the problems at the site to the best of our abilities. That could hurt our community, our industries, and our legacy to future generations.

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problems to avoid putting too much economic stress on the responsible parties. We have many of these same concerns, but attempting to tiptoe around these areas will only reduce our ability to solve the problems at the site to the best of our abilities. That could hurt our community, our industries, and our legacy to future generations.

These written remarks are to be published with the Final Remedial Investigation report as agreed upon by Ms. Jennifer Hall, USEPA Region 5.

cc: Valdus Adamkus, USEPA Region 5
Richard Shank, OEPA Director
Governor Richard Celeste
Senator Frank R. Lautenberg
Attorney General Anthony Celebrezze, Jr.
Pickaway County Commissioners
Stephen Lester, CCHW
Rep. Mike Dewine
Senator Jan Long
Rep. Mike Shoemaker
Mayor Mike Logan
Senator John Glenn
Senator Howard Metzenbaum

6/2/88

DECLARATION

SELECTED REMEDIAL ALTERNATIVE FOR THE WHEELER PIT SITE LA PRAIRIE TOWNSHIP, WISCONSIN

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Wheeler Pit Site, La Prairie Township, Wisconsin, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site.

Assessment of the Site

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

Description of the Selected Remedy

The selected remedial action is a final remedy for the site. The purpose of this remedy is to eliminate or reduce migration of contaminants to the groundwater and to reduce the risks associated with exposure to the contaminated materials.

The major components of the selected remedy include:

- Construction of a landfill cover (cap) in compliance with Chapter NR 504.07, Wisconsin Administrative Code (WAC) landfill closure requirements;

- Consolidation of waste and soil from adjacent property onto original disposal area;

- Use of institutional controls on landfill property to limit land and groundwater use;

- Monitoring of groundwater to ensure effectiveness of the remedial action;

- Evaluating monitoring results to determine if additional action is necessary; and

- Monitoring private wells.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable. However, because treatment of the principle threats of the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

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

State Concurrence

The State of Wisconsin concurs with the selected remedy. The Letter of Concurrence is attached to this Record of Decision (ROD).

Valdas V. Adamkus
Regional Administrator

Sept. 28, 1990.
Date

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny, Secretary
Box 7921
Madison, Wisconsin 53707
TELEFAX NO. 608-267-3579
TDD NO. 608-267-6897

September 19, 1990 IN REPLY REFER TO: 4440

Mr. Valdas Adamkus, Regional Administrator
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, IL 60604

SUBJECT: Selected Superfund Remedy, Wheeler Pit, La Prairie Township, Wisconsin

Dear Mr. Adamkus::

The Department is providing you with this letter to document the State of Wisconsin's concurrence on the proposed remedy for the Wheeler Pit Superfund site. The proposal, as identified in the draft Record of Decision, includes the following:

Alternative 3B: Enhanced Capping

This alternative provides for the hazardous substances to be consolidated into the original disposal area and capped with a new clay cap according to the requirements of NR 504.07, Wisconsin Administrative Code. In addition to the capping requirement, institutional controls will be implemented at the site. These controls will include a fence around the disposal site and deed restrictions on future land uses on the disposal site. Long-term ground water monitoring will occur to evaluate the performance of the remedy, as well as to determine if any additional actions are necessary. Long-term operation and maintenance of the cap will be required, in addition to sampling of private wells.

Estimated Costs: Construction - $829,600
Operation and Maintenance - 137,300/year
30-Year Total Present Worth - $2,940,000

The Department concurs with the selected remedy described above and presented in the Record of Decision for this site.

The State of Wisconsin will contribute 10 percent of the remedial action costs associated with the Wheeler Pit site if the potentially responsible parties (PRPs) do not agree to fund the remedy. This assurance is provided on the condition that the U.S. EPA will pursue legal action against the PRPs, to the extent feasible. The State's preferred enforcement approach is for U.S. EPA to issue a unilateral order to the PRPs requiring them to undertake remedial design and remedial action of the selected remedy.

We also understand that our staff will continue to work in close consultation with your staff during the remedial design and remedial action phases of the Wheeler Pit site.

Thank you for your support and cooperation in addressing this contamination problem at the Wheeler Pit site in La Prairie Township. If you have any questions regarding this matter, please contact Mr. Paul P. Didier, Director of the Bureau of Solid and Hazardous Waste Management.

Sincerely,

C.D. Besadny
Secretary

CDB:MS:ps
d:\swm\wlrpt.mrs

cc:

Lyman Wible - AD/5
Linda Meyer - LC/5
Paul P. Didier - SW/3
Joe Brusca - SD
Mike Schmoller - SD
Mary Pat Tyson - EPA
Mary Beth Novy - EPA
Mark Giesfeldt - SW/3
Sue Bangert - SW/3

RECORD OF DECISION SUMMARY
WHEELER PIT SITE
LA PRAIRIE TOWNSHIP, WISCONSIN

1.0 SITE NAME, LOCATION, AND DESCRIPTION

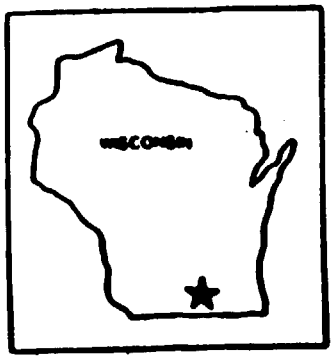
The Wheeler Pit site is located in rural La Prairie Township approximately 1-1/2 miles east of the City of Janesville, Wisconsin, population 51,000, directly northwest of the intersection of County Highway O (Old Delavan Road) and County Highway J. (See Figure 1) The site (Wheeler Pit) is within a physical depression approximately 50 feet deep and spanning an area of approximately 35 acres, which previously operated as a sand and gravel pit. The site, as originally defined by General Motors Corporation in their Notification of Hazardous Waste Site, consists of 3.82 acres of land in the southeast portion of Wheeler Pit which was used as a disposal area for industrial wastes for approximately 18 years.

The base of the gravel pit is fairly flat, and the sides slope steeply upwards, particularly to the north and east. The ground surface is sloped for an access roadway from County Highway J to the floor of the gravel pit. The road runs around the southern and western edges of the site.

The soils under the site are generally glacial outwash sands and gravels. A clay layer was found near the ground surface south of the site as well as northeast of the site. In the disposal area, the clay layer did not exist or was removed during sand and gravel mining operations and was replaced by the waste material.

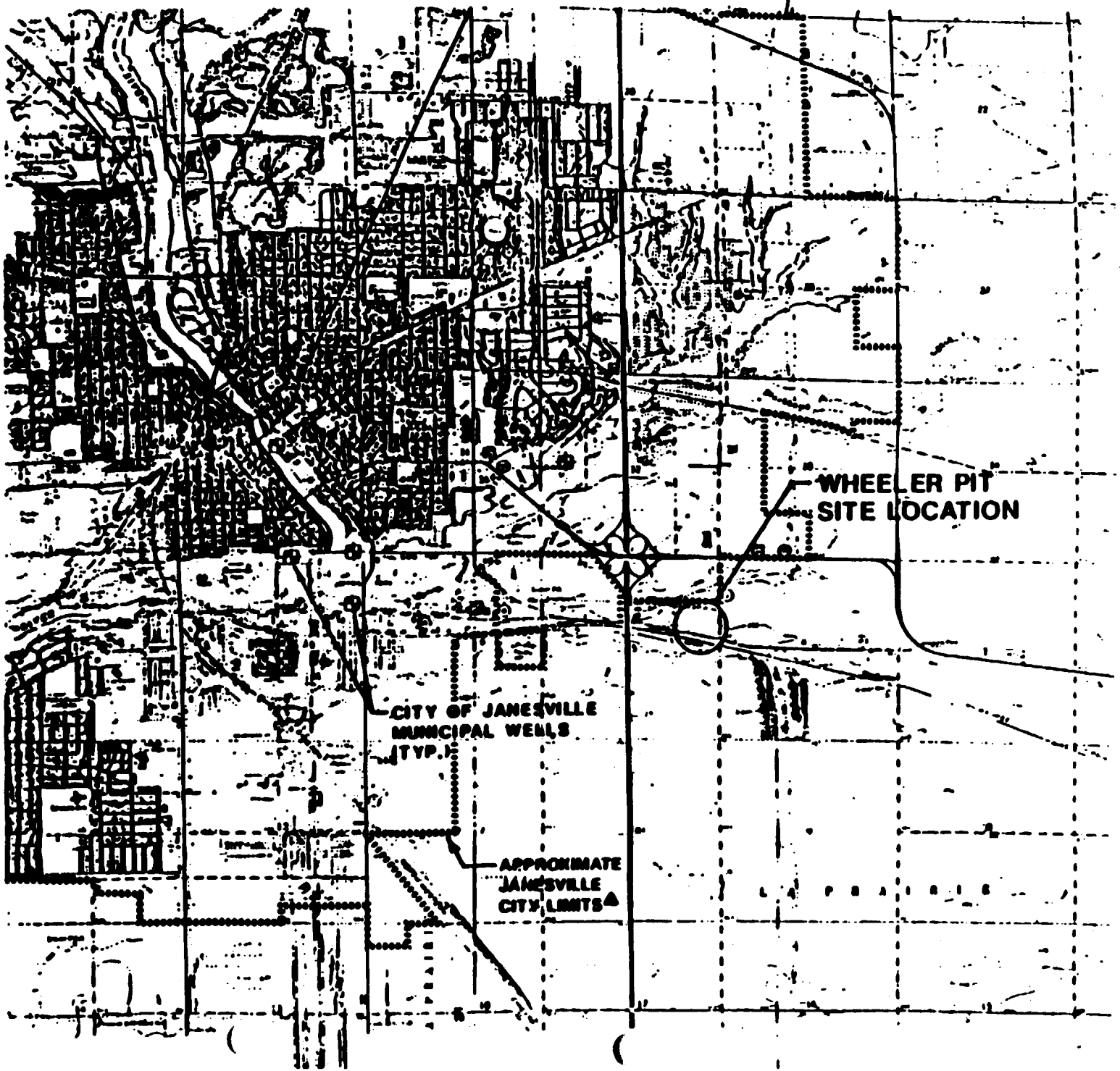
The area surrounding the site is mainly used for agriculture and for sand and gravel mining. There is a small asphalt plant on property owned by Frank Brothers, Inc., which is north of and adjacent to the property on which the site is located. Tanks and piping associated with this operation encroach on the northern portion of the site. There is a well located on this property, but is not currently in use. Along the eastern site boundary on County Highway J, the Rock County Highway Department maintains a salt storage facility. No water supply well exists on this property. West of the site, in the western portion of Wheeler Pit, a fertilizer company, Green-Rock PS Cooperative, leased a parcel of land in 1962. The buildings and equipment of the fertilizer plant were demolished and removed in early 1989.

The Rock River is located approximately 2 miles west of the site and flows in a southerly direction. The river is mainly used for recreational purposes. Groundwater beneath the site in the upper aquifer flows to the southwest at a rate ranging from 30-365 feet/year. The upper aquifer is composed of outwash sand and gravel deposits, and regional information indicates that this sand and gravel outwash is at least 200 feet thick beneath the site. This aquifer is a major source of drinking water in the



SITE LOCATION MAP

FIGURE 1



Janesville area. The aquifer below the sand and gravel outwash is composed of sandstone and is most likely hydraulically connected to the upper aquifer. The nearest municipal water supply well is the City of Janesville Municipal Well No. 8, which is located approximately 6,000 feet northwest of the site. Private wells located near the site are 900 feet south, 1,000 feet southwest, and just across County Highway J to the east of the site. These wells are screened in the upper aquifer. The site does not lie in wetlands or a floodplain.

A more complete description of the site can be found in the RI/FS Reports.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Wheeler Pit property was purchased in 1900 by the Janesville and Southeastern Railway Company, predecessor in interest to the Chicago, Milwaukee, St. Paul and Pacific Railroad, which filed for bankruptcy in the 1970s. Upon completion of the bankruptcy proceedings, CMC Real Estate Corporation, successor to the Railroad, acquired ownership of the property on which the site is located. In early 1990, CMC Real Estate Corporation reformed to become CMC Corporation. CMC Corporation is the current owner of the property on which the site is located. The Wheeler Pit property was originally bought to provide sand and gravel for the Railroad. It has been reported that the Railroad also used Wheeler Pit for refuse disposal.

In 1956, General Motors Corporation (GM) leased a 3.82 acre portion of the pit from the Railroad as a general waste disposal site. From 1956 to 1960, GM disposed of general refuse at the site. From 1960 through 1974, GM disposed of paint spray booth sludges, residue from the part hanger stripping system, clarifier sludges and powerhouse coal ashes from its automobile assembly plant in Janesville. The disposal site was reported to be approximately 400 feet long, 250 feet wide and 8 feet deep. An estimated 22.3 million gallons of organic and inorganic sludges were disposed of at the site, as reported by GM to the United States Environmental Protection Agency (U.S. EPA) in GM's Notification of Hazardous Waste Site form submitted in June 1981. The Railroad also filed a Notification of Hazardous Waste Site.

At the site, waste was disposed of by depositing it within a diked area and allowing it to spread freely. The material was quite dense, so that compaction equipment was not used. The waste was deposited in layers, alternating between layers of sludge and layers of coal ash. Trucks were then able to drive over the previously filled area. The dike, which contained the materials, was located on the north and west sides of the disposal area. In August 1981, some liquid seepage was noticed on the ground surface outside the disposal area. The Remedial

Investigation (RI) results showed that the ash/waste boundary extends beyond the original disposal boundary to the north and northwest, indicating that the waste spilled over the dike to some extent during the active life of the site.

At the request of La Prairie Township, disposal at the site was discontinued in 1974. The disposal area was covered and closed during the fall of 1974 and summer of 1975 in general accordance with guidelines provided by the Wisconsin Department of Natural Resources (WDNR) in a letter dated May 6, 1974. WDNR required that GM implement a groundwater monitoring program; generate a site topographic map; stabilize surface water runoff; and grade, cover and re-vegetate the site.

Groundwater monitoring was performed by GM on an irregular basis after closure in 1974. In response to complaints concerning potential groundwater quality impacts related to waste disposal practices at the site, WDNR and GM sampled on-site monitor wells and certain private water supply wells in April 1981. Elevated levels of trichloroethylene, chromium, zinc and barium were noted in both WDNR and GM samples taken on site. Results from these analyses and GM's January 1981 sampling round were used by U.S. EPA in the Hazard Ranking System (HRS) evaluation of the site performed in April 1983. The site was placed on the National Priorities List on September 21, 1984. This NPL listing was published in 49 Federal Register 37070.

In June 1987, two known PRPs for the site, GM and CMC Corporation (CMC), received special notice letters, which provided them with the opportunity to conduct the Remedial Investigation and Feasibility Study (RI/FS). GM and CMC signed a consent order with U.S. EPA and WDNR which became effective December 1, 1987. This order outlined the scope and schedule for the RI/FS at the Wheeler Pit site. GM and CMC assumed responsibility for the site investigation, and Warzyn Engineering Inc., under contract to the PRPs, conducted the RI/FS. U.S. EPA and WDNR oversaw activities at the site.

RI field activities began in September 1988 and included two phases. Activities included digging and sampling of four test pits, installation of six monitor wells (three nests), hydraulic conductivity testing, groundwater level monitoring and groundwater sampling. Phase II activities included three additional test pits, an electromagnetic survey to help determine the waste boundary and volume, waste/soil borings and sampling, shallow soil borings,. surface soil sampling, four additional monitor wells (two nests), and a second round of hydraulic conductivity testing and groundwater sampling. Figure 2 shows the locations of the monitoring wells, soil borings, surface soil samples and test pits. The RI Report describing these activities was finalized on March 1, 1990. An Endangerment Assessment was also prepared and was included as part of the RI

Report.

In September 1989, it was decided to streamline the remainder of the RI/FS based on the straightforward nature of the site. The number of alternatives considered for this site was reduced very early in the FS process, and all groundwater alternatives were eliminated from the list, based on the levels of contaminants detected in the groundwater and the limited extent of contamination. Four alternatives remained and were evaluated in the FS Report. The Public Review Draft of the FS Report was submitted on May 30, 1990.

U.S. EPA has not yet sent out special notice letters for Remedial Design and Remedial Action (RD/RA) to the PRPs. These should be issued after the time that this ROD is signed.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

A community relations plan was developed in 1988 to document community concerns and to plan an information strategy. U.S. EPA has held one public meeting and one informal availability session to keep the public informed about the activities at the site. U.S. EPA has also sent out fact sheets at various times during the RI/FS process.

As part of its community relations program, U.S. EPA has maintained two information repositories: one is at the Janesville Public Library, 316 South Main Street, Janesville, Wisconsin; and the other is at the La Prairie Township Clerk's Home/Office, 915 Sharon Road, Janesville, Wisconsin. All formal reports submitted by the PRPs during the Wheeler Pit RI/FS are available at these locations. The repositories also contain documents prepared by U.S. EPA, such as fact sheets and the Proposed Plan, as well as documents prepared by U.S. EPA's oversight contractor.

U.S. EPA notified the local community, by way of the Proposed Plan, of the recommendation of a remedial alternative for the Wheeler Pit. To encourage public participation in the selection of a remedial alternative, U.S. EPA scheduled a public comment period from July 12 to August 11, 1990. This public comment period was extended to August 24, 1990. Additionally, on August 8, 1990, U.S. EPA held a public meeting to discuss the recommended remedial alternative and the other alternatives

IGURE 2

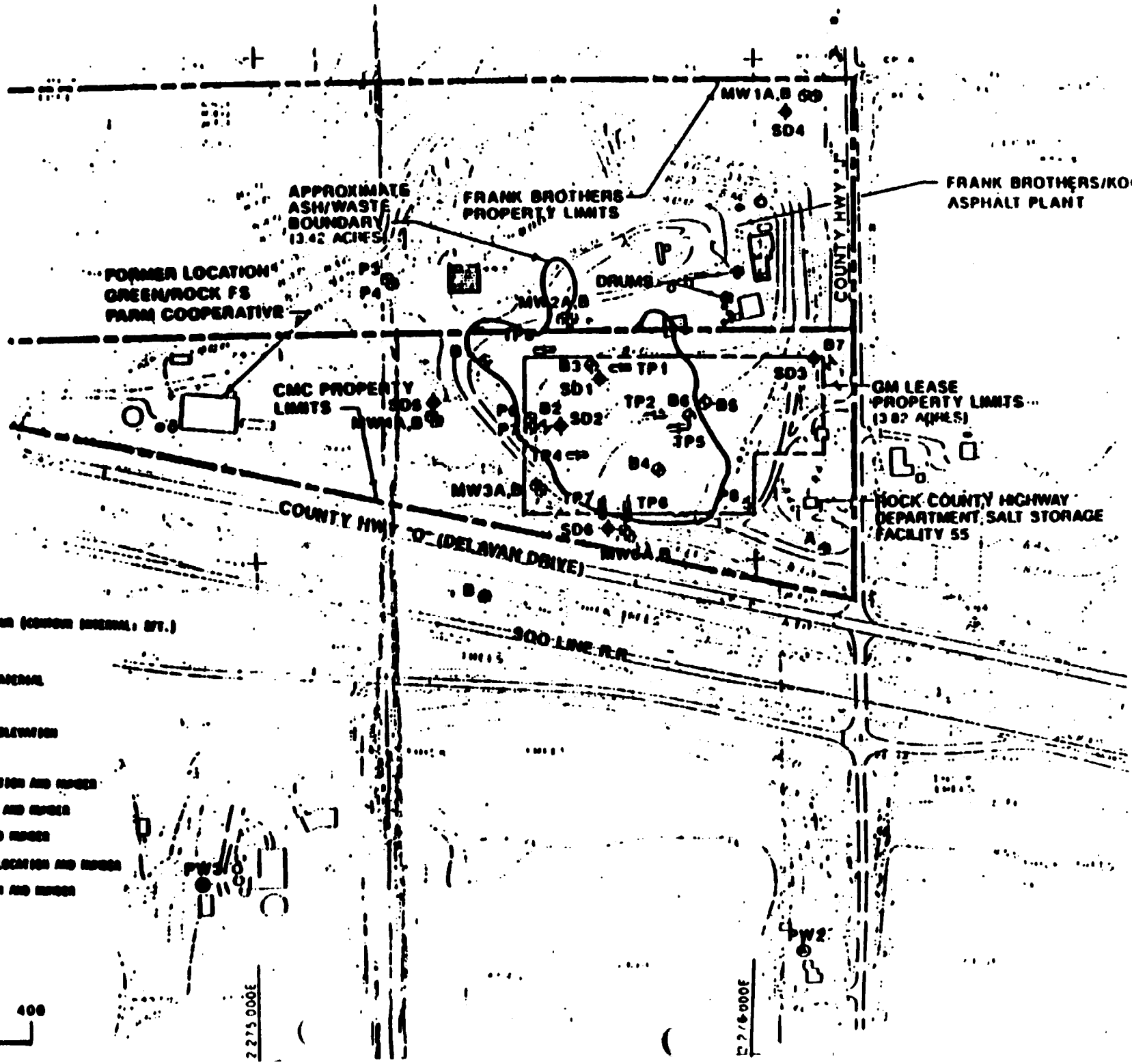
LEGEND

TANKS
BUILDING
FENCE LINE
ACCESS ROAD
TREES
830 GROUND SURFACE CONTOUR (CONTOUR INTERVAL: 5FT.)
DRUMS
UNIDENTIFIED WASTE MATERIAL
PUMPHOLE
834.2 GROUND SURFACE SPOT ELEVATION
STORAGE FACILITY
MW1A MONITORING WELL LOCATION AND NUMBER
B1 SOIL BORING LOCATION AND NUMBER
TP1 TEST PIT LOCATION AND NUMBER
SD1 SURFACE SOIL SAMPLE LOCATION AND NUMBER
PW2 PRIVATE WELL LOCATION AND NUMBER

north

0 200 400

SCALE IN FEET



identified and evaluated in the FS. A transcript of this meeting is included as part of the Administrative Record for the Wheeler Pit site. U.S. EPA's responses to comments received during this public meeting and to written comments received during the public comment period are included in the Responsiveness Summary which is attached to this ROD.

Press releases were sent to Janesville and Rockford, Illinois, media, and advertisements were placed in the Janesville Gazette concerning the availability session, public meeting and comment period.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

The selected remedy for the Wheeler Pit site is intended to be the final response action at the site. The remedy will combine source control, site access and land-use restrictions, and long-term groundwater monitoring. In summary, the selected remedy will include consolidating waste that is currently on adjacent property onto CMC property, removing trees and vegetation from the landfill, installing an NR 504.07 cap, providing for institutional controls including fencing the site and restricting site use via land use restrictions, and conducting long-term groundwater monitoring. The components of the selected remedy are described in greater detail in Section 9.0. This remedy will be subject to a review in five years since waste material above health-based levels will be left on site.

No principal threat which warrants treatment at the site has been identified. The level of contamination remaining in the waste on site can be reliably controlled over time through engineering and institutional controls; therefore, treatment is not practicable. However, the waste mass in place represents a potential threat through contact and a release of contaminants to the environment, and the present and potential future groundwater contamination may be a threat to the environment and public health. This remedial action will address these concerns.

During the groundwater monitoring program, if it is shown that the groundwater conditions become worse or do not improve over a reasonable period of time, U.S. EPA may evaluate options for a groundwater treatment program. Whether additional measures are needed will be determined by U.S. EPA and the WDNR as discussed in Section 9.0.

5.0 SUMMARY OF SITE CHARACTERISTICS

The source of contamination at the site is the estimated 22.3 million gallons of sludges and coal ash which GM disposed of in Wheeler Pit. The disposal area was located in a portion of the former sand and gravel pit and was not lined. According to the results of the RI, the waste/fill covers an approximately 3.4

acre area and ranges from 0-23 feet in thickness. At its deepest point the waste is approximately 10 feet above the water table. The estimated volume of waste is 60,600 cubic yards (cu yds). The predominant contaminants in the waste materials are toluene, ethylbenzene, xylenes, phthalates, polynuclear aromatic hydrocarbons (PAHs) and metals. Concentration ranges for organic compounds detected in test pit waste samples are as follows:

- toluene, ethylbenzene, xylenes: total concentrations ranging from 3,302 ug/kg to 508,000 ug/kg.

- phthalates: detected as individual compounds at concentrations ranging from 450 ug/kg to 630,000 ug/kg.

- PAHs: total PAH concentrations ranged from 9,520 ug/kg to 152,000 ug/kg.

Toluene, ethylbenzene and xylenes are volatile organic compounds (VOCs). VOCs are compounds which tend to evaporate when exposed to air. Phthalates are semi-volatile organic compounds associated with plastics and plastic-making processes. PAHs are semi-volatiles derived from coal and oil tars and the incomplete combustion of carbonaceous materials.

Nine metals were detected in test pit wastes at maximum concentrations that were at least 10 times the background soil concentrations. They are (with maximum concentration):

antimony (20 mg/kg)	lead (3,130 mg/kg)
barium (14,500 mg/kg)	mercury (0.28 mg/kg)
cadmium (20.2 mg/kg)	nickel (608 mg/kg)
total chromium (1,250 mg/kg)	zinc (13,100 mg/kg)
copper (151 mg/kg)	

The waste/fill material also contains metal, concrete and wood debris, chunks of paint sludge, and a variety of other materials such as wire, insulation and bricks.

The present cover at the site consists of 0-6 inches of sand, ash or silt plus 0-2 inches of topsoil. This cover is vegetated with grass and trees. Phthalates and three metals were detected in surface soil both on-site and southwest of the waste disposal boundary. The highest phthalate concentration detected was 7,200 ug/kg, and cadmium and lead were detected at levels 2-3 times background. The range of background concentrations for cadmium was .10 -.36 mg/kg and for lead was 10.3 - 34.9 mg/kg.

Approximately 27,600 cu yd of contaminated subwaste soil in the 3.4-acre area are present beneath the waste. Concentrations of contaminants in subwaste soil were low relative to the concentrations in the test pits. Staining of subwaste soils was observed, but it only extended approximately 6 inches below the

waste, in the areas sampled.

As stated earlier, the groundwater flows to the southwest at a rate of 30-365 feet per year. Based on the wells sampled at the site, the groundwater contamination appears to be limited in terms of contaminant concentrations and extent. However, the plume leaving the site was not well-defined. Chlorinated benzene compounds -- such as 1,4-dichlorobenzene, 1,3-dichlorobenzene and chlorobenzene -- were detected in two downgradient water table wells, as were elevated concentrations of certain metals. 1,4-dichlorobenzene was detected at 24 ug/l at a well adjacent to the site and at 25 ug/l at a well further downgradient. Arsenic, chromium, iron and manganese were detected in downgradient wells at concentrations which exceed Preventive Action Limits (PALs). PALs are Wisconsin State groundwater standards and are 10 or 20% of Wisconsin's Enforcement Standards (ES), which are generally equivalent to Federal Maximum Contaminant Levels (MCLs). MCLs are drinking water standards set forth in the Safe Drinking Water Act (SDWA). In addition, PALs are a trigger by which the State of Wisconsin contemplates taking an action at a site, which can range from no action to active remediation. Manganese exceeded its ES at the furthest downgradient well. Maximum concentrations of these metals in the groundwater and the corresponding PAL and ES are as follows (for well locations see Figure 2):

Arsenic: 32 ug/L in Well MW03A
PAL - 5.0 ug/L ES - 50.0 ug/L
Chromium: 5.8 ug/L in Well MW04A
PAL - 5.0 ug/L ES - 50.0 ug/L
Iron: 9,120 ug/L in Well MW03A, and 170 ug/L in Well MW03B
PAL - 150 ug/L ES - 300 ug/L
Manganese: 818 ug/L in Well B, and 158 ug/L in Well MW03A
PAL - 25.0 ug/L ES - 50.0 ug/L

The levels of 1,4-dichlorobenzene detected do not presently exceed PALs or ESs, since the current standards are 150 ug/L for PALs and 750 ug/L for ESs. It is expected, however, that the PAL will be lowered to 15 ug/L and the ES will be 75 ug/L as of October 1, 1990. Under these new standards, 1,4-dichlorobenzene will exceed its PAL at MW03A and Well B.

Background groundwater quality indicates elevated total dissolved solids, zinc and nitrate concentrations upgradient from the site. However, elevated alkalinity, total dissolved solids, specific conductance and oxygen deficient conditions in downgradient groundwater indicate groundwater impacts have resulted from the site as well as from possible upgradient sources. Nitrates exceeded ESs at 10 wells, and total dissolved solids exceeded ESs at the site in 4 wells, but this may be in part due to background conditions.

At this time, groundwater seems to be the primary potential contaminant migration pathway. However, based on available data, groundwater contamination appears to be limited. The closest downgradient private well is 900 feet away. It was sampled by the WDNR in 1984 and 1985 for volatile organic compounds (VOCs), and the analyses determined no VOCs were present. No analysis for metals was done. Three municipal wells are approximately 2 miles west of the site, with the nearest well 6000 feet northwest of the site.

The RI Report states that reducing conditions in the groundwater may be partially responsible for the metals present in the groundwater. These reducing (oxygen deficient) conditions may increase the solubility of such metals as arsenic and iron and to some extent manganese, causing the release of these metals from the subwaste soils. As the reducing conditions diminish away from the site, the affected metals will readsorb to the soils. While this theory may partially explain the presence of certain metals in the groundwater, U.S. EPA and WDNR still believe that, based on groundwater data, these and other metals not affected by the oxidation/reduction chemistry, as well as the semi-volatile chlorinated benzene compounds, are migrating from the waste at the site.

Other attenuating mechanisms identified in the RI Report were adsorption of organic and inorganic contaminants to sludge and fly ash; physical encapsulation of liquid and volatile contaminants by dried paint sludges, which would reduce the interaction of waste contaminants with percolating water; and biochemical degradation of organic contaminants in the waste, evidenced by possible reducing conditions in one monitoring well (MW03A) and observations of septic odors from the waste material during soil borings. All of these mechanisms may be contributing to some undetermined extent to limit the migration of organics and inorganics found at elevated levels in the waste. However, the extent of these mechanisms in the waste and the permanence of these conditions is not certain.

6.0 SUMMARY OF SITE RISKS

In accordance with the Administrative Order by Consent, the PRPs prepared the baseline risk assessment during the RI/FS. This assessment, called an Endangerment Assessment in the RI Report (chapter 8), followed the guidance provided in U.S. EPA's Superfund Public Health Evaluation Manual. U.S. EPA has since issued a new risk assessment guidance document called Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual. This more recent guidance was not used.

In order to calculate actual and potential risks to human health and the environment posed by the Wheeler Pit site,

indicator chemicals were selected to represent the contamination at the site. This list of indicator parameters is only a subset of the constituents of concern identified during the RI. The indicator chemicals which were identified for each medium, with the maximum concentration at which they were found, are listed below:

<u>Surface Soil</u>
Cadmium - 1.0 mg/kg
Butylbenzyl phthalate (BBP) - 7,200 ug/kg
Bis(2-ethylhexyl)phthalate (BEHP) - 160 ug/kg

<u>Waste/Subwaste Soils</u>
Lead - 3130 mg/kg
Cadmium - 20.2 mg/kg
Naphthalene - 110,000 ug/kg
BBP - 630,000 ug/kg
BEHP - 47,000 ug/kg
Ethylbenzene - 53,000 ug/kg
Xylenes - 370,000 ug/kg

<u>Groundwater</u>
BEHP - 3.0 ug/L
1,4-Dichlorobenzene - 25 ug/L
Ethylbenzene - 0.8 ug/L
Xylenes - 6.0 ug/L

After evaluating potential current and future exposure pathways at the site, three exposure scenarios were chosen to represent possible risks posed by the site. One considers current site conditions, and two assume hypothetical future site conditions. These exposure scenarios are:

1. Trespasser Scenario: A trespasser would be exposed to contaminated surface soils currently on site via ingestion and dermal absorption. This scenario assumed that a child would trespass twice a week, eight months/year, for 10 years.

2. Groundwater Scenario: Future site occupants would drink contaminated water from a private well. This scenario assumed that a person would drink 2L of water every day for a lifetime of 70 years.

3. Construction Worker Scenario: Future construction workers would build on the site and would be exposed directly to waste via ingestion, dermal absorption, and inhalation of fugitive dust and VOCs. This scenario assumed that a worker would be exposed eight hours/day, seven days/week, for six months.

Using these scenarios, risk numbers are calculated for each contaminant. These calculations factor in the amount of exposure assumed, the dose of the chemical received (based on the concentrations found during the RI), and a constant set for each individual chemical which quantifies the toxicity of that chemical. Different constants and equations are used based on whether or not the chemical is carcinogenic. The constant for a

carcinogenic chemical is called a slope factor, and the constant for a noncarcinogen is called a reference dose.

The results of these calculations are a cancer risk number for carcinogenic risks and a Hazard Index number for noncarcinogenic risks. The cancer risk number is expressed in scientific notation and represents a probability of getting cancer. For example, 1.0E-06 represents a risk of one additional case of cancer per 1 million people, under the exposure conditions assumed. U.S. EPA considers this 1.0E-06 number as a point of departure when determining risk at a site. Risks calculated to be less than this value are considered protective of human health and the environment, while risks between 1.0E-04 and 1.0E-06 are within a range acceptable to U.S. EPA but may not be considered protective due to site-specific conditions. Risks greater than 1.0E-04 are unacceptable.

The Hazard Index (HI) number generated is interpreted differently than the cancer risk number. To evaluate risk at a site due to noncarcinogenic contaminants, U.S. EPA has determined that a Hazard Index less than 1 is protective, while a Hazard Index greater than 1 is not protective of human health and the environment.

Table 1 summarizes the cancer risk numbers and Table 2 summarizes the hazard index values calculated for each chemical under each scenario and exposure pathway. The numbers listed in these tables represent the maximum exposure conditions by using the greatest concentration of a chemical found in each media. The cumulative risk for each scenario is included beneath each table.

TABLE 1

MAXIMUM CALCULATED CANCER RISKS

IND.CHEM	TRESPASS INGEST	TRESPASS DERMAL	GRNDWTR INGEST	WORKER INGEST	WORKER DERMAL	WORKER DUST	WORKER VOCS
BEHP	3.7E-10	1.9E-10	1.3E-06	6.7E-09	1.1E-08	1.5E-09	NA
1,4Dichlor	NA	NA	1.9E-05	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	2.8E-07	NA
*TOTALS:	5.6E-10		2.0E-05	3.0E-07			

TABLE 2

MAXIMUM CALCULATED HAZARD INDEX SCORES

IND.CHEM	TRESPASS INGEST	TRESPASS DERMAL	GRNDWTR INGEST	WORKER INGEST	WORKER DERMAL	WORKER DUST	WORKER VOCS
Lead	NA	NA	NA	2.3E-02	3.7E-02	1.7E-02	NA
Xylenes	NA	NA	9.3E-05	1.9E-06	3.1E-05	9.8E-06	6.8
Cadmium	1.7E-04	8.4E-05	NA	2.0E-04	3.4E-04	4.6E-05	NA
BEHP	1.4E-06	6.8E-07	4.7E-03	2.4E-05	3.9E-05	5.5E-05	NA
BBP	6.1E-06	3.0E-06	NA	3.2E-05	5.3E-05	7.2E-06	NA
Napthalene	NA	NA	NA	2.8E-06	4.6E-06	6.4E-07	NA
Ethylbenz	NA	NA	2.5E-04	5.4E-06	8.8E-05	1.2E-06	1.5
*TOTALS:	2.7E-04		5.0E-03	8.4			

* - The totals at the bottom of each table represent the total risk for each scenario considered. This risk is the sum of all the individual chemical's risk for all pathways of exposure (i.e. ingestion, dermal, etc.) under each scenario considered.

In summary, the risk assessment highlights two potential future risks at the site (refer to Tables 1 and 2):

1. a possible carcinogenic risk of 2.0E-05 for groundwater if a well is placed on site; and
2. a potential noncarcinogenic risk for a construction worker who inhales VOCs while digging in the waste. (Average HI = 1.1, Maximum HI = 8.3)

In addition, if no action is taken at the site, there is the potential for erosion to continue to degrade the present cover and eventually expose more of the waste. If this occurs, a trespasser at the site under these conditions might encounter a risk similar to that posed to a construction worker.

6.1 UNCERTAINTIES

In addition to the chemicals considered in the endangerment assessment, there are several other contaminants present in the waste and groundwater which were not included as indicator chemicals. These were either screened out when the indicator chemicals were selected or did not have known slope factors or reference doses. The most notable of these omissions is arsenic in the groundwater. Arsenic was detected in one downgradient well in both phases of groundwater sampling at levels of 29 ug/L and 32 ug/L. When U.S. EPA calculated the risk for this contaminant using the assumptions made in the endangerment assessment, the carcinogenic risk is 1.9E-03. According to the current well placement and sampling data, this risk would be present only if a well were placed on site or in very close proximity to the site, or if groundwater contaminated at these levels migrated from the site to an off-site water supply well.

6.2 ENVIRONMENTAL RISKS

No critical habitats or endangered species are affected by contamination at the site.

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

7.0 DESCRIPTION OF ALTERNATIVES

In September 1989, it was decided to streamline the remainder of the RI/FS based on the straightforward nature of the site. The number of alternatives considered for this site was reduced very early in the FS process, and all groundwater alternatives were eliminated from the list, based on the levels of contaminants detected in the groundwater and the limited extent of contamination. The four remaining alternatives

evaluated in the FS Report are source control actions which rely on natural attenuation to remedy the groundwater. Source control will address the area of contamination (AOC), which is defined by the ash/waste boundary as denoted in Figure 2. The remediation goals are to reduce the threat of direct contact with the waste, to reduce the infiltration of water into the waste which might lead to further groundwater contamination, and to achieve PALs where technically and economically feasible.

The four alternatives are summarized in Table 3 and are described in greater detail in the text which follows. The major applicable or relevant and appropriate requirements (ARARs) which were identified for these alternatives will be discussed in Section 8.0 - Comparative Analysis of Alternatives, under Compliance with ARARs.

TABLE 3
SUMMARY OF ALTERNATIVES AND COSTS

ALTERNATIVE	COST CAPITAL	*O&M	PRESENT NET WORTH**
ALTERNATIVE 1: NO ACTION	$0	$0	$0
ALTERNATIVE 2: COVER REPAIR AND ACCESS RESTRICTIONS -Repair present soil cover in needed areas -Fence site -Institutional controls -Groundwater and cover monitoring	$42,000	$137,000 per year	$2,084,000
ALTERNATIVE 3: ENHANCED CAPPING -Consolidate waste into original disposal area -Install one of three cap systems proposed -Fence site -Institutional controls -Groundwater and cap monitoring	Cap A $522,500 Cap B $829,600 Cap C $1,226,500	$137,300 per year " "	Cap A $2,633,000 Cap B $2,940,000 Cap C $3,337,000
ALTERNATIVE 4: TREATMENT BY FIXATION -In-situ fixation OR -Excavation and fixation -Cap treated waste -Institutional controls -Groundwater and cap monitoring	$11,563,900 OR $12,223,600	Annually: 1st 5 yrs $137,000 2nd 5 yrs $73,800 last 20 yrs $42,100	$12,731,000 OR $13,391,000

* - These Operation and Maintenance (O&M) costs are based on a conservative groundwater monitoring program.
** - Present net worth cost is calculated over a 30 year period at a 5% discount rate.

Alternative 1: No Action

U.S. EPA is required to evaluate a no-action alternative at every Superfund site. It is used as a basis of comparison during the evaluation of other alternatives. Under this alternative, U.S. EPA would take no further action at the site to monitor, control, treat, or otherwise cleanup contamination. The cost of this alternative is zero. However, since waste is being left on site, a five-year review of conditions at the site would be required.

This alternative will not reduce the threat of direct contact with the waste and will not reduce the permeability of the present cover.

Alternative 2: Cover Repair and Access Restrictions

Under this alternative, the existing cover would be repaired in select areas in accordance with the closure requirements provided in 1974 in a letter to GM from WDNR. These requirements stated that at a minimum, "adequate earthen cover materials and subsequent planting of the area" be accomplished in the closing of the site. As part of Alternative 2, a cap analysis would be performed during the remedial design/remedial action phase to determine where cover repair is required. Cover repair would then take place in areas where wastes are at or near the surface to provide a uniform cover, promote runoff and promote vegetation. Existing trees, which are rooted in the waste, would not be removed. The objective would be to achieve a permeability of the repaired cover in the range of 1E-04 cm/sec to 1E-05 cm/sec.

Other components of this alternative are installation of a fence around the site, institutional controls, and a program to monitor groundwater and the cover. The waste which is on Frank Brothers property would be consolidated into the original disposal area prior to cover repair, or the fence would be installed on Frank Brothers property. If the waste were removed from Frank Brothers property, sampling would be done to assure that no waste remained.

This alternative would require careful maintenance to ensure that the cover remains intact. This remedy would not significantly reduce the rate of water infiltration into the waste.

Time to Implement: several months

Estimated Cost:
- Capital: $44,000
- O&M: $132,700 per year
- Present Net Worth: $2,084,000

Alternative 3: Enhanced Capping

Under this alternative, one of three cap systems would be installed over the waste at the site. Descriptions of the three caps are provided below:

Cap A: This cap would consist of 2 feet of compacted clay and 6 inches of topsoil, as required by NR 181.44(12), Wisconsin Administrative Code (WAC). This cap is used for Resource Conservation Recovery Act (RCRA) facilities that have interim status.

Cap B: This cap is a solid waste cap which would meet RCRA Subtitle D closure requirements. Solid waste landfill closure requirements are more specifically defined in Wisconsin in NR 504.07 WAC. The components of an NR 504 cap, from bottom to top, are 2 feet of clay, a layer of soil 1.5-2.5 feet thick, and 6 inches of topsoil.

Cap C: This cap is a hazardous waste cap which would meet RCRA landfill closure regulations and RCRA guidance for design of Subtitle C closure. This cap is similar to a NR 181.44 (13) cap. The cap would consist of, from bottom to top, 2 feet of compacted clay, an impermeable synthetic membrane, a 1 foot drainage layer, and 2 feet of vegetated cover.

All three caps would provide a barrier between the ground surface and the waste to prevent direct contact. Each cap also requires a hydraulic conductivity in the low permeability layer of not more than 1E-07, which would limit water infiltration. Cap A, however, does not have a sufficient soil cover to protect the low permeability clay layer from freeze/thaw damage, and does not meet the requirements for closure of a solid waste facility in Wisconsin. Cap A will therefore not be considered further in the comparative analysis section. Cap B does meet the requirements for closure for a solid waste landfill under NR 504.07, WAC. While both solid and hazardous waste regulations are potential ARARs, it was determined that an NR 504.07 cap provides adequate protection at this site. Subtitle C landfill requirements, while relevant were determined not to be appropriate, based on site-specific circumstances. This determination was made based on the hazardous properties of the waste, its composition and matrix, and the nature of the release from the site.

First, according to available records, no RCRA listed hazardous waste was disposed of at the site. In addition, based on an analysis of the waste, the levels of hazardous constituents

in the waste are not at levels that would be expected to be characteristic for any of the newly identified organic Toxicity Characteristic constituents or for metals.

Second, there is some evidence that the dried paint sludges and fly ash have acted to attenuate organic and inorganic contaminants, to a degree which has yet to be determined which limits migration from the waste matrix.

Finally, groundwater contamination appears to be limited to a degree because of the attenuation mechanisms referred to above. For these reasons, it is determined that a Subtitle C cap is not appropriate in light of the circumstances of the site. Therefore, only Cap B will be carried forward to the comparative analysis section, and this alternative will be referred to as Alternative 3B.

Other components of this alternative are installation of a fence around the site, institutional controls, and a program to monitor groundwater and the cap. The waste which is on Frank Brothers property would be consolidated into the original disposal area prior to capping, in order to minimize the area to be capped. To implement this alternative, trees on site would have to be removed, either by pulling them up by the roots or by cutting them off at grade. If the latter is done, a gas venting system would have to be installed as part of the cap to release gas generated as the tree roots decompose.

Time to Implement: Six months

Estimated Cost: (for Cap B only) (does not include gas venting system cost)
Capital: $829,600
O&M: $137,300 per year
Present Net Worth: $2,940,000

<u>Alternative 4: Treatment by Fixation</u>

Waste materials at the site would be uniformly fixated by controlled mixing of the waste with additives such as portland cement, lime, gypsum, fly ash or other solidification agents. The waste, surface soil and subwaste soil (approximately 91,900 cu. yds.) would be either treated in-situ or excavated and then treated. This fixation process would convert the contaminated soil and waste into a solidified mass with the consistency of cement. The contaminants would be immobilized and would be protected from interaction with infiltrating water, thereby reducing their ability to leach into the groundwater. After treatment, the solidified waste would be covered with a solid waste cap, as required in NR 504.07, WAC.

Other components of this alternative are institutional controls to limit future site use and a program to monitor

groundwater and the cap. The waste which is on Frank Brothers property would be consolidated into the original disposal area prior to in-situ treatment, and would be excavated and added to the rest of the waste for the excavation and treatment option. To implement this alternative, trees and roots on site would be removed prior to the treatment process.

This alternative will prevent direct contact with the waste, limit the mobility of the contaminants, and effectively reduce infiltration of water into the waste and the potential for water to come into contact with the contaminants.

Time to Implement: one year

Estimated Cost:		In-situ	Excavate
Capital:		$11,563,900	$12,223,600
O&M: (annually)	0-5 yrs -	$137,000;	
	5-10 yrs -	$ 73,800;	
	10-30 yrs -	$ 42,100	
Present Net Worth:		$12,731,000	$13,391,000

8.0 COMPARATIVE ANALYSIS OF ALTERNATIVES: THE NINE CRITERIA

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

A. Threshold Criteria

1. Overall Protection of Human Health and the Environment

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

Alternatives 3B and 4 would provide adequate protection of human health over time. Alternative 1 would not be protective of human health and the environment in that it does nothing to reduce current and future exposure to site contaminants. Alternative 2 would reduce potential contact with contaminants in the waste, but the vegetated soil cover directly above the waste would remain less than 1 foot thick and would be subject to freezing and thawing cycles which would likely lessen the integrity of the cover. Fencing and other institutional controls, which are implemented in conjunction with the cover repair, are not as reliable as the containment and treatment options offered in Alternatives 3B and 4. Given these uncertainties,

Alternative 2 may not adequately maintain protection over time. Alternatives 3B and 4, while possibly exposing some of the waste during implementation of the remedy, would ultimately provide a 4-5 foot clay and soil layer above the waste material.

Alternatives 3B and 4 also provide protection against water infiltration, which would reduce the potential for release of contaminants to the groundwater. Alternative 4 would immobilize contaminants and eliminate the potential for a future release of contaminants to the groundwater. Present groundwater contamination should decrease over time. While all alternatives would leave wastes remaining at the site, Alternative 3B (capping) and Alternative 4 (fixation) would reduce the short and long-term risks at the site by utilizing standard engineering or treatment methods.

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

This criterion evaluates whether an alternative meets applicable or relevant and appropriate requirements set forth in Federal, or more stringent State, environmental laws pertaining to the site or proposed actions.

Since Alternatives 2, 3 and 4 are similar in that they are source control remedies and address the same problem at the site, the same ARARs apply to each and will be identified and discussed below.

i. Identification of ARARs

a. Closure

There are no Federal or State closure requirements for solid waste or hazardous waste landfills which are applicable to this site, because the site was originally closed prior to the effective date of these regulations. The existing landfill cover does not meet section NR 504.07, WAC, the current State landfill closure requirements, which are similar to the proposed federal Subtitle D regulations. Chapter NR 504, WAC, is applicable to the closure of (currently) permitted solid waste landfills in the State. Since the Wheeler Pit site is sufficiently similar to a solid waste landfill, Ch. NR 504, WAC, requirements are relevant to the Wheeler Pit site. Chapter NR 504, WAC, requirements are well-suited for the Wheeler Pit site due to the reduction of infiltration by the clay layer and the long-term effectiveness offered by the frost protection layer. Thus, Ch. NR 504, WAC, the current solid waste landfill closure requirements, are also appropriate for this site. In part, section NR 504.07, WAC, requires that the

cap be composed of a 2-foot layer of compacted clay overlain by a frost-protective soil layer. The repaired cover proposed in Alternative 2 would, at most, consist of 8 inches of soil over the waste and would not comply with this ARAR. Alternative 3, Cap B and the cap placed after the treatment process in Alternative 4 would both meet the requirements of section NR 504.07, WAC.

The State of Wisconsin is authorized to implement portions of the RCRA Subtitle C program. As stated in the description of Alternative 3 in Section 7.0 above, RCRA Subtitle C is considered a relevant but not appropriate requirement at this site.

b. Groundwater Standards

1. Federal ARARs

Maximum Contaminant Levels (MCLs), and to a certain extent, Maximum Contaminant Level Goals (MCLGs), the Federal drinking water standards promulgated under the Safe Drinking Water Act (SDWA), are applicable to municipal water supplies servicing 25 or more people. At the Wheeler Pit site, MCLs and MCLGs are not applicable, but are relevant and appropriate, since the sand and gravel aquifer is a Class IIA aquifer which is presently being used in the area surrounding the site and which could potentially be used for drinking in the area of concern. MCLGs are relevant and appropriate when the standard is set at a level greater than zero (for non-carcinogens), otherwise, MCLs are relevant and appropriate at Superfund sites. The point of compliance for MCLs and MCLGs is at the boundary of the landfilled wastes or throughout the plume if wastes are removed from the site.

2. State ARARs

The State of Wisconsin has promulgated groundwater quality standards in Ch. NR 140, WAC, which the WDNR states is being consistently applied to all facilities, practices, and activities which are regulated by the WDNR and which may affect groundwater quality in the State. Chapter 160, Wis. Stats., directs the WDNR to take action to prevent the continuing release of contaminants at levels exceeding standards at the points of standards application. Chapter 160 deals with all groundwater, not just drinking water or potable aquifers. The groundwater quality standards established are Preventive Action Limits (PALs) and Enforcement Standards (ESs), which are described in detail in Section 5.0 of this document. The chemicals at the site which exceed these standards are also discussed in Section 5.0. (Wisconsin) Alternative Concentration Limits (WACLs) may also be established pursuant to Ch. NR 140, WAC. These

State standards are generally more stringent than corresponding Federal standards set forth under the Safe Drinking Water Act (SDWA) and are relevant and appropriate for the Wheeler Pit site, since they address overall groundwater quality rather than just drinking water quality.

Consistent with the exemption criteria of section NR 140.28, WAC, a WACL may be established as the clean-up standard if it is determined that it is not technically and economically feasible to achieve the PAL for a specific substance. Except where the background concentration of a compound has been determined to exceed the ES set forth in NR 140, WAC, the WACL that is established under 140.28(4)(b) may not exceed the ES for that compound. A determination of technical or economic infeasibility may be made after five years if it becomes apparent that the contaminant level has ceased to decline over time and is remaining constant at a statistically significant level above the PAL (or any WACL established due to high background concentrations) in a discrete portion of the area of attainment, as verified by multiple monitor wells.

The State, in Ch. 140, WAC, has set forth lists of potential responses to be taken when either a PAL or ES is exceeded. No active groundwater remediation is presently proposed, with the intention that source control and natural attenuation of the groundwater is a sufficient response at this time. This is based on the chemicals and levels of these chemicals found at the site during the RI. As both Alternatives 3B and 4 qualify as potential responses according to the list provided in Table 6 of Ch. 140, WAC, "Range of Responses for Exceedance of Enforcement Standards for Substances of Health or Welfare Concern", the State concurs with the remedy selected in this document.

c. Land Disposal Restrictions

Another set of RCRA regulations which may be an ARAR at the site are Land Disposal Restrictions (LDR), 40 CFR Part 268. Waste would be potentially moved at the site in Alternatives 2 and 3B during consolidation of the waste from Frank Brothers property into the original disposal area, or in Alternative 4 during excavation, treatment and redisposal. What will trigger LDRs is whether this movement constitutes placement of RCRA hazardous waste. For Alternatives 2 and 3B, the consolidation of the waste is taking place within the Area of Contamination (AOC). In this instance, the LDR requirements are not applicable or relevant and appropriate at the site. Alternative 4, under the excavation and treatment option, may trigger LDR

requirements. Whether LDRs are applicable to this alternative depends on if it is determined that RCRA characteristic hazardous wastes are present, since listed wastes were not disposed at the site. Based on this existing information, LDRs are not applicable or relevant and appropriate.

ii. Discussion

As discussed earlier, solid waste closure standards are relevant and appropriate requirements for this site. The landfill covers in Alternatives 1 and 2 do not meet current Wisconsin requirements for solid or hazardous waste landfill closures.

Although no groundwater treatment actions are being proposed, it is estimated that groundwater contaminant levels will decrease to levels that comply with Wisconsin groundwater standards by reducing the infiltration of water into the waste. Under Alternative 1, water would continue to infiltrate at its present rate, with only a slight decrease under Alternative 2. Alternative 3B would significantly reduce infiltration. Alternative 4 would be of similar effectiveness to Alternative 3B while also greatly reducing the potential for any infiltrating water to come in contact with contaminants.

The cap in Alternatives 3B and 4 will also help minimize any future risks from the site. The cap, if maintained, would prevent future direct contact with contaminants and reduce infiltration which will minimize, to the extent practicable, any future releases into the groundwater from the site. It is expected that this will result in future compliance with Wisconsin statutes which require that future releases of contaminants should not exceed state groundwater quality standards.

B. Primary Balancing Criteria

3. Long-Term Effectiveness/Permanence

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

Under Alternative 1 (no action), protection from direct exposure would not be achieved and water infiltration would not be reduced. Alternative 1 would not maintain protection over time due to freezing and thawing cycles and erosion which would likely damage the present cover. Alternative 2 would be more effective in limiting direct contact than

Alternative 1, but the cover would still be exposed to the same weathering conditions as Alternative 1 and would need to be continually repaired to maintain effectiveness. Alternatives 3B and 4 will provide adequate protection assuming the cap is maintained. This is because Alternatives 3B and 4 remove the direct contact threat and reduce water infiltration into the disposal area. Alternative 3B and 4 would also be affected by weathering conditions, but the low permeability clay layer in these alternatives would be protected by 2 to 3 feet of soil, which will minimize the impact of the freeze and thaw cycles. The clay cap in Alternatives 3B and 4 may also be affected by desiccation and cracking and by subsidence of the waste materials. Under these alternatives, the cap would be monitored for continued effectiveness and would be repaired as necessary.

4. Reduction of Toxicity, Mobility or Volume Through Treatment

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

Alternatives 1, 2, and 3B would not reduce the toxicity, mobility, or volume of contaminants through treatment. These alternatives do not meet the statutory preference for treatment. Alternative 4 would reduce the mobility of contaminants through fixation, but the toxicity would not be reduced, and the volume of waste materials would increase.

5. Short-term Effectiveness

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

Alternatives 2, 3B and 4 would involve moving a small amount of waste at the site. Minimal risks to nearby residents posed by dust from digging during the implementation of Alternatives 2, 3B and 4 would be controlled through standard dust control measures and health risks to workers would be minimized with protective equipment. There will be a fence around the site during construction activities which will protect nearby residents. This fence will remain after construction activities are completed. In implementing Alternatives 3B and 4, the trees on site would be removed in a way to minimize disturbance of the waste materials. While it is recognized that placing a cap on a site may initially disturb the waste, all standard methods for minimizing such an impact will be employed. If necessary, special equipment, engineering controls and

design techniques can be utilized. Alternative 4 would require 1 year to complete and Alternatives 2 and 3B could be completed in approximately 6 months.

It is unknown how long before groundwater standards will be met in the aquifer. Groundwater quality will be evaluated during the monitoring program to determine if it is improving or remaining the same. The monitoring program is expected to continue for at least 30 years.

6. Implementability

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

Alternatives 2, 3B and 4 are technically feasible, although Alternative 4 might be slightly more difficult to implement because the waste will be handled during the treatment process. According to the RI, the waste contains refuse such as steel-reinforced concrete and aluminum window frames which probably would have to be separated out prior to fixation. For Alternatives 2, 3B and 4, there might be some administrative difficulties in receiving permission to access adjoining property, since some waste currently exists on neighboring property. For Alternative 4, the excavation and fixation option may be subject to Land Disposal Restrictions.

All pathways of risk will receive adequate monitoring through the groundwater and cap monitoring programs. If monitoring is not sufficient to detect failure of the remedy and increased groundwater contamination, nearby downgradient homes with private wells would potentially be affected. To address this possibility, private wells downgradient will be monitored to detect changes in groundwater quality. If additional remedial action becomes necessary at the site, this will be fairly easy to undertake under any of the alternatives presented here.

7. Cost

Costs include the estimated capital and operation and maintenance (O & M) costs, as well as present-worth costs. These costs for each alternative are presented in Table 3.

C. Modifying Criteria

8. State Acceptance

U.S. EPA and WDNR agree on the selected alternative.

9. Community Acceptance

Community acceptance is assessed in the attached Responsiveness Summary. The Responsiveness Summary provides a thorough review of the public comments received on the Proposed Plan, and the Agency's responses to those comments.

9.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, as amended by SARA, and the NCP, the detailed analysis of alternatives and public comments, U.S. EPA and WDNR have selected Alternative 3B -- the NR 504.07, WAC, multi-layer cap; consolidation of waste; institutional controls and groundwater monitoring -- as the cost-effective protective remedial action for the Wheeler Pit Site.

Under Alternative 3B, the cap will be placed on the site in compliance with the current requirements of Section NR 504.07, WAC for closure of solid waste facilities. The cap will consist of a grading layer, a minimum 2-foot clay layer (compacted to a permeability of 1E-07 cm/s or less), a frost protective soil layer at least 1.5 feet thick, and a minimum 6-inch topsoil layer. The thickness of the soil layer will depend on the frost penetration depth at the site. A drainage layer will also be included as part of the cap on top of the clay layer to enhance drainage off the clay layer. The waste and soil (approximately 400 cu yd) which is presently on the property north of the site will be consolidated under the cap. Testing will be conducted to assure all waste is contained under the cap and to verify that all waste has been removed from Frank Brothers' property.

Institutional controls will be relied upon to enhance the effectiveness of the remedy, including deed restrictions and landfill development restrictions (NR 506). A cyclone fence will also be installed around the site. State restrictions on the installation of drinking water supply wells within 1200 feet of a landfill (restrictions found in Ch. 112, WAC) cannot be relied upon to limit off-site groundwater use over the long-term, since variances provided for in section NR 112.04, WAC, may be granted in the future. Additional groundwater monitor wells will be installed to more fully characterize the groundwater system. New and existing wells will be monitored for at least 30 years. Private wells located down-gradient of the site will also be monitored to assess potential impacts to human health and the environment.

The risk due to direct contact with the waste will be reduced immediately after cap construction is completed. It is projected that the contamination presently in the groundwater will begin to decrease over time once the cap is in place. However, groundwater quality will be evaluated during the monitoring program to determine if it is improving or remaining the same. The goal of the source control action will be to attain the groundwater clean-up standards at the waste boundary of Wheeler Pit, which is the suggested NCP point of compliance for groundwater. The clean-up goals which have been established are PALs.

The initial review of the groundwater monitoring data will

TABLE 4

COST SUMMARY
ALTERNATIVE 3 - ENHANCED CAPPING
WHEELER PIT SITE

CAPITAL COSTS	CAP A	CAP B	CAP C
INSTITUTIONAL CONTROLS	$10,000	$10,000	$10,000
CHAIN LINK FENCING W/GATES	19,100	19,100	19,100
CAPPING			
CAP A - NR 181.44(12)	$331,200	--	--
CAP B - NR 504.07	--	★ 543,100	--
CAP C - NR 181.44(13)	--	--	816,700
CAPITAL COST SUBTOTAL	$360,300	$572,200	$845,800
ADMINISTRATION, LICENSING (5%)	18,000	28,600	$ 42,300
ENGINEERING (20%)	72,100	114,400	$169,200
CONTINGENCY (20%)	72,100	114,400	$169,200
TOTAL CAPITAL COSTS	$522,500	$829,600	$1,226,500
OPERATION AND MAINTENANCE COSTS (ANNUAL)			
CAP MAINTENANCE	$ 4,700	$ 4,700	$ 4,700
MONITORING - CAP	4,300	4,300	4,300
MONITORING - GROUNDWATER	110,400	110,400	110,400
ANNUAL OPERATION AND MAINTENANCE COST SUBTOTAL	$119,400	$119,400	$119,400
CONTINGENCY (15%)	$ 17,900	$ 17,900	$ 17,900
ANNUAL OPERATION AND MAINTENANCE COST TOTAL	$137,300	$137,300	$137,300
30-YEAR PRESENT NET WORTH			
(5% Discount Rate)	$2,633,000	$2,940,000	$3,337,000

★. Cost does not include drainage layer

be conducted within 5 years after the commencement of remedial action. Thereafter, the monitoring data will be reviewed at no longer than 5-year intervals. In the event that conditions at the site degrade, or the remedy does not provide for timely improvement of groundwater, the EPA and WDNR will consider additional actions, as appropriate, to achieve protection at the site.

Table 4 presents the details of the cost.

10.0 STATUTORY DETERMINATIONS

The selected remedy must satisfy the requirements of Section 121 (a-e) of CERCLA, as amended by SARA, to:

a. Protect human health and the environment;
b. Comply with ARARs;
c. Be cost-effective;
d. Utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; and,
e. Satisfy the preference for treatment as a principal element or provide an explanation as to why this preference is not satisfied.

The implementation of Alternative 3B at the Wheeler Pit Site satisfies the requirements of CERCLA, as amended by SARA, as detailed below:

a. <u>Protection of Human Health and the Environment</u>

This selected remedy provides adequate protection of human health and the environment.

Implementation of the selected alternative will reduce and control potential risks to human health and the environment posed by exposure to site contaminants and will reduce the site as a source of groundwater contamination. Since groundwater contaminant loading will be reduced due to decreased infiltration of water through the cap, groundwater quality is expected to improve over time.

No unacceptable short-term risks will be caused by the implementation of the remedy. The community and site workers may be exposed to dust and noise nuisances during construction of the cap. Standard safety programs, such as fencing, use of protective equipment, monitoring and dust control measures, should mitigate any short-term risks. Standard methods for minimum disturbance of the waste and for prevention of infiltration, such as placing a tarp over exposed areas, will also be employed.

b. Compliance with ARARs

The selected remedy will comply with all Federal and/or State, where more stringent, ARARs. The following ARARs will be attained.

1. Chemical-specific ARARs

Chemical-specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics.

Applicable or Relevant and Appropriate Requirements

- Ch. NR 140, WAC, and Ch. 160, Wisconsin Statutes. PALs will be established as the remediation goals.

- SDWA MCLs and MCLGs

"To Be Considered" Criteria

Occasionally, advisories that do not meet the definition of ARAR may be necessary to determine what is protective at a site. Although the new chemical specific clean-up standards for 1,4-dichlorobenzene, which were mentioned in Section 5.0 of this document, have not been promulgated yet, it is a "To Be Considered" criteria which is presently exceeded at the site.

2. Location-specific ARARs

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

Applicable Requirements

- NR 112, WAC. Requires that no drinking water wells be located within 1200 feet of a landfill, unless a variance is obtained from the WDNR.

- NR 506 and NR 540, WAC. Regulates the development of landfills.

3. Action-specific ARARs

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

Applicable Requirements

There were no applicable action-specific requirements.

Relevant and Appropriate Requirements

- NR 504.07, WAC. Regulates design of solid waste landfill cap.

- Additional State action-specific ARARs can be found in the FS Report.

c. Cost-effectiveness

A cost-effective remedy is one for which the cost is proportional to the remedy's overall effectiveness. Table 3 lists the costs associated with the implementation of the remedies.

Alternative 3B affords a high degree of effectiveness by providing protection from exposure to the contaminants in the waste and minimizing the infiltration of water into the waste. Treatment of the source (Alternative 4) is greater than 10 times the cost of a cap and does not provide a significant benefit proportional to its cost. Although Alternative 2 is less expensive than Alternative 3B, it is not protective. Alternative 3A, although less expensive than Alternative 3B, does not provide for frost protection. Alternative 3C, which includes a flexible membrane liner, is not believed to be appropriate for this site. Therefore Alternative 3B is a cost-effective alternative which provides overall effectiveness proportional to its cost.

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

U.S. EPA and the State of Wisconsin believe the selected remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be utilized in a cost-effective manner for the Wheeler Pit site. Of the alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA and the State have determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, short-term effectiveness, implementability, cost and State and community acceptance. The selected remedy can be

implemented and completed more quickly with less difficulty

and at less cost than the waste treatment alternative. The cost of the fixation option was an order of magnitude greater than the cap, with not much increased benefit.

The selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized for this action, since the waste poses a low-level, long-term threat and no "hot spots" were identified. The level of contamination remaining in the waste on site can be reliably controlled over time through engineering and institutional controls, and treatment is therefore not practicable. A cap provides adequate protection from exposure to waste and acts as a barrier to precipitation infiltration, assuming the cap is effectively maintained.

e. Preference for Treatment as a Principal Element

The Wheeler Pit site contains waste mixed with fly ash and other debris. The landfill does not appear to contain "hot spots", and no principal threat which warrants treatment at the site has been identified. Therefore, satisfaction of the preference for treatment as a principal element of the remedy is not applicable. In addition, based on the comparative analysis of alternatives, it has been determined that treatment does not provide a significant benefit proportional to its cost.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Wheeler Pit site was released for public comment in July 1990. The Proposed Plan identified Alternative 3B, a solid waste landfill clay cap with groundwater monitoring, as the recommended alternative. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

RESPONSIVENESS SUMMARY

This Responsiveness Summary has been prepared to meet the requirements of Sections 113(k)(2)(B)(iv) and 117(b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), which requires the United States Environmental Protection Agency (U.S. EPA) to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on a proposed plan for remedial action. The Responsiveness Summary addresses concerns expressed by the public and potentially responsible parties (PRPs) in the written and oral comments received by the U.S. EPA and the State regarding the proposed remedy for the Wheeler Pit site.

A. OVERVIEW

I. BACKGROUND/PROPOSED PLAN

The Wheeler Pit Superfund site is a 3.8 acre property located in rural La Prairie Township, Wisconsin, approximately 1.5 miles east of the City of Janesville. This site is located in the southeast portion of the former 34-acre Wheeler Sand and Gravel Pit.

The Remedial Investigation (RI) identified several concerns at the site: 60,600 cubic yards of waste in the pit and groundwater contaminated with constituents in excess of state groundwater standards. The Feasibility Study evaluated four cleanup alternatives to address these concerns. The Proposed Plan for remedial action included:

- consolidation of off-site waste into the original disposal area;
- installation of a cap to meet current State landfill closure requirements;
- institutional controls; and
- groundwater monitoring.

II. PUBLIC COMMENT PERIOD

A public comment period was held from July 12, 1990 to August 24, 1990 to allow interested parties to comment

on the Proposed Plan in accordance with Section 117 of CERCLA. On August 8, 1990, a public meeting was held in La Prairie Township, Wisconsin, at which the U.S. EPA and Wisconsin Department of Natural Resources (WDNR) presented the Proposed Plan, answered questions, and accepted comments from the public. During the public comment period, U.S. EPA received approximately 29 written and several verbal comments concerning the proposed plan.

B. COMMUNITY INVOLVEMENT

Public interest regarding the site has been low. The community generally seems to favor taking only limited action at the site and were concerned with the types and extent of institutional controls which would be placed on land near the site.

The above concerns will be addressed in the following section.

C. SUMMARY OF SIGNIFICANT COMMUNITY COMMENTS

Comment 1

One commentor requested that U.S. EPA sample the groundwater across Highway O. He further stated that the site should be "covered on a slant to protect the groundwater."

Response

As part of the Remedial Investigation, one well south of Highway O was monitored. Based on the limited groundwater contamination identified at the site, it seems unlikely that significant contamination would be discovered off-site. However, U.S. EPA agrees that additional samples should be taken in this location. Therefore, as part of the groundwater monitoring program described in the preferred alternative and adopted as the selected remedy in the ROD, we estimate that three wells south of Highway O will be sampled. These wells will include well 'B', which was monitored during the RI, and at least two private wells. We anticipate monitoring the groundwater for approximately thirty years.

The commentor also stated that the site should be "covered on a slant to protect the groundwater", so that groundwater runs off the site instead of sinking into the soil at the site. The cap described in the preferred alternative will do just that. The cap will consist of a grading layer, a

minimum 2-foot clay layer, a frost protective soil layer at least 1.5 feet thick, and a minimum 6-inch topsoil layer. A drainage layer may also be included as part of the cap on top of the clay layer. The specific plan for grading the surface of the site will be developed as part of the remedial design.

Comment 2

Another commentor suggested adding a couple of feet of clay and grading the surface so that the rain would drain to the southwest.

Response

The cap described in the Proposed Plan as the preferred alternative, and now chosen as the Selected Remedy, will be designed so that water cannot enter the soil and mix with the waste at the site. The cap will be basically an engineered version of the concept described by the commentor. State regulations require that the cap meet current solid waste landfill closure requirements. These regulations call for the landfill cover to be composed of a grading layer, a minimum 2-foot clay layer with a permeability of 1E-07 cm/sec, a frost-protective soil layer, and a minimum 6-inch topsoil layer. Although relying on a cap made solely out of clay may seem like a simpler and cheaper approach, the requirements outlined above better protect human health and the environment by enhancing the long-term effectiveness of the cap.

Comment 3

Another commentor requested that the existing residential wells be monitored. She also requested information on how deed restrictions imposed at the site could impact adjoining properties.

Response

As part of the monitoring program described in the selected remedy, nearby residential wells will be monitored.

Deed restrictions may be used as part of the institutional controls that will be used for the remedial action. Possible additional restrictions or limitations could be instituted by utilizing zoning restrictions, or by purchasing the land outright. It is likely that any restrictions will be related to the site itself, and if they are used they would have a minimal impact on adjoining landowners. If restrictions need to be placed on adjoining property owner's land, these property owners will be

notified prior to any action.

Comment 4

Another commentor felt that the preferred alternative was too expensive. She also stated that the agency was moving too fast, because a remedy had been selected before a problem had even been found.

Response

The Selected Remedy, Alternative 3B, is cost-effective. It affords a high degree of effectiveness by providing protection from exposure to the contaminants in the waste and minimizing the infiltration of water into the waste. A detailed discussion of the costs of the various alternatives may be found in the Record of Decision.

U.S. EPA does not believe that it is too early to select a remedy and take action at the site. In fact, there are several reasons why action must be taken at the site. The Risk Assessment has identified sufficient hazards to necessitate an action to protect human health and the environment. In addition, the U.S. EPA and the State of Wisconsin have identified Ch. NR 504 WAC as a relevant requirement for the site. Also, on a practical level, it makes sense to take action now. By constructing a sound cap over the site, any future risks to groundwater will be minimized. It will also be less expensive to respond now, rather than in the future. Contamination could spread making cleanup more costly. Also, cleanup costs in general will likely increase if remediation is required in the future.

Comment 5

Another resident inquired as to whether GMC would be liable for a new well if an existing well became contaminated due to the waste disposed of at the Wheeler Pit site, and who would be liable if a lawsuit was filed in response to use of the existing well.

Response

The groundwater monitoring program provided for under the remedial action is intended to address groundwater contamination resulting from the site. If it is determined at a future date, for example during the five year review provided for under CERCLA, that active groundwater remediation is required, those parties who can be linked to the contamination may be required to carry out those activities. Concerning a potential lawsuit, the lawsuit

would be between private parties and U.S. EPA would not be involved. To reiterate, U.S. EPA and WDNR believe that the groundwater monitoring program to be carried out under the remedial action, in conjunction with the other aspects of the action, is protective of human health and the environment.

D. SUMMARY OF SIGNIFICANT PRP COMMENTS

The PRPs disagree with the Proposed Plan and its selection of Alternative 3B. The PRPs believe that conditions at the site, and the absence of any significant threat to human health or the environment, warrant the selection of Alternative 1, No Action, or at most Alternative 2, Cover Repair, for this site. They feel U.S. EPA's proposed remedy poses a greater potential threat to human health and the environment than current conditions, because it may disrupt stable waste and cause the release of contaminants into the environment. The comments from the PRPs are organized below based upon issue.

I. SITE HISTORY AND CURRENT CONDITIONS

a. Waste Fixation

Comment 1

Disposal practices at the Site resulted in the mixing of paint booth sludges, fly ash and clarifier sludges from General Motor's automobile assembly plant. Since the fly ash, acting as a pozzolanic material, was mixed with clarifier sludges containing lime all in the presence of water, the three necessary ingredients for pozzolanic stabilization / solidification were present to immobilize chemicals.

Response

U.S. EPA acknowledges that these materials were present during disposal at the Wheeler Pit site. However, disposal at the site was not an engineered solidification / stabilization process. The percentages of each material disposed there is not known, so the materials may not have been in the proper proportions to result in an effective treatment process. In addition, the method of disposal was a layering process, not a process in which the materials were mechanically mixed, which is required as part of a properly implemented solidification / stabilization technique. Also present in the waste are pieces of concrete, bricks, aluminum frames, and other debris

which lessen the effectiveness and uniformity of any supposed treatment process. As a result of these unknowns and deviances, U.S. EPA does not think that it can be conclusively stated that all the waste at the site has been stabilized and that the disposal methods used at the site have achieved the same degree of effectiveness that an engineered solidification / stabilization treatment process can. Therefore, the chemicals may not be entirely immobile and may still come in contact with infiltrating water and be carried into the groundwater.

Comment 2

In addition to the chemical fixation of waste contaminants, there is evidence of encapsulation of volatile organic compounds (VOCs). The lack of significant VOC detects in the subwaste soils or groundwater attest to the capacity of the paint "clods" to prevent the migration of VOCs from the waste.

Response

The sampling method utilized during the RI does not conclusively prove that all the volatiles in the waste are contained in the "clods". The RI did not investigate the ability of the "clods" to contain the VOCs, nor did it subject any of the waste samples to the Toxicity Characteristics Leaching Potential (TCLP) analytical procedure, which is designed to ascertain this very issue. Thus, contrary to the PRPs' assertion, there is little hard evidence of encapsulation of the VOCs. The PRPs have themselves identified in the FS Report, under the evaluation of Alternative 4, Treatment by Fixation, that stabilization / solidification has not been demonstrated to adequately address VOCs. Some VOCs may be available for contact with infiltrating water.

Comment 3

The effectiveness of the fixed waste to reduce contaminant migration, meets or exceeds the 90% to 99% reduction guidelines stated in the NCP for treatment that would be required for a CERCLA remedy.

Response

As stated in the response to comment 2, there is little evidence that the waste is chemically fixed. In fact there are contaminants from the waste which indicate that the mobility of the contaminants remains a

concern. There is no evidence that the waste has been treated to reduce the mobility of contaminants by 90-99 percent.

The NCP was clarifying the agency's goal to consider a wide variety of treatment technologies to address hazardous substances at Superfund sites, and thus specified a treatment range that the technology should be designed to achieve.

b. Groundwater

Comment 4

No evidence of significant migration could be found in subwaste soils and groundwater. Chemicals detected in the waste were either not detected in subwaste soils or were detected in very low concentrations. The most plausible explanation for the lack of contaminant migration is that the waste has stabilized and does not interact with the percolating water.

Response

As stated in the responses to comments 1, 2 and 3 in Section I(a), U.S. EPA and WDNR do not think that it can be conclusively stated that all the waste at the site has been stabilized and that the disposal methods used at the site have achieved the same degree of effectiveness that an engineered solidification / stabilization treatment process can. In fact, the PRPs acknowledge that sufficient stabilization / solidification has not been demonstrated to adequately address VOCs (see comment 2, Section I(a)). Therefore, the chemicals may not be entirely immobile and may still come in contact with infiltrating water and be carried into the groundwater. See also responses in the following Sections I(c) and IV(a).

c. Reducing Conditions

Comment 5

The effect of "reducing conditions" on groundwater chemistry immediately downgradient of the Site is to enhance the solubility of certain multivalent inorganic parameters (such as iron, arsenic and to some extent manganese contained in the natural soils). The result in groundwater samples collected from monitoring well MW3A is concentrations of iron and arsenic in excess of

Chapter NR 140, Wisconsin Administrative Code, Groundwater Standards.

1. The extent of the downgradient reducing conditions appears limited.

2. As background groundwater quality conditions return downgradient of the site, the solubilized metals are reabsorbed and precipitate out of solution.

3. The degree of reducing conditions will diminish with time as organic matter in the fill decomposes.

4. No current risk to human health or the environment exists as a result of the reducing conditions.

Response

U.S. EPA acknowledges that reducing conditions may be in part responsible for the present groundwater contamination. However, concentrations of arsenic in groundwater at the site and immediately downgradient of the site indicate that exceedances of the NR 140, WAC, Preventative Action Limit (PAL) exist, and that this level presents a risk of 1.9E-03 to a consumer of that water. While groundwater at the site is not presently used for potable purposes, the potential for such future use exists. Such use would result in an unacceptable health risk to the user. In addition, further migration could impact groundwater wells downgradient.

Comment 6

The current impact of chlorinated benzenes is low (concentrations are less than 1/4 of the NR 140 PAL standards and there is no current risk to human health). The chlorinated benzenes were not detected in fill materials and may well be related to off-site activities.

Response

U.S. EPA acknowledges that the chlorinated benzene compounds were not detected in the fill material during test-pit activities, but notes that another explanation offered by the RI Report was that chlorinated benzene compounds in the waste were very localized. The fact the compound was not found during

the limited test pit activities does not prove that the waste is from off-site, and U.S. EPA considers the chlorinated benzene contamination as a release from the site.

The potential future risk, under the exposure conditions identified in the risk assessment section of the RI Report, is greater than the point of departure, 1.0E-06. Furthermore, the actual extent of 1,4-dichlorobenzene contamination is uncertain, since the furthest downgradient well still showed elevated levels, with a concentration of 25 ug/L and a risk of 2.0E-05. This risk, calculated solely on the basis of 1,4-dichlorobenzene, is greater than the point of departure.

In addition, PALs and Enforcement Standards (ESs) for 1,4-dichlorobenzene will be lowered as of October 1, 1990, at which time this chemical at the site will exceed its PAL. These new levels are "To Be Considered" criteria at the site. U.S. EPA believes that their use is consistent with the statutory requirement to protect human health and the environment.

d. Human Health

Comment 7

Exposure to contaminants in groundwater does not affect current health risks because the area of impacted groundwater is not used for potable purposes. The future risk was above 1 in 1 million (1.0E-06), but can be further reduced by access and deed restrictions.

Response

U.S. EPA acknowledges that contaminated groundwater at the site is not used for potable purposes, and that future risk due to groundwater usage can be partially addressed by access and deed restrictions. In fact, the Selected Remedy, Alternative 3B, incorporates access and deed restrictions along with groundwater monitoring. Alternative 3B also incorporates a cap as a means of reducing infiltration and percolation, and thus will help further minimize the potential future releases of site waste constituents to groundwater. Alternative 2 does not use an adequate cover or cap, and thus does not adequately address infiltration and protection of groundwater.

It is U.S. EPA's expectation, as promulgated in the NCP, that "contaminated groundwaters will be returned to their beneficial uses wherever practicable within a timeframe that is reasonable given the particular circumstances". As explained earlier, U.S. EPA believes that by capping the site, and reducing infiltration into the waste, groundwater quality will improve. If this is not the case, U.S. EPA and WDNR may require additional remedial action. U.S. EPA believes that institutional controls can be used, as appropriate to prevent exposures to releases of hazardous substances during remedy implementation and to supplement engineering controls. These institutional controls should not substitute for active response measures as the sole remedy, unless these measures are impracticable.

U.S. EPA also notes that groundwater is used by downgradient residences for potable purposes. While the nearby residential wells were not sampled and analyzed during the RI, testing by the State of Wisconsin in 1984, 1985 and 1988 indicated that the nearby residential wells tested did not show detectable levels of VOCs. This testing, however, did not analyze for other site contaminants. The Selected Remedy includes testing of nearby residential wells as part of its groundwater monitoring program.

II. REMEDIAL ACTION ALTERNATIVES

a. Alternative 2

Comment 1

Waste stability and groundwater quality will be monitored to measure groundwater quality improvement over time as reducing conditions diminish.

Response

U.S. EPA acknowledges that groundwater quality monitoring will be key to ascertaining groundwater quality improvement over time, and as such will be the indirect measurement of waste stability and effectiveness of the implemented remedy for both Alternatives 2 and 3B. However, Alternative 2 does not adequately provide for overall protection of human health and the environment. Alternative 2 does not sufficiently provide for limitation of infiltration and reduction of potential leaching of site waste constituents to groundwater. Alternative 3B, through

use of an engineered NR 504 cap, does provide for limitation of infiltration and reduction of potential leaching of site waste constituents to groundwater.

Comment 2

Physical contact with the waste will be prevented through cover repair, cover monitoring and maintenance, perimeter fencing and institutional controls.

Response

U.S. EPA acknowledges that an important aspect of the remedy is the prevention of physical contact with the waste through capping, monitoring and maintenance of the cap, perimeter fencing, and institutional controls. While the "cover" to be implemented under Alternative 2, Cover Repair and Access Restrictions, provides limited protection to restrict physical contact with the waste through the combination of controls as stated above, it does not provide for adequate protection from freeze / thaw cycles and erosion. Hence, Alternative 2 may subject the waste to disturbance through erosion and subsequent releases to the environment. Furthermore, Alternative 2 does not adequately provide protection of groundwater. Alternative 2 does not sufficiently provide for limitation of infiltration and reduction of potential leaching of site waste constituents to groundwater. As a result, Alternative 2 does not adequately provide for overall protection of human health and the environment. Alternative 3B, through use of an engineered NR 504 cap, does provide for limitation of infiltration and reduction of potential leaching of site waste constituents to groundwater, as well as affording protection from freezes and thaws.

Comment 3

Use of impacted groundwater would be prevented both through the groundwater monitoring activities and restrictions (institutional controls) over groundwater use.

Response

U.S. EPA acknowledges that groundwater monitoring activities and restrictions (institutional controls) over groundwater use are key components of a remedy which provides for overall protection of human health and the environment. These elements are included in the Selected Remedy, Alternative 3B, Enhanced Capping.

See the response to comment 7 in Section I(d).

Comment 4

Implementation of Alternative 2 minimizes disturbance of the stabilized wastes and therefore eliminates the potential for adverse effects due to destabilization and subsequent releases of fixed contaminants.

Response

While Alternative 2, Cover Repair and Access Restrictions, does minimize disturbance of wastes, it does not eliminate the potential for adverse effects due to destabilization and subsequent releases of contaminants. Alternative 2 does not provide for adequate protection from freeze / thaw cycles, and hence may subject the waste to disturbance through erosion and subsequent releases to the environment. U.S. EPA disagrees with the PRPs contention that the wastes are "stabilized" or "fixed". See the response to Comment 1 under Section I(a) above for further discussion of the stabilized / fixed issue.

b. Alternative 3

Comment 5

Evidence collected during the RI indicated the paint sludges had dried into "clods" encapsulating potentially mobile VOCs. The release of VOCs to air upon disturbance of the waste and subsequent breaking of clods was documented during test pit activities as elevated HNu readings.

Response

While test pitting activities during the RI encountered some "clods", no testing has been done of these clods to evaluate the assertion that they are "encapsulating" potentially mobile VOCs nor is it known how extensive these "clods" are. While U.S. EPA acknowledges that breaking of clods during test pit activities resulted in elevated HNu readings at the exposed cut face of the excavation, U.S. EPA notes that no elevated HNu readings were detected in the breathing zone (i.e., at face level) in the same location. This lack of detection in the breathing zone is an indication of minimal air impacts. However, the potential impacts of excavation and earthmoving activities associated with Alternative 3B will need to be evaluated during the

design phase. The design phase will also ascertain the need for an air monitoring program in the work zone and at the site perimeter during implementation of Alternative 3B.

Comment 6

The result of Warzyn's model is that a significant release of toluene, ethylbenzene, xylenes and other waste constituents could occur due to the disturbance of only the upper 2 feet of waste materials. The contaminant concentrations potentially occurring in groundwater from such a release would result in substantial impacts to groundwater quality. The benefit of reducing infiltration through the implementation of Alternative 3 would be minimal at best and, in light of the demonstrated potential for a release due to waste disturbance, would be inappropriate and in fact more dangerous.

Response

The model referred to here was prepared by Warzyn on behalf of the PRPs. That model theorizes that a release to groundwater of toluene, ethylbenzene and xylenes could occur due to disturbance of the upper two feet of waste materials, but only with the exposure of these waste materials to a one-inch rainfall event. Simple engineering controls, however, exist to address this very problem, and can be very easily implemented with little cost impact. An example of one such control is placement of a tarp over the exposed waste material, thereby eliminating the possibility of infiltrating rainfall to leach the contaminants out of the exposed waste materials. Without this rainfall exposure, the modeled release will not occur. The Selected Remedy, Alternative 3B, can be adequately engineered and implemented to address this risk of release. However, if a release were to occur during or after the implementation of the selected remedy, U.S. EPA and WDNR will reevaluate whether further remedial action is appropriate. U.S. EPA is concerned that if no action is taken at the site, a release such as that described above would be inevitable. U.S. EPA and WDNR therefore believe remedial action is necessary at Wheeler Pit.

III. Protection of Human Health and the Environment

Comment 1

Although Alternative 3 would be more effective in reducing infiltration than the cover repair option, Alternative 2 provides adequate protection from risks. Monitoring would enable detection of a future change in groundwater quality. The length of time the wastes have been in place (approximately 30 yrs) and the minimal groundwater impact to date supports the assertion that contaminants have been stabilized, even given the permeability of the existing cover.

Response

While U.S. EPA acknowledges that groundwater monitoring, to be implemented under both Alternatives 2 and 3B, will enable detection of future changes in groundwater quality, U.S. EPA disagrees with the PRPs' assertions that contaminants have been adequately stabilized, and that Alternative 2 provides adequate protection from risks. See the responses to Comments 1 and 2 under Section I(a) above for a discussion of the "stabilization" issue. See the response to comment 3 under Section III below for a discussion of the "protectiveness" issue.

Comment 2

The lack of evidence supporting the agency position that groundwater quality will necessarily improve in the short-term with the implementation of Alternative 3, as well as the possibility of detrimental impacts through alternative implementation, do not support selection of Alternative 3 over Alternative 2 as the Site remedy.

Response

The NCP established nine evaluation criteria for selection of remedies at Superfund sites. The first two of these criteria are "threshold" criteria--i.e., if the alternative considered can not meet both of these criteria, the alternative can not be further considered. These two threshold criteria are: 1) overall protection of human health and the environment, and 2) compliance with state and federal ARARs. Alternative 2 does not comply with federal and State applicable or relevant and appropriate requirements (ARARs). Because Alternative 2 does not meet this threshold criteria, it cannot be considered further for implementation as the final remedy. The issue of "detrimental impacts" due to implementation of Alternative 3B is addressed under the response to Comment 6 under Section II(b) above. Again, the PRPs are stating that they believe a release is inevitable if the waste is disturbed. This concerns us

since we are required to protect human health and the environment over the long-term. U.S. EPA does not believe Alternative 2 will provide that protection since institutional controls may not be effective, and the cover repair is not protective of groundwater.

Comment 3

Alternatives 2 and 3 are equally protective because they both rely on institutional controls (e.g., deed restrictions) to restrict the types of acceptable future site development.

Response

U.S. EPA acknowledges that Alternatives 2 and 3B both rely on identical institutional controls to restrict the types of acceptable future site development. Alternative 2, however, does not provide the same level of effectiveness as Alternative 3B in relation to prevention of direct contact risk, nor in terms of reduction of infiltration and limitation of potential groundwater contamination. U.S. EPA has determined that Alternative 2 is not protective.

IV. ARARs

a. NR 140

Comment 1

The only ES exceedances at Well B were TDS (total dissolved solids) and manganese. ES exceedances are not attributable to the Site, directly nor indirectly. None of these exceedances pose a significant threat to human health nor the environment. Under these circumstances, therefore, the "No Action" or groundwater monitoring alternatives may be appropriate and could satisfy the requirements of NR 140.

Response

The State of Wisconsin established Chapter 160, Wisconsin Statutes, and Chapter NR 140, Wisconsin Administrative Code, to protect not only drinking water quality in the State of Wisconsin, but more importantly to protect the State's overall groundwater quality. In doing so, it developed a set of actions that the Wisconsin Department of Natural Resources could take to mitigate present and future releases, regardless of whether the contamination is from public health

contaminants or public welfare contaminants (such as TDS, iron, nitrate, and manganese). Also see the responses to comments 1 and 2 under Section IV(a).

The agencies and PRPs continue to disagree on whether action, pursuant to Chapter NR 140, WAC is required at the Wheeler Pit site. Regardless of whether or not action is specifically mandated at this site by Chapter NR 140 (which the State believes it is), the WNDR would like to point out that nothing in Chapter NR 140, WAC precludes the State from taking action under other State laws. In particular, NR 140.24(7) states "the department may take any actions within the context of regulatory programs established in statutes or rules outside of this chapter, if those actions are necessary to protect public health and welfare or prevent a significant damaging effect on groundwater or surface water quality for present or future consumptive or nonconsumptive uses, whether or not an enforcement standard and preventative action limit for a substance have been adopted under this chapter."

The U.S. EPA and State disagree with the statement that the exceedances are not attributable to the Site, for several reasons. First, the agencies do not believe that sufficient evidence has been provided to satisfactorily demonstrate that Wheeler Pit is not the source nor cause of the contamination. The commentors allude that the contamination is from high background levels or other off-site sources. However, sampling to support this statement has not been conducted. In particular, the sampling conducted does not meet the criteria for establishing background water quality pursuant to NR 140.24, WAC.

With respect to whether certain contaminants, such as manganese, were disposed of at the site, historical data was unavailable on specific waste types disposed of at Wheeler Pit. The U.S. EPA 103(c) notification filed by General Motors-Janesville stated that General Motors disposed of organics, inorganics, solvents, heavy metals, and wastes from painting processes, coal-fired boilers, and wastewater treatment processes. Information on the type of wastes produced at the GM Janesville plant in later years is available. In particular, General Motors records available as of 1979 indicate that manganese was a chemical found in the Janesville-GM plan's sludge lacquer, elpo ultrafiltrate, primer sludge, truck enamel sludge, and clarifier sludge. This information was made available to the U.S. EPA and WDNR, by GM, as part of the Janesville Superfund site investigations.

The RI report, prepared by the PRPs, does not support the conclusion that the exceedances of TDS and manganese are not attributable to the Site, directly or indirectly. The RI report (December 1989(states "Background ground water quality indicates elevated total dissolved solids, zinc and nitrate concentrations upgradient from the site. Elevated alkalinity, total dissolved solids, specific conductance and reducing (oxygen deficient) conditions in downgradient ground water suggest possible ground water impacts resulting from the Site, and/or other upgradient sources."

The PRPs state that none of the exceedances pose a significant threat to human health or the environment, thus no action or monitoring is acceptable under State law. It is U.S. EPA's and the WDNR's continued belief that this site poses an actual or potential risk which requires more aggressive action than what is being proposed by the PRPs. In addition, it should be made clear that the decision to take active response measures at this site was made pursuant to the federal Superfund law and the NCP - not State law.

State laws, such as Chapter 160, Wis. Stats. and Chapter NR 140, WAC do come into play in determining whether an alternative is eligible for selection. In order for an alternative, such as groundwater monitoring, to be eligible for selection, that alternative must be both protective of human health and the environment and comply with federal and state environmental requirements (ARARs). Any potential remedy, then, would need to comply with Chapter 160, Wis. Stats. and Chapter NR 140, WAC.

U.S. EPA and the WDNR believe that no action and groundwater monitoring are unacceptable alternatives for the Wheeler Pit Site, because those alternatives are neither protective, nor do they comply with federal and State ARARs. Specifically, the WDNR believes those alternatives do not comply with Chapter 160, Wis. Stats., and Chapter NR 140, WAC.

According to Chapter NR 140, WAC, no action and groundwater monitoring are not acceptable responses where there are ES exceedances of public health and/or public welfare standards at or beyond the point of standards application.

<u>Comment 2</u>

In the alternative, an exemption under NR 140.28 would

be appropriate and is hereby requested since detected concentrations do not pose a threat to public health or welfare.

Response

The WDNR may grant an exemption from taking remedial action, if certain factors pursuant to NR 140.28 are met. In the case of the Wheeler Pit Superfund Site, the WDNR will not grant an NR 140.28 exemption from taking remedial action since this action is being taken pursuant to federal law, not State law. Further, if this action was solely being taken pursuant to State law, the WDNR would not grant an exemption. The PRPs have not sufficiently characterized background, pursuant to NR 140.24. Additionally, the exceedances of chromium, arsenic, 1-4 dichlorobenzene, manganese, TDS and iron are unacceptable from a public health and welfare perspective.

b. NR 504

Comment 3

NR 504 standards have not been uniformly applied to old sites regardless of current conditions.

Response

The WDNR is consistently applying Ch. NR 504, WAC at Superfund sites in Wisconsin. There are many other landfill sites in Wisconsin which are Superfund sites where similar action is taking place or will take place to comply with this regulation and Ch. NR 140, WAC (e.g., Janesville, Onalaska, Hunts Disposal, Hagen Farm and Master Disposal). 504 is also being consistently applied to recent remedial actions where groundwater contamination has been found.

Comment 4

Installation of an NR 504 cap will result in greater risks to human health and the environment and threaten greater impacts to groundwater and air pathways than currently exist. NR 504 would involve removal of existing trees and roots and operating heavy equipment on top of the waste, and would weigh considerably more than the existing cover. Construction of an NR 504 cap could very well prompt exceedances of NR 140 standards, relating to protection of human health. Releases to air could occur if the encapsulated wastes are disturbed.

Response

The commentor concludes that installation of an NR 504 cap will potentially create impacts to groundwater, based on the Warzyn contaminant transport model referenced earlier in this Responsiveness Summary. The catalyst for this model is a rainfall event, which may create a release of VOCs to the groundwater if it rains after the waste has been disturbed during cap construction. The rain would have to come in to contact with the waste in order to cause this groundwater impact. If, as stated in the response to Comment 6, in Section II(b), an engineering control were implemented during construction activities, such as placement of a tarp over the waste to prevent rainwater infiltration, the modeled impact to groundwater would not occur.

The commentor also states that a release to air could occur if the encapsulated wastes are disturbed. U.S. EPA acknowledges that, during the RI, VOCs were released when an encapsulated waste "clod" was disturbed. However, the HNu only detected such a release right next to the waste, not in the ambient air. Air will be monitored during construction activities to assess air quality.

Comment 5

The stabilization process prevents the interaction of waste constituents with water percolating through the fill material, and these substances are not migrating out of the waste.

Response

U.S. EPA acknowledges that the waste constituents appear to have limited mobility at this time. However, based on the uncertainties associated with the stabilization process that may have occurred to some extent at the site and the presence of VOCs, (these uncertainties are outlined in the response to Comment 1 under Section I(a)), U.S. EPA is not confident that infiltrating water cannot interact with contaminants in the waste and believes that future releases are possible.

Comment 6

Even if an NR 504 cap were required by the regulations themselves, an ARARs waiver would be and is hereby requested since (a) the State has not consistently

applied NR 504 requirements to old landfills and (b) compliance (installation of a clay cap) will result in greater risks to human health and the environment than Alternative 2.

Response

While an NR 504.07 cap is not an applicable requirement, it is relevant and appropriate to the site. An ARARs waiver is not appropriate in this instance. The WDNR is consistently applying Ch. NR 504, WAC at Superfund sites in Wisconsin. There are many other landfill sites in Wisconsin which are Superfund sites where similar action is taking place or will take place to comply with this regulation and Ch. NR 140, WAC (e.g., Janesville, Onalaska, Hunts Disposal, Hagen Farm and Master Disposal). See responses to comment 6 in Section II(b) and comment 4 in Section IV(b) for responses to the PRPs' assertion that the selected remedy will result in greater risks to human health and the environment.

Comment 7

Alternative 2 also meets the other criteria for review established by the NCP.

Response

In support of this comment, the commentor evaluates Alternative 2 according to the nine criteria in Table 1 of the PRPs' comments. U.S. EPA does not agree with the commentor that Alternative 2 provides the best balance of the nine criteria because Alternative 2 does not meet the threshold criteria. Alternative 2 is not protective and does not comply with ARARs, which excludes it from selection as a remedy for this site.

V. Deletion

Comment 1

One commentor suggested that an appropriate remedial alternative for the site is the "No Action" alternative and that U.S. EPA delete the Wheeler Pit Site from the National Priorities List (NPL). He further stated that

1) there has been no significant release of hazardous constituents from the waste;

2) appears that no substantial threat of a release is

present; and

3) there are no current risks at the site, and only a highly unlikely noncarcinogenic future risk and carcinogenic risk within the risk range.

Response

U.S. EPA has determined that remedial action is necessary at the Wheeler Pit Site in order to protect the public health or welfare or the Environment. Therefore, the request for deletion of the site from the NPL is premature.

There has been a release of hazardous substances, pollutants or contaminants into the environment. This release includes chlorinated benzene compounds, arsenic, chromium, iron, and manganese into the groundwater.

There also continues to be a substantial threat of a release of hazardous substances, pollutants or contaminants into the environment which may present an imminent and substantial endangerment to the public health or welfare or the environment. This is due to the fact that high concentrations of a large variety of contaminants are "contained" in the waste at the site. The PRPs submitted information describing the fragile nature of the "solidified" material at the site and express concern that this material will both leach into the groundwater and volatilize into the air if the site is disturbed. By their own admission, the breaking up of the "pods", or "clods" that are at the site will create a potentially hazardous situation. This information further substantiates the Agency's concern over the need to take a remedial action in order to protect human health and the environment from a release over the long term. Monitoring will detect any release that may occur. That information will be assessed to determine if further groundwater action is necessary. The cap [along with institutional controls] will help to prevent infiltration into the waste and prevent disturbance of the waste over the long-term. If no remedial action is taken, there is no assurance that waste disturbance can be avoided through the use of a fence and deed restriction alone. The PAL exceedance of Arsenic (As) in the groundwater does, in fact, pose a threat to human health and the environment. The cancer risk due to exposure to As in groundwater is 1.9E-03. The total carcinogenic risk due to groundwater exposure, excluding arsenic, is 2.0E-05. Although this falls within the range of risk levels that may generally be acceptable levels, U.S. EPA uses an individual lifetime excess cancer risk of 10^{-6} as a point

of departure for established remediation goals for the risks from contaminants at sites. This point of departure has been exceeded at Wheeler Pit.

The NCP envisions that both current and future exposures are to be considered. The future scenario describing exposure to site waste is a reasonable scenario. The risk posed under this scenario is significantly above the noncarcinogenic acceptable level at which no adverse affects occur.

Because there are unacceptable risks due to exposure to contaminants at the site, remedial action is appropriate for the site. Once it has been determined that action is required, ARARs must be met (or a waiver from meeting ARARs granted). Since closure (i.e., NR504) regulations are triggered, the site, at least, needs to be closed in accordance with those regulations.

Although the commentor believes that the future risk at the site is a highly unlikely scenario, U.S. EPA and WDNR disagree. By the PRPs own assessment, they believe that even minimal disturbance of the waste may create a release.

Again, "no action" is an inappropriate response and a limited action alternative will not meet ARARs and is not protective.

Finally, regarding the commentor's request that the site be deleted from the NPL, U.S. EPA has determined that it is not an appropriate time to consider deletion proceedings. U.S. EPA must consider whether any of the following criteria has been met:

(i) Responsible parties or other persons have implemented all appropriate response actions required;

(ii) All appropriate Fund-financed response under CERCLA has been implemented and no further response action by responsible parties is appropriate; or

(iii) The remedial investigation has shown that the release poses no significant threat to public health or the environment and, therefore, taking of remedial measures is not appropriate.

U.S. EPA has determined that none of these criteria have been met since it is determined that taking of remedial measures is appropriate based on the future risks from

the site.

In addition, Section 121 of CERCLA specifies that U.S. EPA will conduct five year reviews at sites where remedial actions result in hazardous substances, pollutants or contaminants remaining on-site. There is a policy that U.S. EPA conduct at least one five-year review before deleting such a site from the NPL. Again, the request for deletion is premature in that even if the action chosen were a "limited action", a five year review would still be required since the site would not provide for unrestricted use.

E. SIGNIFICANT STATE COMMENTS

The WDNR submitted their comments on the selected remedy in a letter to U.S. EPA dated July 20, 1990. All of the State's comments have since been addressed in the Record of Decision. The State of Wisconsin has reviewed the ROD and concurs on the selected alternative.

Declaration for the Record of Decision

Site Name and Location:

Marion/Bragg Landfill
Marion, Indiana

Statement of Basis and Purpose:

This decision document represents the selected interim remedial action for the Marion/Bragg Landfill developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP).

This decision is based upon the administrative record for the Marion/Bragg Landfill. The attached index identifies the items which comprise the administrative record and the public comments upon which the selection of an interim remedial action is based.

The State of Indiana, through the Department of Environmental Management, has concurred on the selected remedy.

Description of the Selected Remedy:

This landfill has three operable units: the surface soils and on-site wastes, the ground water and the on-site pond. This operable unit addresses the surface soils and the on-site wastes. The major components of the selected remedy include:

- Regrade and cap the site to promote rain runoff, reduce infiltration, eliminate leachate seeps and contaminated seep sediments, and prevent direct contact with contaminated surface soils and exposed waste.
- Provide and maintain flood control measures to protect that portion of the site which lies within the 100 year flood plain.
- Construct and maintain a fence around the site perimeter to protect the landfill cover and restrict access to the site and the on-site pond.
- Provide three private use drinking water wells within the deep aquifer for water users who drink from the affected aquifer within the site boundary. Seal the existing shallow wells (if possible, keep one as a monitoring well.)
- Monitor the ground water to determine the effectiveness of the interim remedy and conduct additional studies, as necessary, to complete the remaining ground water and on-site pond operable units.

Declaration:

The selected interim remedy is protective of human health and the environment, attains Federal and State requirements that are appropriate and is cost-effective for those elements addressed by this interim remedy. The statutory preference for treatment is not satisfied because treatment was found to be impractical and not cost-effective. Incineration was the only treatment technology considered beyond the initial screening stage. Based on the lack of off-site incineration capacity, anticipated duration of such remedial action (30 to 100 years), high inorganic content of the waste and ash disposal problems, incineration was not considered a feasible alternative for the landfill contents.

Concurrent with the implementation of the interim measures, the United States Environmental Protection Agency (U.S. EPA) will further study the nature of groundwater contamination on fish consumption and potential impacts to aquatic life and the environment. Implementation of these actions is appropriate now, pending a future determination of the need for any other remedial actions.

September 30th, 1987
Date

Valdas V. Adamkus
Regional Administrator
Region V

Record of Decision Summary
Marion/Bragg Landfill

I. Site Description

The Marion Bragg Landfill site is located just outside the southeastern city limits of Marion, Indiana. (Figure 1) The landfill occupies approximately 45 acres of a 72-acre site along the west bank of the Mississinewa River. The northern end of the site is within the estimated 100 year flood plain.

The site is bordered on the north and east by the Mississinewa River. (Figure 2) A cemetery is located along the western border and the Eastside Cove recreational area is located along the site's southern border. A residence and two businesses are located on the southwest corner of the site. The two businesses are Marion Paving Company and Dobson Construction Company. Both companies are asphalt plants. A large (15 acre) pond formed from sand and gravel quarry operations is in the center of the site. The on-site pond is occasionally used for recreational purposes, such as boating and fishing. The on-site pond receives discharges associated with gravel washing operations from the Marion Paving Company asphalt plant. A large pond of similar size is located off-site on the Eastside Cove recreational area, adjacent to the southern site boundary. This large pond on the Eastside Cove recreational area is used for fishing.

II. Site History and Current Status

A. History and Waste Types

1. History

The Marion/Bragg site was used as a sand and gravel quarry from 1935 until approximately 1961. During the period from 1949 through 1970, Radio Corporation of America (RCA) leased and used portions of the site for industrial refuse disposal. Concurrently, during the period from 1957 to 1975, Bragg Construction leased and used the site for a municipal landfill. Periodic inspections by the Indiana State Board of Health indicated that operations at the landfill were continually conducted in an unacceptable manner. Indiana State Board of Health (ISBH) specifically noted the disposal of hazardous or prohibited wastes including acetone, plasticizers, lacquer thinners and enamels.

Drummed wastes were allegedly emptied from the drums and "worked" into the landfill waste with a bulldozer. Fires created from this co-disposal operation destroyed two bulldozers. Drums were allegedly rinsed and resold. Other typical violations included lack of daily cover, placing waste in standing water (pond encroachment) and the burning of refuse. In 1975 Bragg Construction ceased operation of the landfill. The landfill was covered with a sandy/silty material and seeded. The landfill was never formally closed through ISBH.

In 1975, Waste Reduction Systems, a division of Decatur Salvage, Inc., constructed a transfer station on the premises in order to transfer solid wastes to an approved landfill. The transfer station was closed in 1977. In January 1980, ISBH issued a letter stating that the transfer station had been closed in an acceptable manner.

In December, 1982 the Marion/Bragg Landfill was proposed for the National Priorities List (NPL) with a score of 35.25.

2. Waste Types

During the remedial investigation, wastes from 3 boring locations were analyzed to confirm the presence and relative concentrations of hazardous contaminants. (Table 1) Leachate wells were constructed in these borings. These wells were screened within the waste material in order to provide information on the relative concentration of contaminants leaching from the landfill to the ground water at the present time.

B. Present Site Conditions

The final cover applied to the landfill is a very permeable silty sand material which varies in thickness from three to 24 inches. There are numerous areas where debris, including drum carcasses, protrude from the fill. The surface is vegetated in most areas and four to five inch diameter trees are also predominant surface features.

The on-site pond was at one time stocked for recreational fishing, but is no longer used as such. Teenage children have been seen fishing occasionally from the on-site pond, otherwise the site is not typically used. At the southwest edge of the pond is an intake pipe and effluent ditch from the Marion Paving Company. Marion Paving has an expired permit issued for "private use water." The permit allows water withdrawal and discharge to the on-site pond for the gravel washing operation.

Another asphalt company, Dobson Paving Company and a private residential home are also located within the property boundary. All three have shallow wells which are in the upgradient, uncontaminated portion of the aquifer.

C. Site Stratigraphy and Hydrogeology

The stratigraphy at the Marion/Bragg Landfill is very simple. It consists of landfill wastes (0-32 feet thick), outwash deposits (6-64 feet thick), glacial till (54 to 63 feet thick) and bedrock (thickness unknown, surface is 89 to 125 feet below ground surface).

The landfill contains approximately 1.1 million cubic yards of waste. At least 4 percent of the total volume is perennially saturated in the upper aquifer. The saturated areas are to the east, west, and north of the pond. South of the pond a water filled gravel pit was allegedly filled with demolition debris. The saturated volume of this pond has not been estimated. (Figures 3 & 4)

Outwash deposits (sands and gravel) constitute the surficial aquifer. The average hydraulic conductivity is 4.27×10^{-2} cm/sec. The aquifer gradient is toward the Mississinewa River. The Mississinewa River is a hydraulic barrier causing the contaminated groundwater beneath the site to discharge to the river, without allowing flow to pass beyond the river. The estimated flow velocity is 2.78 ft./day. At this rate, the aquifer beneath the site purges every 2.2 years, or 7 times in the last 15 years.

The on-site and off-site ponds are hydraulically connected to the groundwater. The presence of the large on-site and off-site ponds creates a hydraulic anomaly in that water flows from the off-site pond, discharging to the aquifer, recharging the on-site pond from the south. The on-site pond discharges radially from the west, north and east sides of the pond. The predominant discharge area is to the north, to the Mississinewa River.

The outwash deposits are underlain by a very low permeability glacial till. This till is approximately 54 to 63 feet thick. The hydraulic conductivity ranges from 1.0×10^{-7} cm/sec to 2.88×10^{-8} cm/sec. This till layer is considered an aquiclude.

The glacial till layer is underlain by limestone bedrock. The thickness of this layer is uncertain, but it was first encountered at 88 feet below ground surface. This bedrock layer constitutes a second aquifer. This confined aquifer has an upward vertical gradient, toward the glacial till.

D. Public Health Evaluation: Hazardous Compounds, Pathways and Risks

Numerous exposure pathways were considered in the Public Health Evaluation. These include direct contact with surface soils, leachate seeps, swimming and fish consumption from the on and off-site ponds and consumption of groundwater beneath the site. The field work was completed in two phases; spring (March) and summer (July). This offered some seasonal variability as well as providing two rounds of samples (in most matricies) for data evaluation.

1) Surface Soils and Landfill Contents

a) Contaminants and Pathways of Exposure

Surface soil samples were collected to determine if hazards exist because of the contaminants present. Five samples were taken from the landfill surface, and one sample was taken adjacent to the asphalt plant, off of the landfill area. Each sample was a composite of five grab samples in a 50-foot radius. These data were evaluated relative to background soil concentrations.

The contaminants of concern were Bis (2-ethylhexyl) phthlate, cadmium, lead, mercury and several polycyclic aromatic hydrocarbons (PAHs). The presence of PAHs is likely due to both the landfill and the existing asphalt plants. PAH concentrations were highest in the sample near the asphalt plant. Only one other sample had a significant concentration. This was located on the northern part of the landfill, away from both asphalt plants. Cadmium and lead were also present at low levels in at least five of the six locations.

Two leachate seeps are present on the landfill surface. One leachate seep discharges directly into the on-site pond. The other leachate seep is on the south center section of the site. It is present most of the year. The seep follows the surface drainage direction off-site to the south and toward the large off-site pond on the East Side Cove property. The contaminants of concern are arsenic and most of the other inorganic metals.

Because the surface soil is contaminated, receptors (wildlife and human) may inhale, ingest and contact hazardous compounds directly. Contaminated soils may also be transported off-site during rain events. This action, over time, could result in greater exposure of landfill contents as well.

b) Risk to Receptors

Risks above 1×10^{-6} are associated with direct contact with soils due to PAHs in the surface soils (average: 2×10^{-7}, maximum: 5×10^{-5}) and arsenic in the leachate seep (average: 4×10^{-7}, maximum: 8×10^{-6}). The hazard indicies for these matrices for noncarcinogenic effects are less than one.

2) On-Site and Off-Site Pond Water and Sediments

a) Contaminants and Pathways of Exposure

Eleven samples were taken from on-site and off-site ponds. Seven sediment samples were collected. These data were compared to background samples. Chloroform (13 ppb) and bis(2-ethylhexyl) phthalate (11 ppb) were detected once in the on-site pond. Many inorganics were detected in the on-site pond above background levels. The only sample which exceeded water quality criteria

represented a leachate seep which discharges directly into the on-site pond. Chromium and mercury were each detected once in the off-site pond below acute water quality criteria. The mercury, however, was not reproducible in the sample duplicate, nor did subsequent sampling confirm its presence.

Pond sediments contained several inorganic constituents, phthalates and some PAH compounds. Two on-site pond sediment samples had low levels of some PAH compounds. Individual PAH were present at concentrations ranging from 65 to 170 parts per billion (ppb). One off-site pond sediment sample contained a trace amount of two PAH compounds. The off-site pond is hydraulically upgradient of the landfill. It may be somewhat under the influence of the landfill from the ground water pathway, however, it is likely that surface run-off from the landfill is the greater influence on water quality. Although the southern portion of the landfill is well vegetated, it does slope toward the south and the leachate seep flows off-site toward, and likely into, the off-site pond.

b) Risk to Receptors

Risks were considered for swimming in the on-site pond and fish ingestion for both ponds (the off-site pond is not used for swimming). The risks presented for these activities were not above the 1×10^{-6} point of departure, and the hazard index for noncarcinogenic effects was less than one. There are two possible weaknesses in this assessment. First, the risk assessment did not rely on actual fish data. Instead, bioaccumulation factors from available literature values were used. Such bioaccumulation pathways are not well studied and the modeling of fish contaminant uptake has a high degree of uncertainty. The risks (or lack of risk) estimated at this time may or may not reflect actual or potential risks due to the site.

PAHs and inorganics present in the pond sediments, in general, do not tend to bioaccumulate. The predominant method for the accumulation of chemicals by fish is presumed to be absorption through the gills from the water, not from the sediments or through the food chain. Sediments may be a critical source of chemicals for aquatic life that dwell or feed primarily on the bottom. There is very little information on the relative contribution of sediments to chemical residues in aquatic life. Literature values do not exist for sediment uptake by fish, therefore it can not be modeled.

Second, the surface waters (with the exception of the leachate seep flowing into the on-site pond) met water quality criteria to the extent that this criteria was above detection limits. However, the difficulty with the water quality criteria is that many of the inorganic constituents have levels set for protectiveness of either the aquatic life or human consumption which are well below

analytical detection limits. Therefore, it is conceivable that bioaccumulation could be occurring either from the sediments or the water, which is not evident based on existing data. Bioassay work is needed to determine if a risk is present to human health from this surface water/sediment pathway.

Sediment data, in general, are difficult to evaluate because there are no criteria. Region V has developed a database for inorganics from the Great Lakes Harbor sediments. This provides a relative concentration range for comparing non-polluted, moderately polluted and heavily polluted sediments. In comparing the inorganics to the pollutional classification suggested in this database, only one sediment location was noted to be a potential concern by the U.S. Fish and Wildlife service. This was at the leachate seep in the on-site pond.

3) Ground Water

a) Contaminants and Pathway of Exposure

The ground water beneath the site discharges to the river. Ground water exposure is an incomplete pathway because no one is currently using the aquifer beneath the site as a water supply. The risk estimate was based on potential future use.

Thirteen wells were drilled around the site perimeter, eight of the wells were drilled through the landfill. Since this site borders the river, there is no plume or downgradient area to sample, except for the river. Therefore, the monitoring wells had to be drilled through the fill material and screened in the aquifer below.

Since any release from a facility is a potential problem, all chemicals present are of concern. Benzene, trichloroethylene and bis-(2-ethylhexyl) phthalate are present most frequently and above criteria. Most of the heavy metals were detected only once in the ground water beneath the site. These are generally below the MCL, where available, but above the fresh water aquatic life criteria. Arsenic is an exception. It is above the MCL in three of the samples, but detected at lower levels frequently. In general, the contaminants were detected at low levels. (Table 2)

b) Risk to Receptors

The public health evaluation presumed future land use as a recreational area, where drinking water wells would be required. Exposure would be infrequent, but would occur over at least a 10-year period. This resulted in a lifetime risk range of $7x10^{-6}$ to $5x10^{-4}$ due to arsenic. Without the arsenic, the maximum risk was estimated at $3x10^{-7}$. The hazard index for noncarcinogenic effects was less than one.

The risk present in the ground water beneath the source is likely to vary from one area to another due to varying waste types and resultant ground water concentrations. The maximum risk was estimated by using the highest concentrations of all contaminants found. (Table 3)

Parameters other than the priority pollutants are also a concern because they can indicate unacceptable water quality. Parameters of concern here are ammonia and chemical oxygen demand (COD). Ammonia is a product of degrading organic material. The ammonia ranged from 0 to 24 milligrams per liter (mg/l) and the average ground water COD was about 600 mg/l. There are no drinking water standards for these parameters.

Since the ground water discharges to the river, several parameters are of potential concern for protection of fresh water and aquatic life. These are discussed below.

4) The Mississinewa River

a) Contaminants and Pathway of Exposure

The Mississinewa River is the major ground water receptor. During the winter, river water levels were slightly higher than the summer. In both phases of field investigation, the river was at average flow (about 600 cfs). Ten water samples and six sediment samples were collected. The river did not show signs of being impacted by priority pollutants. Sodium was detected in the river water north of the site at levels above background. This is likely to be landfill related. Beryllium and silver were detected in one sediment sample downstream of the site. This may be a result of off-site migration of surface soils, due to the flood pathway between this sample location and the site. This is uncertain since these contaminants were found only once, at a low level.

Certain water quality indicator parameters were analyzed for in order to evaluate whether or not the landfill may be impacting water quality in a way which is not characterized by priority pollutants. Ammonia and chemical oxygen demand (COD) were again the key indicator parameters. The COD did not vary significantly between upstream, near-site or downstream. Ammonia was present above water quality criteria in two samples taken north of the site. One sample was taken from a backwater channel (5.6 ppm) and the other was taken at the river edge (3.2 ppm). Ammonia was also detected above background, but below water quality criteria east of the site (.6 ppm). The State of Indiana river standard for ammonia is .8 ppm in the summer and 1.13 ppm in the winter. This standard is pH and temperature dependent.

North of the site there is a backwater channel which flushes when the river is at a high level, but otherwise exists as a stagnant pool. The extent to which samples north of the site represented an impact from the landfill versus the backwater channel is uncertain. Ammonia is toxic to aquatic life, and the criteria represent the minimum conditions necessary to support aquatic life.

b) Risk to Receptors

No current human health risk is estimated for recreational use of the river near the site. However, the FS did examine ground water discharge concentrations which would allow protection of the river, its uses and the biota. This is based on possible low river flow conditions. This approach is typically used under the National Pollutant Discharge Elimination System (NPDES) to establish discharge limits. The impact of a discharge on a river's water quality is based on minimum dilution which is represented by the lowest seven consecutive day flow occurring statistically once every 10 years (Q7/10) in a specific reach of the river. Limits developed using minimum dilution provide maximum protection of aquatic communities.

Given the groundwater contamination flow from the site, and the river flow, the resulting contaminant concentration in the river can be estimated. This is a simple dilution equation. Taking a slightly different approach, the on-site concentration allowed to protect the river at the low flow can be estimated. This NPDES approach is not required, but provides a logical means for estimating potential risk to the river. Under this scenario; two potential problems became apparent, the inorganics and ammonia. Aquatic species are very sensitive to low concentrations of some inorganics. Most inorganics of concern were not detected more than once on-site. Only longer term monitoring could determine their significance. Arsenic, however, is high on-site and has the potential to affect humans consuming fish. The aquatic life criteria for protection of fish ingestion is .0175 ppb. Since this level cannot be analytically detected in the surface water, arsenic released from the site could be bioaccumulating at a very low level. In addition, the on-site ground water ammonia levels have the potential to adversely impact aquatic life in the river. This is particularly a concern since elevated ammonia concentration have been detected in the river. In two samples, it was above the State of Indiana water quality criteria.

Based on this assessment, the Remedial Investigation (RI) and Feasibility Study (FS) conclude that there is no currently identfied risk to the river, but the potential for such risk does exist.

5. Asphalt Plant Effluent

The asphalt plant operates about half of the year. Effluent from the Marion Paving Company asphalt plant is discharged to the on-site pond via a surface drainage ditch. The effluent is a result of gravel washing. It was sampled to determine whether or not contaminants found in the on-site pond could logically be attributed to this source. The discharge contained a significant amount of inorganic contaminants, mostly associated with the high total solids content of the water. This source is not expected to contribute significantly to the inorganic contaminants within the on-site pond. The COD

in the effluent was high and likely contributes some oxygen demand within the pond, however, pond COD values were not significant.

Public Health Evaluation Summary

Table 4 summarizes the potential risks associated with the Marion/Bragg Landfill. These potential risks are above the 1×10^{-6} point of departure for carcinogenic risk for two pathways: surface soils and ground water consumption. As noted before, the PAHs causing the risk in the surface soils are a result of both the landfill and the asphalt plants. The hazard index for noncarcinogenic effects is less than one in all matrices.

III. Enforcement Summary (see appendix 1)

IV. Alternatives Evaluation

Remedial action goals were presented in the Marion/Bragg FS report to address each of the site hazards or exposure pathways identifed. They were identified for each of the following operable units: surface soils and on-site wastes, ground water, and on-site pond and sediments. The alternatives were also designed to comply with § 121 of SARA. The extent to which each alternative meets the remedial action goals and complies with SARA is discussed relative to the evaluation criteria provided by Section 121(b)(1).

A. Remedial Action Goals

1) Surface Soils (incl. Leachate Seeps) and On-Site Wastes (Landfill Contents)

Minimize Direct Contact - Minimize risk to public health and environment from direct contact or ingestion of landfill contents, contaminated surface soil, surface leachate seeps or seep sediments.

Control Migration Off-Site and to Surface Waters - Minimize and mitigate the overland migration of contaminants from leachate seeps and contaminated surface soils which may flow or be washed off-site or to the surface waters.

Minimize Migration to Ground Water - Minimize the leaching of contaminants from contaminated soils and landfill contents into the ground water to adequately protect the surface water receptors.

2) Groundwater

Minimize Direct Contaminant Consumption - Minimize possible future risk to public health from direct consumption of contaminated ground water.

Control Migration to Surface Water - Manage migration of contaminated groundwater to the on-site pond and the Mississinewa River to provide adequate protection of surface water quality and aquatic life habitats, and the human ingestion of aquatic organisms.

3) On-Site Pond and Sediments

Minimize Direct Contact - Minimize the human exposure potential to the on-site pond from swimming and ingestion of aquatic organisms.

B. Alternatives Considered

Six alternatives (plus No Action) were developed to meet the above remedial action goals. These are described in detail in the FS. The alternatives were assembled in a building block manner so that any or all of the operable unit components could be addressed (i.e.: cap, cap and ground water). A wide range of subalternatives were provided because there are several ways of achieving the remedial action goals in a cost-effective way. Each alternative has four subalternatives based on two cost sensitive variables. The first variable concerns regrading of the existing landfill surface prior to capping. Both capping alternatives have minimum grade requirements to promote rain run-off and prevent erosion. This requires that either a significant amount of off-site borrow material be used on the existing surface to bring it up to grade, or that the existing surface be regraded to achieve the required grade before capping.

The second subalternative considers whether the on-site pond operable unit component is addressed. The pond water is a receptor for the contaminated groundwater. Since this pathway is a concern, options for minimizing potential exposure were evaluated. In leaving the pond open, long-term monitoring and site access restrictions are presumed. The other approach would be to eliminate the pathway by backfilling, and thereby eliminate the need for monitoring and access restrictions.

These two variables are assembled as subalternatives.

i) Cap installed over existing fill with pond remaining open
ii) Cap installed over existing fill with pond backfilled
iii) Cap installed after regrading existing fill with the pond remaining open
iv) Cap installed after regrading existing fill with the pond backfilled.

In total, there are 24 subalternatives to consider. All alternatives, except no action, include replacement of shallow wells, fencing and flood protection. Deed restrictions will also be sought from the land owner, regardless of the alternative selected. The components of the six alternatives are presented below.

Alternative 1 -- Indiana Sanitary Landfill Cap and Monitoring

Alternative 1 includes fencing, a two-foot clay-type cap and six inches of topsoil to reduce infiltration, promote runoff and eliminate off-site migration of contaminated soils and leachate seeps. This alternative addresses all of the operable unit goals except one. It does not aggressively manage the migration of groundwater to the surface water(s). The exposure pathway from groundwater to surface water is still present in this alternative. This alternative reduces infiltration through the landfill from 13.0 to 4.13 inches (70%). It meets the technical requirements for Subtitle D landfill capping under the State of Indiana regulation. This alternative minimizes, but does not eliminate, leaching of contaminants to the ground water. The alternative relies upon monitoring to ensure that levels protective of the surface water(s) and their uses is still achieved. If protective levels are exceeded then additional remedial actions would be indicated. Alternative 1 would cost between $6.8 million and $19.7 million in present worth (cost variations due to regrading and backfilling the on-site pond).

Alternative 2 -- Multi-layer (RCRA) Cap and Monitoring

Alternative 2 is the same as alternative 1 except that the cap is a RCRA multi-layer cap. This reduces infiltration to zero and meets the technical requirements for landfill capping for site closure under RCRA. This alternative does not address the groundwater and monitoring is still needed to ensure that levels protective of the surface water(s) and their uses is still achieved. Additional remedial action would be needed if protective levels are exceeded. Alternative 2 would cost between $11.2 and $25.6 million in present worth (cost variation due to regrading and backfilling the on-site pond).

Alternative 3A -- Indiana Sanitary Landfill Cap, Slurry and On-Site Ground Water Treatment

Alternative 3A includes the sanitary landfill cap, a slurry wall to minimize off-site migration and groundwater pumping, and on-site groundwater treatment. The on-site treatment facility would consist of activated carbon adsorption for low level organics and COD removal, and an air stripping system for ammonia removal. Pilot studies would be required before implementation of the remedy for slurry wall/waste compatibility and to ensure that the carbon adsorption ground water treatment system can remove the low level of inorganic contaminants. Since the landfill is not supported on the river's edge, the slurry wall would need to be installed 70 to 95 feet from the edge (i.e., through the landfill material). This would result in some portion of the landfill remaining outside the slurry wall (approximately 1.6% of the total waste volume).

Neither the slurry wall or the cap are impermeable. The ground water inside the wall would need to be pumped and treated. Sufficient water would be pumped to maintain an inward gradient, thus preventing any contaminants from seeping out.

This alternative would meet all of the remedial action goals. Monitoring would still be required to ensure effectiveness of remedy and to comply with the NPDES discharge permit from the on-site treatment facility. Alternative 3A is estimated to cost between $12.4 million and $25.1 million in present worth (cost variation due to regrading and pond backfilling).

Alternative 3B -- Indiana Sanitary Landfill Cap, Slurry Wall and Discharge of Ground Water to Marion POTW

This alternative contains all the same technical considerations as described for alternative 3A except that the Marion Publicly Owned Treatment Works (POTW) would provide the treatment and discharge under their NPDES permit. Alternative 3B is estimated to cost between $11.8 million and $24.5 million in present worth (variation in cost due to regrading and pond backfilling).

Alternative 4A -- Multi-layer (RCRA) Cap, Slurry Wall and On-Site Ground Water Treatment

Alternative 4A combines the RCRA cap discussed in alternative 2 with groundwater treatment. This alternative would meet the remedial action goals to the maximum extent practicable. The RCRA cap reduces the amount of ground water requiring treatment. The water which passes through the slurry wall or enters the pond from rainfall (if the pond is left open) would require treatment. The on-site treatment system would consist of carbon adsorbtion and air stripping. The cost for implementation of this alternative ranges from $16.7 million to $30.9 million in present worth (cost variations due to regrading and pond backfilling).

Alternative 4B -- Multi-layer (RCRA) Cap, Slurry Wall and Discharge of Groundwater to Marion POTW

Alternative 4B is similar to 4A except that the ground water would be treated at the Marion sewage treatment plant. This alternative meets the remedial action goals and costs between $16.1 million and $30.2 million in present worth (cost variation due to regrading and pond backfilling).

Alternative 5 -- No Action

The No Action Alternative is required by the National Contingency Plan. It provides a baseline for comparison of other alternatives.

C. Evaluation Criteria

Table 5 presents a brief qualitative summary of how the alternatives were evaluated against the human health and environmental goals expressed in Section 121 of the SARA amendments. The costs presented in this table presume the site will be regraded. This reduces the presentation of costs. Appendix 2 contains the cost summary for all 24 subalternatives.

Evaluation Summary

Capping alternatives 1 and 2 provide protection of public health and the environment from the risks associated with the surface soils and leachate seeps. Both alternatives reduce infiltration and therefore the leachate generated; both will prevent contaminated surface soil from discharging to surface waters or off-site, and both caps meet the technical specifications for landfill closure requirements which may be relevant and/or appropriate. Neither alternative, however, addresses the groundwater pathway in terms of direct human consumption or discharge to surface waters. Therefore, both alternatives rely on monitoring to ensure that the levels released are not above action levels. If action levels are exceeded, groundwater pump and treat or other active protective actions will be required.

Alternatives 3A, 3B, 4A and 4B address capping requirements and the groundwater pathway (with the option of pond open or backfilled). To the maximum extent practicable, all these alternatives address elimination of potential pathways of concern. The slurry wall eliminates off-site migration of ground water and reduces the amount of water requiring treatment. However, some waste must be left on the outside of the slurry wall in order to support the wall. The RCRA cap further reduces the amount of ground water to be treated, but maintenance requirements, especially repair work may be expensive. Both the on-site and off-site groundwater treatment system are technically feasible. The off-site treatment system would be more reliable since the operation and maintenance is already done by the city POTW. Further characterization may be required to determine if the ground water pumped from the Marion/Bragg site can be accepted at the Marion POTW.

D. Rationale for Selection of an Interim Remedy

The ground water beneath this facility is contaminated with a low level of various organic and inorganic constituents. Given that hazardous wastes were mixed, or co-disposed with other trash, and that some volume of this trash is perennially saturated, the contaminant levels found during the RI are likely to continue for a long time.

The general response objectives require that human health and the environment (in this case, surface waters) be protected from existing and potential future contamination. In protecting human health from exposure to ground water, two options are available; use institutional controls to prevent exposure, or pump and treat the aquifer. For surface water protection there are also two options available; establish as Alternate Concentration Limit (ACL), which essentially says that existing levels are protective, or pump and treat the aquifer in order to protect the river.

SARA specifically addresses Superfund sites which are adjacent to surface water bodies. § 121 (d)(2)(B) discusses the use of water quality criteria and releases to surface waters. In some circumstances, it is acceptable to establish an ACL or alternate contaminant level for releases to surface waters. There are two restrictions on use of this provision. There can be no statistically significant increase of constituents from the ground water in such surface water at the point of entry or any point where there is reason to believe accumulation of constituents may occur downstream; and the remedial action includes enforceable measures that will preclude human exposure to the contaminated ground water at any point between the facility boundary and all known or projected points of entry of such ground water into surface water.

The FS examined possible action levels based on protectiveness of the river at the Q7/10. This is a very protective approach since the Q7/10 does not occur frequently. Based on this approach, the inorganics and ammonia have the potential to impact the surface water at the low flow. The on-site ground water levels were above levels allowed by the NPDES model, yet these were not significant in the river samples (except for two ammonia data points).

A ground water remedy at the Marion/Bragg landfill should be carefully considered. If ground water treatment is required to protect human health or the environment, the resulting slurry wall and treatment scenario would last in perpetuity. On the other hand, the sensitive water quality criteria for inorganics, especially arsenic, and the presence of ammonia, suggest that a potential threat to aquatic resources does exist. In order to be conservative in selecting a ground water remedy to ensure protectiveness, additional ground water studies are recommended. These studies will focus on the general toxicity, if present, of this ground water on the surface waters or to humans through fish ingestion.

The ground water treatment alternatives 3A, 3B, 4A and 4B are being deferred at this time. When the final ground water remedy is selected, U. S. EPA will either select an appropriate ACL or action level and allow ground water discharge to continue, or select a ground water treatment alternative already investigated in the FS. This approach assumes a land use restriction is enforceable.

Enforceable institutional controls play an important role in selecting the final ground water action and determining the fate of the on-site pond, which is also a point of surface water exposure. CERCLA itself does not give that type of enforcement authority, yet requires enforceable land use restrictions to prevent human exposure as an element of the ground water option if releases continue. The State of Indiana lacks legal authority to bar uses of property for such activities as well drilling and excavation, that might interfere with the capping of the site. The Region will attempt to negotiate a voluntary restrictive covenant with the property owner, and expects that the PRPs will assist in these negotiations. The operable unit for the on-site pond will also be deferred until the ground water remedy is selected since the two operable units are related.

Alternatives 1 and 2, capping alternatives, remain for consideration for this operable unit. In comparing the two capping alternatives with respect to the evaluation criteria and the site-specific technical aspects, alternative 1, the sanitary landfill cap, was selected. This rationale is further documented in Section VI of this Record of Decision.

V. Recommended Alternative

U.S. EPA's recommended alternative is alternative 1. (Figure 5) The major components of the alternative are: access restrictions, residential well replacement, flood protection, clay-type cap, installation of ground water monitoring wells and additional study of the surface waters. The alternative includes regrading of the site, but defers action on the on-site pond. The capital cost is $5.7 million, the present worth of operation and maintenance is $1.0 million and total present worth is $6.8 million.

- Access Restriction

  The access restriction includes a fence to prevent site use. This preserves the integrity of the cap and prevents recreational use of the on-site pond. Access to the site would be controlled by completing the fencing around the site perimeter and posting signs. This component of the remedy will cost $54,000.

- Residential Well Replacement

  U.S. EPA seeks to secure a voluntary deed restriction to prohibit use of groundwater or installation of shallow wells on-site. As a protectiveness measure and in anticipation of an enforceable deed restriction, three existing shallow wells within the site boundary will be replaced with deep wells. The existing wells will be sealed. One well, however, maybe left open for monitoring purposes. This component of the remedy will cost $8,000.

- Flood Protection

To protect beneficial use of the floodplain, yet allow construction within the floodplain and prevent inundation of the site, flood protection will be required over the clay cap. For the purposes of cost estimation, it was anticipated that a levee would be required. This will protect the site from a 100 year flood event. The FS estimated that a levee would be approximately 2,800 feet long and be constructed of compacted soil. The cost for this component of the remedy is $385,000.

- Sanitary Landfill Cover (clay cap)

This cap includes two feet of clayey soil (10^{-6} cm/sec. permeability minimum) and six inches of topsoil.

Contaminated leachate seeps and sediments would be removed and/or covered under the clay cap in the course of regrading the surface. Waste, which is currently uncovered or protruding from the surface, would also be covered in the course of regrading. A minimum working face will be maintained during surface regrading in order to minimize the potential airborne release of contaminants. All work will be performed in a "good housekeeping" manner. Any drums or other hazardous wastes, if present, would be removed, analyzed and disposed according to RCRA requirements. If regrading fails to eliminate the seeps, then seep collection would be required. Disposal of seep leachate would be based upon its chemical characteristics.

Eight additional monitoring wells are recommended. These would be placed as close to the landfill edge as possible. These wells would best represent ground water quality as it enters the surface water.

The cap will be covered with six inches of topsoil and seeded to control erosion and promote evapotranspiration. This component of the remedy, including grading and site construction, will cost approximately $3,075,000.

- Monitoring

Contaminant migration would be assessed through a regular groundwater and surface water monitoring program. Priority pollutant analysis will be conducted on a semi-annual basis. Parameters at various locations requiring confirmation will be resampled on the alternate quarter. Selected indicator parameters will be included in the analyses every quarter. It is estimated that 10 groundwater wells, 3 on-site pond locations and 5 river locations will be included in the quarterly analyses. The existing leachate wells and the off-site pond will also be sampled occasionally. Should the ground water results remain relatively consistent over time, monitoring may not need to be as extensive.

° Determine the effectiveness of the clay cap

The key element of this interim remedy is to determine its effectiveness before implementing other remedial actions. The monitoring data gathered before and after installation of the clay cap will be evaluated to determine the effectiveness of this interim remedy. Design and construction of the cap may require 1 1/2 to 2 years. It will take approximately 2.2 years for the aquifer beneath the site to move from the south through the north to the Mississinewa River. Groundwater samples taken during and after that period should demonstrate the effectiveness of reduced infiltration on leachate generation and subsequent groundwater contamination.

° Additional Studies

The additional studies will include fish bioassay work for the on-site and off-site ponds and the river. Indicator parameters will be selected from the volatiles, PAHs and inorganic constituents. In addition, general toxicity tests will be performed on the river to determine if ammonia or other constituents in the ground water cause a toxic effect on the aquatic environment. These general tests may be modeled after the toxicity tests that NPDES dischargers are subject to, or employ other approaches as may deemed appropriate by U.S. EPA.

VI. Statutory Determinations

SARA §121 requires that the comparison of alternatives take into account the following factors:

(1) long-term uncertainties of land disposal;
(2) the goals and objectives of the Solid Waste Disposal Act (RCRA);
(3) the persistence, toxicity, mobility and propensity to bio-accumulate hazardous substances;
(4) short- and long-term potential for adverse human health effects;
(5) long-term maintenance costs;
(6) the potential for future remedial action costs if the chosen remedy were to fail; and
(7) the potential threat to human health and the environment associated with excavation, transportation, redisposal, or containment.

SARA further requires that the selected remedy be protective of human health and the environment, attain applicable or relevant and appropriate standards, use treatment technologies to the maximum extent practicable, and be cost-effective.

The Feasibility Study considered all these factors during screening of alternatives and recommendation of a final remedy. Appendix 3 contains the applicable or relevant and appropriate requirements for this site.

This section describes how the selected remedy will comply with the statutory requirements in SARA §121, generally referred to as the cleanup standards.

A. Consistency With Other Laws (Compliance with ARARs)

SARA requires that remedial actions meet legally applicable or relevant and appropriate requirements of other environmental laws. These laws may include: the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Solid Waste Disposal Act (RCRA), and any state law which has stricter requirements than the corresponding federal law.

A "legally applicable" requirement is one which would legally apply to the response action if that action were not taken pursuant to §104 or §106 of CERCLA. A "relevant and appropriate" requirement is one that, while not "applicable" is designed to apply to problems sufficiently similar that their application is appropriate.

The following is a description of environmental laws which are legally applicable or relevant and appropriate to different components of the remedy, and an explanation of how this remedial action meets those requirements.

1. Landfill Closure Requirements

Neither the sanitary landfill requirements of Subtitle D or the RCRA Subtitle C requirements are directly applicable. This landfill accepted some hazardous waste before the passage and effective date of RCRA, but was not a hazardous waste landfill. Therefore, the jurisdictional prerequistes are not met for either subtitle. Both subtitles were designed to apply to landfills. The Marion/Bragg landfill is a sufficiently similar circumstance such that both laws are considered relevant.

The site was viewed in terms of the component parts for the total site remedy, or operable units. Each component was compared to the requirements of both Subtitle C and Subtitle D which were sufficiently similar. This interim remedy, and the final remedy, will comply with the requirements which are determined to be the most appropriate. For example, the flood protection requirement complies with RCRA, CWA (and other State of Indiana requirements which are not specifically stated in the Subtitle D regulation), and the cap complies with sanitary landfill requirements. The future ground water remedy must also consider the appropriateness of RCRA corrective actions, ground water protection requirements or other standards.

2. Soil/Capping Requirements

Alternatives 1 and 2 address capping requirements for the Marion/Bragg landfill. Alternative 1 complies with the State of Indiana Sanitary Landfill capping requirements. Alternative 2 complies with the RCRA capping requirements. Both caps are protective and meet respective statutory requirements.

The State of Indiana has jurisdiction for Subtitle D, sanitary landfill operation and closure laws. This is covered by the Solid Waste Management Board Regulation Title 329 IAC. This regulation is currently under revision. This regulation applies to those facilities which operated in accordance with the stated requirements and did not accept hazardous waste. The existing regulation is more general than the proposed regulation, and relies on guidance and final approval of the permit writer. The proposed regulation codifies previous requirements. The existing and the proposed standards are technically equivalent. The FS incorporated the greater level of technical detail offered by the proposed standard. Not unlike the general RCRA cap requirements, this cap seeks to minimize infiltration by specifying clay type, and promote drainage by specifying sloping and topsoil requirements. This also accommodates subsidence and minimizes maintenance.

RCRA Subtitle C requirements for caps as proposed in alternative 2 can also be considered. The RCRA regulation is applicable to those facilities which operated after promulgation of the regulation in 1980 and/or were granted interim status to operate in the manner provided by the regulation. This regulation requires that the cap minimize liquid migration, minimize maintenance, promote drainage, accommodate subsidence and be less permeable than the bottom liner. Since waste from regrading will be consolidated on-site, RCRA Land Ban Requirements will not be triggered.

Distinguishing which regulation is most applicable, when both are relevant, requires a review of site-specific technical considerations. The Marion/Bragg Landfill has a portion of the waste saturated within the upper aquifer. This water table aquifer will fluctuate up and down within the waste as dictated by seasonal hydrologic conditions. This fluctuation was noted in the RI. Although it is clear that reducing infiltration will reduce leachate generation, the low concentration of ground water contamination may be more influenced by seasonal fluctuations in the water table/waste saturation interface. Therefore, the zero infiltration provided by the RCRA cap will not likely result in a commensurate reduction in existing ground water concentrations. In addition, the nature of the codisposal operations at the landfill, the very permeable nature of the existing cap material and the fact that leaching has been occurring for a very long time now, suggests to U. S. EPA that the existing levels of ground water contamination are not likely to significantly increase. Therefore, between the two caps, the Subtitle D sanitary landfill capping requirements were considered to be the most appropriate.

3. Floodplain and Wetlands Protection

The State of Indiana regulation I.C. 13-2-22, Indiana Flood Control Act, regulates construction in a floodplain. The U.S. EPA also has a floodplains and wetlands policy which

serves similar objectives, as does RCRA 40 CFR 270.14(b)(11)(iv). Any construction which occurs in a floodplain must minimize the loss of floodplain and provide floodproofing for anything which must be constructed in that area. Appendix 4 shows the floodplain area and levee which must be constructed around the landfill. The flood control levee will border the west, north and one half of the eastern side of the landfill. This is a performance based goal. The FS evaluated a levee as the best means of complying with requirements. Other technical means of achieving the requirements may be available. The actual design is subject to appoval from the U. S. Army Corps of Engineers, U. S. Fish and Wildlife Service, Indiana Department of Natural Resources, in addition to U. S. EPA and IDEM.

B. Use of Permanent Solutions, Alternative Treatment and/or Resource Recovery Technologies (Reduction of Toxicity, Mobility or Volume)

Permanent solutions provided by treatment technologies were considered for this landfill, but were screened out before detailed analysis due to technical and cost considerations. This is detailed in the FS.

Incineration of the entire landfill was considered. On-site incineration was considered, even though it would require a waiver from existing State of Indiana regulations. These regulations prohibit the use of mobile or temporary incineration facilities within the state. On-site incineration would require at least 25 years, require waste pretreatment and is not very amenable to the high level of inorganics present in the landfill. The cost would be approximately $404 million.

Existing RCRA permited off-site incineration facilities were considered. Waste restrictions and/or pretreatment requirements were a significant limitation. In addition, existing capacity at these facilities limits their ability to dispose of the 1.1 million cubic yards of waste present at Marion/Bragg. Assuming this was not a limitation, it would still take 100 years to accomplish the objective, at a cost of approximately $3,439 million. (Costs were based on the use of SCA Incinerator.)

Given the numerous technical limitations, incineration as a means of permanently reducing toxicity and mobility was eliminated. Significant volume reduction would not occur with incineration because the resultant ash volume would be great. Capping in place does provide some reduction in contaminant mobility, but not toxicity or volume.

C. Short-Term Effectiveness

Short-term effectiveness considers such things as risks posed to the community during remedial action implementation, time required to complete remedial action and the subsequent reduction in existing risks. It is anticipated that remedial actions will require one construction season to complete. During that time some wastes

will be exposed due to regrading of the surface. U. S. EPA proposes to use "good housekeeping" procedures to minimize the airborne release of contaminants and minimize the working face of the regrading operations. The workers on-site will also have appropriate personal protection. Once remedial action is complete, the remedial action goals stated in section IV of this Record of Decision will be met.

D. Long-term Effectiveness and Permanence

It is clear from the screening of technologies in the FS, that this landfill will need to be contained in place. The contents will remain in-tact and therefore will require long term operation and maintenance and periodic review of the effectiveness. SARA §121(c) requires that EPA review remedial actions where any hazardous substances, pollutants, or contaminants remain at the site, no less often than every five years after initiating the remedial action. This review should assess whether the remedial action is truly protective of human health and the environment and determine whether any further action is necessary.

Since this is an interim remedy, the long-term effectiveness and permanence is best evaluated when the ground water component is resolved. However, one of the goals of this interim remedy is to determine its effectiveness in reducing leachate generation. The extensive monitoring data which will be provided over the next few years will aid in the evaluation of the effectiveness and permanence provided by any subsequently selected ground water action.

E. Implementability

Capping a landfill with clay is a very conventional technology, considered reliable in the long term and it does not require specialized expertise. Design approvals will be required from several Federal and State offices in order to ensure that technical requirements are met. Once design is complete, construction is expected to take only one construction season.

F. Cost and Cost-effectiveness

The capital, operation and maintenance and total present worth costs for alternatives 1 and 2 were considered. Should the ground water require treatment, the reduction in infiltration provided by the RCRA cap reduces the amount of ground water to be treated and correspondingly reduces the O&M costs. However, this savings is off-set by the possible higher costs involved in RCRA cap maintenance. Therefore, there are no long-term savings provided by the RCRA cap over the sanitary landfill cap. In fact, the total present worth costs of O & M are slightly less for the clay cap than for the RCRA cap.

G. Community Acceptance

This site has not seen a significant amount of community involvement. This is likely because few people are directly affected by the landfill. Comments on the FS provided by the Potentially Responsible Parties (PRPs) suggest that the actions proposed by the Agency in this Record of Decision are reasonable, but expensive. Instead of capping under Subtitle D requirements, they suggest maintenance of the existing cap material. In addition, they suggest that flood protection can be provided more cheaply and as effectively by means other than a levee. This Record of Decision specifies a performance based response to the flood protection goal. The PRPs can offer alternative means of achieving the goal in the design phase.

The municipal officials are concerned about the possible cost of the remedy and their potential liability. They do not feel the tax payers would be amenable to paying for the remedy. These comments are addressed in the responsiveness summary.

H. State Acceptance

The Indiana Department of Environmental Management has been a party to the RI/FS through their technical input, and concurs on the selected interim remedy. IDEM also recognizes their cost share and O & M responsibilities.

I. Overall Protection of Human Health and the Environment

This remedy has been evaluated according to the criteria listed in SARA §121. This remedial action will eliminate a direct contact threat associated with existing surface soils, leachate seeps and exposed debris. It will also prevent the off-site migration of contaminated surface soils to surface waters. Fencing the site to restrict access will prevent use of the on-site pond on an interim basis. Replacing the three existing shallow residential drinking water wells will provide long-term protection against the potential for any future contamination. Futhermore, this remedy will be consistent with any final ground water actions.

VII. Consistency with National Contingency Plan

The National Contingency Plan, 40 CFR Part 300.68(i)(1), states that the appropriate extent of remedy shall be a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of public health and the environment. The selected remedy will attain relevant and appropriate Federal and State public health and environmental requirements that have been identified for the Marion/Bragg site. Based upon the analysis of the options, State and Federal environmental requirements, and comments received from the public and the State, the recommended option has been determined to be consistent with Section 300.68.

VIII. Future Schedule

Good Faith proposal by PRPs to undertake Remedial Action	October, 1987
Conclude all negotiations	December, 1987
Begin Remedial Design	Fall, 1987/Spring, 1988
Complete Remedial Design	Fall, 1988
Complete Remedial Action	Summer/Fall, 1989
Determine effectiveness of interim remedy and select final ground water remedy	Fall, 1991

It is possible that a final ground water remedial action can be selected as soon as Spring, 1989. If the additional studies demonstrate that the existing ground water does not adversely impact the surface waters, action levels can be established which are protective of human health and the environment.

List of Appendicies

Appendix 1 -- Enforcement Summary (CONFIDENTIAL)

Appendix 2 -- Cost Summary for all alternatives

Appendix 3 -- Applicable or Relevant and Appropriate Requirements for the Marion/Bragg Landfill

Appendix 4 -- Floodplain and levee control area

Appendix 5 -- Community Relations History and Responsiveness Summary

Appendix 6 -- Administrative Record Index

Appendix 7 -- State of Indiana Concurrence

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
NANCY A. MALOLEY, Commissioner

105 South Meridian Street
P.O. Box 6015
Indianapolis 46206-6015
Telephone 317-232-8603

September 29, 1987

Mr. Valdas V. Adamkus
Regional Administrator, Region V
U.S. Environmental Protection Agency
230 S. Dearborn Street
Chicago, IL 60604

Re: Letter of Concurrence
Marion/Bragg Landfill
Grant County, Indiana

Dear Mr. Adamkus:

The draft Record of Decision (ROD) for the Marion/Bragg Landfill has been reviewed by the staff of the Indiana Department of Environmental Management (IDEM). The IDEM is in concurrence with the selected interim remedy presented in the draft ROD.

The selected interim remedy has the following components: a) a sanitary landfill cap which meets IDEM's proposed landfill closure requirements, b) construction of a flood control dike, c) access restrictions, d) replacement of 3 private use wells on-site by constructing new wells into the deeper aquifer, and e) monitoring of ground water, surface water and aquatic life on on around the site. In our view, this selected remedy best addresses the public health, welfare and the environment surrounding the Marion/Bragg Landfill and it meets the State's Applicable or Relevant and Appropriate Requirements (ARARs).

The State of Indiana recognizes its obligation to provide the assurances listed in Section 104(c)(3) of the CERCLA as amended by SARA. The State will provide the required ten percent State match of approximately $600,000 for the remedial action, and operation and maintenance costs of $1,080,000, present worth, for thirty years. Please be assured that the State of Indiana is committed to accomplish cleanup of all Indiana sites on the NPL and intends to fulfill all obligations required by law to achieve that goal. In addition to these assurances, Indiana will provide assistance to the U.S. EPA regarding site access to the degree that the State has legal authority.

Sincerely,

Nancy A. Maloley

Nancy A. Maloley
Commissioner

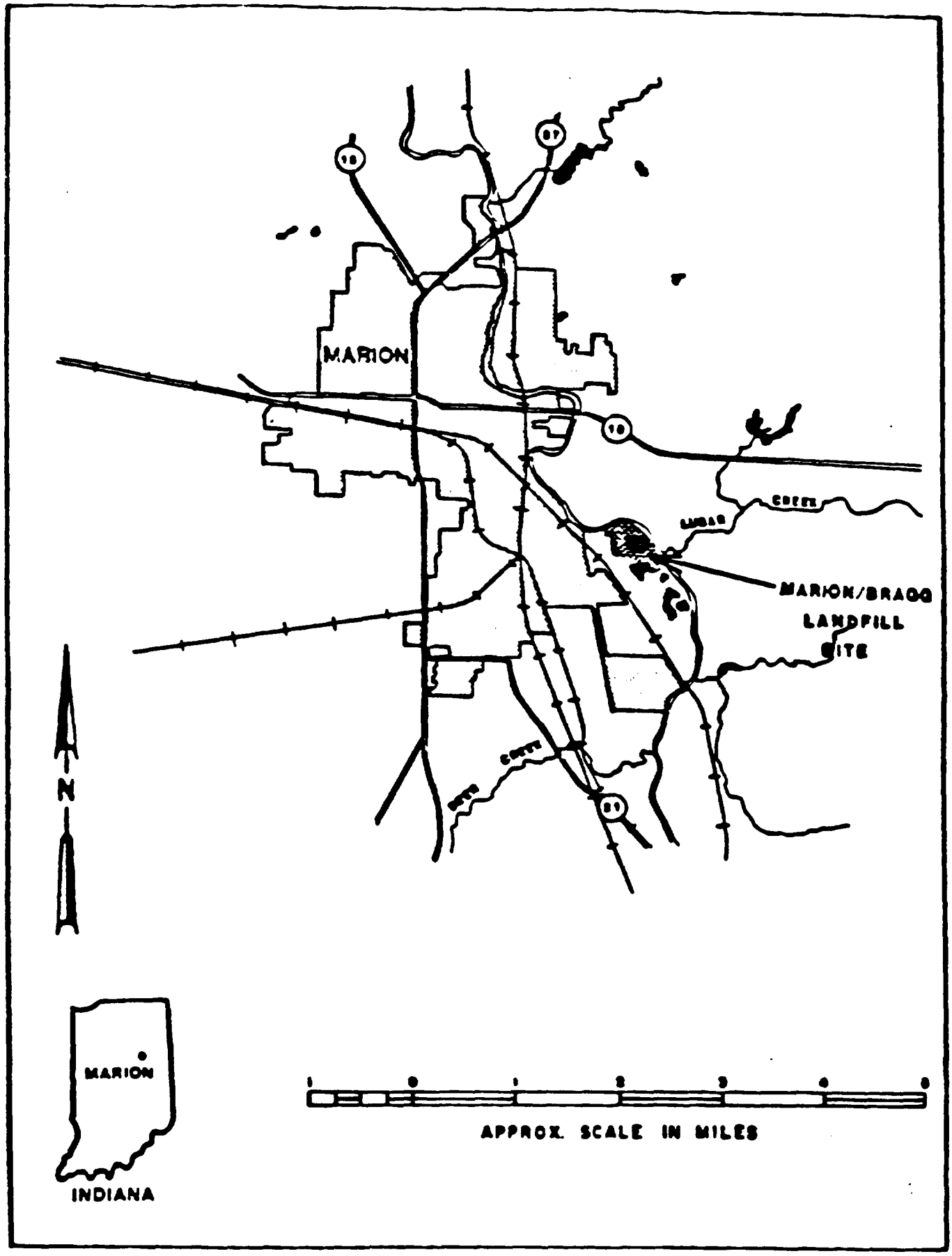


FIGURE 1 SITE LOCATION

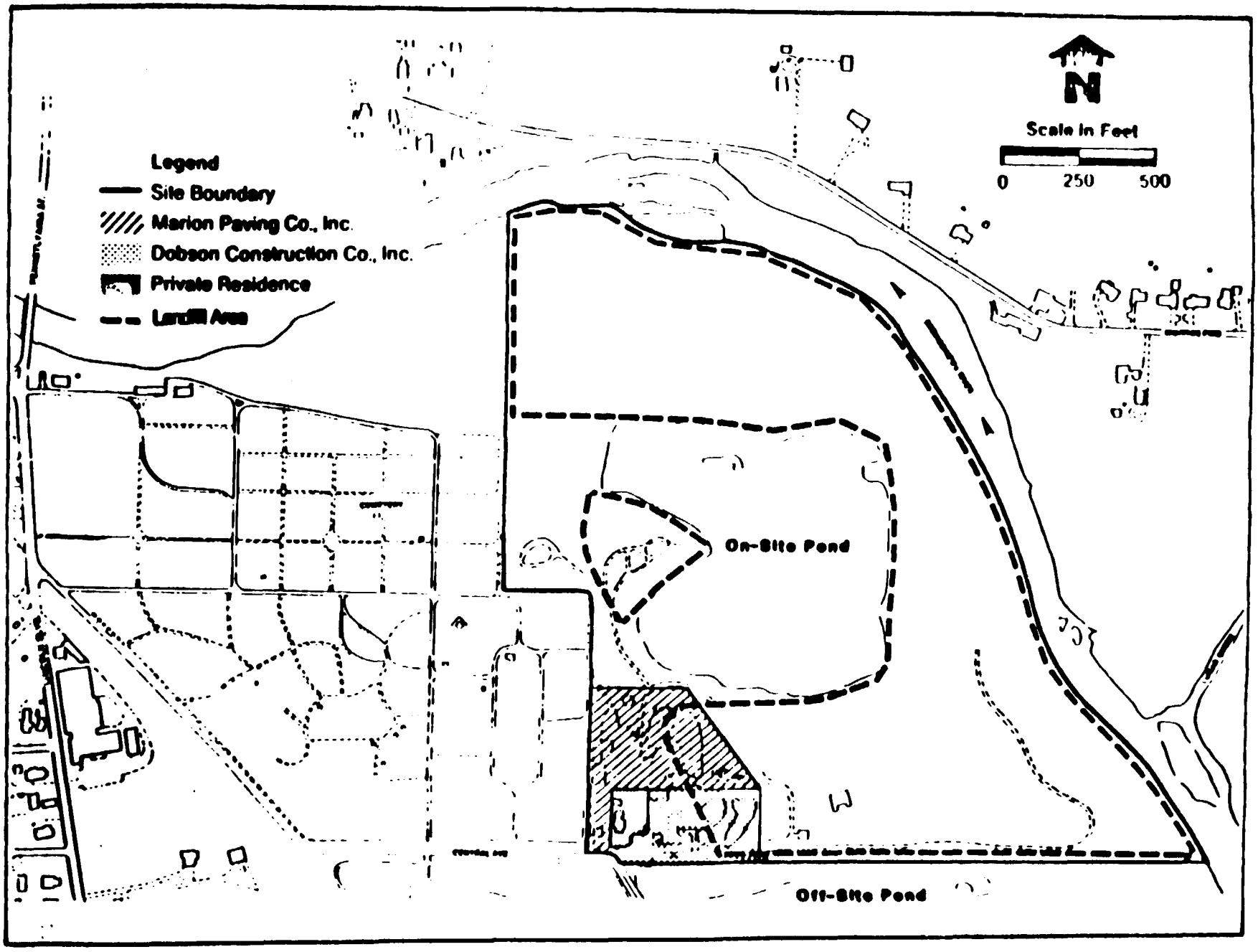


FIGURE 2 SITE MAP - MARION/BRAGG LANDFILL

Table 1
Summary of Waste Boring Sampling Results
Marion/Bragg Landfill RI/FS

CONSTITUENTS	INVESTIGATIVE SAMPLES(a) NO. OF POSITIVE DETECTIONS/ NO. OF VALID OBSERVATIONS(c)	INVESTIGATIVE SAMPLES(a) RANGE OF DETECTION	BACKGROUND SAMPLES(b) NO. OF POSITIVE DETECTIONS/ NO. OF VALID OBSERVATIONS(c)	BACKGROUND SAMPLES(b) RANGE OF DETECTION	TYPICAL CONC. IN U.S. SOILS (EPA,1983)	EXCEEDS TYPICAL CO IN U.S. SO
VOLATILES, (ug/kg)						
1,1-Dichloroethene	1/11	12	0/7	ND	None Established	NA
1,1,1-Trichloroethane	4/11	15 - 46	0/7	ND	None Established	NA
Acetone	6/11	53 - 824	4/7	11 - 85	None Established	NA
Benzene	5/11	5 - 11	0/7	ND	None Established	NA
Carbon Disulfide	1/11	5	0/7	ND	None Established	NA
Ethylbenzene	5/11	13 - 340	0/7	ND	None Established	NA
Methylene Chloride	10/11	18 - 240	2/7	7.5 - 9.5	None Established	NA
Styrene	1/11	17	0/7	ND	None Established	NA
Tetrachloroethene	3/11	36 - 91	0/7	ND	None Established	NA
Toluene	5/11	5 - 27	0/7	ND	None Established	NA
Total Xylenes	3/11	40 - 100	0/7	ND	None Established	NA
Trans-1,2-dichloroethene	4/11	10 - 4745	0/7	ND	None Established	NA
Trichloroethene	9/11	5 - 414	0/7	ND	None Established	NA
Vinyl Chloride	3/11	82 - 341	0/7	ND	None Established	NA
SEMI-VOLATILES,(ug/kg)						
bis(2-ethylhexyl)phthalate	11/11	537 - 9,040,000	1/7	970	None Established	NA
Di-n-butylphthalate	1/11	188,000	1/7	447	None Established	NA
Di-n-octylphthalate	1/11	450,000	0/7	ND	None Established	NA
PESTICIDES, (ug/kg)						
Chlordane	3/4	300 - 640	0/7	ND	None Established	NA
INORGANICS,(mg/kg)						
Antimony	3/11	28 - 46	0/7	ND	2 - 10	Y
Barium	11/11	10 - 402	7/7	11 - 85	100 - 3000	N
Cadmium	9/11	4.3 - 403	1/7	3	.01 - 0.7	Y
Chromium	11/11	6.3 - 25	7/7	7 - 17	1 - 1000	N
Copper	11/11	13 - 5850	7/7	11 - 42	2 - 100	Y
Lead	11/11	6.9 - 5870	7/7	5.5 - 18	2 - 200	Y
Mercury	8/11	.10 - .35	0/7	ND	0.01 - 0.3	N
Sodium	11/11	1410 - 3060	6/7	600 - 1960	None Established	NA
Tin	10/11	11 - 73	3/7	19 - 22	2 - 200	N
Zinc	11/11	32 - 2910	7/7	29 - 87	10 - 300	Y

a) Waste Boring Samples - WB01, WB02, and WB03
b) Background Samples - SS05, SS06, SS09, SS10, SB01, SB02, and SB03
c) Number of samples in which chemical was detected over total number of samples analyzed.
ND - Not Detected
NA - Not Applicable

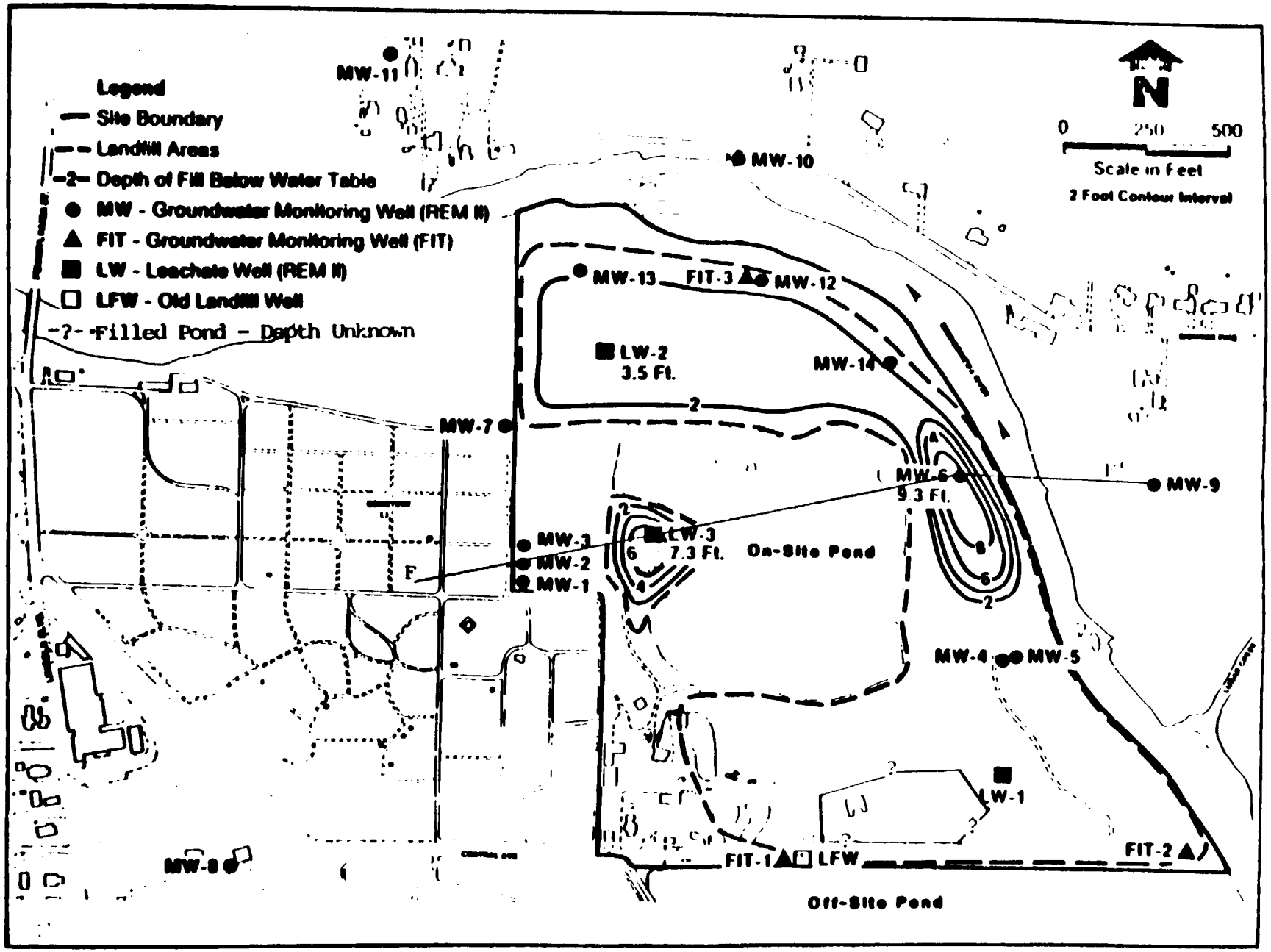


FIGURE 3 AREAS OF LANDFILL THAT ARE BELOW THE WATER TABLE MAY 27 AND JULY 23, 1986 - MARION/BRAGG LANDFILL

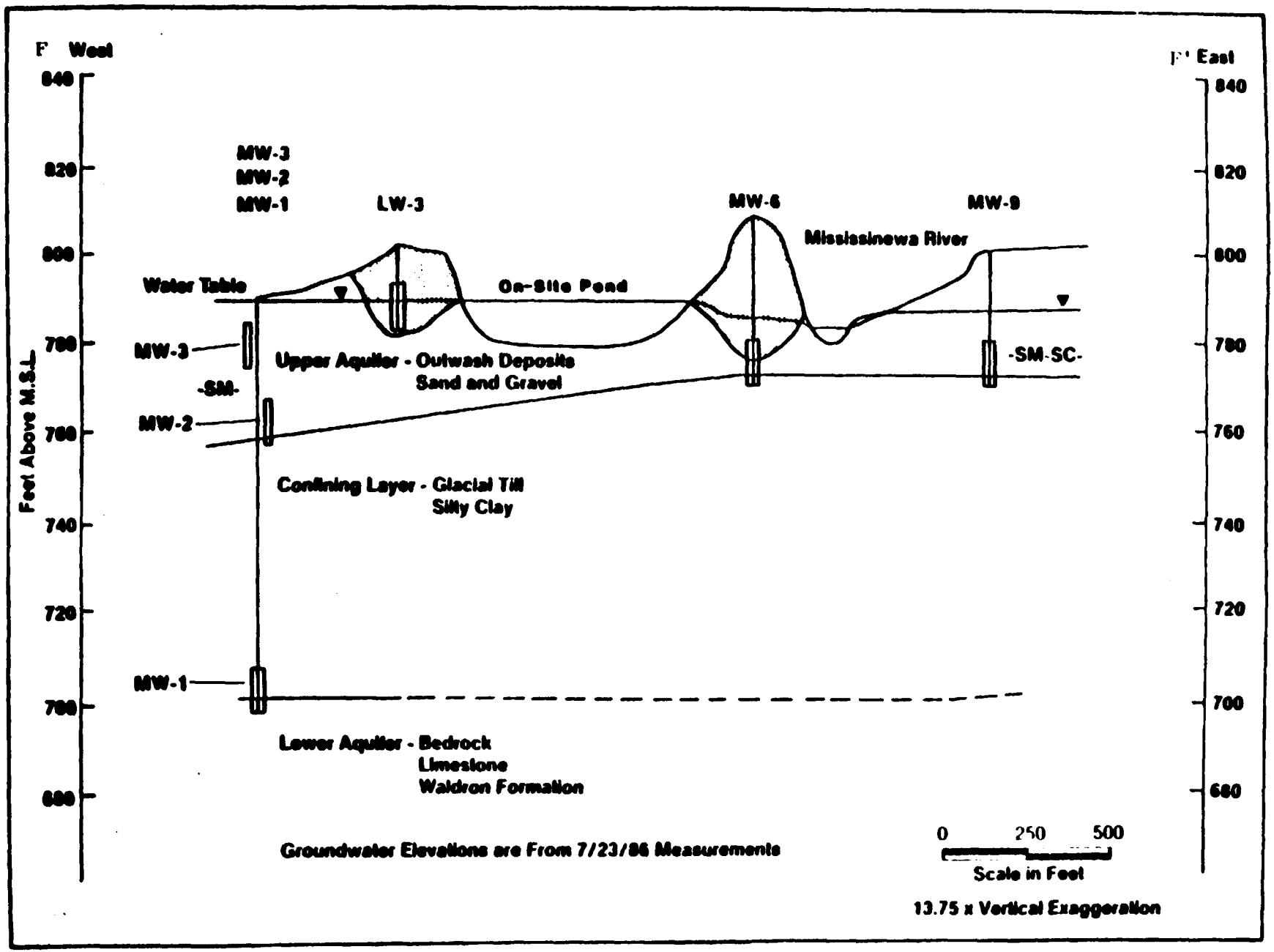


FIGURE 4 GEOLOGIC CROSS SECTION F-F' MARION/BRAGG LANDFILL

Table 2

Summary of Groundwater Sampling Results

Morton/Bragg Landfill RI/FS

CONSTITUENTS	DOWNGRADIENT SAMPLES(a) NO. OF POSITIVE DETECTIONS/ NO. OF VALID OBSERVATIONS(c)	DOWNGRADIENT SAMPLES(a) RANGE OF DETECTION	BACKGROUND SAMPLES(b) NO. OF POSITIVE DETECTIONS/ NO. OF VALID OBSERVATIONS(c)	BACKGROUND SAMPLES(b) RANGE OF DETECTION	STANDARDS AND CRITERIA: SAFE DRINKING WATER ACT MCL	PROPOSED MCL	MCLG	PROPOSED MCLG	CLEAN WATER ACT: PROTECTION OF HUMAN HEALTH: INGESTING WATER AND ORGANISMS	PROTECTION OF HUMAN HEALTH: INGESTING ORGANISMS ONLY	PROTECTION OF FRESHWATER AQUATIC LIFE: ACUTE	PROTECTION OF FRESHWATER AQUATIC LIFE: CHRONIC	EXCEEDS STANDARDS AND CRITERIA: HUMAN HEALTH	EXCEEDS STANDARDS AND CRITERIA: FRESHWATER AQUATIC LIFE
UPPER AQUIFER														
VOLATILES,(ug/l)														
1,1 Dichloroethane	1/21	.02	0/7	ND		--								
Benzene	9/21	0.5 - 12	1/7	5	5	--	0		.66 (e)	40 (e)	5100 (g)		Y	N
Chlorobenzene	4/21	4 - 16	0/7	ND		--		60	488 (d)	15,050 (d)	19,500 (g)		N	N
Ethylbenzene	4/21	1.5 - 9	0/7	ND		--		680	1400 (d)	3280 (d)	32,000 (g)		N	N
Styrene	1/21	3.3	0/7	ND	--	--								
Tetrachloroethene	1/21	.70	0/7	ND		--	0		.8	70	5280 (g)	840 (g)	Y	N
trans 1,2 Dichloroethene	4/21	.26 - 20	0/7	ND	--	--	-	70			133,000 (g)		N	N
Trichloroethene	5/21	0.9 - 7.0	0/7	ND	5	--	0		2.7 (e)	81 (e)	45,000 (g)		Y	N
Bis(methylethyl)	3/21	2.5 - 7.5	0/7	ND		-	--	440					N	
SEMIVOLATILES,(ug/l)														
1,4 Dichlorobenzene	1/21	14	0/6	ND	75	--	75	-	400 (d)	2600 (d)	1120 (g)	763 (g)	N	N
Benzoic Acid	1/21	950	1/6	5		--		-						
bis (2 ethylhexyl)phthalate	9/21	9 - 1000	0/6	ND	-	-			15,000 (d)	50,000 (d)	11,100 (g)	3 (g)	N	Y
Di n Butylphthalate	1/21	99	0/6	ND	-	--		-	34,000 (d)	154,000 (d)	940 (g)		N	N
INORGANICS,(ug/l)														
Arsenic	10/21	11 - 70	0/6	ND	50	-		50	.0022 (e)	.0175 (e)	360 (f)	190 (f)	Y	N
Barium	21/21	39 - 1040	6/6	36 - 111	1000	-		1500					Y	
Beryllium	1/21	6	1/6	.4	--	--			.0037 (e)	.0645 (e)	130 (g)	5.3 (g)	Y	Y
Cadmium	1/21	5	0/6	ND	10	--		5	10 (d)		17.1 (f,h)	3.2 (f,h)	N	Y
Iron	12/21	232 - 10700	0/6	ND		--								
Lead	1/21	6	0/6	ND	50	--		20	50 (d)		429 (f,h)	16.8 (f,h)	N	N
Magnesium	21/21	26000 81000	6/6	21400 - 56700		--								
Manganese	2/21	424 - 661	5/6	20 - 415		--								
Silver	1/21	9.2	0/6	ND	50	-			50 (d)		30.2 (f,h)	12 (f)	N	Y
Sodium	21/21	9100 251000	6/6	11100 - 27400										
Zinc	1/21	110	0/6	16 - 97							947 (f,h)	47 (f,h)	N	Y

a) Groundwater samples - GW02,GW03,GW04,GW05,GW06,GW07,GW10,GW11,GW12,GW13,GW14, and GW15

b) Background Samples - GW08, GW09, GW16, and GW17

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

d) For Toxicity Protection

e) For 10E-6 Carcinogenicity Protection

f) EPA Ambient Water Quality Criteria

g) Lowest Reported Toxic Concentration

h) Values shown are based on an average groundwater hardness of 360 mg/l as CaCO3.

ND Not Detected

NOTE: Results from unfiltered samples are not included in this table.

TABLE 3

EXPOSURES AND RISKS ASSOCIATED WITH INGESTION OF UPPER AQUIFER GROUND WATER[a]

Carcinogens	Upper Aquifer Concentrations (mg/liter)		Chronic Daily Intake--70-kg Individual, Prorated over a 70-Year Lifetime (mg/kg/day)		Cancer Potency Factor $(mg/kg/day)^{-1}$	Risk (upperbound)	
	Average	Maximum	Average	Maximum		Average	Maximum
Arsenic	0.006	0.078	4.5×10^{-7}	3.5×10^{-5}	1.5×10^{1} (A)	7×10^{-6}	5×10^{-4}
Benzene	(b)	0.012	ND	5.4×10^{-6}	2.4×10^{-2} (A)	ND	1×10^{-7}
Bis(2-ethylhexyl) phthalate	0.0015	1.000	5.8×10^{-7}	4.5×10^{-4}	6.8×10^{-4} (B2)	3×10^{-10}	3×10^{-7}
Trichloroethane	(b)	0.007	ND	3.1×10^{-6}	1.1×10^{-2} (B2)	ND	3×10^{-8}
Tetrachloroethane	(b)	0.001	ND	4.5×10^{-7}	5.1×10^{-2} (B2)	ND	2×10^{-8}
Total						7×10^{-6}	5×10^{-4}

Noncarcinogens	Upper Aquifer Concentrations (mg/liter)		Chronic Daily Intake--70-kg Individual, 10 years (mg/kg/day)		Risk Reference Dose (mg/kg/day)	Hazard Index (DI/RfD)	
	Average	Maximum	Average	Maximum		Average	Maximum
Barium	0.202	1.64	1.5×10^{-4}	5.1×10^{-3}	5×10^{-2}	3×10^{-3}	1×10^{-1}
Beryllium	(b)	0.006	ND	1.9×10^{-5}	5×10^{-3}	ND	4×10^{-3}
Bis(2-ethylhexyl) phthalate	0.0015	1.000	3.5×10^{-6}	3.1×10^{-3}	2×10^{-2}	2×10^{-4}	1×10^{-1}
Cadmium	(b)	0.015	ND	1.4×10^{-5}	5×10^{-4}	ND	5×10^{-2}
Chlorobenzene	(b)	0.014	ND	5.0×10^{-5}	3×10^{-2}	ND	2×10^{-3}
1,4-Dichlorobenzene	(b)	0.014	ND	4.4×10^{-5}	2×10^{-2}	ND	2×10^{-3}
trans-1,2-Dichloroethene	(b)	0.020	ND	6.3×10^{-5}	1×10^{-2}	ND	6×10^{-3}
Di-n-butylphthalate	(b)	0.009	ND	3.1×10^{-4}	1×10^{-1}	ND	3×10^{-3}
Ethylbenzene	(b)	0.009	ND	2.8×10^{-5}	1×10^{-1}	ND	3×10^{-4}
Silver	(b)	0.009	ND	2.8×10^{-5}	3×10^{-3}	ND	9×10^{-3}
Xylenes (Total)	.005	0.007	2.2×10^{-6}	2.2×10^{-6}	1×10^{2}	2×10^{-4}	2×10^{-3}
1,1-Dichloroethane	(b)	0.001	ND	3.1×10^{-6}	1.2×10^{-1}	ND	3×10^{-5}
Tetrachloroethane	(b)	0.001	ND	3.1×10^{-6}	2×10^{-2}	ND	2×10^{-4}
Styrene	(b)	0.003	ND	9.3×10^{-5}	2×10^{-1}	ND	5×10^{-5}
Lead	(b)	0.006	ND	1.9×10^{-5}	1.4×10^{-3}	ND	1×10^{-2}
Manganese	.432	0.441	3.2×10^{-4}	1.3×10^{-3}	2.2×10^{-1}	2×10^{-3}	6×10^{-3}
Zinc	(b)	0.110	ND	3.7×10^{-4}	2.1×10^{-1}	ND	2×10^{-3}
Total						$<1(5\times10^{-3})$	$1<(3\times10^{-1})$

[a] Only chemicals of concern detected in the upper aquifer and for which quantitative health effects criteria are available were included in this assessment. Benzoic acid, iron, magnesium, and sodium were not evaluated. See text and tables 5-5, 5-20, and 5-22 for details.

[b] Means were not calculated when only one sample was positive and were not reported when the calculated mean was less than the detection limit. These chemicals were evaluated in the plausible maximum scenario only.

TABLE 4

SUMMARY OF POTENTIAL RISKS ASSOCIATED WITH EXPOSURE TO MARION/BRAGG CHEMICALS OF CONCERN[a]

Pathway/Chemical	Frequency of Detection	Hazard Index for Noncarcinogenic Effects: Average	Hazard Index for Noncarcinogenic Effects: Maximum	Lifetime Excess Cancer Risk (Upperbound): Average	Lifetime Excess Cancer Risk (Upperbound): Maximum
Direct Contact with Soils					
Leachate Seep Area					
Arsenic	1/1	NQ	NQ	4×10^{-7}	8×10^{-6}
Total	—	4×10^{-3}	9×10^{-2}	4×10^{-7}	8×10^{-6}
Surface Soils					
PAHs (Carcinogenic)	13/42[b]	NQ	NQ	2×10^{-7}	5×10^{-5}
Total	—	2×10^{-3}	6×10^{-1}	2×10^{-7}	5×10^{-5}
Swimming in On-Site Pond					
Total	—	6.4×10^{-3}	2.3×10^{-3}	NQ	3×10^{-8}
Consumption of Fish from On-Site Pond					
Total	—	3.7×10^{-2}	2.2×10^{-1}	NQ	2.10^{-7}
Consumption of Fish from Off-Site Pond					
Total	—	NQ	7×10^{-4}	NQ	NQ
Consumption of Groundwater from Upper Aquifer					
Arsenic	7/19	NQ	NQ	7×10^{-6}	5×10^{-4}
Total	—	5×10^{-3}	3×10^{-1}	7×10^{-6}	5×10^{-4}

[a] The individual chemicals of concern presented in this table are those that may pose a potential risk; they are defined as chemicals exhibiting noncarcinogenic effects for which the hazard index of exposure is greater than one, or the chemicals exhibiting carcinogenic effects for which the upperbound risk from exposure is greater than 10^{-6}.

[b] None of the individual carcinogenic PAHs were detected more frequently than 2/6 monitoring samples.

NQ = Not Quantified.

TABLE 5 - Matrix Evaluation of Alternatives

Alternative	Cost (in Millions) Cap*	O&M*	PW*	Effectiveness: Public Health Protectiveness	Effectiveness: Environmental Protectiveness	Implementability: Technical Feasibility	Implementability: Administrative Feasibility
1) Sanitary Landfill Cap				Prevents direct contact threat from surface soils, but does not eliminate threat from ground water or from on site pond (if open)	Would limit, but not prevent contact of ground water with landfill contents and subsequent discharge to the Mississinewa River	Will significantly reduce infiltration, but long term monitoring will be required One construction season needed for implementation	Long term enforcement of site access and deed restrictions uncertain
pond open	5.8	1.0	6.8				
pond closed	13.4	1.1	14.5				
2) RCRA Cap				Prevents direct contact threat from surface soils, but does not eliminate threat from ground water or from on site pond (if open)	Would limit, but not prevent contact of ground water with landfill contents and subsequent discharge to the Mississinewa River	Maintenance requirements of the cap, especially repair of the impermeable membrane, are substantial because of likely landfill differential settling Will significantly reduce infiltration, but long term monitoring will be required One construction season needed for implementation	Long term enforcement of site access and deed restrictions uncertain
pond open	10.8	1.2	11.2				
pond closed	19.1	1.2	20.3				
3A) Sanitary Cap and Ground-water Treatment on-site				Extraction and treatment of ground water would significantly reduce potential risks	Minimal effects during construction	Compatability testing of bentonite with waste prior to construction needed One construction season needed for implementation	NPDES permitting may significantly delay the construction
pond open	10.9	1.4	12.4				
pond closed	18.6	1.2	19.8				
3B) Sanitary Cap and Ground-water Extraction, treatment at POTW				Extraction and off-site treatment of ground water would significantly reduce potential risks	Minimal effects during construction	Compatability testing on bentonite with waste prior to constuction needed One construction season needed for implementation	POTW acceptance of the discharge must be approved by Indiana Office of Water Management
pond open	10.7	1.0	11.8				
pond closed	18.4	8	19.2				
4A) RCRA Cap and Ground-water Treatment on-site				Extraction and treatment of ground water would significantly reduce potential risks	Minimal effects during construction	Maintenance requirements of the cap, especially repair of impermeable membrane, are substantial because of likely landfill differential settling One construction season needed for implementation	NPDES permitting may significantly delay construction
pond open	15.2	1.5	16.7				
pond closed	24.3	1.3	25.6				
4B) RCRA Cap and Ground-water Extraction, treatment at POTW				Extraction and off site treatment of ground water would significantly reduce potential risks	Minimal effects during construction	Maintenance requirements of the cap, especially repair of impermeable membrane, and substantial because of likely landfill differential settling Compatability testing of bentonite with waste prior to construction needed One construction season needed for implementation	POTW acceptance of the discharge must be approved by Indiana Office of Water Management
pond open	15.0	1.0	16.1				
pond closed	24.1	8	24.9				
5) No Action	No	Cost		Potential health risks associated with contact with contaminated soils, surface water and ground water will remain	Contaminants spread to Mississinewa River	None	Not Applicable

*Capital costs/Operation & maintenance/Present worth

[illegible]

[illegible]

[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]
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2.0 [illegible]													
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3.0 [illegible]													
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4.0 [illegible]													
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
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Appendix 1 -- Enforcement Summary

The Marion/Bragg Landfill site was proposed on the NPL on December 30, 1982. In March 1985 the REM II contractor was tasked to draft a work plan for a Remedial Investigation/Feasibility Study. The draft work plan was used as a basis for negotiating voluntary actions with an identified group of potentially responsible parties. Notice letters were issued and a meeting was held on November 7, 1985 at the Region V office in order to provide them an opportunity to work cohesively and respond to the Agency's offer.

On December 9, 1985 Enforcement and Regional Counsel determined that the RI/FS should proceed as a program lead. Little or no interaction has occurred with the PRPs since.

Special notice letters were issued at the completion of the RI/FS on August 7, 1987. The negotiation moratorium commenced on August 12 and will be completed by October 11th, at which time the program will proceed with RD if a good faith offer is not received.

Appendix 2 -- Cost Summary for all alternatives

Appendix 3 -- Applicable or Relevant and Appropriate Requirements for the Marion/Bragg Landfill

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
MARION/BRAGG LANDFILL SITE

REGULATION, POLICY OR LAW	APPLICABILITY	RESPONSE	ALTERNATIVES 1	2	3A	3B	4A	4B	5
FEDERAL									
Resource Conservation and Recovery (RCRA) Subtitle C	Closure of Hazardous Waste Facilities	This alternative meets RCRA capping requirements.		X			X	X	
		This alternative meets RCRA closure requirements.					X	X	
40 CFR 264.116	Deed Restriction	State of Indiana has jurisdiction.	X	X	X	X	X	X	
40 CFR 264.14 264.117(b)	Access Restriction	Meets RCRA requirements if implemented.	X	X	X	X	X	X	
40 CFR 264.310(b)(5)	Monitoring Surface Run-Off (Final Cover)	Surface water management system would comply with RCRA requirements.	X	X	X	X	X	X	
40 CFR 264.90 3008(h) 3004(u)	Contamination Levels, Monitoring, Treatment	Action levels in on-site pond, groundwater and Mississinewa river will be set by U.S. EPA.	X	X					

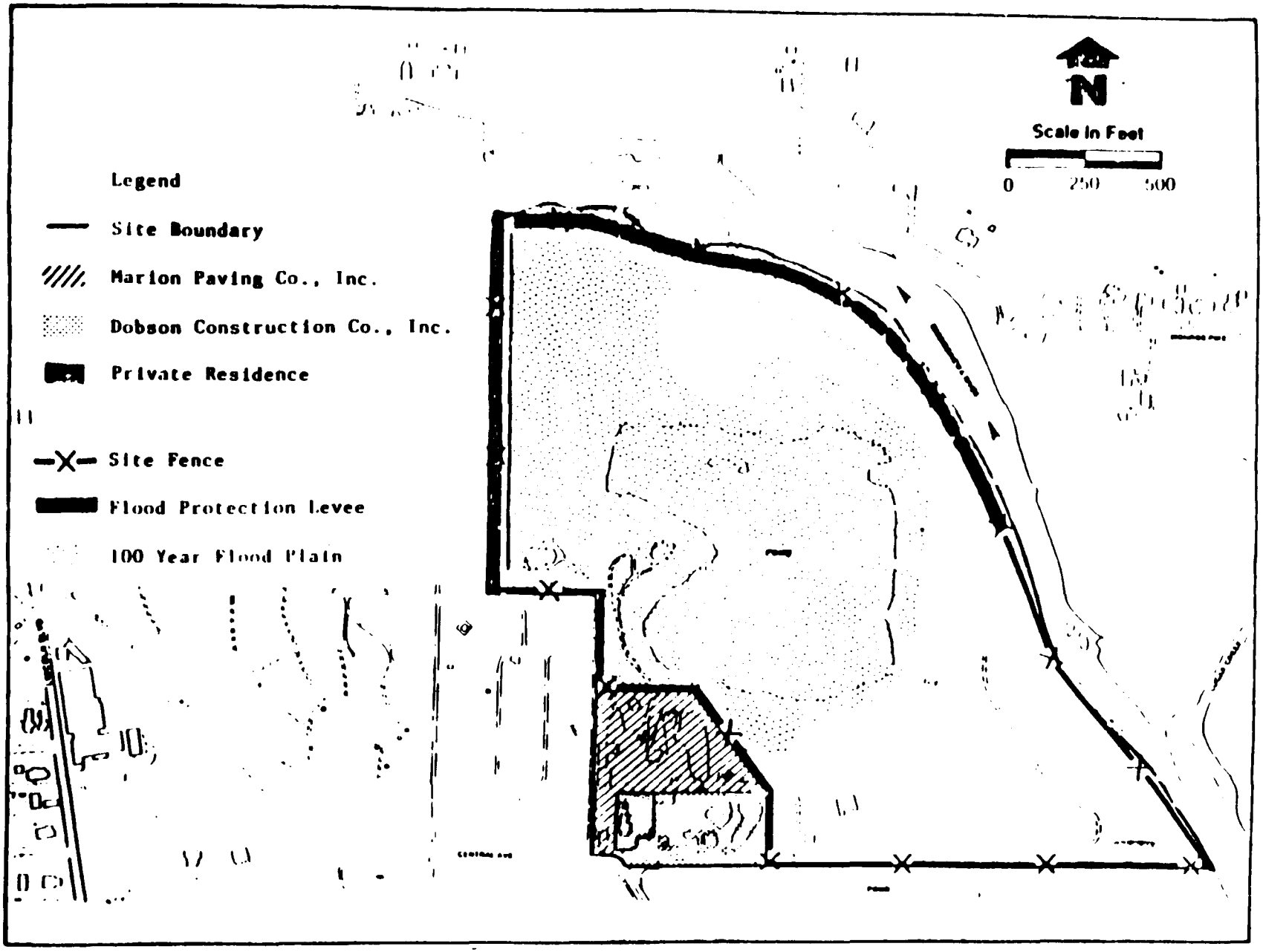
COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
MARION/BRAGG LANDFILL SITE

REGULATION, POLICY OR LAW	APPLICABILITY	RESPONSE	ALTERNATIVES 1	2	3A	3B	4A	4B	5
40 CFR 264.310	RCRA Landfill Cover Systems	This alternative meets RCRA capping requirements.		X			X	X	
		This alternative meets RCRA Closure requirements.					X	X	
40 CFR 270.14	Slurry Wall	Slurry wall will be located behind the flood control levee.			X	X	X	X	
40 CFR 264.340(c)	Treatment/Incineration	None of the alternatives involve treatment or incineration of landfill contents.							
40 CFR 262 & 263	Groundwater Storage	None of the alternatives involve the storage and surface transportation of contaminated groundwater.							
40 CFR 261.4(a)(2)	Groundwater Discharge	Discharge of groundwater to Mississinewa River would comply with CWA, Section 402.			X		X		
40 CFR 264.114	Decontamination of Equipment	Equipment decontamination procedures will be followed during construction.	X	X	X	X	X	X	
Clean Air Act (CAA)	Incineration/Treatment	None of the alternatives involve incineration or treatment of hazardous soil.							
Clean Water Act (CWA)	Regulates Discharge of Water into Rivers	State of Indiana has jurisdiction over issuance of NPDES permits (See state ARARs).			X		X		

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
MARION/BRAGG LANDFILL SITE

REGULATION, POLICY OR LAW	APPLICABILITY	RESPONSE	ALTERNATIVES 1	2	3A	3B	4A	4B	5
STATE OF INDIANA									
Indiana Dept. of Environmental Management (IDEM)									
Indiana Hazardous Waste Management Program (IHWMP) - 320 IAC-4	Regulates Closure of Existing Hazardous Waste Facilities	This alternative is in compliance with IHWMP.		X			X	X	
Indiana Waste Treatment Facilities Regulation (IWTFR) 330 IAC-3.1	Authorizes and Regulates Waste Treatment Facilities	This alternantive provides for an on-site treatment facility and complies with IWTFR.			X		X		
Industrial Waste Water Pretreatment and NPDES Program 330 IAC-5(1-10)	Regulates Discharges to State Waters NPDES	This alternative will require an NPDES permit.			X		X		
Pretreatment Standards 330 IAC-5(11-15)	Regulates Discharge to POTW	This alternative includes discharge of contaminated groundwater to Marion POTW.				X		X	
Indiana Water Quality Standards Stream Pollution Control Board 30 IAC 1&2(b)	Establishes Water Quality Standards for the State	This alternative is subject to compliance with Indiana Water Quality Standards.	X	X	X		X		
Title 329 (Proposed) Solid Waste Management Board 329 IAC 2-8-(4,7) 2-9-(2,3)	Regulates Solid Waste Landfill Closure	This alternative will comply with proposed solid waste regulations.	X		X	X			
Dept. of Natural Resources Division of Water									
Indiana Flood Control Act I.C.13-2-22	Regulates construction in a flood plain	This alternative is subject to compliance with DNR Division of Water requirements.	X	X	X	X	X	X	
LOCAL									
City of Marion Municipal Code Ord. 8-1981	Regulates discharge to municipal sewer system.	This alternative is subject to the requirements of the Marion sewer use code.				X		X	

Appendix 4 -- Floodplain and Levee Control Area



Access Restrictions, 100 Year Flood Plain, Flood Protection Levee
All Alternatives Except No Action

Appendix -- 5 Community Relations History and Responsiveness Summary

Marion Bragg Landfill
Responsiveness Summary

Section I. Overview

Section II. Background on Community Involvement and Concerns

Section III. Summary of Major Comments Received during the Public Comment Period and EPA Responses to the Comments

Section IV. Remaining Concerns

I. Overview

The United States Environmental Protection Agency (U.S. EPA) presented a preferred alternative in the feasibility study. This was available at the beginning of the five and one half week public comment period. Only the Potentially Responsible Parties submitted comments. Judging from the comments received, the PRPs support the remedial action goals, but suggest that the risks posed by the site do not warrent the cost of response presented in the FS. These comments are addressed in Section III.

II. Background on Community Involvement and Concerns

Very little interaction has occured with the community of Marion. Most of the people who attended the RI/FS kick-off meeting were those homeowners living adjacent to the existing landfill. These people wanted U. S. EPA to close this facility. They were also concerned about acceptable levels of arsenic (detected in their wells). The citizens were advised of the MCL and advised to submit any analytical data to the State. They were also advised that the State has authority for sanitary landfills, not U. S. EPA. This landfill is now closed and this group of citizens did not attend the FS public meeting.

The municipal officials are concerned about the possible cost of the remedy and their potential liability. They don't feel the taxpayers would be amenable to paying for the remedy. These comments are addressed in the responsiveness summary.

III. Summary of Major Comments Received during the Public Comment Period

Comments were received from the following parties:

1) Mr. J.B. Smith of Beckman, Kelly and Smith on behalf of Mr. Delmar Bragg;

2) Mr. Spitzer of Browne, Spiter, Herriman, Browne, Stephenson & Holderead on behalf of General Plastics Corporation;

3) Mr. Browne of Browne, Spiter, Herriman, Browne, Stephenson & Holderead on behalf of the City of Marion and the Marion Utility Services Board;

4) Mr. Cromer of Mishkin, Cromer, Eaglesfield & Maher P.A. on behalf of RCA Corporation; and,

5) Mr. Hanson of Beveridge & Diamond, P.C. on behalf of the Steering Committee. This Steering Committee is comprised of the following firms:

1. Dana Corporation
2. General Electric Corporation
3. General Motors Corporation
4. Central Waste Systems, Waste Management Corporation of North America, Inc.
5. RCA Corporation
6. Owens-Illinois, Inc.
7. American National Can Company

There were three types of comments submitted; technical, legal and party specific. Comments from parties 2, 3 and 4 listed above incorporate by reference, comments submitted by Mr. Hanson. These comments will be categorized by relevant topic. The comments had to be paraphrased in order to fit them into the summary. The reader is referred to the actual reports and comments available at the public repository (Marion Public Library).

A. Technical

ERM, acting as technical consultant to Mr. Hanson and the Steering Committee, submitted a report divided into 6 Sections; each addressing a specific portion of the RI/FS. U.S. EPA will respond by section as well.

Section 1 - Introduction

This is an executive summary of all comments contained in Sections 2 through 5.

U.S. EPA Response: These comments will be addressed by general topic in the subsequent sections.

Section 2 - Remedial Investigation - Hydrogeology

Comment 1. The geophysical information was referenced in the RI, but data and results are not contained within the report.

EPA Response: The EPA contractor, Roy F. Weston, through the REM II contract, was not tasked to complete the geophysical work. The geophysical work was completed by the Agency (in-house). The contractor was present to aid in data interpretation and to ensure project continuity. The geophysical data and interpretation report was available at the public repository at the time of public comment.

Comment 2. Minor errors were made in developing contour maps showing the groundwater surface, particularly at MW-12 and FIT-3.

EPA Response: The contour lines were not in error. The head differences in MW-12 and FIT-3 are due to an upward vertical gradient from the ground water discharge to the river (similarly at MW-4 and MW-5).

This is common near major rivers and supports the assessment that the river is a hydraulic barrier. See RI p.2-27, 2nd paragraph.

Section 3 - Remedial Investigation - Quality Assurance/Quality Control

Comment 1. The organization charts presented in the QAPP (pages 3-2 and 3-3) give names of individuals responsible for QA reviews, yet no reviews were present in the RI/FS.

EPA Response: The flow charts presented are not site-specific, but refer to the entire National Superfund program under REM II, beginning with the Hazardous Site Control Division in Headquarters (Fig. 3-1 REM II Organizational Charts) to the Camp, Dresser & McKee (CDM) Regional representive of Quality Assurance (Fig. 3-2 REM QA Organization). Under the REM II contract, there are rigorous QA requirements. The procedures and actual requirements are documented in the contract itself and the established Standard Operating Procedures (SOPs). The QAPP documents how this site fits into the QA/QC responsibilities under the REM II contract.

On a site specific basis, the project tasks must include a line item for project QA (See the Work Plan). Each deliverable, including the QAPP has an organizational sign-off sheet which shows the individuals who have reviewed the deliverable to ensure it meets all requirements, thus demonstrating the QA system meets its intended purpose.

Comment 2. No report on the data quality was presented in the RI report (reference to Figure 9-1 of the QAPP).

EPA Response: This figure refers to the data flow at CRL. The REM II contractor is not responsible for analysis of samples or data validation. Analysis is handled through the CRL and CLP systems under a different contract, and the data review is done by EPA. The labs are responsible for data QA in accordance with the CLP contact, SOPs and other guidance. The QC review is done in-house on every data package. A summary page of comments is prepared by the EPA data reviewer concerning the use, and qualifications for use, of the data. These qualifiers are present on the data in the RI. No data quality report is prepared or required because it is specific to the data package itself. These reviews are available with the raw data package. Since the raw data is massive, it is made available by request only.

Comment 3. CRL Lab audit reports do not appear in the RI.

EPA Response: They do not belong in a site-specific RI. These are not performed by the contractors, but by U.S. EPA. They serve to ensure that each lab meets the performance standards established by U.S. EPA under the CLP system. In doing so, quality data is ensured for each site. The QAPP describes where audit freqency, responsibilities and SOP references are located. Audit results of a specific lab can be made available upon request.

Comment 4. Data review procedures are not documented (QAPP Section 13).

EPA Response: Data review procedures follow specific EPA guidance. Site-specific documentation is not required. A list of all relevant EPA guidance was provided at the repository.

Comment 5. Corrective action requirements are not documented in the RI (QAPP Section 14).

EPA Response: Laboratories which have sample specific problems are required to call the specified Region V EPA data reviewer. This chemist will advise on corrective action procedures. The corrective action resolution is documented by the lab on the the individual data package.

Comment 6. No QA/QC section is provided in the RI (QAPP Section 15).

EPA Response: Subsequent to QAPP approval, it was determined that this task was unnecessary for the following reasons: 1) Data review is an Agency function; the contractor is merely the recepient of the qualified data and has no direct review authorities; 2) To be interpreted correctly, the data packages must be viewed individually. A summary may generalize the data and cause confusion in interpretation or use; 3) Such a summary would be a duplication of the Agency's work.

Comment 7. Appendix A, page 2 is unacceptable
Comment 8. One half hour is insufficient data review time
Comment 9. The cyanide data presented in Appendix A may have QA/QC problems associated with it which may invalidate the basis for scoring the site.

EPA Response: In reviewing the QAPP from the commentor's perspective, it is now clear why Appendix A of the QAPP would lead to the above questions. Appendix A should have been more clearly labeled. It is the raw data package summary for the HRS scoring of the site. The Region V QA office always requests a summary of existing data available at the site in order to evaluate whether the analytical range presented in the QAPP will meet the site's Data Quality Objectives. No RI data had been gathered before the QAPP, therefore, the site scoring data was submitted. (Site scoring data is under the purview of a different QAPP.) With respect to the cyanide, the holding times can be tracked if needed. If the holding times were exceeded, the contract requirements would have been violated and the data rejected. The time to have submitted comments on the site scoring was in 1983 when the site was proposed for NPL listing.

Comment 10. The RI fails to document holding times, especially for SAS parameters.

EPA Response: This does not need to be in the RI. Holding times for RAS are specified in the CLP contract (and the QAPP). Holding times for SAS are specified in the SAS's attached to the QAPP. Laboratories call the EPA for corrective action procedures

if holding times are a problem. The EPA data reviewers check holding times when the data package is reviewed. Holding time was exceeded for one set of pesticides samples during this RI. EPA subsequently rejected the data. This rejected data is noted on RI p.3-13, however, the reason for rejection was not listed.

Additional EPA Response: All the above questions concerned the site specific implementation of the system established by U.S. EPA to ensure defensible data. All contractor SOPs are available for review at the Region V office. All EPA SOPs are established through guidance from Headquarters. A list of all available program guidance was provided for review in the project file at the Marion Public Library. The sections of the QAPP referred to should be almost identical between REM II projects, since the same "system" is used. In the case where a project is not conducted by REM, under the CLP system, the burden is on the project director to explain how equivalent QA/QC procedures will meet EPA requirements.

Comment 11. The definition and use of "non-detects" is arbitrary and means that every sample is considered a positive result.

EPA Response: For the purposes of this project, the selection of "chemicals of concern" and the data reduction procedures are one in the same. The procedures are described before the data is dicussed (RI p.3-3, 3-4) and again in the PHE (RI p.5-4). A geomentic mean was applied to the data set. It is a particularly good method for this site because the ground water investigation was conducted beneath the source material and there was significant variability in the concentrations detected. Geometric rather than arithmetic means were used since most collections of measurements of environmental contaminants are log-normally distributed. An arithmetic mean is "additive", where as a geometric mean is "proportional". One cannot calculate the log of zero, therefore, one half of the CRDL was arbitrarily used. Most statistics books say that X + 1 is frequently used for a zero value. Since the CRDL is used as a baseline, it is reasonable to use half of that value for zero. As noted above, this approach best suits this site and works to the commentor's favor since a geometric mean is generally lower than an arithmetic mean.

To further clarify the application to the PHE, refer to RI p. 5-4. A mean wasn't used unless at least two samples were above the CRDL. If, however, only one sample was detected above the CRDL, it was used in the maximum exposure scenario. Contaminants detected below the CRDL were not used in the PHE at all. This approach is reasonable and defensible.

Comment 12. Use of Federal water Quality criteria for leachate comparison is erroneous.

EPA Response: EPA assumes the commentor is referring to Table 3-17 (See RI page 3-51, 3rd paragraph). The Agency agrees that

fish don't live in leachate. The RI presents the criteria merely as a reference. This is discussed in the RI p.3-51, middle paragraph.

Comment 13. Screening of data qualified as a "B" was not done according to the specified rules.

EPA Response: In general, the rules were followed. Had the commentor provided an example, EPA could provide better explanation. The EPA project manager noted that one EPA data reviewer had inadvertently misapplied the evaluation criteria with respect to the "B" qualifier. The data were rechecked and corrected. It is possible that some corrections were overlooked. This applies to typical lab contaminants such as methylene choride and the pthalates. In order to be cautious about the data, all QA/QC was checked for parameters which were sensitive to the interpretation of the PHE.

Comment 14. Typical concentrations of metals in soils are not provided.

EPA Response: Data summary tables for soils compares the investigative sample results to both the site-specific background valves and typical concentrations found in U.S. soils. See Table 3-1, 3-7 and 3-12.

Comment 15. Cyanide was not detected in the waste borings yet was the basis for site scoring.

EPA Response: The comment is noted. Three borings are not representative of the entire landfill contents. Other contaminants detected bring the site clearly within the scope of SARA.

Comment 16. Data below CRDL is reported as being detected when concentrations below CRDL can not be detected and quantified with accuracy.

EPA Response: The data referred to in Table 5-4 is a geometric mean. The phthalate and arsenic were in error; the values should be 13.4 and 12.3 respectively. This changes the average risk due arsenic from $7x10^{-6}$ to $2x10^{-5}$. An errata sheet will be issued. The following clarification of the definition of the CRDL is provided. The CRDL represents a minimum detection limit that all laboratories participating in the CLP program must meet. The CRDL value is actually set artificially high in order to be certain that a sufficient number of laboratories qualify for the program to meet the program capacity needs. In reality, most labs can achieve a more sensitive instrument detection limit. Any value detected is a "hard" number. It is quantified with accuracy because it is above the instrument's detection limit, and therefore within the instrument's analytical range. The results would be reproducible on any instrument which could achieve the same detection limit. The "J" value means that the result may not be reproducible (it may not be detected) if another lab were used. Another lab may not have an instrument which can achieve the same sensitivity. Defining "J" as "estimated" is a misnomer, since the value presented is not an estimate. Technically, every data value could have been used in the PHE. The CRDL provided a convenient break point for selecting chemicals of concern.

Comment 17. There is no documentation in the RI to indicate whether the inorganics were filtered or unfiltered. The application of MCLs to unfiltered samples is not justified.

EPA Response: See the last footnote on Table 3-22, page 3-56 of the RI.

Comment 18. The PAH concentrations detected on-site are typical of urban soils and are attributed to sources other than the landfill.

EPA Response: The history of the site suggests that a lot of burning occured on-site. Burning creates PAHs. The RI clearly states (page 3-22) where each sample was taken. The conclusion that EPA draws from this data is that multiple sources (i.e., the landfill and the asphalt plants) contribute to the PAH problem. PAHs were detected above site-specific background values.

Comment 19. The RI describes DDT and cadmium in background as "anomalies" and therefore may not be considering alternate sources of contamination.

EPA Response: EPA assumes the commentor is referring to page 3-34, 5th paragraph, in which case the pesticide in question is BHC, not DDT. The soil boring samples were used as site-specific background values for comparison to the waste boring (Table 3-1). Since BHC was not found in the waste boring, listing the background soil concentration is moot. The cadmium value was listed in the table. Therefore, from Table 3-1, one can conclude that the background cadmium (detected once in seven samples) is above typical soil concentrations, but the waste boring sample for cadmium is statistically significant above the background values. The commentor's remark is not clear.

Section 4 - Risk Assessment

Comment 1. Unrealistic Interpretation of the Plausible Maximum Scenario for PAH Exposure in Surface Soils.

EPA Response: EPA interprets the commentor to suggest that subchronic exosures should have been calculated, and that the site average concentration should have been used in the maximum exposure case. Both exposures scenarios are considered chronic. Exposure duration is what determines chronic or subchronic (occuring over a period of time). The difference in the exposure scenarios was frequency, not duration. Subchronic values were not needed. It is generally the Agency's procedure to look at the maximum value in the maximum exposure case. This is supported in the Superfund Exposure Assessment Manual (Aug. 17, 1984). A review of the maximum, or worst case exposure scenario is necessary to compensate for uncertainties in sampling and analysis, unknown health effects due to multiple contaminants and possible exposure to sensitive subgroups within the population. It is true that the maximum concentration for PAHs represent a specific source. This particular area leaches radially in the direction of the surface slope. The point at which it enters the pond serves as a convenient access point. Teenage kids seen fishing from the pond, have been noted at the most accessible points, on the western side of the pond. This assessment doesn't even address

the exposure to workers who are present in this area during the asphalt plant's operating periods.

Comment 2. Representation of Various PAHs with limited evidence of Carcinogenicity as Benzo (a) Pyrene.

EPA Response: The discussion presented on p. 5-56 and 5-59 very clearly states that numerous assumptions are made for PAHs in the risk assessment. Each assumption is discussed, the impacts of that assumption on the risk value presented and the appropriate EPA references which endorse the assumption are given. The nature of risk assessments is such that many assumptions must be made. Use of this group of carcinogenic PAHs is suggested in the criteria documents (attached) used to develop the SPHEM guidance. Refer to:

EPA (1984) Health Effects Assessment for Polycyclic Aromatic Hydrocarbons. Environmental Critteria and Assessment Office. September 1984. EPA 540/1-86-013. and,

EPA (1980) Ambient Water Quality Criteria for PAHs. Office of Water Regulations and Standards, Criteria and Standards Division. October 1980. EPA 440/5-80-069.

There is a discrepancy between these criteria documents and the SPHEM with respect to the two compounds mentioned by the commentor. The Agency will request clarification of this, but would rely on the criteria development documents for the time being.

3. 4.3 Inappropriate Specification of Applicable or Relevant and Appropriate Requirements (ARARs).

EPA Response: Possible ARARs were identified throughout the entire RI, in all discussion of data. It is important to distinguish applicable from relevant and appropriate. A standard which is applicable in a given situation, meets the statutory requirements (circumstances) of the law it reflects. A relevant and appropriate requirement is not directly applicable but the circumstances are sufficiently similiar that its use is appropriate. For example, MCLs are not directly applicable to the aquifer beneath the site. However, since the aquifer is a Class II B, potential use aquifer, MCLs may be considered relevant and appropriate.

The commentor states: "These ARARs are applicable at the point of use; if concentrations of contaminants are not available at these points, the concentrations should be predicted." The Agency agrees, and did just that when predicting possible risks from consumption of the aquifer beneath the site, if it were used. The RI clearly states the ground water risk is based on potential future use. In addition, in the absence of criteria, health effects criteria such as risk reference doses or potency factors are to be considered in risk development. Therefore, ARARs presented in Chapter 5 are correctly used and the points of exposure (beneath the site) correctly referenced.

IARC (1983) has evaluated selected PAHs based on the overall weight of evidence of carcinogenicity to humans. These classifications range from Group 2A (BaP) and 2B meaning that the compound is probably carcinogenic in humans to Group 3 which indicates that there is only limited animal evidence or a paucity of evidence such that the data base is inadequate to assess the human carcinogenic potential. Some of these classifications are based on routes of exposure other than oral and inhalation. As a class, PAH-containing soots, tars and oils are most appropriately classified as Group 1 (IARC, 1983). Applying the criteria proposed by the Carcinogen Assessment Group of the U.S. EPA (Federal Register, 1984) for evaluating the overall weight of evidence for human carcinogenicity, these chemicals are most appropriately classified in Group A.

IARC has judged the following specific PAHs to be probably carcinogenic in humans, there being sufficient animal evidence and or limited human evidence. The corresponding U.S. EPA grouping (Federal Register, 1984) would be Group B1 or B2, depending on the quality of the evidence.

1. benz[a]anthracene
2. benzo[b]fluoranthene
3. benzo[j]fluoranthene
4. benzo[k]fluoranthene
5. benzo[a]pyrene
6. dibenz[a,h]acridine
7. dibenz[a,j]acridine
8. dibenz[a,h]anthracene
9. 7H-dibenzo[c,g]carbazole
10. dibenzo[a,e]pyrene
11. dibenzo[a,h]pyrene
12. dibenzo[a,i]pyrene
13. dibenzo[a,l]pyrene
14. indeno[1,2,3-cd]pyrene

Reference: EPA (1984) Health Effects Assessment for Polycyclic Aromatic Hydrocarbons. Environmental Criteria and Assessment Office. September 1984. EPA 540/1-86-013.

Further, the following compounds have limited animal evidence for carcinogenicity, however, the evidence according to IARC is inadequate for making a definitive statement about the human carcinogenic potential. The appropriate U.S. EPA classification (Federal Register, 1984) for these chemicals is Group C-Possible Human Carcinogen.

1. anthanthrene
2. benz[c]acridine
3. carbazole
4. chrysene
5. cyclopenta[c,d]pyrene
6. dibenz[a,c]anthracene
7. dibenz[a,j]anthracene
8. dibenzo[a,e]fluoranthene
9. 2 and 3-methylfluoranthenes

Comment 3. The Future Use Scenario is unrealistic.

EPA Response: The commentor's opinion is noted. The Agency did not check with the County to determine land use. However, it would not be unreasonable to assume future land use similar to existing land use (i.e. additional commercial facilities on the property, perhaps with a need for recirculating cooling water, as Marion Paving has now). Since municipal water does not extend to this area, use of the surficial aquifer is not an unreasonable assumption. Restrictions currently do not exist. Note that the home existing within the site boundry has a woman of child bearing age, with an infant (sensitive population). Many more conservative assumptions could have been made, just based on extrapolation of existing conditions. The recreational use projected for only a five or ten year period (depending on matrix) presents a rock bottom set of assumptions (which favor the commentor's view) when future conditions cannot be known.

Comment 4. Application of Data Reduction Procedures is Inconsistent.

The commentor felt that data reduction errors led to erroneous identification of chemicals of concern at the site and that use of the highest contaminant value in the maximum exposure scenario presents a misleading interpretation of the risks present at the site. The commentor also presents his interpretation of the best indicator chemicals.

EPA Response: Examples of data reduction errors were not presented, therefore, EPA has no comment on this point. Use of the highest contaminate value and the plausible maximum exposure scenario is conservative, but not unreasonable given it is at least based on existing values where future values are uncertain. See response to Comment 1, section 4. The maximum exposure scenario compensates for many data uncertainties.

The selection of indicator chemicals is not a requirement, merely a convenience when working with a large data base. This process was not necessary at Marion/Bragg. The Agency doesn't need to assess the commentor's recommended PHE procedures. The RI has already completed this task in a manner which complies with the guidelines.

Section 5 - Feasibility Study

Comment 1. Listing of Media Inconsistent

The commentor suggests that inconsistent listing of media has lead to inconsistent response objectives, which may not correspond to the PHE.

EPA Response: The FS correctly identifies the media in which the PHE identified risks, as well as the media in which the pathway for potential future risk exists. The on-site pond and/or river

were identified as presenting a current risk, however, they are exposure pathways of concern. In addition, the FS (Chapter 7) clearly states that (based on existing data) these pathways are more likely to be impacted if existing contaminant level actually increase over time. Since the Agency is required to select remedial actions which are permanent and protective, then the potential for future risk must be addressed.

Comment 2. Interim Remedy

The commentor presents an alternate view of the selected remedy elements.

5.3.1 Access and Deed Restrictions

The commentor concurs on the need.

EPA Response: The comment is noted. A point of clarification is needed with respect to the deed restriction. The land owner must provide the restriction voluntarily. The Agency does not have the authority to impose it.

5.3.2 Flood Protection Measures

The commentor feels the levee is an expensive means of achieving the goal and suggests other technical approaches which are felt to be comparable.

EPA Response: The language in the ROD has been clarified as a result of this comment. The goal stated is performance based. If the PRPs can find another means of achieving it which gains the approval of appropriate State and Federal Agencies, then U.S. EPA may accept it as well.

Comment 3. Indiana Sanitary Landfill Cap

The commentor feels the clay cap is an excessive means of preventing the direct contact threat. Further, the commentor suggests that repair work on the existing cap is all that is necessary.

EPA Response: Section 121 of SARA specifically states that the selected remedy will comply with the ARARs which are determined to be appropriate. The Subtitle D requirements are the minimum ARAR at this site. Two feet of clay would be excessive if the direct contact threat was the only concern. Congress wanted to ensure that selected remedies did not undermine the minimum protectiveness requirements considered by the regulations established under other State and Federal environmental laws. This mandate is very clear in Section 121. The sloping and capping requirements under Subtitle D serve to minimize future problems at any landfill. This minimum ARAR follows common sense and good engineering practice. This cap will be consistent with any ground water remedy, ACL or slurry wall.

Comment 4. Monitoring and Additional Investigations

The commentor suggests that additional study is not needed, only monitoring. Further, a frequency for monitoring is suggested, interpretion of the point of compliance, and action levels selected based on table 6-2 in the FS.

EPA Response: The FS clearly states that ammonia is a "potential" problem (page 7-4, 4th paragraph), and that additional data will answer whether it is an actual problem. This is a conservative and reasonable approach to make sure that the final remedy is indeed permanent and protective.

The monitoring program suggested is not sufficient. The river bank is one half mile long on the site border. Ground water quality will change because waste type and characteristics will change. In order to be protective, EPA recommended monitoring appropriate "discharge zones" (page 6-7). The action levels suggested in Table 6-2 are only "to-be-considered". The NPDES approach is logical, but there are several differences in the fundamental assumptions between an end-of-pipe discharger and a chronic discharge occurring over a one half mile stretch. The FS did not specify which of the "to-be-considered" values would be applicable since the ground water remedy was not being selected at this time. Other approaches can also be considered in the future. Refer to the RCRA ACL Determinations guidance for examples.

Comment 5. Future Remedial Actions

The commentor felt that a slurry wall was not justified by the existing risks and that the FS failed to adequately address the technical limiations associated with installation of a slurry wall through trash.

EPA Response: EPA is not recommending a slurry wall at this time. If it were needed, the FS strongly suggests that compatibility tests be performed first (Table 6-3). Table 6.8 shows the potential cost consequences if the slurry wall failed. The EPA contractor recognized the difficulties and risks associated with application of a slurry wall in a landfill environment and made adjustments for those concerns in the estimated capital cost. However, if it was necessary to prevent the ground water from reaching the river, not many technical choices are available. The FS evaluates use of a hydraulic barrier (FS Appendix A), but still suggests that the slurry wall presents the best cost and feasibility.

Comment 6. General Comments - FS

The commentor felt that the cost documentation should have been more detailed so that they could determine the reasonableness of the figures.

EPA Response: This level of cost documentation is typical of FSs. EPA has offered to make detailed cost documentation available to the PRP steering committee.

Section 6 - Conclusions

The commentor summarized all previous comments and suggests that the proposed remedy is not responsive to the risk.

EPA Response: All comments have been adequately addressed. It appears that the commentor actually concurs with EPA's response actions, but feels that the clay cap is excessive. The comments have not changed the Agency's view of the need for the selected remedy. The EPA again reminds the commentor of the requirements of SARA, particularly Section 121.

No other technical comments were submitted. The next section will summarize legal comments. This will begin with Mr. Hanson's letter.

1. Mr. Hanson of Beveridge & Diamond, P.C. on behalf of the Steering Committee.

Comment: Due Process Requires a Reasonable Comment Period and Fair Agency Procedures: They Have Not Been Provided.

The PRPs are entitled to procedural due process, and are entitled to a substantially extended public comment period to include 60 days beyond the date they receive a response to a Freedom of Information Act request concerning the Marion/Bragg site.

EPA Response: EPA agrees that the PRPs are entitled to the benefits of that procedural due process, which is due and appropriate under the circumstances, regarding notice of and an opportunity to comment on the remedy selection set forth in the Feasibility Study (FS) released August 4, 1987. However, EPA disagrees with the PRP position that the demanded extension of the public comment period beyond that provided for in the enabling legislation and the National Contingency Plan is mandated by considerations of due process.

First, the public comment period began with the release, with public notice, of the FS on August 4. Special notice letters were sent to the PRPs on August 10, 1987, notifying them of their opportunity to negotiate a voluntary performance of remedial action at the facility, and notifying them of the availability of the FS. EPA rejects as completely ungrounded the PRP assertion that public comment period began on August 22, 1987.

Most of the PRPs who have received special notice under Section 122(f) of SARA were previously given, in December 1985, an opportunity to perform the RI and FS themselves. They declined to do so. They have also been aware of the existence of the Region's ongoing RI and FS activities since that date, which are part of a continuum from identification and listing of an NPL site through of final remedy and removal from that list. The PRPs have evidently chosen not to remain involved in that process or to seek to obtain the data and other developing site information

available from the EPA. Notice consistent with the requirements of Section 113(k) of SARA was given, along with "special notice" of the moratorium period under Section 122(e)(2) of SARA. The administrative record developed to date has been available since August 4, 1987, in the locations prescribed in Section 113(k)(1) of SARA (at the Marion public library and in Region V's offices), and it contains the "background data and procedures" used in developing the RI and FS. The FOIA request submitted by one of the PRPs largely tracks and includes information already available to the PRPs in the public record established by the Region.

Comment: A summary of the technical comments is provided in points II, III, IV and V. The Agency will not repeat the response to comments which have been provided to the ERM Report in Appendix 2 to Mr. Hanson's letter.

Comment: Mr. Hanson also requests the opportunity to comment on a draft work plan for remedial action.

EPA Response: The Agency generally does not submit a work plan for RD/RA to public comment since it represents implementation of a remedy already the public has already commented on. The plan, however, will be put in the repository for review. If the steering committee elected not to undertake RD/RA, their next opportunity for project involvement will be at cost recovery. There is, of course, the moratorium period which began with the special notice (plus delivery time) on August 10, 1987. The negotiations during this period, and the PRP's opportunity to submit a good faith proposal for RD/RA work consistent with this ROD, allows the PRPs access to discussions on the work plan with EPA.

2. Mr. J. B. Smith of Beckman, Kelly and Smith on behalf of Mr. Delmar Bragg.

Comment: Mr. Smith refutes the Agency's record of hazardous waste at the site and provided additional information on the likely quantities. He also felt the risk posed by the site was de minimus and that a clay cap over only the transfer station area is needed to restrict percolation. He suggests that EPA consider this in lieu of the FS proposed remedy.

EPA Response: The Agency appreciates the augmentation of site history provided. A clay cap over a small portion of the landfill achieves very little and does not comply with the law.

3. Mr. Spitzer of Brown, Spitzer, Herriman, Browne, Stephenson and Holderead on be half of General Plastics Corporation.

Comment: Mr. Spitzer requests that General Plastics Corporation be removed from the list of PRPs since their waste is of an industrial, but not hazardous nature.

EPA Response: EPA will accept information General Plastics cares to submit on the scope of their involvement.

4. Mr. Browne of Browne, Spitzer, Herriman, Browne, Stephenson & Holderead on behalf of the City of Marion and the Marion Utility Services Board.

   Comment: Mr. Browne requests that the City of Marion be withdrawn from the EPA list of PRPs because the City does not handle hazardous waste (or hazardous sludge). Mr. Browne also suggests that this landfill does not pose a risk and the EPA remedy is inappropriate.

   EPA Response: Ultimately, the court determines liability. EPA has adequately addressed the technical concerns raised by the steering committee and continues to assert that the recommended remedy is the minimum necessary to protect human health and the environment. Therefore, it is appropriate.

5. Mr. Cromer of Mishkin, Cromer, Eaglesfield & Maher P.A. on behalf of RCA Corporation.

   Comment: The procedure followed in identifying and selection the Marion/Bragg remedy is inconsistent with CERCLA and SARA and arbitrary and capricious.

   This general statement and comment includes a number of sub-points that will be addressed individually.

   Comment: The allegedly short review and comment period is being imposed solely to meet internal Regional desires to conclude the ROD by the end of EPA's fiscal year.

   EPA Response: As demonstrated above, EPA does not believe the comment period is unreasonable short, but does not dispute that it desires to conclude the ROD process as quickly as possible. EPA maintains, however, that the procedures and timing followed here are fully consistent with the law.

   Comment: The PRPs are entitled to a full trial-type hearing before a "neutral and detached decision maker," including pre-hearing discovery, examination of witnesses and associated procedures, before being compelled to expend large sums of money at the facility.

   EPA Response: The PRPs have not been required to expend large sums of money to finance the remedy. The PRPs have received the statutory notice of two opportunities to voluntarily assume the responsibility for certain response actions: To perform the RI/FS, and to undertake the remedy. No compulsion attaches to EPA's offer to allow such voluntary action.

Beyond that threshold point, however, it is patent that neither CERCLA nor SARA apprehend any adjudication-type procedures before a "neutral and detached decision maker," presumably and equivalent of an administrative law judge or hearing officer. Section 113 requires notice and opportunity to comment, which has been provided. Section 107 provides defenses and sets the standards for recovery, in a judicial adjudication that must be brought by EPA, of costs the EPA must expend if the PRPs decline to assume the remedial tasks. Particular notice and opportunity to comment have been given to the PRPs and the community in the manner provided by the site, and the PRPs have been on notice of ongoing RI/FS process since December 1985. The data generated by EPA during the RI/FS process are made available routinely on request from PRPs and the public and are included in the public record.

The final decision on a ROD is committed by delegated authority to the Regional Administrator, who is not involved in the details of the remedial development process. EPA believes that the statutory process is fully protective of the PRPs' due process rights, and the process as administered here was neither arbitrary nor capricious given the manifold opportunities the PRPs have had continuously available to gain information about the remedy selection process and prepare comments for submission during the public comment period.

Comment: EPA has disregarded a requirement of Section 122(e) of CERCLA, as amended, by closing the public comment period during the moratorium on r esponse action established in Section 122(e).

EPA Response: Closure of the public comment period on the FS is not "commencement of response action" under Section 104(a). Rather, it is only one step in the process, already under way, leading to actual commencement of on-site cleanup activity. The moratorium period is clearly inteneded to halt, where environmental and human health threats are not pressing, the actual conduct of response actions at the facility. The moratorium period, moreover, is an additional opportunity for the PRPs to negotiate with EPA concerning response work to be performed, if the PRPs produce a good-faith proposal after 60 days and oblige themselves by the end of 120 days through a consent agreement to perform the remedial work. EPA does not agree that the Section 122 moratorium requires holding the public comment period and the administrative record open. Indeed, this PRP comment, were it to be acceded to by EPA, poses a conundrum: A remedy, following the PRPs' view of the moratorium, could not be selected through a ROD and made the subject of negotiations until the moratorium period was over, but negotiations over the remedy cannot begin until the EPA has established the remedy.

Comment: In a cost recovery action, the EPA will not be able to support its recommended remedy, and the ultimate decision maker on issues such as cost recovery will be a Federal District Court.

EPA Response: EPA agrees that cost recovery actions will be decided, if they are not settled, by a federal court. This comment illustrates a degree of confusion between the process of selecting a remedy through notice-and-comment procedures, and litigation of cost recovery claims should the PRPs decline to undertake the remedy. In any cost recovery action, the PRP defendants will have the opportunity to demonstrate to the court that the remedy is inconsistent with the National Contingency Plan and the enabling legislation, and to seek to raise challenges to that legislation as well. The PRPs' rights to due process of remedy selection and to negotiate their own agreement on performing a remedy; and they have access to judicial review, in action brought to recover EPA costs, of the EPA's remedy.

IV. Remaining Concerns

None identified.

Appendix 6 -- Administrative Record Index

Administrative Record Index -- Marion/Bragg Landfill

Administrative Record for Marion/Bragg Landfill, Grant County, Indiana as of September 30, 1987.

File # 1. PA/SI, HRS

- Raw data for scoring package

2. Site Inventory

- memos from observation during site visits
- file search information obtained during RAMP period including: land ownership, water well records, city township location documentation

3. RAMP (Remedial Action Master Plan) 9/9/83

4. RI/FS initiation

- letter from IDEM requesting project initiation and making Assurances
- RI/FS Statement of Work

5. Work Plan memorandum 6/19/85

6. Community Relation Plan 2/10/86

7. Initial Site Evaluation 8/20/85

8. Groundwater Utilization Survey 7/18/85

9. Draft Geophysical Investigation Fall '85

10. Work Plan - PRP negotiating draft 10/11/85

11. Final Work Plan 4/24/86

12. Final Quality Assurances Project Plan 7/10/86

13. Final Health and Safety Plan 4/24/86

14. Phase II Sampling and Analysis Memorandum 6/2/86

15. Request for applicable, relevant and appropriate requirements for Remedial Alternatives 3/6/87

    USEPA Comments:

    - Water Division 4/28/87
    - Air Division 6/17/87
    - Great Lakes National Program Office 4/27/87
    - Solid Waste Branch 4/15/87

    IDEM Comments: 5/4/87 and 7/27/87

16. Quality Assurance Project Plan - Addendum One for supplemental sampling (May, 1987)

17. General Correspondence File - Contains various comments and correspondence with other Agencies such as; ATSDR, ISBH, IDEM and U.S. Fish and Wildlife Service.

    - ISBH letter identifing water quality standards 7/3/85
    - Fact sheet, Public "Kick-off" meeting 1/30/86
    - ISBH comments to Draft QAPP and Health and Safety Plan 9/25/85
    - ISBH comments to Draft Work Plan 10/9/85
    - ATSDR comments to Draft Work Plan and Draft QAPP 10/23/85
    - Memo from Potentially Responsible Party meeting of 11/7/85
    - ATSDR memo for review of residential drinking water samples 11/9/85
    - ISBH additional comments on Work Plan and QAPP 2/6/86
    - U.S Fish and Wildlife comments on surface water and sediment data 6/10/87

18. Applicable Guidance

19. Comments to Agency Proposed Plan

Uncopied references which are available at the Regional Office in Chicago, Illinois:

1. Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments - April, 1977

2. Raw Data from all RI field investigations

The reader should note that in 1986 the Indiana State Board of Health (ISBH) was reorganized and the Indiana Department of Environmental Management (IDEM) was created.

Appendix 7 - State of Indiana Concurrence

RECORD OF DECISION

ROD SUMMARY
MASTER DISPOSAL SERVICE LANDFILL
BROOKFIELD, WISCONSIN

LIST OF FIGURES TABLES

Figure 1-1 - Waukesha Quadrangle Detail

Figure 1-2 - Agricultural Land

Figure 1-5 - Round 1 - Ground-Water Sampling Highlights

Figure 5-2 - Round 2 - Ground-Water Sampling Highlights

Figure 5-3 - Round 3 - Ground-Water Sampling Highlights

Figure 8-1 - Gas Venting System

Table 4-5 - _____

Table 5-2 - Adult Risk Characterization (1) For Ingestion Of Groundwater: Noncarcinogenic Effects

Table 5-3 - Child Risk Characterization (1) Fog Ingestion Of Groundwater: Noncarcinogenic Effects

Table 5-4 - Estimated Adult Incremental Carcinogenic Risk (1) Associated With Ingestion Contaminated Groundwater

Table 5-5 - Estimated Child Incremental Carcinogenic Risk (1) Associated With Ingestion Contaminated Groundwater

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Master Disposal Service Landfill
Brookfield, Wisconsin

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Master Disposal Service Landfill (MDSL) site, in the Town of Brookfield, Wisconsin, which was chosen in accordance with the requirements 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, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information and documents contained in the administrative record for this site.

The State of Wisconsin concurs with the selected remedy.

Assessment of the Site

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

Description of the Selected Remedy

This remedy is the first operable unit for the MDSL site and consists of a remedy for the waste mass and an interim action for contaminated groundwater. Capping of the waste mass in conjunction with containment of contaminated groundwater is considered as source control, both components are necessary since the groundwater appears to be in contact with the waste mass. Thus, "containment" will not be achieved through solely capping the site. A second and final remedy will be implemented for groundwater, surface water and wetlands. The combination of a clay/soil cap with an active landfill gas venting system and a groundwater extraction system with capability for both organic and inorganic pollutant removal followed by stream discharge constitutes the first remedy for the site. The primary goals of the remedial actions at the MDSL site are:

- to reduce infiltration into the landfill which is a source of groundwater contamination and to reduce the risks associated with exposure to contaminated materials; and

- to contain known contaminated groundwater in the surficial aquifer.

The MDSL Remedial Investigation identified contaminated groundwater as the principal threat, with the waste materials acting as the source of that contamination due to infiltration and the probable contact between portions of the waste mass and the groundwater.

The major components of the selected remedy consist of:

- Placement of a clay/soil cap and an active venting system over the fill material to reduce infiltration into the waste mass. (Constructed in accordance with NR 504.07 and NR 506.08 Wis. Adm. Code).

- Installation of a groundwater extraction and treatment system to remove both organic and inorganic contamination from a portion of the contaminated alluvium aquifer groundwater beneath the site.

- Conduct groundwater, surface water, water budget/hydrology and wetland monitoring to assess the quality and quantity of area groundwater, surface water and wetlands.

- Impose access and use restrictions.

Declaration of Statutory Determinations

The selected remedy is protective of human health and the environment, and is cost-effective. The waste mass alternative (clay/soil cap) will comply with all Applicable and Relevant and Appropriate Requirements (ARARs), while the interim groundwater remedy (containment of the plume) will comply with those environmental standards directly associated with the limited nature of this action. The waste mass remedy utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable, given the limited scope of the action. Treatment of the landfill waste mass is impracticable due to the large volumes of wastes with low levels of contamination.

This interim groundwater action is protective of human health and the environment, complies with Federal and State ARARs directly associated with this action, and is cost-effective. The statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed by both this and the final response action. Subsequent actions are planned to address fully the principal threats posed by the conditions at this site. Through employment of treatment techniques such as adsorption, oxidation, etc., groundwater contaminant toxicity and mobility will be reduced.

As required by SARA, when hazardous substances are left on site, a review will be conducted within 5 years after commencement of remedial action to ensure that the remedies continue to provide adequate protection of human health and the environment.

Valdas V. Adamkus

9/26/90.

Valdas V. Adamkus, Regional Administrator
U.S. Environmental Protection Agency, Region V

Date

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Carroll D. Besadny
Secretary
Box 7921
Madison, Wisconsin 53707

September 18, 1990

IN REPLY REFER TO: 4440

Mr. Valdas V. Adamkus, Regional Administrator
U.S. Environmental Protection Agency
230 S. Dearborn Street
Chicago, IL 60604

O: WMD
CC: RF
FREEMAN

SUBJECT: Selected Superfund Remedy
Master Disposal Service Landfill

Dear Mr. Adamkus:

The Department is providing you with this letter to document our position on the proposed source control operable unit for the Master Disposal Service Landfill. The proposal, as identified in the draft Record of Decision includes the following:

Alternative WM3/GW3: Capping with Groundwater Extraction/Treatment
A cap with an active gas extraction system, in compliance with NR504 Wis. Adm. Code, will be placed over the waste mass. In addition, a groundwater extraction and treatment system will be installed to contain groundwater contaminants from leaving the site. The groundwater system and the capping will be designed to have minimal impacts on the surrounding wetlands.

Estimated Costs WM3:
Construction - $3,495,000
Operation and Maintenance - $54,130
30 Year Present Worth - $3,608,000

Estimated Cost GW3:
Construction - $430,300
Operation and Maintenance - $103,000
30 Year Present Worth - $1,408,000

The total 30-year present net worth for the Master Disposal Service Landfill source control operable unit is approximately $5,016,000. The Department concurs with Alternative WM3/GW3, as described in the Record of Decision for this source control operable unit. The State of Wisconsin will contribute 10% of the remedial action costs associated with this source control

operable unit at the Master Disposal Service Landfill if the potentially responsible parties (PRPs) do not agree to fund the remedy. This assurance assumes that EPA will pursue all legal action against the PRPs, including issuance of a unilateral order and litigation of such order, prior to expending the Fund.

We also understand that our staff will continue to work in close consultation with your staff during the remaining Remedial Investigation/Feasibility Study work associated with the groundwater/wetlands/surface water operable unit at the Master Disposal Service Landfill site, as well as during the design and construction of the source control operable unit remedy.

Thank you for your support and cooperation in addressing this contamination problem at the Master Disposal Service Landfill site in Brookfield. If you have any questions regarding this matter, please contact Mr. Paul Didier, Director of the Bureau of Solid and Hazardous Waste Management, at (608) 266-1327.

Sincerely,

C.D. Besadny, Secretary

CDB:RS

cc: Lyman Wible - AD/5
Linda Meyer - LC/5
Paul Didier - SW/3
Frank Schultz - SED
Jim Schmidt/John Krahling - SED
Doug Ballotti/Russ Hart/Beth Reiner - US EPA Region V (5HS/11)
Mark Giesfeldt/Sue Bangert/Robin Schmidt - SW/3

RECORD OF DECISION

ROD SUMMARY
MASTER DISPOSAL SERVICE LANDFILL
BROOKFIELD, WISCONSIN

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The Master Disposal Service Landfill (MDSL) site is located at 19900 West Capitol Drive (Wisconsin Route 190), Town of Brookfield, Waukesha County, Wisconsin. The property is situated in the southwest quarter of the southwest quarter of Section 5, Township 7 North, Range 20 East of the Waukesha Quadrangle, Wisconsin. (See Figure 1-1). The site is bounded by Wisconsin Route 190 to the south, and otherwise is surrounded by wetlands. The wetlands located around the landfill are privately owned parcels of land. The Fox River is located approximately 300 feet to the west. The site vicinity map is illustrated in Figure 1-2.

The MDSL site is located in the marshy floodplain of the Fox River and is partially surrounded by drainage channels which discharge to the river. The site occupies approximately 26 acres of the 40-acre parcel. The landfilling operations have created a raised plateau, confined by perimeter berms, that is surrounded by flat-lying lowlands.

The 1980 population of the area surrounding the landfill (census tract 2008) is approximately 10,440, and the area is experiencing rapid growth. Of the total, approximately 8,530 persons are residents of the City of Brookfield. The City of Brookfield is a western suburb of the City of Milwaukee. It is a heavily urbanized area located approximately 3/4 mile east of the site.

The nearest residential well is approximately one mile to the south of the site. Groundwater flow is primarily to the south-southwest. Within the wetlands surrounding the site, a substantial amount of peat is encountered. The dolomite aquifer begins at approximately a depth of 55 feet below the ground surface. Within the unconsolidated glacial till are two sand and gravel aquifer units at depths of 15 and 35 feet.

The MDSL site lies within a primary environmental corridor, as defined by the Southeastern Wisconsin Regional Planning Commission (SEWRPC). SEWRPC defines those areas in southeast Wisconsin that have the highest concentrations of natural, recreational, historic, and scenic resources as "environmental corridors". A primary environmental corridor is further defined as being at least 400 acres in size, two miles in length, and 200 feet in width. Resources contributing to the area's ranking as a primary environmental corridor include the Fox River, the wetlands, and wildlife habitat areas. There are no known records of endangered or threatened animal or plant species in or surrounding the site area.

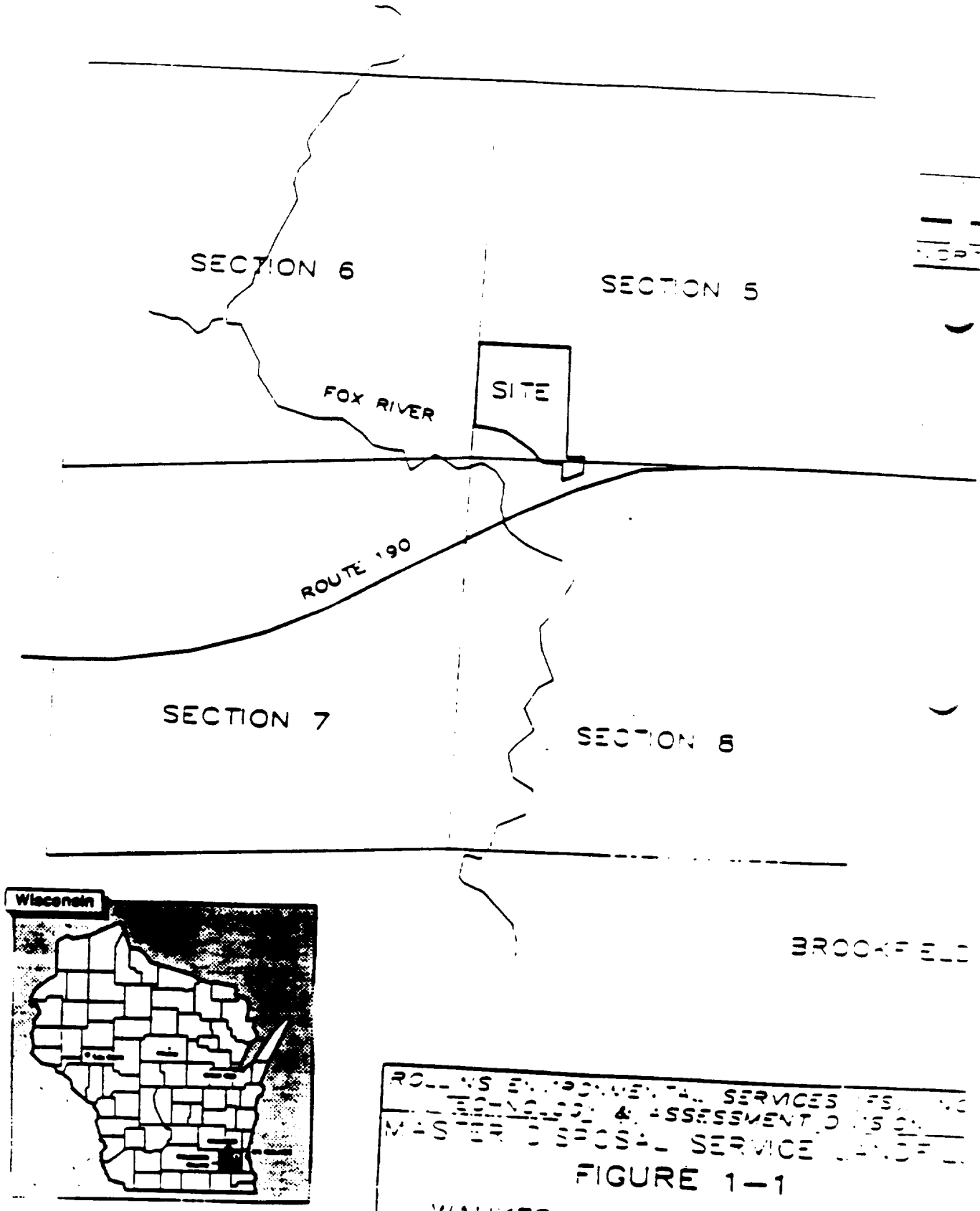
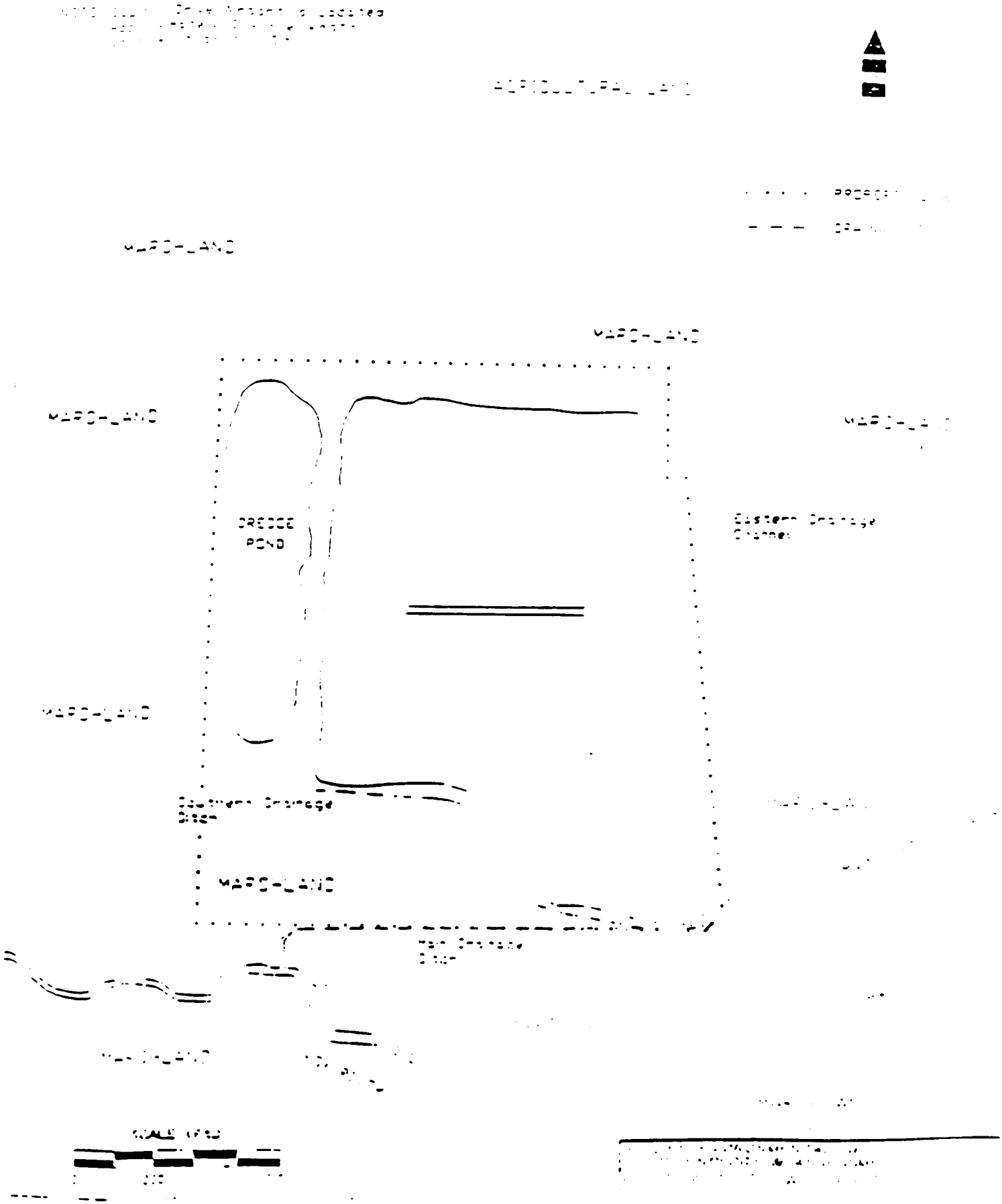


FIGURE 1—1

WAUKESHA QUADRANGLE


AGRICULTURAL LAND
MARSHLAND
MARSHLAND
MARSHLAND
DREDGE POND
Eastern Drainage Channel
MARSHLAND
MARSHLAND

The MDSL site is underlain by reworked glacial drift (alluvium) and glacial till. This glacial material is unconsolidated and rests atop the Niagara Dolomite, a consolidated Silurian unit 300 to 700 feet thick in the vicinity of the site. Beneath the Niagara Dolomite lies the Maquoketa Shale and Ordovician/Cambrian Sandstones and dolomites. Beneath these units lies the Precambrian basement bedrock.

There are two aquifer systems at the MDSL site: an upper unconfined aquifer consisting of the glacial till and the Niagara Dolomite formation; and a deeper confined aquifer beneath the Maquoketa Shale consisting of the Ordovician/Cambrian sandstone formation.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The MDSL site was operated from 1967 until 1982 when it was partially closed. At that time, wastes no longer were received for disposal with the exception of wood wastes which were burned in a controlled air-pit burner known as an air curtain destructor. The ash from this operation was disposed of on-site. During the active life of the landfill (1967-1982), disposal of industrial and non-industrial solid wastes and drummed liquids and solids occurred on site.

During the fall of 1966, the site was purchased by Master Disposal, Inc. and began its operation as MDSL. Waste was initially accepted in 1967.

In April 1967, after the Wisconsin Department of Natural Resources (WDNR) received legislative authority to regulate solid waste facilities, the WDNR inspected the MDSL facility. At that time, the WDNR noted that the site was located entirely in a swampy, peat area. The WDNR subsequently advised Master Disposal, Inc. that adequate diking be maintained. The WDNR also chose at that time not to license the site due to the poor setting of the site. The WDNR routinely inspected the site during the years of [illegible]on.

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A WDNR inspection in August 1973, indicated that the on-site operations consisted primarily of industrial waste disposal. Foundry sands and slags constitute the largest class of wastes accepted for disposal. Some evidence of hazardous waste (including inks, sludges, solvents, and other industrial compounds) reportedly was present at the site.

The WDNR performed approximately 19 inspections of the MDSL site during the period from December 1976, though August 1977. The inspections generally consisted of visual observations of disposal operations in the industrial waste disposal area, wood burning area, refuse disposal area, and salvage area. Most WDNR inspection reports noted that hazardous substances were being accepted. A summary report of the WDNR site inspections noted that operational violations included the following:

- continuous open burning,
- inadequate waste covering,
- lack of surface water drainage,
- acceptance of some hazardous wastes, and
- deposition of waste materials directly into ponded waters.

Under contract to the site owner, Warzyn Engineering, Inc. completed a study in June 1977, which assessed the hydrogeologic and geotechnical feasibility of continued disposal operations at MDSL. Warzyn recommended a phased abandonment over time based on the poor site setting, potential increase of contaminants to ground and surface waters, lack of on-site borrow materials, and difficult operating conditions.

In August 1977, the WDNR and the State Department of Justice (DOJ) entered into a stipulated agreement with Master Disposal Corporation. As a result, a State license was issued; however, the agreement called for site abandonment within 2-1/2 years as well as the development of a groundwater monitoring program at the site.

By 1982, MDSL was partially closed. The only known wastes which were received after partial closure were wood wastes which were burned in the air curtain destructor; the ash from the burning was disposed of on site. MDSL ceased this activity and closed in 1985.

In 1984, U.S. EPA placed the MDSL site on the National Priorities List (NPL). In 1985, U.S. EPA sent notice letters to potentially responsible parties (PRPs) informing them of an opportunity to engage in negotiations with the Agency over the need to evaluate extent of contamination at the MDSL site. In 1986, approximately 20 PRPs entered into an agreement with U.S. EPA and WDNR for the purpose of performing this study.

The Remedial Investigation/Feasibility Study (RI/FS) was performed by the PRPs who were a party to the Consent Order. A goal of the RI/FS was to determine the effect of the MDSL site on the surrounding environment through the

collection of various samples (e.g. - surface water, groundwater, etc.) RI sampling results showed that the MDSL site has had demonstrable negative effects on both the nearby groundwater and surface water. An FS Report to identify remedial action alternatives for the MDSL site was completed by the PRPs in June 1990.

3.0 COMMUNITY RELATIONS

In 1986, a public meeting was held at the Brookfield City Hall as a "kickoff" to the PRP-lead RI/FS process. The RI/FS Report and the Proposed Plan for the Master Disposal Service Landfill were released to the public for comment on July 9, 1990. These two documents were made available to the public in both the administrative record and an information repository maintained at the U.S. EPA Docket Room in Region V and at the Brookfield Library. Another repository was established at the Brookfield City Hall. The notice of availability for these two documents and the scheduled July 16, 1990 public meeting was published in the Milwaukee Journal on June 27, 1990. A public comment period on the documents was initially set for July 9, 1990 to August 8, 1990. However, in response to a request for an extension of the comment period, U.S. EPA extended the comment period until September 7, 1990. On July 16, 1990, U.S. EPA conducted a public meeting at the Brookfield City Hall concerning the Proposed Plan. Written and oral comments were accepted. At this meeting, representatives from U.S. EPA and WDNR answered questions concerning problems at the site and the remedial alternatives under consideration. Responses to the comments received during the meeting as well as during the public comment period are included in the Responsiveness Summary, which is part of this ROD.

4.0 SCOPE AND ROLE OF OPERABLE UNIT

The environmental setting at the MDSL site contributes to the complexity of environmental problems. As a result, U.S. EPA organized the work into two operable units (OUs). This ROD addresses the first of two planned operable units for the site. The operable units are as follows:

OU One: Source Control - Containment of the waste mass consisting of a cap on the site to prevent infiltration of water through the landfill. In addition, since groundwater is believed to be in direct contact with the waste materials, a groundwater containment system to control the migration of the contaminant plume is required.

OU Two: The second of two planned operable units will focus on the restoration of the groundwater (both upper alluvium aquifer as well as the dolomite aquifer which underlies the alluvium) to comply with state and federal ARARs, and on impact to the wetlands and the Fox River and the environment. (U.S. EPA and WDNR will issue a subsequent Proposed Plan when they determine the recommended option for those media).

U.S. EPA seeks a course of action which will contain the groundwater plume and also restore the aquifer throughout to federal and state groundwater standards. However, the presence of the surrounding wetlands poses a problem. These wetlands are of environmental significance, and an overly aggressive groundwater restoration effort may have the undesired effect of drying out and destroying these wetlands.

Therefore, for this first of two planned operable units, the primary focus will be to control the source of contamination (the landfill) and contain known portions of the contaminated groundwater that is likely in direct contact with the waste materials. Because this is an interim groundwater remedy, attainment of federal/state groundwater criteria throughout the aquifer is not a goal of this operable unit. For groundwater protection measures, pertinent federal/state regulations would encompass groundwater restoration criteria, location-specific construction measures and effluent limitations upon treatment. This interim measure will attain regulations on the latter two points. The goal of this action is containment rather than to attain groundwater restoration quality standards.

The second operable unit will consider aquifer response and wetlands effects, and will seek to optimize both groundwater restoration and wetlands preservation. It will also consist of an extensive monitoring system to better evaluate the impact to the wetlands quality and both surface water quality and quantity. It will be the goal of the second operable unit to define the remediation standards and the restoration timeframe of the contaminated aquifer.

The remedy for the first operable unit at the MDSL site was selected by combining aspects of source control, treatment, and long-term monitoring. The MDSL site received primarily industrial wastes of a non-hazardous nature. While such

wastes contain hazardous substances, they are not RCRA hazardous wastes, and waste mass contamination is at relatively low levels. Therefore, the selected remedy for the MDSL site includes a clay/soil cap of the waste mass with an active gas venting system and a groundwater pump and treat system to contain and treat groundwater as well as prevent contaminants from leaving the site in the shallow alluvium aquifer. A RCRA Subtitle C cap is not technically appropriate because of contact between the waste mass and groundwater. More vigorous means of reducing infitration is not justified because such a cap would not preclude waste mass contact with groundwater. In accordance with NR 504.07 and NR 506.08 Wisconsin Administrative Code, the cap/cover system will be composed of a minimum 2-foot thick clay cap that will minimize water from infiltrating through the landfill; covered by a 1-1/2 to 2-1/2-foot thick soil frost-protection layer; covered by a layer of top soil at least 6 inches thick to promote vegetation growth. The cap will be slightly sloped to promote precipitation runoff. In addition, an active venting system, in accordance with Wisconsin NR 504.05, will be installed to reduce gas buildup from decomposition within the landfill, and to monitor or control emissions from the vents. The selected remedy will also include site fencing, sign placement, and site deed restrictions. Part of the first operable unit will be to conduct treatability studies, including a pump test, on the groundwater to determine which of the combination organic/inorganic treatment technologies are best suited for the groundwater contamination to comply with discharge limitations.

Key direct pathways at MDSL are contact with the waste mass as well as ingestion of groundwater if no further action is taken. The selected remedy will address these threats by containing the plume of contaminated groundwater, and by halting deterioration of existing cover materials which could result in subsequent exposure of the waste mass. Waste materials in contact with the groundwater will continue to impact the groundwater, thus groundwater containment is a necessary component of the overall waste mass containment alternative.

The groundwater medium has been identified as the principal pathway of exposure from chemicals at the site. The primary chemicals of concern are as follows: 1,1-dichloroethane, trichloroethene (TCE), cadmium, toluene, and benzene. It should be noted that vinyl chloride was not detected in samples from the MDSL site. However, multichlorinated species such as TCE may undergo degradation to vinyl chloride.

Compound	Max. Conc. Detected	MAX. CONTAMINANT LEVEL (MCL)
1,1-dichloroethene	28	7
trichloroethene	190	5
cadmium	15	10
toluene	1100	--
benzene	91	5

5.0 SITE CHARACTERISTICS

The RI consisted of sampling and subsequent laboratory analysis to determine the nature and extent of contamination at the site and affected areas. During the RI, samples were taken from surface and subsurface soils, monitoring wells, residential/municipal wells, surface water, and sediment. An assessment of wetlands surrounding the site was not included in the RI.

Geophysical investigation of the MDSL site did not reveal areas which may be construed as "hot spots" requiring treatment of that segment of the waste mass. The largest class of wastes at the MDSL site includes foundry sands and slags, along with plastic wastes and certain solvents associated with their usage. The RI report for the first operable unit was completed in June 1990. The results of the RI are summarized below.

5.1 Groundwater

Eighteen monitoring wells were installed at nine locations around the MDSL site. All of the monitoring wells were screened either in the sand and gravel or the dolomite aquifers. For most of the monitoring wells, three rounds of sampling were conducted and samples were compared to samples taken from wells considered upgradient of the site. The sampling revealed elevated concentrations of both organic and inorganic compounds in both the sand and gravel and the dolomite aquifers. The reader is referred to Figures 5-1, 5-2 and 5-3 for sampling results. The highest levels of organic contaminants were found in the second round of sampling. Due to drought conditions that existed during most of the RI, the second round of sampling occurred during more typical weather conditions.

No contamination attributable to the MDSL site, however, was found in the seven residential and two municipal wells sampled.

FIGURE 5-1

ROUND 1 -
GROUND-WATER SAMPLING HIGHLIGHTS

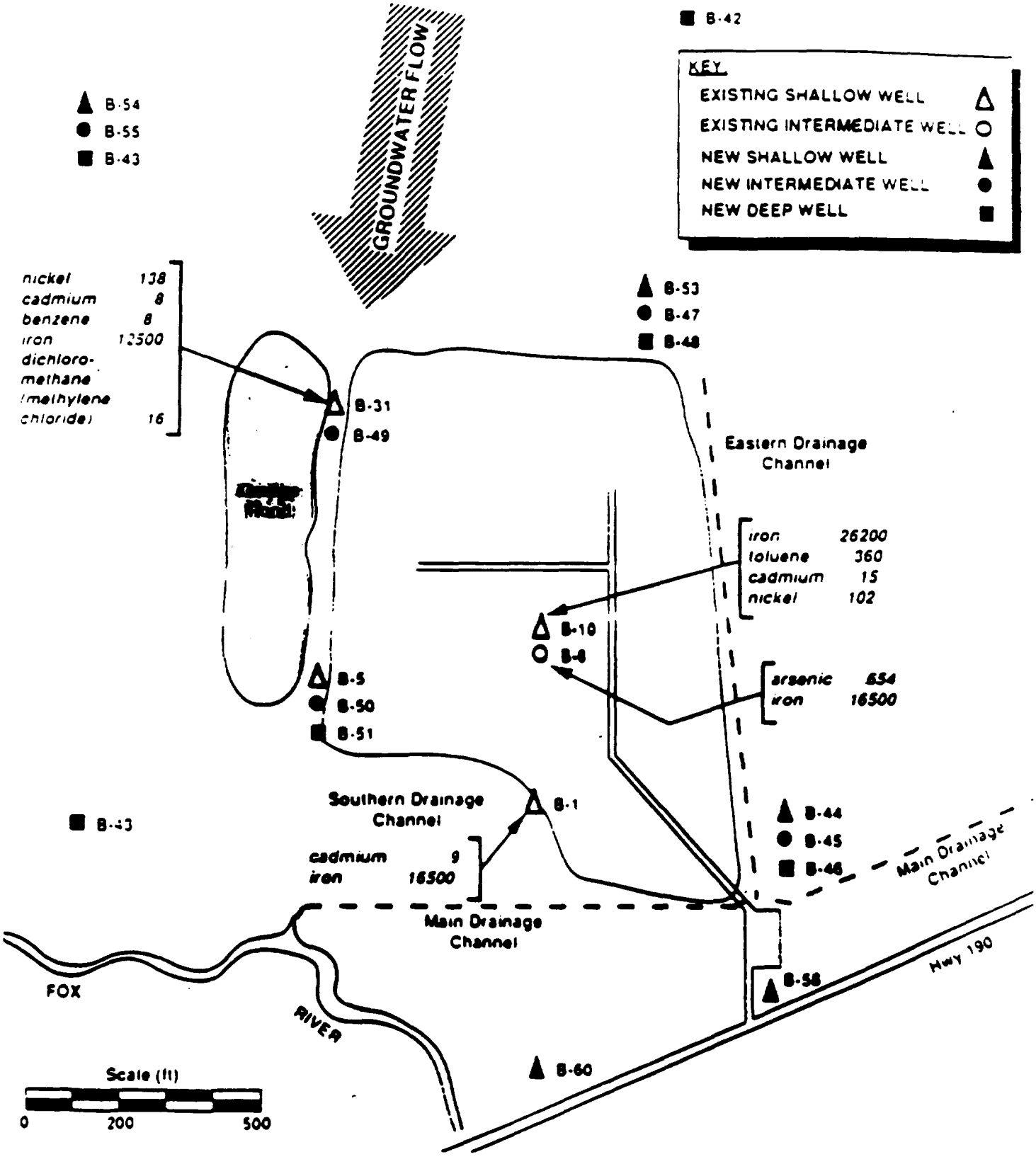


FIGURE 5-2

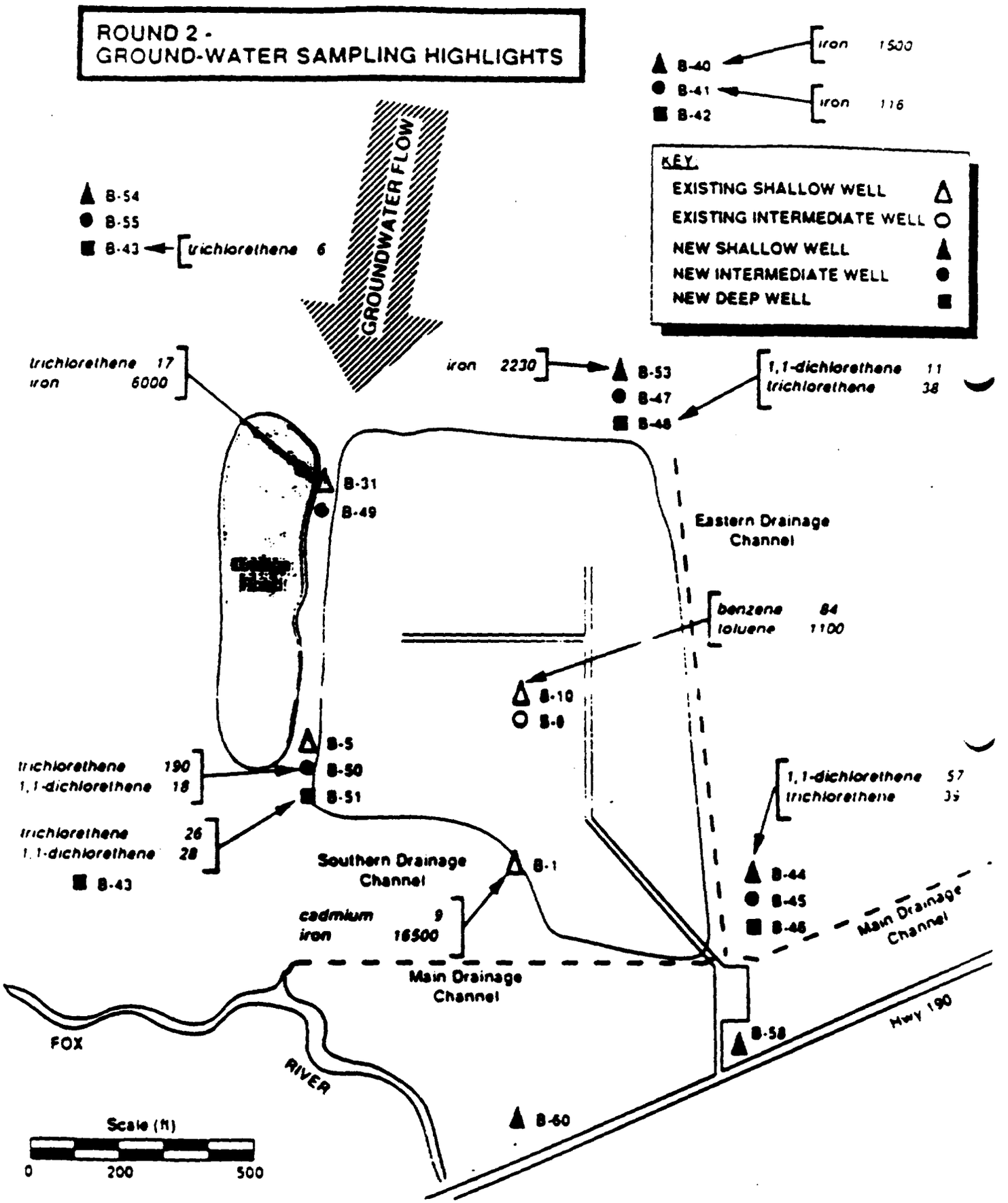
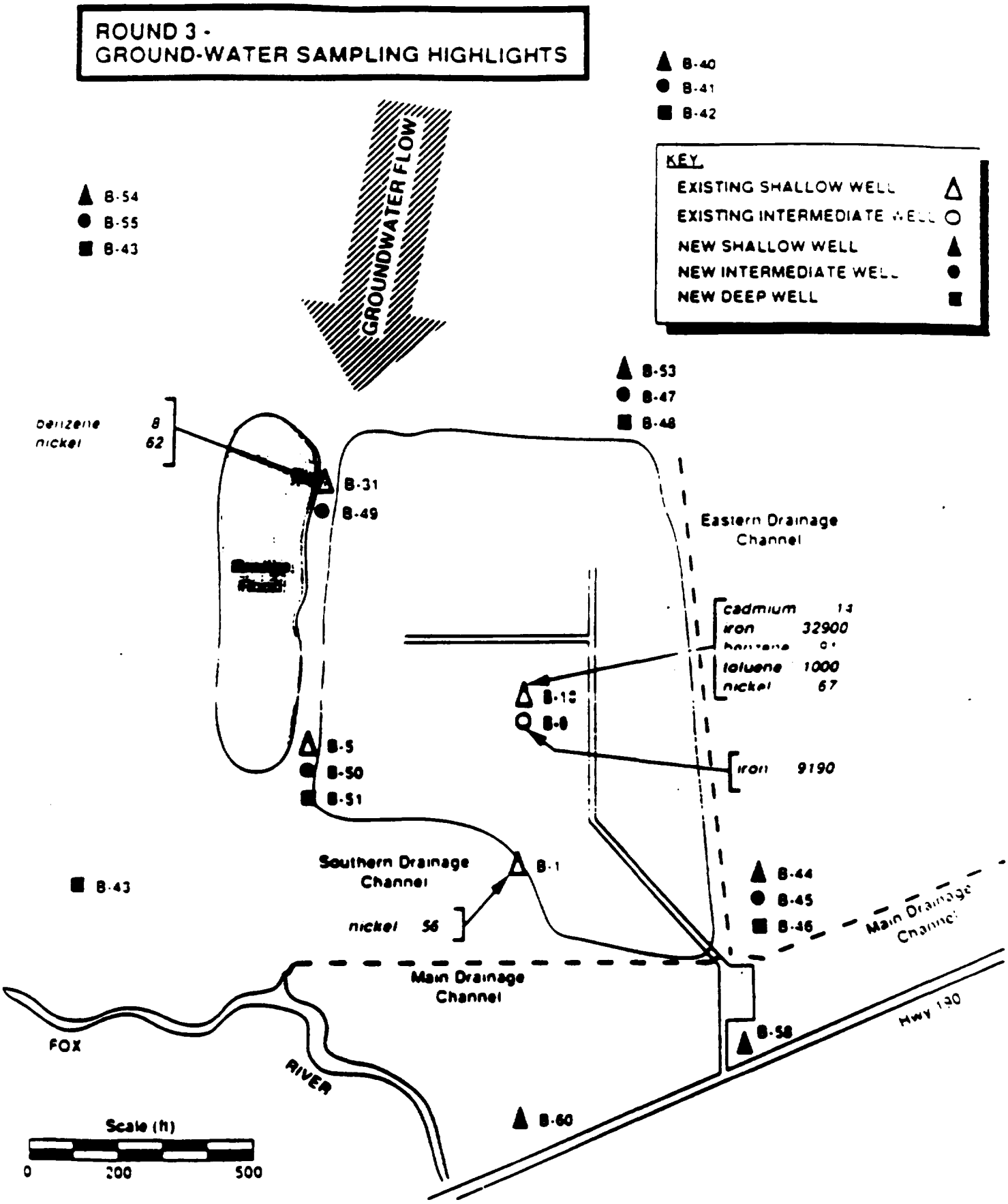

ROUND 2 -
GROUND-WATER SAMPLING HIGHLIGHTS
B-40
B-41
B-42
iron 1500
iron 116
KEY
EXISTING SHALLOW WELL
EXISTING INTERMEDIATE WELL
NEW SHALLOW WELL
NEW INTERMEDIATE WELL
NEW DEEP WELL
GROUNDWATER FLOW
B-54
B-55
B-43
trichlorethene 6
trichlorethene 17
iron 6000
iron 2230
B-53
B-47
B-48
1,1-dichlorethene 11
trichlorethene 38
B-31
B-49
Eastern Drainage Channel
benzene 84
toluene 1100
B-10
B-9
B-5
B-50
B-51
trichlorethene 190
1,1-dichlorethene 18
trichlorethene 26
1,1-dichlorethene 28
B-43
1,1-dichlorethene 57
trichlorethene 35
Southern Drainage Channel
B-1
cadmium 9
iron 16500
B-44
B-45
B-46
Main Drainage Channel
Main Drainage Channel
FOX
RIVER
B-58
Hwy 190
B-60
Scale (ft)
0
200
500

FIGURE 5-3


ROUND 3 -
GROUND-WATER SAMPLING HIGHLIGHTS
B-40
B-41
B-42
KEY
EXISTING SHALLOW WELL
EXISTING INTERMEDIATE WELL
NEW SHALLOW WELL
NEW INTERMEDIATE WELL
NEW DEEP WELL
GROUNDWATER FLOW
B-54
B-55
B-43
B-53
B-47
B-48
benzene 8
nickel 62
B-31
B-49
Eastern Drainage Channel
cadmium 14
iron 32900
benzene 0.
toluene 1000
nickel 67
B-10
B-9
iron 9190
B-5
B-50
B-51
Southern Drainage Channel
B-1
nickel 56
B-43
B-44
B-45
B-46
Main Drainage Channel
Main Drainage Channel
B-58
Hwy 130
FOX
RIVER
B-60
Scale (ft)
0
200
500

5.2 Surface Water

During the RI, sampling of the Fox River, dredge pond and drainage channels surrounding the landfill was conducted to determine whether contamination had occurred as a result of site activities. Two rounds of surface water samples were collected. On comparing upstream river and drainage channel results to downstream locations, it is clear that the site has had a demonstrable and detrimental effect upon surface water quality. For example, at the upstream Fox River sampling point, iron levels were 624 and 597 ug/l for the first and second rounds of sampling, respectively. At a downstream Fox station, located just after the confluence with the main drainage channel, iron levels had increased to 842 and 971 ug/l, from the first to second rounds of sampling, respectively. East, or upgradient of the site, the main drainage channel showed iron concentrations of 633 and 700 ug/l, respectively. At a point in the main drainage channel just prior to entry into the Fox River, iron levels had increased to 1,900 and 3,090 ug/l, respectively. Additionally, at this same point, a cadmium level of 44 ug/l was detected. Cadmium was not detected at any upstream point. The detected levels of cadmium exceed federal and state ambient water quality criteria.

5.3 Conclusion

With regard to the contaminants and figures noted above, carcinogenic substances encountered in the groundwater or surface water at the MDSL site include but are not limited to, benzene, arsenic, 1,1-dichloroethene and trichloroethene. The RI describes groundwater movement as being generally to the south-southwest, and notes that there are residential well users located approximately 1 to 2 miles away in that direction. Furthermore, compounds such as 1,1-dichloroethene and trichloroethene are heavier than water and may in time extend their vertical migration further into the dolomite aquifer.

6.0 SUMMARY OF SITE RISKS

As part of the RI, a baseline risk assessment was initiated to determine whether the contaminants of concern identified at the site pose a current or potential risk to human health and the environment in the absence of any remedial action. It provides information used in determining whether remedial action is necessary and is one justification for performing remedial actions. The Superfund baseline risk assessment process may be viewed as consisting of an exposure assessment component and a toxicity assessment component,

the results of which are combined to develop an overall characterization of risk. As indicated above, these assessments are site specific and therefore may vary in the extent to which qualitative and quantitative analysis are utilized.

The risk assessment concluded that the site presently poses a risk to human health through ingestion of contaminated groundwater and, if untreated, the contaminated groundwater would continue to pose future risks. The risk assessment considered both soil ingestion and dermal contact pathways as regards to adult populations, but did not take into account the use of the site by children, as the site is partially fenced. However, it should be noted that dirt bike tracks were found at the site during subsequent site visits, indicating that children may have access to the site.

6.1 Introduction

Water, soil and sediment samples were analyzed for chemicals on the U.S. EPA Target Compound List (TCL) and Target Analyte List (TAL). As discussed in the RI Report, the risk assessment process allows for the massive list of compounds detected at the MDSL site to be pared down to a more manageable list of chemicals of concern. The inclusion of each chemical of concern was based on its relative concentration, frequency of detection, and toxic effects, as well as whether an environmental standard or criteria (such as federal drinking-water standard) exists for the chemical. Compounds found in the upstream or upgradient samples in the same frequency and magnitude, or greater, as the downstream or downgradient samples were eliminated from this assessment. Inclusion of a compound on the list of chemicals of concern indicates that remedial controls that may be applied to a site should mitigate exposure to the compound in groundwater, soil, surface water and sediments.

The chemicals of concern are classified as non-carcinogens, or as potential or known human carcinogens (cancer-causing agents). Acute (short-term at high concentrations) or chronic (long-term at low concentrations) exposure to each of the chemicals of concern leads to various toxic effects. The following chemicals of concern were selected for the MDSL site (using the Superfund Public Health Evaluation Manual (SPHEM; U.S. EPA 1986a):

CHEMICALS OF CONCERN

Inorganic	Organic
Arsenic	Methylene Chloride
Cadmium	1,1-Dichloroethene
Chromium	Trichloroethene
Copper	Benzene
Lead	Toluene
	Xylene

All of the above noted chemicals were found in groundwater and/or surface water at the site.

6.2 Exposure Assessment

The primary exposure pathways of concern evaluated for the MDSL exposure assessment are incidental ingestion of contaminated surface water, ingestion of contaminated fish, and groundwater ingestion. Dermal contact with soils was also considered in this assessment.

The potentially exposed populations include adult and child groundwater users (via drinking water), fishermen and other consumers of potentially contaminated fish, and recreational surface water users who may incidentally ingest water.

The risk assessment made the following assumptions concerning duration and frequency of exposure, and concentrations of pollutants (no direct contact with the waste mass was assumed):

For adult carcinogenic risk associated with ingesting groundwater:
365 days/year frequency
25 years duration
2 liters/day

For recreational users of surface water:
10 instances of exposure per year

The maximum concentrations and the geometric means were calculated for the chemicals of concern. For worst case calculations, the maximum concentrations of a compound detected were assumed to equal the exposure concentration. For most probable cases of exposure, the geometric mean concentration of a pollutant was utilized.

The ingestion quantity of fish was estimated at 6.5 g/day both for an adult and child. The fraction of the fish diet obtained from the immediate vicinity of the landfill was estimated at 20%.

6.3 Toxicity Assessment

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

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

Table 4-5 presents the summary of the toxicity values for ingestion for the chemicals of concern.

U.S. EPA weight-of-evidence classification for carcinogens are as follows:

Group A - Human Carcinogen (sufficient evidence of carcinogenicity in humans).

Group B - Probable Human Carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans).
Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data).
Group D - Not Classifiable as to Human Carcinogenicity (inadequate or no evidence).
Group E - Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in adequate studies).

6.4 Summary of Risk Characterization

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1 X 10-6 means that an individual has an additional one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site).

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The reasonable worst case hazard index was calculated as part of the Risk Assessment and was calculated to be 1.2 for adults, based primarily on the contributions from lead, toluene and 1,1-dichloroethene. A hazard index of greater than one indicates an unacceptable risk. The worst case hazard index calculated for children at the MDSL site was 4.0. (See assessment tables 5-2 and 5-3 as presented here).

The sum of the carcinogenic risks for adults and children were calculated to be 4 X 10-4 and 1 X 10-3 respectively. The NCP established acceptable levels of risk for Superfund sites at between one in 10,000 and one in one million excess cancer cases. This translates to a risk range of between 1 X 10-4 and 1 X 10-6. Site specific factors will be used to determine the level of risk acceptable at a particular site. The risk levels at the Master Disposal site exceed

TABLE 4

[illegible] ALLOCATION COMPS

	ARS (1)	AIC (2) (Regular)	PF (3)	EPA WEIGHT OF EVIDENCE
[illegible]	[illegible]	[illegible]	[illegible] 5 E-3	B 2
[illegible]	[illegible]	[illegible]	6 E 1	C
[illegible]	[illegible]	[illegible]	Not Given	B 2
[illegible]	Not Given	Not Given	2 9 E-2	A
[illegible]	4 E-1	3 E-1	Not Given	D
[illegible]	4 E-0	2 E-0	Not Given	D
[illegible]	1 E-3	1 E-3	Not Given	A
[illegible]UM	Not Given	1 E-3 (Food) 5 E-4 (Water)	N/A	N/A
[illegible]MIUM	1 E-1 (Trivalent) 2 E-2 (Hexavalent)	1 E-0 (Trivalent) 5 E-3 (Hexavalent)	N/A	N/A
[illegible]N	** Not Given	** Not Given	Not Given	D
[illegible]	Not Given	Not Given	Not Given	B2

ARS = Allowable Intake - Subchronic
AIC = Allowable Intake - Chronic
PF = Carcinogenic Potency Factor

(1) Toxicity values, i.e., ARS, AIC and PF, obtained from the 1986 Superfund Public Health Evaluation Manual and 1987 U.S. EPA Memorandum (Interim Reference Dose and Cancer Potency Numbers for Use in Risk Assessments).

* [illegible] withdrawn in July 1989

** [illegible] concluded toxicity data were inadequate [illegible]

TABLE 5-2
[illegible] CHARACTERIZATION (1) FOR INGESTION
OF GROUNDWATER: NON-CARCINOGENIC EFFECTS

[illegible]	[illegible] Worst Case (mg/kg/day)	[illegible] Probable Case (DI) (mg/kg/day)	[illegible] (2)	HAZARD INDEX WORST CASE	HAZARD INDEX MOST PROBABLE CASE
[illegible]	[illegible]	[illegible]	6.1E-02	7.7E-03	8.2E-04
[illegible]	[illegible]	9.0E-05	9.E-01	1.9E-01	1.0E-02
[illegible]	[illegible]	7.0E-05	Not Given	(3)	(3)
[illegible]	[illegible]	5.5E-05	Not Given	(3)	(3)
[illegible]	[illegible]	8.4E-05	3.E-01	1.1E-01	2.0E-04
[illegible]	[illegible]	7.5E-05	2.E+00	5.5E-01	1.8E-05
[illegible]	[illegible]	9.6E-05	5.E-04	8.0E-01	1.9E-01
[illegible]	[illegible]	5.2E-05	Not Given	(3)	(3)

Sum of His - Worst Case = 1.2E+0

Sum of His - Most Probable Case - 2.0E-1

[illegible] to Table 5-5 for Exposure Doses
[illegible] Characterization for non-carcinogens is presented as a Hazard Index which is the ratio of the estimated exposure dose to acceptable dose.
Acceptable Dose = Allowable Intake - Chronic (AIC) as presented in Table 5-1
(3) Hazard Index cannot be calculated since an acceptable dose has not been established.

TABLE 5.1
CHILD RISK CHARACTERIZATION (1) FOR INGESTION
OF GROUNDWATER - NONCARCINOGENIC EFFECTS

[illegible]	Chronic Daily Intake (CDI) (mg/kg/day)	Reference Dose (RfD) (mg/kg/day)	ACCEPTABLE RISK (2)	HAZARD INDEX (1) WORST CASE	HAZARD INDEX (1) MOST PROBABLE CASE
[illegible]	[illegible]	1.[illegible]E-03	6.[illegible]E-02	2.7E-02	2.0E-01
[illegible]	5.7E-01	3.[illegible]E-04	9.[illegible]E-01	6.3E-01	3.4E-02
[illegible]	1.9E-02	2.[illegible]E-04	Not Given	(3)	(3)
[illegible]	9.1E-01	1.[illegible]E-04	Not Given	(3)	(3)
[illegible]	1.1E-01	2.9E-04	3.[illegible]E-01	3.7E-01	9.7E-04
[illegible]	3.7E-02	2.6E-04	2.E+00	1.9E-02	1.3E-04
[illegible]	1.5E-01	3.1E-04	5.[illegible]E-04	3.0E+00	6.6E-01
[illegible]	9.4E-04	1.8E-04	Not Given	(3)	(3)

Sum of HIs - Worst Case = 4.0E+0

Sum of HIs - Most Probable Case = 7.0E-1

Notes: to Table 3.6 for Exposure Doses
(1) Risk Characterization for noncarcinogens is presented as a Hazard Index which is the ratio of the estimated exposure dose to acceptable dose.
(2) Acceptable Dose - Allowable Intake - Chronic (AIC) as presented in Table 5.1
(3) Hazard Index cannot be calculated since an acceptable dose has not been established.

TABLE 5-4
ESTIMATED ADULT INCREMENTAL CARCINOGENIC RISK (1) ASSOCIATED
WITH INGESTING CONTAMINATED GROUNDWATER

[illegible]	Frequency (2)	Worst Case CDI (mg/kg/day)	Most Probable Case CDI (mg/kg/day)	Carcinogenic Potency Factor (mg/kg/day)-1	Worst Case Incremental Risk	Most Probable Case Incremental Risk
[illegible]	0.36	4.6E-[illegible]	4.9E-05	7.5E-03	1E-06	1E-07
[illegible]	0.36	1.7E-[illegible]	9.0E-05	6E-01	4E-04	2E-05
[illegible]	0.36	5.5E-[illegible]	7.0E-05	Not Given	(3)	(3)
[illegible]	0.36	2.6E-[illegible]	5.5E-05	2.9E-02	3E-05	6E-07
[illegible]	0.36	2.7E-[illegible]	5.2E-05	Not Given	(3)	(3)
		Sum of Incremental Risk - Worst Case -			4E-4	
		Sum of Incremental Risk - Most Probable Case			2E-5	

(1) See Table 5-5 for exposure doses.

Incremental Carcinogenic Risk = Estimated Lifetime Dose (CDI x Frequency) x Carcinogenic Potency Factor

(2) Frequency = Estimated Frequency (365 days/year x 25 years / 70 year lifetime)

(3) Total Risk [illegible] Carcinogenic Potency Factor is not established

TABLE 5-5
ESTIMATED CHILD INCREMENTAL CARCINOGENIC RISK (1) ASSOCIATED
WITH INGESTING CONTAMINATED GROUNDWATER

[illegible]	Frequency	Worst Case CDI (mg/kg/day)	Most Probable Case CDI (mg/kg/day)	Carcinogenic Potency Factor (mg/kg/day)-1	Worst Case Incremental Risk	Most Probable Case Incremental Risk
[illegible] CHLORIDE	0.36	1.6E-1	1.7E-4	7.5E-03	4E-6	5E-7
[illegible]	0.36	5.7E-1	1.3E-4	6E-01	1E-3	8E-5
[illegible]	0.36	1.9E-2	2.7E-4	Not Given	(3)	(3)
[illegible]	0.36	9.1E-3	1.9E-4	2.9E-02	1E-4	2E-6
[illegible]	0.36	9.4E-4	1.0E-4	Not Given	(3)	(3)
		Sum of Incremental Risk - Worst Case -			1E-3	
		Sum of Incremental Risk - Most Probable Case			7E-5	

(1) [illegible] for exposure [illegible]

(2) Incremental Carcinogenic Risk = Estimated Lifetime Dose (CDI x Frequency) x Carcinogenic Potency Factor

(3) Frequency = Estimated Exposure (36 days/year x 25 years/70 year lifetime)

(4) [illegible] carcinogenic potency factor [illegible] metabolites

this range and, therefore, require that remedial action be taken. (See assessment tables 5-4 and 5-5 as presented here).

CALCULATED RISKS AT THE MDSL SITE

	Adults	Children
HAZARD INDEX (HI) (Noncarcinogenic)	1.2	4.0
CARCINOGENIC	4 X 10-4	1 X 10-3

NOTE: HI greater than 1 indicates an unacceptable risk. Carcinogenic risk greater or equal to 1 X 10-4 exceeds the NCP upper range.

6.6 Potential Future Risks

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

6.7 Uncertainties

There are a number of uncertainties existing at the site with respect to the extent of contamination such as the lack of assessment information on contact with the waste mass and dermal contact risk involving children. Additional data may be gathered for the final operable unit that addresses the wetlands, surface water and groundwater pathways.

7.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The U.S. EPA has reviewed and responded to all relevant comments received from the interested parties, including those from the State and community, during the public comment period. Comments were made on the selected alternatives as well as other remedial alternatives. Based on the public comments, the U.S. EPA has determined that there is no need for any significant changes to Waste Mass Alternative 3 and Groundwater Alternative 3.

In the event that additional data or information during the design of the remedy reveals the need for a modification, the U.S. EPA will notify the public of any changes to the remedy presented here in this Record of Decision in

accordance with applicable law, the NCP and U.S. EPA guidance.

8.0 DESCRIPTION OF ALTERNATIVES

The Feasibility Study developed two sets of remediation alternatives that were subject to "detailed analysis." Four alternatives were developed to address contaminated groundwater, and five alternatives addressed the landfill itself (referred to as "waste mass").

As noted above, groundwater will be dealt with in two operable units or distinct actions. This ROD addresses the first groundwater operable unit, which is an interim action for source control. It is expected that the remedy for the waste mass in conjunction with source control efforts will be a final remedy. The alternatives for the MDSL site are presented below. To the greatest degree possible, the interim groundwater action will be consistent with the final remedy.

8.1 Waste Mass Alternatives

8.1.1 Waste Mass Alternative 1 (WM1) - No Action

The National Contingency Plan (NCP) requires that a No Action Alternative be evaluated for every site as a baseline of comparison for the other alternatives. Under this alternative, nothing would be done at the site regarding the waste mass. The site would continue to exist in its present condition.

Time to Implement:	None
Capital Cost:	$0.0
Annual O & M Cost:	$0.0
Total Present Worth Cost:	$0.0

8.1.2 Waste Mass Alternative 2 (WM2) - Monitoring/Maintenance

This alternative would consist of limiting access to the site, routine inspection and maintenance of the existing cover, consisting of native soils, and implementing institutional controls (deed restrictions).

Monitoring during this alternative would include inspections of the landfill cover and security systems, and sampling of existing wells. The need for the installation of additional monitoring wells would be determined during the remedial design, and be installed as necessary. Deed restrictions

would alert future land owners of the presence of hazardous substances, and the prohibition of excavation into the waste mass. This alternative would only be chosen if active response measures are not practicable, as specified in the NCP.

Time of Implement:	2 months
Capital Cost:	$107,500
Annual O & M Cost:	$ 42,130
Total Present Worth Cost:	$505,000

8.1.3 Waste Mass Alternative 3 (WM3) - Capping

This alternative provides for the covering of the waste mass with a clay/soil cap. Capping will reduce the potential migration of contaminants into the groundwater, prevent direct contact with the waste mass, and reduce potential impact to surface water bodies from storm-water/precipitation run off. The cover system would be designed to meet State of Wisconsin specifications per the Wisconsin Administrative Code, NR 504.07 and NR 506.08. This cap will consist of a grading layer, a minimum of two feet of compacted clay, a 1-1/2 to 2-1/2 foot frost protection layer, and a minimum of 6 inches of cover topsoil. Dust production during construction of the cap will be minimized. The cap construction will be conducted to minimize wetlands impacts. Wetlands adversely impacted by the remedy will be repaired or mitigated. In addition, an active gas extraction system will be installed as a part of the cap system (see figure 8-1).

After installation of the cap, the area would be fenced, signs erected and a long-term monitoring program initiated. Deed restrictions would be required to prevent future construction on the property. Monitoring and maintenance would be the same as in Alternative WM2.

Time to Implement:	6 months
Capital Cost:	$3,495,000
Annual O & M Cost:	$ 54,130
Total Present Worth Cost:	$3,608,000

8.1.4 Waste Mass Alternative 4 (WM4) - In-Situ Vitrification

This alternative would vitrify the entire waste mass through the use of a high intensity electrical current. Heat from the electric current would melt the soil and decompose organic materials. During the process, metallic and other inorganics would dissolve into or are encapsulated in the vitrified mass. Gasses evolved from the melt would be

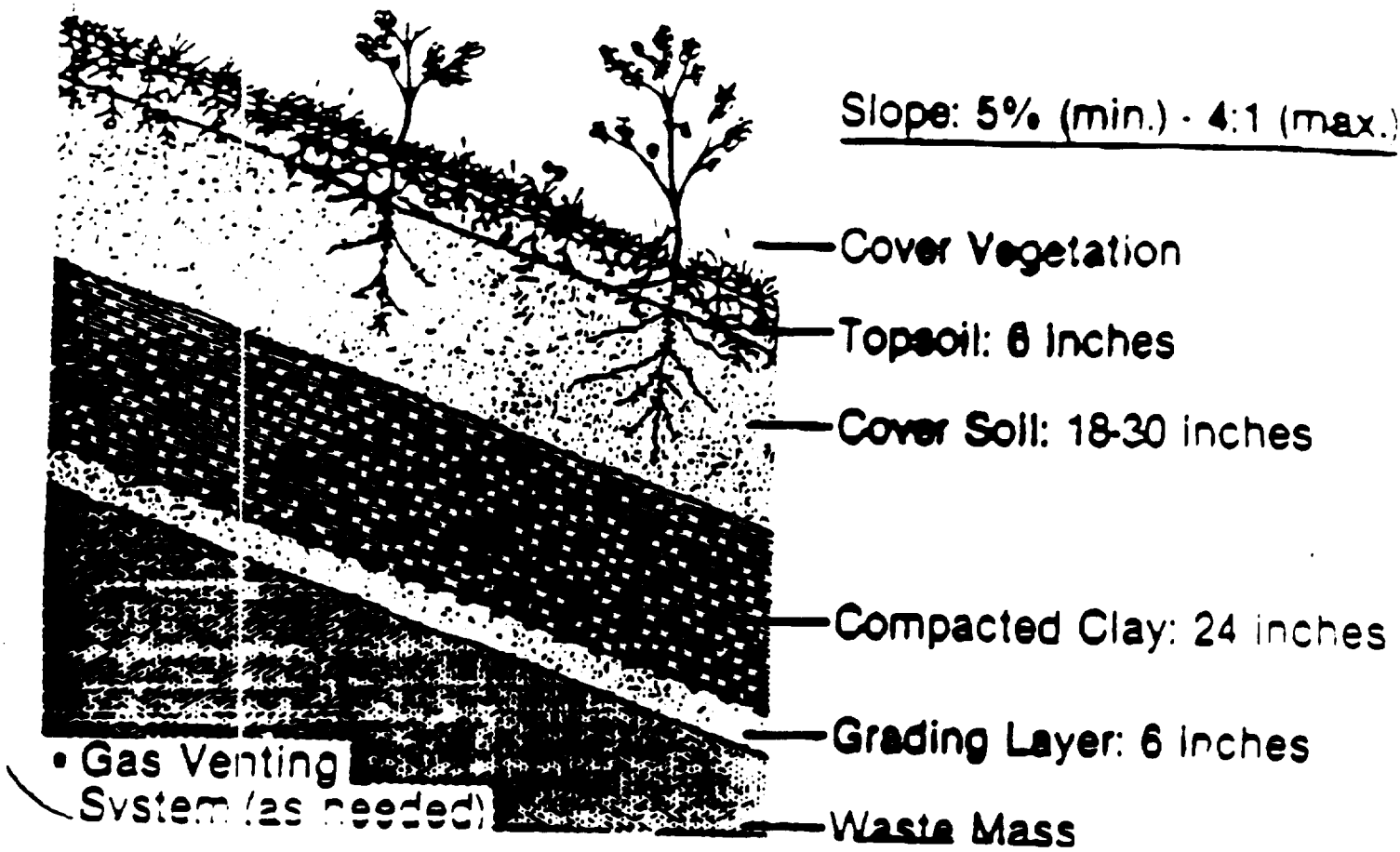

Slope: 5% (min.) - 4:1 (max.)
Cover Vegetation
Topsoil: 6 inches
Cover Soil: 18-30 inches
Compacted Clay: 24 inches
Grading Layer: 6 inches
Waste Mass
• Gas Venting
System (as needed)

FIGURE 8-1

recovered by an off-gas collection system placed over the area. These off gasses would then be routed through a scrubber system for treatment. Scrubber effluent would then require treatment to meet state emission standards prior to discharge. To the degree possible, such treatment could be accomplished as outlined herein for alternatives GW3 and GW4. When the electric current ceases, the molten mass cools and solidifies into a glass-like material that will permanently retain its physical and chemical integrity.

Approximately 5 tons per hour would be expected on the average to be vitrified. Generally, operations are conducted 24-hours per day, seven days per week utilizing four crews. Normally, on a large scale job, an area selected for vitrification is processed (vitrified) for four days then the equipment is moved to a different location on the site (requiring about 16 hours) and operations re-initiated. Given the size of the site (26 acres), and based on the mobilization rate, it would take well over 20 years to complete the vitrification. Once the vitrified mass cools, the area would be backfilled.

Following vitrification, contaminant mobility would be sharply curtailed, thereby reducing risk associated with the MDSL site.

Time to Implement:	22+ years
Capital Cost:	$255,510,000
Annual O & M Cost:	$ 0
Total Present Worth Cost:	$255,510,000

8.1.5 Waste Mass Alternative 5 (WM5) - Complete Removal with Disposal at Off-Site Landfill

This alternative provides for the complete excavation of the waste mass and transportation to an approved facility for disposal. Disposal would have to be in accordance with applicable state and federal regulations.

During operations, worker dermal and respiratory protection equipment would be required. Special dust suppression measures would have to be implemented to reduce the potential for off-site migration of contaminated particulate. The estimated 668,000 cubic yards of waste would be excavated and loaded using conventional excavation equipment (i.e. dozers, backhoes and front-end loaders).

Due to the volume of material to be disposed of, the bulk solid waste would have to be disposed of at a number of different landfills. Landfill capacity would be a major

concern in this alternative. If 60 loads were dispatched per day, approximately 760 work days would be required to complete the excavation.

To sustain a removal rate of 60 loads per day, approximately 180 trucks need to be in the load-transport-unload cycle.

Alternative WM5 invc ves "clean closure" of the site by completely excavating wastes and landfilling them off-site. Major environmental requirements with which this alternative would have to comply include the Resource Conservation and Recovery Act (RCRA), and State of Wisconsin regulations governing solid waste handling and transport.

The U.S. EPA does not believe that Land Disposal Restrictions (LDRs) are an ARAR for this site, because the contaminants present do not appear to be among those so restricted. However, no toxicity tests were conducted on the waste. If this alternative were chosen, however, the wastes would be tested by the toxic contaminant leachate procedure (TCLP) to determine if the wastes are hazardous. Cost calculations assumed non-hazardous wastes.

Time to Implement:	3 years
Capital Cost:	$142,816,320
Annual O & M Cost:	$ 0
Total Present Worth Cost:	$142,816,320

8.2 Groundwater Alternatives

As an interim action for groundwater, and a component of the source control operable unit, the remedial goal for the groundwater remedy in this ROD is to contain known contaminated groundwater in the surficial aquifer. Information derived from this operable unit concerning the effects of a groundwater extraction system on the surrounding wetlands and the hydrogeology of the site will aid in the selection of remedy for the final groundwater operable unit. U.S. EPA could expect, through pumping tests and evaluation of containment achieved by extraction wells to learn more about aquifer response. This information can then be utilized to evaluate the need for other extraction components, wetlands mitigation measures, and whether extraction measures should be augmented.

8.2.1. Groundwater Alternative 1 (GW1) - No Action

The NCP requires that a No Action Alternative be evaluated for every site as a baseline of comparison for the other

alternatives. Under this alternative no work would be done at the site regarding the waste mass or the groundwater. The site would continue to exist in its present condition. Risks posed as noted earlier in this document would be unabated.

Time to Implement:	None
Capital Cost:	$0.0
Annual O & M Cost:	$0.0
Total Present Worth Cost:	$0.0

8.2.2 Groundwater Alternative 2 (GW2) - Monitoring/Maintenance

This alternative would consist of long-term for at least 30 years groundwater monitoring and deed restrictions over the area of the contaminant plume to prevent use as a drinking water source.

Monitoring during this alternative would include such sampling as a network of existing and potential new monitoring wells, surface water, and wetlands. The need for the installation of additional monitoring wells would be determined during the remedial design. Deed restrictions would alert future land owners of the presence of hazardous substances and the prohibition of installation of residential wells into the contaminated groundwater plume. However, compliance with such restrictions cannot be assured. Risks posed as noted earlier in this document would be unabated. Pertinent regulations to be attained by this alternative include federal/state regulations on proper landfill post-closure monitoring.

Time to Implement:	2 months
Capital Cost:	$107,500
Annual O & M Cost:	$ 42,130
Total Present Worth Cost:	$505,000

8.2.3 Groundwater Alternative 3 (GW3) - Groundwater Extraction Well Systems

This alternative consists of a groundwater extraction and treatment system for the purpose of plume containment, as part of source control with discharge of treated groundwater to the Fox River. Within this alternative, the following four treatment technologies will be discussed:

- Air Stripping
- Carbon Adsorption
- Ion-Exchange
- Chemical Treatment

Treatability studies during the remedial design will determine the appropriate technology or combination of technologies for groundwater treatment. The technology selected must comply with discharge limits as well as Best Developed Available Technology (BDAT) for this type of discharge. Attachment A indicates the effluent limitations that the system must meet for surface water discharge based on NR 102, NR 105, NR 106 and NR 207 of the Wisconsin Administrative Code.

The extraction system itself will be designed to pump groundwater hydraulically downgradient of the waste mass and upgradient of the Fox River to prevent discharge of the contaminant plume into the wetlands and river. The number of extraction wells, location, depths and average extraction rates will be determined during the remedial design stage. The pump system will be designed to contain contaminated groundwater emanating from the site while not having a negative impact on the wetlands. If wetland impacts occur, mitigation of wetlands will be necessary.

In addition to the groundwater extraction and treatment system, this alternative would include continuous extensive groundwater monitoring, temporary deed restrictions over the area of the contaminant plume, assessment of the effects of the interim remedy on the surrounding wetlands, and long-term operation and maintenance of the extraction system.

The presence of 1,1-dichloroethene and trichloroethene, because of their ability to sink, may pose a long-term challenge to cleaning up the aquifer. The second operable unit will address potential problems associated with aquifer clean up. U.S. EPA estimates that 1 to 2 years of operation of this alternative would generate sufficient information in order to reach a decision on components of a final operable unit regarding groundwater and impact to wetlands.

Costs for each of the technologies have been estimated. The following is a discussion of each of the groundwater treatment technologies with their respective costs.

8.2.3.1 Groundwater Collection with On-Site Air Stripping Followed by Discharge

Following recovery, the groundwater would be pumped through a filter system to remove suspended particulates that could

cause operational problems and decrease system efficiencies (unserviceable filter elements or backwash from cleaning filters must be collected and properly disposed of). Effluent from the filter system would be injected at the top of a packed air stripper column. Treated effluent in compliance with state NPDES requirements, would pass through an effluent monitoring station and then be piped to an outfall at a drainage channel adjacent to the site.

Monitoring would be performed at the outset of operations to define effluent variability and to assure compliance with required limits. An air quality risk assessment may be required as part of this alternative.

If volatile air emissions exceed standards, emission controls will be required to be in compliance with NR 445 Wisconsin Administrative Code. Any additional requirements necessary as part of Chapter 144.391 and 144.393 pertaining to non-attainment areas would also need to be met. In addition, the substantive requirements of a Wisconsin Pollutant Discharge Effluent Standards (WPDES) permit would have to be met prior to discharging the effluent to the drainage channel. Operation and maintenance costs are projected over a thirty year period.

Time to Implement:	1 year
Capital Cost:	$ 183,300
Annual O&M Cost:	$ 88,600
Total Present Worth Cost:	$1,024,000

8.2.3.2 <u>Groundwater Collection with On-Site Carbon Adsorption Followed by Discharge</u>

Following recovery, the groundwater would be pumped through a filter system to remove suspended particulates that could cause operational problems (e.g., plugging of the carbon bed). (Note: Plugged filter elements or backwash from cleaning filters must be collected and properly disposed of). Effluent from the filtration unit would flow to carbon adsorption units (one to serve as a spare during carbon replacement). Treated effluent would be discharged to the drainage channel adjacent to the site.

The substantive requirements of a WPDES permit would have to be met prior to discharging the effluent to the drainage channel. Effluent monitoring/analysis would be needed.

Time to Implement:	1 year
Capital Cost:	$ 195,000
Annual O&M Cost:	$ 91,400
Total Present Worth Cost:	$1,063,000

8.2.3.3 Groundwater Collection with On-Site Ion-Exchange Treatment Followed by Discharge

This system would be identical to the air stripping or carbon adsorption system except that in lieu of the stripper or carbon adsorption unit a fixed-bed, counter-current ion exchange unit would be utilized.

As with the other systems, the treated effluent would be discharged to the drainage channel adjacent to the site. Prior to discharge, the substantive requirements of a WPDES permit would have to be met.

When exhausted, the resin would be regenerated by backwashing. The backwash would be stored for off-site disposal.

Time to Implement:	1 year
Capital Cost:	$ 293,800
Annual O&M Cost:	$ 110,000
Total Present Worth Cost:	$1,337,000

8.2.3.4 Groundwater Collection with On-Site Chemical Treatment Followed by Discharge

Recovered groundwater would be pumped to a pH adjustment tank where lime would be added to raise the pH. From this tank the liquid would flow to a mixing tank where flocculating polymers would be added and mixed. The liquid would then be pumped to a sedimentation tank where the flocculated solids would settle out and be removed for disposal at an off-site facility. The treated effluent would flow to a tank for final pH adjustment prior to release to the drainage channel adjacent to the site.

Since this system would be effective only for inorganic compounds, it would have to be integrated with other treatment systems to address organic contaminants. The substantive requirements of a WPDES discharge permit must be met prior to initiation of treatment.

Time to Implement:	1 year
Capital Cost:	$ 430,300
Annual O&M Cost:	$ 103,070
Total Present Worth Cost:	$1,408,000

8.2.4 Groundwater Alternative 4 (GW4) - Groundwater Collection with Barrier

This alternative would involve the design and implementation of a groundwater extraction system with a barrier system 4,076 feet long installed around the perimeter of the landfill. This barrier system would be anchored to a soil layer approximately 40 feet below the ground's surface or to the dolomite bedrock layer. This barrier would be either a slurry wall, composed of a mixture of low-permeable clay and soil, or would be made of other material. The barrier would prevent uncontaminated ground water from moving through and from the landfill and becoming contaminated. The contaminated groundwater within the barrier would be extracted and treated. The projected cost for this alternative would be up to $1.8 million, in addition to the cost of well installation and treatment, described above.

Time to Implement:	1 year
Capital Cost (barrier only):	$1,983,112
Annual O&M Cost (barrier only):	$ 88,000
Total Present Worth Cost: (barrier + GW treatment)	$3,100,000

9.0. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The alternatives are evaluated against the nine criteria recommended by U.S. EPA (U.S. EPA, 1987). The criteria are as follows:

1) Overall protection of human health and the environment addresses whether or not an alternative provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment and engineering or institutional controls.

2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) addresses whether or not an alternative will meet all of the applicable or relevant and appropriate requirements or provide grounds for invoking a waiver.

3) Long-term Effectiveness and Permanence refers to the ability of an alternative to maintain reliable protection of human health and the environment, over time, once cleanup objectives have been met.

4) Reduction of Toxicity, Mobility, or Volume is the anticipated performance of the treatment technologies an alternative may employ.

5) Short-term Effectiveness involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup objectives are achieved.

6) Implementability is the technical and administrative feasibility of an alternative, including the availability of goods and services needed to implement the solution.

7) Cost includes capital costs, as well as operation and maintenance costs.

8) State Acceptance indicates whether, based on its review of the RI/FS and Proposed Plan, WDNR agrees on the preferred alternative.

9) Community Acceptance indicates the public support of a given alternative. This criteria is discussed in the Responsiveness Summary.

9.1 Overall Protection of Human Health and the Environment

The No Action and Monitoring/Maintenance alternatives (WM1, WM2, GW1, GW2) are not protective of human health and the environment because they do not eliminate, reduce or control risks through various combinations of treatment and engineering controls and/or institutional controls. Taking no action to address the groundwater would allow unabated, unmonitored movement of contaminants whose ingestion poses an unacceptable risk. The no action alternatives are also unacceptable because the existing site cover is showing signs of disrepair and erosion, which may increase human contact with the contaminants. Further, the alternatives also would not protect the surface water and wetlands from continued deterioration. The monitoring/maintenance alternatives are not protective of human health and the environment. They may reduce the potential for human contact with site contaminants and portions of these alternatives may be a component of other alternatives, they would not stop the deterioration of the landfill cover or halt the movement of the ground-water contamination. As the no action and monitoring/maintenance alternatives do not provide protection of human health and the environment, it is not eligible for selection and shall not be discussed further in this document.

Alternatives WM3, WM4, and WM5 all provide adequate protection of human health and the environment by reducing contaminants moving into the groundwater, and by reducing human contact with the waste mass. Contaminant movement would be reduced by either capping, in-situ vitrification, or excavation and removal of the waste mass.

Alternatives GW3 and GW4 are protective of human health and the environment. They would not necessarily eliminate all releases; however, they would contain such releases. Therefore, these alternatives are considered protective. Both of these alternatives would collect and treat contaminated groundwater to state-established effluent limitations followed by discharge to a surface water body. One of several groundwater treatment methods would be chosen during the remedial design. The treatment methods to be considered include: on-site air stripping; on-site carbon adsorption; on-site ion-exchange; and on-site chemical treatment. Alternative GW4 would utilize a barrier system in conjunction with the recovery system. These 2 alternatives, at present, are not intended to restore groundwater to federal and state standards.

Alternatives WM3, WM4, and WM5 will provide adequate protection of human health and the environment over time. The groundwater alternatives GW3 and GW4 will provide adequate protection particularly with respect to short-term impact.

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

SARA requires that remedial actions meet legally applicable or relevant and appropriate requirements (ARARs) of other environmental laws. These laws may include: the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act (RCRA), and any state law which has stricter requirements than the corresponding federal law.

A "legally applicable" requirement is one which would legally apply to the response action if that action were not taken pursuant to Sections 104, 106 or 122 of CERCLA. A "relevant and appropriate" requirement is one that, while not "applicable," is designed to apply to problems sufficiently similar and that their application is appropriate.

Waste Mass alternatives 3,4, and 5 will comply with all applicable or relevant and appropriate federal and state environmental standards. The ground water interim action

would need to comply with only those action-specific and chemical-specific ARARs associated with the technologies utilized for ground water collection, treatment, discharge, and residuals management. As provided for in EPA's "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites (OSWER Directive No. 9283.1-2; December 1988)," "Clean-up levels for the site typically are not established since interim actions are not final. Thus, an interim ground-water action need not achieve chemical-specific ARARS in groundwater." Therefore no chemical-specific cleanup standards will be established at this time for the existing contaminant plume. The final operable unit for ground water at this site will ensure that the federal clean-up standards or the more stringent State of Wisconsin ground water quality standards established in Chapter 160, Wisconsin Statutes, and Chapter NR 140, WAC will be complied with for the entire site, or justification provided if either the federal or State standards are waived.

9.3. Long-Term Effectiveness and Permanence

The alternatives considered for the MDSL site vary in their ability to provide long-term effectiveness and permanence.

Waste Mass Alternative 4 (WM4) provides the greatest degree of permanence. In-situ vitrification of the waste mass would melt the soil and decompose organic wastes. When the mass cooled, metallic and other inorganic substances would be trapped in the glass-like mass.

Waste Mass Alternative 5 (WM5) would offer a somewhat higher degree of permanence than WM3. WM5 consists of excavation of the entire waste mass and disposal of in three RCRA-permitted facilities, which offer more rigorous protection against infiltration than WM3. The waste mass would be landfilled without treatment. However, off-site disposal of wastes without treatment is defined in SARA as a least preferred alternative.

Alternative WM3 should provide an effective, long-term method for preventing infiltration to or contact with the waste mass if the cover is properly maintained. The clay/soil cap would be constructed in accordance with the Wisconsin Administrative Code, NR 504.07 and NR 506.08. It would consist of a minimum two foot thick clay cap with a minimum 1.5 to 2.5 foot thick frost protection layer and a final soil cover layer for vegetation.

Groundwater Alternatives GW3 and GW4 provide the same amount of protection. Both of these groundwater alternatives consist of a groundwater recovery system followed by treatment of the groundwater to State-

established effluent limitations. Alternative GW4 provides a barrier in conjunction with the groundwater recovery/treatment system, which takes into consideration the long-term impact extraction may have on the river and wetlands.

9.4. Reduction of Toxicity, Mobility, or Volume Through Treatment

The only Waste Mass Alternative that reduces the toxicity, mobility, or volume through treatment is in-situ vitrification (WM4). In-situ vitrification melts the waste mass and solidifies it into a glass-like structure.

The other two Waste Mass Alternatives do not provide treatment of the waste mass and therefore do not meet this criteria. A clay/soil cap is not considered to be treatment, nor is excavation and disposal to an off-site landfill.

Both of the groundwater alternatives are expected to reduce the toxicity and possibly mobility of groundwater contaminants through treatment. Both alternatives consist of a groundwater recovery system in conjunction with treatment to state-established effluent limitations. Neither GW3 nor GW4 would address the full extent of groundwater contamination from this site.

9.5 Short-Term Effectiveness

Alternative WM3 would require approximately 6 months to implement and should effectively prevent contact with contaminants within two months of initiation. There is the potential for site personnel to be exposed through direct contact with materials during initial cleanup activities, although these exposures could be reduced by following standard health and safety and emission control procedures. Alternative WM5 is expected to require at least 3 years to implement, but should result in a fairly rapid removal of exposure pathways to the public, except for the increased opportunity of airborne emissions during excavation and transport. These potential exposures would be reduced by instituting proper health and safety procedures. Exposure from transportation of materials off site also may be a concern. Alternative WM4, however, would not be effective in the short term. It could require up to 22 years to implement, during which time exposure routes to humans and the environment would remain.

Alternatives GW3 and GW4 are estimated to have a 1 year installation time for the extraction and treatment system. The specific short-term effectiveness of these alternatives would depend on the treatment system chosen during the remedial design.

The groundwater recovery system could have adverse impacts on the surrounding wetlands if the extraction rate exceeds the groundwater recharge rate. In addition, this system could have impacts on the river and effluent standards for downstream dischargers because it is a waste load allocated river. The barrier associated with groundwater alternative 4 could have a substantial adverse impact on the surrounding wetlands depending on construction techniques used to implement it.

9.6 Implementability

While all of the alternatives considered are implementable, some alternatives are technically easier to implement than others, based on their design and complexity.

Alternative WM3 could be readily implemented because the technology for landfill capping is well established. Alternatives WM4 and WM5 present serious implementation difficulties. There are relatively few vendors that offer the technology that comprises Alternative WM4; this would delay implementation. While in-situ vitrification has been selected as a remedy on other sites in Region V, no project approaches the magnitude of material proposed for treatment in this fashion as at the MDSL site. Alternative WM5 poses potential difficulty in obtaining sufficient landfill capacity to dispose of the waste mass, and implementation also may be delayed. As noted in Section 8 of this document, the sheer logistics of dedicating a large fleet of trucks (180) to this project will be difficult to implement.

Alternatives GW3 and GW4 should be readily implementable because the technology for groundwater recovery and treatment is well established. The need to conduct treatment studies before the system is implemented may cause some delay. The barrier associated with Alternative GW4 may not be easily implementable due to potential detrimental impacts the construction may have on the surrounding wetland areas.

9.7 Cost

The estimated present worth value of each alternative and option is as follows:

Waste Mass Alternatives

WM3	$ 3,608,000
WM4	$255,510,000
WM5	$142,816,320

Groundwater Alternatives

GW3	$2,000,000
GW4	$3,800,000

9.8 State Acceptance

WDNR concurs on the selected final and interim remedies presented in this ROD. The WDNR predicates this concurrence on the interim nature of the response action planned for the groundwater and the implementaion of measures required to mitigate impacts to the wetlands the groundwater action may have.

9.9 Community Acceptance

Community acceptance of the preferred alterative will be discussed in the Responsiveness Summary in this Record of Decision.

10.0 THE SELECTED REMEDY

Based on the findings of the Remedial Investigation and Feasibility Study, and the evaluation of the nine criteria, U.S. EPA and WDNR have identified the combination of Capping, landfill gas venting (Waste Mass Alternative WM3) and Groundwater Extraction Well Systems and treatment (Groundwater Alternative GW3) to be the preferred alternatives. These alternatives involve a combination of site capping and ground-water extraction with the capability to remove both inorganic and organic pollutants, followed by discharge of the treated groundwater. The combined cost of these two alternatives is approximately $6 million.

Based on the information available at this time, U.S. EPA and WDNR believe that the selected remedies would be protective of human health and the environment, would attain ARARs, and would be cost effective. These actions use permanent solutions and alternative treatment technologies to the maximum extent practicable.

Wetlands

The concern for the welfare of the wetlands surrounding the MDSL site is the primary reason for the interim ground water remedy approach for this first operable unit. The potential for an overly aggressive ground water extraction system adversely impacting the wetlands exists in large measure. The goal for the interim ground water remedy is to contain the ground water contaminant plume to prevent its discharge into the Fox River with minimal adverse impact to the surrounding wetlands. During the operative life of the interim ground water remedy component, the wetlands surrounding the site will be monitored to determine any changes in conditions. Prior to implementation of the ground water remedy, delineation and inventory of the wetlands will be undertaken.

It is expected that this monitoring effort will emphasize delineation of the wetland-upland boundary, as opposed to the lower boundary between wetlands and aquatic habitats. In conducting such monitoring, it will likely be important to consider frequency of occurrence of hydrophytic vegetation (such as obligate wetland plants), soils which are saturated or ponded frequently enough such that they develop anaerobic conditions, and hydrology of the area under consideration.

At any point during the operation of the ground water extraction system where it has been determined that the wetlands have been adversely impacted, the system will be shut down and reevaluated for further action.

Source Control

Source control is a primary remedial goal for this first operable unit. Capping of the waste mass is a component in the effort of source control. It is believed that portions of the waste mass are in contact with the ground water table. Consequently, ground water contamination will continue to emanate from the waste mass to some degree. The interim ground water remedy component will also function as a component of source control.

After a period of monitoring the performance of the first operable unit, additional source control measures may involve the construction of an upgradient cut-off wall to the landfill. The cap for the waste mass will not be affected by any additional measures contemplated. It should be pointed out that in circumstances of extreme flooding events, the cap and waste mass may be subject to erosion.

This will be monitored indefinitely over the lifetime of the remedy.

11.0 STATUTORY DETERMINATIONS

11.1 The Selected Remedy is Protective of Human Health and the Environment

Based on the risk assessment developed for the site, dermal contact with the waste mass, ingestion of contaminated groundwater, incidental ingestion of contaminated surface water and ingestion of contaminated fish are identified as the primary risks with the site. Implementation of the clay/soil cap and an active venting system in accordance with Wisconsin Administrative Code NR 504.07 and NR 506.08 will serve to reduce groundwater infiltration and eliminate the potential for dermal contact with the waste mass. The interim groundwater recovery and treatment system will contain the groundwater plume thereby preventing further migration of the contaminant plume. The selected remedy should assist in improving surface water quality near the site.

11.2 The Selected Remedy Attains ARARs

The waste mass alternative, clay/soil cap, will meet or attain all applicable or relevant and appropriate Federal and state requirements directly associated with the actions. The interim groundwater alternative will meet the ARARs pertinent to the scope and purpose of the interim action.

The following is a description of the environmental laws which are legally applicable or relevant and appropriate to different components of the remedy.

- Clay/Soil Cap

Regulations are found in Chapter NR 504 of the Wisconsin Administrative Code, which governs solid waste disposal facilities which did not accept hazardous wastes after 1980. While both solid and hazardous waste regulations are potential ARARs, it was determined that an NR 504.07 cap provides adequate protection. Subtitle C landfill requirements, while relevant were determined not to be appropriate. It is likely that waste is in contact with the groundwater, making a synthetic cap ineffective in

minimizing leaching. In addition, because large volumes of non-hazardous industrial wastes and some municipal wastes were disposed of at MDSL, a large amount of settling will continue to occur due to decomposition of wastes, making the synthetic membrane subject to damage over the long term. Section NR 504.07 seeks to minimize infiltration by specifying clay type, slope and topsoil requirements for a final cover for the landfill. The regulations require a gas venting system, to relieve gas build-up beneath the cap (NR 445, NR 504.07, NR 506, NR 508, NR 514.07 Wis. Adm. Code). Furthermore, Wisconsin Statute Chapter 160 and Chapter NR 140, WAC indicate that for final action one must prevent the continued release of contaminants to groundwater, at or above state groundwater quality standards.

o Groundwater Extraction and Treatment

As discussed previously, the groundwater remedy is an interim and not a final remedy. The purpose of this interim remedy is to contain the plume of contaminated groundwater while U.S. EPA, in consultation with the State of Wisconsin, determines how best to address the groundwater contamination while maximizing protection of the wetlands. Because restoration of the aquifer is not a goal of this operable unit, the interim groundwater remedy will not meet all ARARS, specifically National Primary and Secondary Drinking Water Standards (40 CFR 141, 143) and Wisconsin Groundwater Quality Standards (NR 140, Wis. Stats.. Wis. Adm. Code). After gaining some experience with this interim remedy, the issue of aquifer restoration will be addressed and these ARARS will addressed in the final ROD.

Groundwater which is extracted, treated and subsequently discharged must meet the substantive requirements of the National Pollutant Discharge Elimination System (NPDES, 40 CFR 122, 125) and the Wisconsin Pollutant Discharge Elimination System (WPDES). Discharge of treated groundwater to the drainage channels adjacent to the site, and ultimately to the Fox River, shall meet the substantive requirements of Section 402 of the Clean Water Act and shall not exceed discharge limits established by the State of Wisconsin (NR 102, NR 105, NR 106, and NR 207 Wis. Adm. Code). Groundwater extraction and monitoring will be done in compliance with Wisconsin Groundwater Monitoring and Recovery Requirements (NR 141, NR 181, Wis. Admin. Code). Effluent limitations are noted in Attachment A.

If groundwater treatment occurs through air stripping, air emissions must not exceed the limits set by U.S. EPA (40 CFR 50, 61) and the State of Wisconsin (NR 404, NR 415, NR 445 Wis. Adm. Code).

o Floodplain Wetlands Policy

U.S. EPA has a floodplain and wetlands policy which regulates construction in a floodplain (similar to RCRA 40 CFR 270.14(b)(ii)(iv) and filling of wetlands (40 CFR 230). Impacts to both the wetlands an floodplain will be considered and minimized to the maximum extent possible during the design phase of this operable unit as directed in Executive Order 11990 and 11988, respectively. The State of Wisconsin also has policies on protection of wetlands (NR 1.95, NR 115, NR 117 Wis. Adm. Code), protection of lakes and streams (NR 102, NR 103 Wis. Adm. Code), and floodplain management (NR 116 Wis. Adm. Code). Assessment of floodplain impacts will be undertaken during the remedial design phase.

The following ARARs are associated with the preferred remedy chosen in this ROD:

Chemical Specific

* Water Quality Criteria (AWQC). 40 C.F.R. Part 131 Quality Criteria for Water, 1986.

* Surface Water Quality Standards (NR 102, NR 105, NR 106 Wis. Adm. Code)

* Prohibition of Air Contaminants which Adversely Affect Human Health and the Environment (NR 404, NR 415, NR 445 Wis. Adm. Code)

Action Specific

* National Pollutant Discharge Elimination (40 C.F.R. Part 125); includes best available technology

* Standards Applicable to Generators of Hazardous Waste (40 C.F.R. Part 262), treatment residuals generation

* Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, (40 CFR 264.90-101), Subpart F

* Groundwater Monitoring and Recovery Well Requirements (NR 141, NR 181, Wis. Adm. Code)

* Requirements and Standards for Pollution Discharge Systems (NR 108, NR 102, NR 104, NR 200, NR 207, NR 218, NR 219, NR 220 Wis. Adm. Code)

* Standards for Landfill Cap Design (NR 181, NR 504 Wis. Adm. Code); NR 181.48 for "other" facilities

* Standards for Emissions Controls (NR 400-499 Wis. Adm. Code)

* Requirements for Collection and Control of Landfill Gas (NR 504, NR 506, NR 508, NR 181 Wis. Adm. Code)

* Standards Applicable to Generators of Hazardous Waste (NR 181 Wis. Adm. Code)

* Resource Conservation and Recovery Act (RCRA 42 U.S.C. 6924(u), (v) and 6928(h)).

Location Specific

* Protection of Wetlands (Exec. Order No. 11,990, 40 C.F.R. 6.302(a) and Appendix A)

* Guidelines for Specifications of Disposal Sites for Dredged or Fill Material (40 CFR 230)

* Floodplain Management (Exec. Order No. 11,988, 40 C.F.R. 6.302(b) and Appendix A; CWA Sect. 404)

* Protection of Wetlands (NR 1.95, NR 115, NR 117 Wis. Adm. Code)

* Protection of Lakes and Streams (NR 102, 103 Wis. Adm. Code)

* Floodplain Management (NR 116 Wis. Adm. Code)

11.3 The Selected Remedy is Cost Effective

Waste Mass Alternative 3 (WM3) and Groundwater Alternative 3 (GW3) represent a cost-effective remedy for the MDSL site. Waste Mass Alternative 3, clay/soil capping of the waste mass, will reduce the amount of leachate production in the fill, thus reducing potential for groundwater contamination. Waste Mass Alternative 4, in-situ vitrification, and

Alternative 5, complete removal of the waste mass, compare highly unfavorably to WM3 in terms of capital cost.

Groundwater Alternative 3, an extraction well system with a combination organic/inorganic treatment system, and Alternative 4, groundwater collection with a barrier, are both cost-effective remedies. Both alternatives will contain the groundwater plume. Since Alternative 3 will be less disruptive to the wetlands area surrounding the site, U.S. EPA and WDNR have chosen it as the preferred groundwater alternative.

11.4 The Selected Remedy Utilizes Permanent Solutions and Alternate Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable.

U.S. EPA and WDNR believe the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the waste mass remedy at the MDSL site. Of the alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA and the State have determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility or volume achieved through treatment, short-term effectiveness, implementability, cost, as well as satisfying the statutory preference for treatment as a principal element and considering State and community acceptance.

Since capping the waste mass will not achieve a reduction in toxicity, mobility or volume, the major trade offs that provide the basis for this selection decision are long-term effectiveness, short-term effectiveness, implementability, and cost. Long-term effectiveness and implementability were key factors in selecting this remedy. Waste Mass Alternative 3 can be implemented and completed quicker with less difficulty and at less cost than the other alternatives considered. Waste Mass Alternative 3 is therefore considered to be the most appropriate solution to contamination at the site.

Neither of the groundwater interim remedies will meet short-term effectiveness. Both of these alternatives will meet all of the remaining criteria, with alternative GW3 being slightly more cost effective than GW4. Groundwater Alternative 3 is considered to be the most appropriate solution for an interim remedy because it will be least disruptive to the surrounding wetlands. The short-term effectiveness criterion was a key factor in selecting this remedy.

11.5 <u>The Selected Remedy Reduces Toxicity, Mobility, or Volume of Waste Materials as a Principal Element.</u>

Treatment of the waste mass to permanently and significantly reduce toxicity, mobility, or volume of contaminants was not found to be practicable or cost effective for remediation of the site. The selected interim groundwater alternative, however, satisfies the statutory preference for remedies that employ treatment of the principal threat which permanently and significantly reduces the toxicity of contaminants by oxidation and adsorption of organic and inorganic hazardous substances.

Attachment A

CORRESPONDENCE / MEMORANDUM **STATE OF WISCONSIN**

DATE: August 14, 1990

TO: Mark Giesfeldt - SW/3

FROM: Duane Schuettpelz - WR/2

SUBJECT: Projected Water Quality-Based Effluent Limits for the Master Disposal Superfund Project

The purpose of this memo is to summarize the water quality-based effluent limitations recommended for the proposed direct discharge from the Master Disposal Superfund site to the Fox (Illinois) River in Waukesha County. Effluent limitations were calculated for each of the substances detected in any of the groundwater samples from the Master Disposal site. Those limitations were calculated using chapters NR 102, 105, 106 and 207 of the Wisconsin Administrative Code and are discussed below. Based on our review, the following recommendations are made on a water quality basis for a direct discharge to the Fox River:

1) If the discharger is able to make the necessary alternative demonstrations required in s. NR 207.04 (1)(d), the effluent limitations are as follows (based on 1/3 of the available assimilative capacity in the Fox River):

Substance:	Daily Maximum (mg/L)	Weekly Average (mg/L)	Weekly Average (lbs/d)	Monthly Average (lbs/d)
Antimony	13			480
Arsenic	0.73 *		0.045 *	
Cadmium	0.22 *		0.0004 *	
Chromium (+3 or total)	9.7 *		0.036 *	
Chromium (+6)	0.028 *		0.0029 *	
Copper	0.1 *		0.0081 *	
Lead	1.5 *		0.0096 *	
Mercury	0.0031 *			#
Nickel	5.1 *		0.043 *	
Zinc	0.57 *		0.0047 *	
Benzene	22			8.5
Chloroform	29			5.3
Dichlorobromomethane				5.3
1,1-Dichloroethylene	30			2.9
1,2-Dichloroethylene	130			920
Ethylbenzene	45			610
Methylene Chloride	220			220
Toluene	17			
1,1,1-Trichloroethane	70			2000
Trichloroethylene	41			22
Bis(2-ethylhexyl)Phthalate	11			
Aluminum	1.5 *			
Effluent Hardness	(Monitoring only)			

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2) If the discharger is <u>not</u> able to satisfactorily demonstrate the alternatives required in s. NR 207.04 (1)(d), the effluent limitations are as follows (based on the full available assimilative capacity in the Fox River):

Substance:	Daily Maximum (mg/L)	Weekly Average (mg/L)	Weekly Average (lbs/d)	Monthly Average (lbs/d)
Antimony	13			1400
Arsenic	0.73 *		0.14 *	
Cadmium	0.22 *		0.0012 *	
Chromium (+3 or total)	9.7 *		0.10 *	
Chromium (+6)	0.028 *		0.0086 *	
Copper	0.1 *		0.024 *	
Lead	1.5 *		0.029 *	
Mercury	0.0031 *			#
Nickel	5.1 *		0.13 *	
Zinc	0.57 *		0.014 *	
Benzene	22			26
Chloroform	29			16
Dichlorobromomethane				16
1,1-Dichloroethylene	30			8.8
1,2-Dichloroethylene	130			2700
Ethylbenzene	45			1800
Methylene Chloride	220			660
Toluene	17			
1,1,1-Trichloroethane	70			6000
Trichloroethylene	41			66
Bis(2-ethylhexyl)Phthalate	11			
Aluminum	1.5 *			
Effluent Hardness	(Monitoring only)			

* - For these substances, effluent limitations may be reported in the "total recoverable" form if such a test is reasonably available.

- For mercury, the monthly average limitation is equal to the 2 ng/L wild and domestic animal criterion because mercury was detected in background sampling of the Fox River at a concentration in excess of the criterion.

Annual maximum mass limitations based upon the recommended daily maximum limits listed above are not provided at this time because of uncertainty over the actual discharge rate.

It is recommended that the set of the above limitations which is deemed appropriate based on the s. NR 207.04 (1)(d) evaluation should be accompanied by a requirement to perform, at a minimum, monthly testing for a period of up to six months following commencement of discharge. Following the conclusion of that sampling period, effluent limitations for individual substances may be removed from the recommended list if those substances are not detected at levels of detection equal to or less than 1/5 the calculated limits for those substances. If the level of detection exceeds 1/5 of the applicable limitation or if the substance is detected in the discharge to surface water, the need for limitations and/or monitoring should be re-evaluated by this Bureau using the procedures in NR 106.

3) Whole Effluent Toxicity Testing Recommendations:

Based on the absence of biological data leading to the overall uncertainty regarding the potential for whole effluent toxicity and the proposed water quality-based chemical-specific effluent limitations derived for several toxicants identified in the contaminated groundwater, the following recommendation is provided:

Acute: Acute toxicity test batteries are recommended with three freshwater species at a frequency and duration of once each three months upon commencement of discharge for the duration of the permit.

Due to the highly contaminated nature of the wastewater from the Master Disposal Superfund Project, it is further recommended that the discharge be ceased immediately upon the failure of any one acute toxicity test battery.

Chronic: Monitoring for chronic whole effluent toxicity is not recommended at this time.

The above limitations should be compared to Best Available Technology limitations, where available, prior to final recommendation to the discharger.

Chemical-Specific Discussion:

Effluent limitations for a direct discharge to the Fox River from the Master Disposal Superfund Site were calculated for each of the substances detected in any of the groundwater monitoring wells at the Master Disposal site that have water quality criteria in ch. NR 105, Wis. Adm. Code. In addition, hardness data used in calculating water quality criteria and associated effluent limitations for metals were generated from calcium and magnesium data collected in those monitoring wells. Finally, since background information was collected in the Fox River for several of those parameters, that information was also used in the effluent limit determinations for Master Disposal. The general information used in calculating effluent limitations at this location is summarized in the following table:

EFFLUENT LIMIT CALCULATIONS FOR: Master Disposal Superfund Site
RECEIVING WATER: Fox (Illinois) River

RECEIVING WATER INFORMATION:
CLASSIFICATION: Warmwater Sport Fish, Non-Public Water Supply

RECEIVING WATER FLOWS (cfs):		7010	702	Gave
		----	----	----
	=	0.66	1.8	34
RECEIVING WATER HARDNESS	=	250 PPM		

EFFLUENT INFORMATION:

EFFLUENT HARDNESS	=	330 PPM
EFFLUENT DILUTION DUE TO ZID	=	not available

Daily maximum effluent limitations were calculated based on twice the NR 105 (or EPA, for aluminum) acute toxicity criteria (ATC) where available, pursuant to s. NR 106.06 (2). If, for a given substance, an NR 105 criterion is not available, the daily maximum effluent limitation equals the lowest species mean LC50 value for aquatic species considered among the warmwater sportfish community subcategory, which represents the classification of the Fox River pursuant to s. NR 102.04 (3). Those limitations are summarized in the following table:

CALCULATION OF EFFLUENT LIMITATIONS BASED ON ATC (in ug/L)

SUBSTANCE	REF. HARD.	ATC	MAX. EFFL. LIMIT
NR 105 Criteria:			
Arsenic		363.8	727.60
Cadmium	330	111.31	222.62
Chromium (+3)	319	4838.65	9677.30
Chromium (+6)		14.2	28.40
Copper	330	51.06	102.12
Lead	330	772.9	1545.80
Mercury		1.53	3.06
Nickel	274	2528.06	5056.12
Zinc	330	283.94	567.88
EPA Criteria:			
Aluminum		748	1496.00
Limitations Based on LC50 Data (s. NR 102.04 (1)):			
Antimony			13000
Ethylbenzene			45000
Toluene			17000
1,2-Dichloroethylene			135000
1,1,1-Trichloroethane			70000
Bis(2-ethylhexyl)Phthalate			11000
Benzene			22000
Chloroform			29000
1,1-Dichloroethylene			30000
Methylene Chloride			224000
Trichloroethylene			41000

Since a specific effluent discharge rate was not proposed, the weekly and monthly average effluent limitations were calculated based on the available assimilative capacity in the Fox River which, based on the definition in s. NR 207.02 (1), is the difference between the applicable water quality criterion for a substance and the existing concentration of that substance in a surface water. The antidegradation provisions in ch. NR 207 are applicable at Master Disposal since this represents a new discharge. As a result, the assimilative capacity of the Fox River is converted from a concentration into an allowable mass loading in pounds per day using the appropriate streamflow pursuant to NR 106.

Weekly average limitations based on NR 105 chronic toxicity criteria (CTC) and monthly average limitations based on NR 105 wild and domestic animal criteria (WDAC), human threshold criteria (HTC), and human cancer criteria (HCC), are summarized in the following tables

using the full assimilative capacity of the Fox River and 1/3 of that capacity. For each of the various criteria, limitations are calculated to address two alternatives based on the implementation of NR 207. The discharger is required to make a series of demonstrations if the proposed discharge would result in a significant lowering of water quality as defined in NR 207. Those demonstrations are contained in s. NR 207.04 (1)(d) and are based on the availability of pollution control and treatment technology alternatives, including alternative discharge locations. If the discharger is able to demonstrate that there are no alternatives available that would satisfy the appropriate portions of s. NR 207.04 (1)(d), the recommended effluent limitations would be based on the full assimilative capacity of the receiving water. On the other hand, if the demonstrations in s. NR 207.04 (1)(d) show that alternatives are available, the recommended limitations would be based upon 1/3 of the available assimilative capacity in the Fox River.

Since the discharger is required to make the s. NR 207.04 (1)(d) demonstration, effluent limitations shall be recommended here based on both of the possible results of that demonstration. Therefore, two sets of weekly and monthly average limitations shall be recommended. Those alternative limitations are summarized below and on the following page.

CALCULATION OF EFFLUENT LIMITATIONS BASED ON CTC (in ug/L)

RECEIVING WATER FLOW (cfs) = 0.165

SUBSTANCE	REF. HARD.	CTC	MEAN BACK-GRD.	ASSIMILATIVE CAPACITY FULL (ug/L)	FULL (lb/d)	x 1/3 (lb/d)
Arsenic		153		153.00	0.13601	0.04533
Cadmium	250	1.32	0	1.32	0.00117	0.00039
Chromium (+3)	250	114.49	0	114.49	0.10177	0.03392
Chromium (+6)		9.74	0	9.74	0.00865	0.00288
Copper	250	27.3	0	27.30	0.02426	0.00808
Lead	250	32.39	0	32.39	0.02879	0.00959
Nickel	250	143.56		143.56	0.12761	0.04253
Zinc	250	107.8	92	15.80	0.01404	0.00468

CALCULATION OF EFFLUENT LIMITATIONS BASED ON WDAC (ug/L unless shown otherwise)

RECEIVING WATER FLOW (cfs) = 1.53

SUBSTANCE	WDAC	MEAN BACK-GRD.	ASSIMILATIVE CAPACITY FULL (ug/L)	FULL (lb/d)	x 1/3 (lb/d)
Mercury (ng/L)	2	200	0.00	0	0

CALCULATION OF EFFLUENT LIMITATIONS BASED ON HTC (in ug/L)

RECEIVING WATER FLOW (cfs) = 34

SUBSTANCE	HTC	MEAN BACK-GRD.	ASSIMILATIVE CAPACITY FULL (ug/L)	FULL (lb/d)	x 1/3 (lb/d)
Antimony	7800		7800	1429	476
Cadmium	82	0	82	15	5
Chromium (+3)	9500000	0	9500000	1740208	580069
Chromium (+6)	9000	0	9000	1649	550
Lead	50	0	50	9.16	3.05
Mercury	0.08	0.2	0	0	0
Nickel	460		460	84	28
Ethylbenzene	10000		10000	1832	611
Toluene	110000		110000	20150	6717
1,2-Transdichloroethylene	15000		15000	2748	916
1,1,1-Trichloroethane	33000		33000	6045	2015
Bis(2-ethylhexyl)phthalate	30000		30000	5495	1832

CALCULATION OF EFFLUENT LIMITATIONS BASED ON HCC (ug/L unless shown otherwise)

RECEIVING WATER FLOW (cfs) = 34

SUBSTANCE	HCC	MEAN BACK-GRD.	ASSIMILATIVE CAPACITY FULL (ug/L)	FULL (lb/d)	x 1/3 (lb/d)
Arsenic	50		50	9	3
Benzene	140		140	25.65	8.55
Chloroform	87		87	15.94	5.31
Dichlorobromomethane	87		87	15.94	5.31
1,1-Dichloroethylene	48		48	8.79	2.93
Methylene Chloride	3600		3600	659	220
Trichloroethylene	360		360	66	22

It should be noted that in the above tables, there is no assimilative capacity available for mercury based on both the WDAC and HTC. No capacity is available because the background concentrations measured at Master Disposal exceeded those criteria. When existing background conditions exceed water quality criteria and the source of at least 90% of the discharge is groundwater, s. NR 106.06 (3)(e)3 states that the effluent limitation shall equal the water quality criterion. For mercury, the limit would equal the lowest criterion available, namely the 2 ng/L wild and domestic animal criterion (WDAC).

For each of the substances evaluated at Master Disposal and detected in at least one of the groundwater samples, the recommended effluent limitations (rounded) are summarized at the beginning of this memo. Where the calculated monthly average limitations exceed the weekly average limitations, only the weekly average limitations are recommended. Finally, where the acute toxicity criteria are lower than all of the remaining criteria, only a daily maximum limitation is recommended based on that acute toxicity criterion.

The proposed discharge also included an alternative involving discharge to a wetland along the Fox River. It is recommended that such a proposal should be discouraged because of the direct discharge alternative to the Fox River that is available. It is felt that a wetland discharge at this location would be contrary to the wetland preservation goals in s. NR 1.95, Wis. Adm. Code, especially since the proposed discharge could potentially contains high levels of heavy metals as well as persistent, bioaccumulating substances. However, since direct discharge could potentially result in dewatering of the wetland, effluent limitations shall be provided for that alternative. In this case, due to the lack of dilution in the wetland (no "upstream" flow), weekly average limitations for those substances with chronic toxicity criteria in NR 105 (CTC) shall be the same as those criteria as listed in the CTC table above, essentially resulting in application of chronic toxicity criteria at "end-of-pipe." Daily maximum limitations based on acute toxicity criteria and monthly average limitations based on the remaining criteria shall be the same as proposed above for the direct discharge to the Fox River. Although human threshold and human cancer criteria are available for waters classified for "limited aquatic life," which include wetlands at this time, those criteria are much greater than those applicable to warmwater sportfish communities. Since the waters would eventually flow into the Fox River, the uses of the Fox River must be considered as well, pursuant to s. NR 207.03 (5)(a)1. As a result, effluent limitations for discharge to the wetland tributary to the Fox River are as follows:

1) If the discharger is able to make the necessary alternative demonstrations required in s. NR 207.04 (1)(d), the effluent limitations are as follows (based on 1/3 of the available assimilative capacity in the Fox River):

Substance:	Daily Maximum (mg/L)	Weekly Average (mg/L)	Weekly Average (lbs/d)	Monthly Average (lbs/d)
Antimony	13			480
Arsenic	0.73 *	0.15 *		
Cadmium	0.22 *	0.0013 *		
Chromium (+3 or total)	9.7 *	0.11 *		
Chromium (+6)	0.028 *	0.0097 *		
Copper	0.1 *	0.027 *		
Lead	1.5 *	0.032 *		
Mercury	0.0031 *			0
Nickel	5.1 *	0.14 *		
Zinc	0.57 *	0.11 *		
Benzene	22			8.5
Chloroform	29			5.3
Dichlorobromomethane				5.3
1,1-Dichloroethylene	30			2.9
1,2-Dichloroethylene	130			920
Ethylbenzene	45			610
Methylene Chloride	220			220
Toluene	17			
1,1,1-Trichloroethane	70			2000
Trichloroethylene	41			22
Bis(2-ethylhexyl)Phthalate	11			
Aluminum	1.5 *			
Effluent Hardness	(Monitoring only)			

2) If the discharger is not able to satisfactorily demonstrate the alternatives required in s. NR 207.04 (1)(d), the effluent limitations are as follows (based on the full available assimilative capacity in the Fox River):

Substance:	Daily Maximum (mg/L)	Weekly Average (mg/L)	Weekly Average (lbs/d)	Monthly Average (lbs/d)
Antimony	13			1400
Arsenic	0.73 *	0.15 *		
Cadmium	0.22 *	0.0013 *		
Chromium (+3 or total)	9.7 *	0.11 *		
Chromium (+6)	0.028 *	0.0097 *		
Copper	0.1 *	0.027 *		
Lead	1.5 *	0.032 *		
Mercury	0.0031 *			#
Nickel	5.1 *	0.14 *		
Zinc	0.57 *	0.11 *		
Benzene	22			26
Chloroform	29			16
Dichlorobromomethane				16
1,1-Dichloroethylene	30			8.8
1,2-Dichloroethylene	130			2700
Ethylbenzene	45			1800
Methylene Chloride	220			660
Toluene	17			
1,1,1-Trichloroethane	70			6000
Trichloroethylene	41			66
Bis(2-ethylhexyl)Phthalate	11			
Aluminum	1.5 *			
Effluent Hardness	(Monitoring only)			

The recommendations regarding daily maximum mass limitations and monitoring frequency and the footnotes involving "total recoverable" reporting and the mercury limitation are the same as previously addressed regarding the direct discharge to the Fox River.

If there are any questions or comments, please contact Jim Schmidt (608) 267-7658 regarding chemical-specific determinations; Bob Masnado (608) 267-7662 regarding whole effluent toxicity testing; or either John Sullivan (608) 267-9753 or myself (608) 266-0156 regarding general issues.

jws/wp3/master.sf/

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Master Disposal Service Landfill (MDSL)
Brookfield, Wisconsin

RESPONSIVENESS SUMMARY

Introduction

The purpose of this responsiveness summary is to document the comments received during the public comment period, and to provide the response of the United States Environmental Protection Agency (U.S. EPA) to such comments. All of the comments summarized in this document were considered prior to U.S. EPA's decision concerning appropriate remedial action regarding the MDSL site.

The responsiveness summary is divided into two parts. The first portion provides the reader with a brief site history, and provides an account of community involvement and citizen concern. The second portion summarizes public comment, both written and oral, concerning the Proposed Plan and contains U.S. EPA's response to such comments. Lengthier comments are provided in their entirety in the administrative record file developed for the MDSL site. In some instances, comments which address a common concern or subject matter may be grouped according to that common issue, and responded to together.

Site Overview and Community Concern

The MDSL site is located at 19900 West Capitol Drive (Wisconsin Route 190) in Brookfield, Wisconsin. The site consists of some 40 acres of land, with the key feature being a 26 acre closed landfill.

The site's setting provides important considerations with regard to environmental concerns. The site is located near the headwaters of the Fox River. Wetlands exist between the landfill and the river.

Landfilling operations were conducted at this site from approximately 1966 to 1982. Landfilling operations ceased at that point, although combustible materials were accepted for burning until 1985.

The MDSL site was added to the National Priorities List (NPL) in 1984. U.S. EPA and the Wisconsin Department of Natural Resources (WDNR) entered into an agreement with a group of potentially responsible parties (PRPs) for the conduct of a Remedial Investigation/Feasibilty Study in 1986. Site sampling and subsequent analysis was conducted in 1987 and 1988. Results indicated contamination of groundwater downgradient of the site, degradation of surface water quality downstream of the site, and deterioration of existing site cover materials.

On June 27, 1990 U.S. EPA placed an advertisement in the "Milwaukee Journal" announcing the commencement on July 9, 1990 of a public comment period to discuss public reaction to the Proposed Plan developed by U.S. EPA and WDNR. A public meeting was held on July 16, 1990 at the Brookfield City Hall at which U.S. EPA and WDNR representatives explained site history, key study findings, alterantives developed, and the recommended alternative at the outset of the comment period. A question and answer session followed. Oral comments were taken. U.S. EPA received a request on July 30 to extend the comment period. Comment period was initially scheduled to end August 8; in a letter from U.S. EPA dated August 2, 1990 the Agency indicated that comment period would be extended to September 7, 1990. U.S. EPA subsequently placed an advertisement in the "Milwaukee Journal" announcing such extension to the general public.

It is U.S. EPA's perception that the following topics are of concern to citizens who reside in the vicinity of the MDSL site:
-Does groundwater contamination extend beyond the site and adversely affect well users?
-Since the site was in operation in the 1960s and 1970s, why are we just now arriving at a point where site cleanup programs are being discussed?
-Wetlands near the site are of importance and should not be adversely affected.
-Possible degradation of the Fox River is important to nearby municipalities.

Summary of Public Comments Received During the Public Comment Period

Oral Commentary Received at the Public Meeting

Comment 1- Has U.S. EPA selected the cleanup alternative?

Response 1: During the comment period, no, U.S. EPA did not select a cleanup alternative. U.S. EPA indicated a preference for remedial remedial action in the Proposed Plan, but considered public comment prior to remedy selection. U.S. EPA provided a 60 day public comment period on the preferred remedy prior to selecting a remedy as documented in this Record of Decision.

Comment 2-If the cost of implementing the remedy does not fall on local taxpayers, select the best remedy possible, "...even if it goes further than [alternative] three..."

Response 2: U.S. EPA considers Waste Mass alternatives 3,4, and 5 as listed in the Proposed Plan as protective of human health and the environment and if properly implemented capable of complying with applicable or relevant and appropriate requirements (ARAR). Therefore, U.S. EPA must consider comparative cost of the remedy

in choosing between alternatives that offer similar features regarding the threshold criteria of protectiveness and ARARs compliance. Cost is one of the balancing criteria, and should be considered.

Comment 3a- The commenter expressed concern over financially viable companies who may be liable for site conditions being given options for responsibility regarding clean up costs.

Response 3a: It is standard practice for U.S. EPA to send notice to persons who may be responsible for site conditions of U.S. EPA's determination of a need to take remedial action in response to the site, and of the opportunity to enter into an agreement with the Agency for private conduct of that action. U.S. EPA will then negotiate with such persons.If such persons refuse to undertake the remedial action, or if no settlement is reached, U.S. EPA has authority under the Superfund statute to proceed with the action and seek reimbursement for response costs. In instances where an imminent and substantial endangerment may exist, U.S. EPA has authority to issue a unilateral order to non-cooperating persons. Penalties may be imposed on non-complying recipients of such an Order.

Comment 3b- The commenter notes concern on the part of residents near the site regarding groundwater quality, and recommends a program of well testing beyond the area performed in the study to date. (U.S. EPA notes that a subsequent speaker also made this point concerning testing of other residential wells near the site.)

Response 3b: Groundwater flow patterns as revealed in the Remedial Investigation (RI) are generally to the south - southwest. Therefore, any subsequent future monitoring should logically concentrate on residents south of the site. However, U.S. EPA believes these citizens have raised a valid point, and has contacted WDNR to explore the possibility of a limited residential well sampling program for the concerned citizens.

Comment 4- The commenter noted that he serves with the Wisconsin Department of Health and Social Services, and that his agency conducts health assessments of all Wisconsin sites currently on the NPL. The commenter notes that a health assessment is being prepared for the MDSL site based on data gathered during the RI.

Response 4: U.S. EPA looks forward to receipt of this document when available, and will then place this document in the administrative record file for the MDSL site.

Comment 5- The speaker expresses some surprise that higher levels of toxins have not been found outside the limits of the dump, and that it may be appropriate to more rigorously cap the site and to continue monitoring.

Response 5: U.S. EPA notes that the feasibility study (FS) developed for the site did indeed consider a more rigorous type of cap for the site, namely one that included synthetic geotextile liner materials. Based upon consultation with the WDNR, U.S. EPA believes that Wisconsin solid waste regulation 504.07 is the appropriate ARAR governing closure of this type of landfill. Therefore, U.S. EPA presented the discussion of cover materials as noted in the Proposed Plan. U.S. EPA also notes this concern with regard to the site: that there is contact between groundwater and lower reaches of fill material pending groundwater level fluctuation. Therefore, even the most rigorous type of cap is unlikely to totally preclude contact between fill and water. The function of a cover in this situation is to reduce water infiltration and preclude exposure of the waste mass. The concentrations of pollutants in the groundwater pose an unacceptable risk to users. Therefore, U.S. EPA believes it is prudent that the remedy include some manner of groundwater component for control and treatment.

Comment 6- The commenter noted her affiliation with the Waukesha Environmental League, and indicated that everything possible should be done to protect wetlands.

Response 6: U.S. EPA notes that the concept of wetlands protection is a key reason for structuring the remedial response in the form of multiple operable units. U.S. EPA notes a groundwater contamination problem associated with the site. U.S. EPA also notes that calculations supplied by the authors of the site FS explored the extraction rates at which groundwater contaminants could be contained. These rates resultes in lengthy periods to extract a volume of water roughly equal to that calculated to be below the MDSL site. At first glance, it mat seem logical to simply increase the extraction rates to yield a more desirable restoration timeframe. However, prudence dictates that there must be some extraction rate at which drawdown of the groundwater level is so profound as to cause inadvertant damage to the wetlands surrounding the site. Consequently, U.S. EPA believes a groundwater component of the remedy should proceed in a phased manner. Movement of contaminants should be checked, and any necessary scale-up of the extraction rates or other components of final wetlands effects and what mitigating acts may be necessary to preserve the wetlands.

Comment 7
The commenter noted several points on behalf of the City of Waukesha. These include: concern over ground water contamination because Waukesha derives its supply from well water, concern over Fox River water quality because it flows through that community, and concern over preservation of wetlands because of their importance to the community. The speaker concludes by urging U.S. EPA to consider "...the strongest possible measures for these things to be protected...".

Response 7: U.S. EPA believes this comment raises many important concerns, and U.S. EPA also believes its approach to the MDSL site will address them. As noted earlier, U.S. EPA's preferred approach has a component of action dealing with the question of groundwater contamination. As noted in the previous response, U.S. EPA also believes action dealing with groundwater must be undertaken in a conservative fashion so as to avoid inadvertent wetland loss. Finally, U.S. EPA believes the preferred approach will be of benefit to Fox River quality. U.S. EPA perceives that contaminants from the MDSL site may enter the drainage channel and/or Fox River in two primary ways: by influx of contaminated groundwater into these surface water bodies, or by runoff of site soils into surface waters. By covering the site, and providing maintenance thereof, the runoff pathway should be addressed. By undertaking a groundwater component of remedy, that pathway should also be reduced.

Written Commentary Received During the Public Comment Period

Comment 8- Letter received July 10, 1990 from U.S. Fish and Wildlife Service- Green Bay, Wisconsin office.
The letter states in part: "...The potential for a release from erosion will always be present and the costs of long term maintenance are nearly impossible to predict...erosion and contamination has the strong potential of continuing to degrade the surrounding wetlands. There needs to be more assurance that the potential for future migration of contamination is effectively nonexistent. If this entails off site removal of contamination then that is the most acceptable alternative. We are in agreement when it comes to the recommendation of groundwater collection. The most suitable option for treatment appears to be...removing both organics and inorganic compounds.."

Response 8: U.S. EPA agrees that if a cover is selected for remedy that there is the potential for erosion. However, proper maintenance of a cover should minimize erosion problems and subsequent contaminant release. U.S. EPA does not concur that such maintenance costs are impossible to predict, and notes that the authors of the feasibility study have included maintenance costs in their overall cost of alternative development. U.S. EPA believes that a program of monitoring to include the wetlands is an essential part of remedial action. U.S. EPA does not

necessarily concur that there is a strong potential for wetlands degradation via the pathway of erosion if the preferred alternative is selected and the cover properly maintained. U.S. EPA notes that the writer appears to favor selection of waste mass alternative 5, which involves excavation of all wastes and off-site disposal thereof. U.S. EPA refers to its earlier reply; see Response 2 above. Both WM 3 and WM 5 are noted in the Proposed Plan as being protective and capable of meeting ARARs. Cost then becomes one of the balancing criteria, and WM 3 would appear to have a decided cost advantage. Further, U.S. EPA notes that under the National Contingency Plan (NCP), sending wastes untreated for disposal at another location is a least preferred remedy.

Comment 9- Letter received at the public meeting, July 16, 1990 from the City of Brookfield
The letter states in part: "...the subject property is within the Town of Brookfield and not in the City of Brookfield. We believe that this statement is important for the record..."

Response 9: U.S. EPA will put this comment into the administrative record and believes no further response is needed.

Comment 10- Letter received July 23, 1990 from the Mayor of Waukesha
The letter notes that "...the City has three primary concerns: the first is for the health of the surrounding wetlands...the second is for the continued vigilance and protection of the groundwater system...the third concern is for the physical and chemical composition of the Fox River...[and that] the City's massive redevelopment and beautification efforts along the banks of the Fox River...would certainly be adversely affected if pollutants escaped the proposed containment...the City would support any cost-effective alternative which prevents any environmental damages as defined above..."

Response 10: U.S. EPA notes that this comment raises many points as discussed in Comment 7. U.S. EPA therefore incorporates Response 7 into this response. U.S. EPA further adds that it will be cognizant of the interests of downgradient/downstream users, and that U.S. EPA believes that implementation of the preferred alternative will help protect such interests.

Comment 11- Letter received August 3, 1990 from a resident of the City of Brookfield
The letter states in part: "...you have not addressed so far the cost of...paying the City of Brookfield for its costs of putting water into the homes...that have had their wells polluted by the dump...the plumbing fixtures and the insides of the water pipes are also coated with pollutants and must be replaced..."

Response 11: U.S. EPA notes that this writer resides on Ventura Circle, which is southeast of the site. As is noted in the administrative record file for the site, groundwater flow from MDSL is generally believed to be to the south- southwest. U.S. EPA cannot conclude therefore that the residence in question has been affected by site contaminants. U.S. EPA will take this concern under advisement, and notes that further residential sampling may be a necessary component of the remedy. The residential well samples collected during the RI did not indicate that migration of hazardous substances associated with the MDSL site had as yet occurred into areas noted by the writer. U.S. EPA will evaluate any information it receives concerning contaminant movement. At this time, U.S. EPA has insufficient information to conclude that substances in the plumbing fixtures are associated with MDSL contaminants and therefore cannot recommend expenditure of CERCLA funds for replacement of such equipment.

Comment 12- Letter received August 6, 1990 from the Waukesha County Environmental Action League (WEAL)
The letter states in part that WEAL supports the alternative which features the installation of a barrier system such as a slurry wall around the landfill rather than relying on groundwater extraction alone. The letter further notes concern over the nearby wetlands, the value of the wetlands as rookeries for the Great Blue Heron, and concern that groundwater extraction may significantly change the valuable wetlands.

Response 12: U.S. EPA believes that the barrier system concept (groundwater alternative 4) does have merit. A possible benefit is that if one is constrained, at least initially, to a low extraction rate, there is less chance of pulling relatively uncontaminated groundwater from upgradient of the site through the waste mass. However, the act of installing a barrier system around the site may be intrusive on the wetlands one is trying to protect. Further information on how mitigation steps would be taken is needed before U.S. EPA could recommend a barrier component as a part of site control. U.S. EPA notes that a barrier system could be a component of a second operable unit on the site.

Comment 13- Letter received August 10, 1990 from the law firm of Michael, Best & Friedrich concerning the potential impacts of the MDSL site on property to the west.
The letter notes several concerns including: a "paucity" of groundwater monitoring wells such that some groundwater releases may go undetected; a past drainage channel may indicate discharge from the site onto property of concern to the west; the potential exists for contaminant movement with groundwater beneath the property of concern to the west of the MDSL site; groundwater flow rates and distances traversed by contaminants therein could be substantially greater than estimated in the site RI/FS;

the minimum rate of groundwater extraction calculated to contain contaminant releases may be underestimated; the MDSL site has had a negative impact on property of concern to the west of the MDSL site; and there are "...simple and more robust methods of assuring the capture of contaminated groundwater..."

Response 13: U.S. EPA was particularly interested in the final point noted in the letter discussed above. On August 13, 1990 U.S. EPA contacted the author of this letter and received a further call from a contributor to the letter on August 14, 1990. A member of the firm of Science Technology from Milwaukee noted that such methods referred to the possibility of a trench excavation of some 15-20' depth along the western edge of the MDSL site coupled with a barrier system as a part of or to the outward side of the trench. U.S. EPA notes that such a system may indeed block a perceived westerly component of radial flow from the site, and was considered briefly within the site FS. However, U.S. EPA also notes that a device at such depth may have a detrimental effect upon wetlands bordering the site. U.S. EPA appreciates the scrutiny provided. U.S. EPA believes that the number of wells utilized in the RI was sufficient to establish that a plume of groundwater contamination exists. U.S. EPA further believes it may be appropriate to consider well installation efforts as a part of remedial design. This concept seems particularly important when considering the writer's concern that groundwater velocity may be greater than that predicted by the RI/FS.

Comment 14- A letter and various attachments were received September 10, 1990 from the Earth Technology Corporation on behalf of the PRP Group. (U.S. EPA notes that several of the attachments already are in the administrative record; other attachments shall be incorporated into the record with no apparent need for comment by U.S. EPA. U.S. EPA believes response is warranted for the letter and attachment C.)

Comment 14a- "...several documents in the Administrative Record file, which were not made available to the PRP Group during the conduct of the RI/FS, contain information and concepts which have affected the Proposed Plan..."

Response 14a: U.S. EPA notes that the administrative record file was compiled contemporaneously with RI/FS report development efforts and that the record was made available to the public both in Region V's Chicago office and at the Brookfield, Wisconsin location.

Comment 14b- "...In the event that the remedial actions preferred by U.S. EPA after the close of the comment period include any remedial measures in addition to the alternatives recommended in the Proposed Plan, the PRP Group reserves the right to require formal notification of such changes..."

Response 14b: U.S. EPA notes page 8851 of the March 8, 1990 "Federal Register" and observes guidance from the National Contingency Plan(NCP). The NCP states that prior to adoption of the selected remedy, if new information significantly changes basic features of the remedy the Agency will either:

1. discuss in the Record of Decision significant changes and the reasons therefore if such changes could reasonably have been anticipated by the public, or
2. seek additional comment on a revised proposed plan where the changes could not have been reasonably anticipated by the public based on the proposed plan or the administrative record.

U.S. EPA believes any such features could be reasonably anticipated based on the record, and does not see a need to revise the Proposed Plan or send notification of change.

Comment 14c- "...The ...risks contained [in]...the Proposed Plan is an incomplete and confusing summary...the Proposed Plan does not explain that the...health effects are hypothetical calculations, not actual risks..."

Response 14c: U.S. EPA notes page 8709 of the March 8, 1990 "Federal Register". The NCP discusses risk assessment and notes that the purpose of such assessment is to determine whether contaminants of concern at a site pose a current or potential risk to human health and the environment in the absence of any remedial action. On page 8716 of this same document, the NCP discusses acceptable risk range. It is noted there that Superfund

selects remedies that reduce the threat of carcinogenic contaminants at a site over a lifetime to within a range of 1 x 10-4 to 1 x 10-6 excess risk. The risk over a lifetime of ingesting contaminated groundwater at the MDSL site clearly exceeds this range. It is entirely appropriate for U.S. EPA to consider current and potential risk.

Comment 14d- "...the installation of groundwater wells is not likely, and can be prevented utilizing administrative controls.."

Response 14d: Page 8706 of the March 8, 1990 "Federal Register" discusses NCP expectations for remedies. Institutional controls may be used to supplement engineering controls but should not substitute for active response measures. Hence, in this regard U.S. EPA notes its preference for the more active response alternatives as presented in the MDSL Proposed Plan.

Comment 14e- "...the possibility of future releases which might warrant a gas abatement system is minimal..."

Response 14e: Remedial actions are to be taken in compliance with applicable or relevant and appropriate federal and state regulations. Wisconsin regulation NR 506.08 notes that solid waste facilities shall have active means of managing emissions. Therefore, if waste mass alternative 3 is selected, U.S. EPA expects compliance with action specific regulations.

Comment 14f- "...the Proposed Plan erroneously listed organic compounds as being detected in...surface waters..."

Response 14f: Organic compounds detected in surface waters at the MDSL site are methylene chloride, acetone, tetrachloroethene, and N- nitrosodiphenylamine.

Comment 14g- "...As documented in both the RI Report and the Warzyn Report...surface soils consist of silts/clays/peat...these soils act as a barrier..."

Response 14g: Upon reviewing certain of this documentation, U.S. EPA expresses doubt that surface soils should be classified as silts, clays, and peat exclusively, and also notes that the surface soils role as a barrier is questionable. On page 4-6 of the RI, it is stated that a thin sand body is encountered along the northeast side of the landfill. Also, Attachment C which the PRP Group submits for the record notes that the under and overlying formations do not form impermeable barriers.

Comment 14h- "...No apparent geologic barrier exists between the glacial and dolomite formations; however, a hydraulic barrier, in the form of an upward gradient, exists between these formations...If the site is capped the horizontal (mound) component will eventually subside and the predominant upward gradient will prevail..."

Response 14h: Appendix A to the FS appears to express a different view. This discussion of a pumping scheme, prepared by Bac-Ground (authors of Attachment C) notes that "...In reality there is a very slight upward hydraulic gradient from A3 to A2...most of the flow in these aquifers is horizontal...". U.S. EPA would conclude from Appendix A that lateral movement of site contaminants in the groundwater system may not be wholly brought under control through installation of a capping system only.

Comment 14i- "...This [pumping as modeled in the FS] would not create a large area (if any) of conical depression because of the recharge from both horizontal and, especially, vertical sources...The concern regarding the proposed groundwater withdrawal system and the wetlands appears to stem from document produced by Metcalf and Eddy... at the request of U.S. EPA...".

Response 14i: Appendix B to the FS notes that "...as long as one well is placed between the MDSL landfill and the Fox River...the plume will be controlled...". U.S. EPA notes that there are wetland areas between the landfill and the Fox River. Placing a well there is of concern to U.S. EPA, and because of this concern U.S. EPA sought assistance in determining what extraction rates may have adverse effects on wetlands. Further, the extraction rates noted in FS appendices A and B speak in terms of collection of one pore volume. It may require more than one pore volume to restore the aquifer even assuming no further introduction of contaminants into the groundwater, which is doubtful considering the circumstance at MDSL. This may then imply operation and maintenance of a groundwater contaminant control system for an extremely long time. It is therefore important that wetlands protection be considered throughout such time.

Comment 14j- "...Based on the site specific hydraulics previously discussed...the barrier wall would provide no protection for ... movement...underneath the wall. This fact was acknowledged by U.S. EPA [in]...the Proposed Plan..."

Response 14j: U.S. EPA did not acknowledge any such "fact" concerning site hydraulics in the Proposed Plan. U.S. EPA observed that some compounds with a greater density than water may tend to sink. A barrier system in itself likely may fail if no other action were taken. However, if coupled with an extraction system, a barrier may help to reduce influx of contaminants into the groundwater system. U.S. EPA believes it is necessary to consider the effectiveness of initial measures, and to further define what wetlands mitigation actions may be necessary at MDSL before further decisions on what final remedy components should be.

Comment 14k- "...Gillen Co. estimated the cost to perform the work at 2.9 to 3.8 million dollars..."[for a barrier system]

Response 14k: As noted in the Proposed Plan, U.S. EPA also developed an estimated cost of 2.9 million for a sheet pile type of barrier.

Comment 14l- "...The soil boring data from around the landfill indicates layers of stiff or hard soils, as evidenced by penetration resistance measurements up to 211 blows/foot. (Refer to Appendix 4-3 of the RI report.)"

Response 14l: U.S. EPA reviewed Appendix 4-3 of the RI. There were 18 borings drilled in 9 different site locations; some locations had two or more borings in near proximity. There were two locations where 211 blows/foot were necessary for penetration. These locations are near the B-42 cluster, which is well to the northeast of the site and served as a background well location, and near the B-51 cluster, which is located at the southwest corner of the landfill. It is somewhat interesting to note the blows/foot needed for borings B-49 and B-48 locations, which are at the northwest and northeast corners of the landfill, respectively. At five foot intervals, necessary blows/foot were 11, 11, 17, 5, 50, 56, 35; and 10, 49, 25, 14, 13, 13, 12, 30, and 50. Surely no one would advocate putting a barrier as far away from the site as the background well location. While putting a sheet pile barrier on the downgradient side of the site may indeed be difficult, the concept may have some merit for future consideration as regards to the upgradient side of the site.

Comment 14m- "...the PRP Group maintains that the remedial alternative proposed in the FS report is a technically sound alternative for the site..."

Response 14m: U.S. EPA recalls correspondence it directed to the PRP Group's consultant expressing the Agency's concern that the Proposed Plan, and not the FS, is the appropriate document in which to express a preference of alternatives for the site. This item of correspondence was placed into the administrative record. As far as the Agency is concerned, preferences expressed in the FS are to be disregarded.

Comment 14n- "...A second operable unit is not warranted..."

Response 14n: A second operable unit is warranted because certain important items of information are not known at this point. Such information includes but is not necessarily limited to some more reliable timeframe as to when aquifer restoration will occur, as

well as effects on nearby wetlands. The Agency believes that an initial goal of containment has merit, but at this point would be forced to conclude that such measures may need to continue in perpetuity given the relationship between the waste mass and groundwater. U.S. EPA notes that page ES-11 of the FS states "..the ultimate clean up goals will be determined..."

Comment 14o- The PRP Group recommends certain remedy components.

Response 14o: U.S. EPA concurs with certain PRP comments concerning site gas collection, but believes this action should be undertaken in accordance with all ARARs. U.S. EPA makes no comment as to possible numbers of extraction wells at this time, but rather believes such information can be gathered and reviewed during the design process. U.S. EPA concurs with the goal of no damage to wetlands; however, further delineation of wetland extent may be necessary to help achieve this goal. U.S. EPA agrees that the monitoring of wells is necessary, but also observes that monitoring of the effluent after passage through treatment devices is likely consistent with Wisconsin administered discharge limitations, and that further delineation of vertical and lateral extent of contamination extent may be necessary.

Comment 14p(from Attachment C)- "...groundwater ...will be captured by the withdrawal well(s) given enough time..."

Reponse 14p: As U.S. EPA noted in the response above, one needs to provide further information as to possible restoration timeframes.

Comment 14q(from Attachment C)- "...If contaminant recovery is the objective of the barrier/well system then, the lost gradients will have to be made up by increased pumping and/or re-injection, ..."

Response 14q: U.S. EPA notes that it may be possible to have a different objective than recovery while utilizing a barrier system. It may be prudent in some situations to change flow patterns so that waters not previously contaminated are not brought into contact with contaminant source areas.

Comment 15- The writer of comment #11 resubmitted that same written comment, and also enclosed several copies of newspaper articles concerning local water supply issues, the MDSL site, radon, and other area Superfund sites.

Response 15: U.S. EPA will put this information into the administrative record. U.S. EPA notes that there may be some impression that the MDSL site and another site given local Superfund coverage are the same. The articles note the recent listing on the NPL of a landfill site in Brookfield known as the Loth Pit. U.S. EPA notes that this other site is not the same as the MDSL site.

Comment 16- Letter and attachments received September 10, 1990 from the Wisconsin Department of Natural Resources. (U.S. EPA will place both the letter and attachments into the administrative record file for this site. U.S. EPA believes no response is necesaary as to the attchments, which discuss site history, setting, and hydrogeologic conditions.)

Comment 16a- "...We recognize that this record of decision does not include a barrier system at this time, and note that the information on the barrier system need not be addressed in the responsiveness summary..."

Response 16a: U.S. EPA believes no further response is necessary.

Comment 16b- "...We believe it is critical to protect the remaining wetlands in Wisconsin, and especially those wetlands that are highlighted for protection by other management agencies ..."

Response 16b: U.S. EPA concurs.

Comment 16c- "...we need to know anticipated drawdowns as a result of the pumping rates described in the reports generated for this site..."

Response 16c: U.S. EPA notes that these values were developed to some extent by request to its oversight contractor and placed in the site record. However, U.S. EPA believes that these values should be refined to help safeguard site wetlands.

Comment 16d: "...WDNR also has noted several times in the past that modelling completed for the RI/FS used (homogeneity) assumptions that are not valid given the complex environmental setting..."

Response 16d: U.S. EPA notes that Attachment C submitted by the PRP Group states "...these calculations are only estimates and a more detailed model may have to be adopted if more complex questions need to be addressed...".

Comment 16e- "...Since it is our opinion that it is likely that wastes are in direct contact with groundwater at this site, capping the site alone will not act as a complete containment system..."

Response 16e: U.S. EPA concurs.

Comment 16f- "...We also agree that an interim remedy for groundwater, wetlands and surface water is necessary due to the

many uncertainties that remain for this site. We believe further delineation of the bedrock contamination, as well as the extent of wetland contamination and surface water impacts needs to be made..."

Response 16f: U.S. EPA concurs.

Comment 16g- "...we strongly urge the EPA to include a contingency interim groundwater remedy..."

Response 16g: U.S. EPA believes that the effectiveness of any groundwater remedial measures as discussed in the proposed plan should be evaluated in a timely manner if adopted into a record of decision. Based upon such evaluation, U.S. EPA would seek the cooperation of Wisconsin in preparing a new proposed plan, which would discuss what, if any, further remedial action may be considered for the site.

Comment 17- Letter received September 10, 1990 from Waukesha County Land Conservation District. (U.S. EPA will place this letter in the administrative record and notes significant comments below):

Comment 17a- The writer expresses concern over the possibility of dense nonaqueous phase liquids (DNAPLs) in the site groundwater system and notes the detection of 190 ppb of trichloroethane in the RI results as being indicative of such compounds.

Response 17a: U.S. EPA agrees, except to note that the compound in question was trichloroethene.

Comment 17b- The writer points out that the proposed plan does not address "the serious issue of deep aquifer contamination... this aquifer is a potential source of public drinking water for a large urban area..."

Response 17b: U.S. EPA believes that it is important to further define vertical extent of contamination and pending results to see if further remedial action is warranted. U.S. EPA believes such definition should be a part of this operable unit.

Comment 17c- "...Should the source of dissolved contaminants in the groundwater be low-solubility liquid contaminants (nonaqueous), it may be necessary to remove 10's or 100's of plume volumes before the source dissolves completely into the groundwater and is removed by the recovery wells..."

Response 17c: U.S. EPA previously alluded to the view that one pore volume removal may not be sufficient to fully deal with the groundwater contamination question (see Response 14i). This comment would seem to bear out the Agency's concern.

Comment 17d- "...An adequate monitoring system...needs to be

installed..."

Response 17d: U.S. EPA concurs, and believes that a good monitoring network is an important component of the remedy.

Comment 17e- "This time period [of the RI study] corresponds with a period of drought...modeling [based upon such data may be] subject to the distortion..."

Response 17e: U.S. EPA will take the above comment under advisement.

Comment 17f- "...The fact that this area is within a wetland hydraulically connected to the Fox River and in a primary environmental corridor only increases the necessity for timely and thorough remediation..."

Response 17f: U.S. EPA concurs.

Comment 17g- "...the logic that the primary environmental corridor location...protect(s) this site and its adjacent surroundings from future development is faulty..."

Response 17g: U.S. EPA concurs. Please note Response 14d on the subject of the role of institutional controls.

Comment 17h- "...habitat degradation may occur due to increased temperatures of the discharge water compared with the present spring flow..."

Response 17h: Effluent limitations as developed under the WPDES system did not specifically call for monitoring of dissolved oxygen or temperature; U.S. EPA notes this may be a matter to consider further.

Comment 17i- The writer expresses concern over not finding Fox River sediment core samples.

Response 17i: Such samples were collected during the course of the RI. Beginning on page 5-13, the RI notes that sediment samples were collected at the same locations as surface water points using an Eckman dredge.

Comment 17j- "...I failed to find a source mentioned for the covering already in place over a portion of the site...should hydric soils have been used for that purpose, behavioral characteristics...may differ markedly from other soil types generally associated with glacial deposits..."

Response 17j: U.S. EPA notes that in the RI on page 3-2 it is noted that "...dredging operations were conducted immediately west of the landfill to obtain soil for the final cover..."

Comment 17k- "...Can the firm instituting the remediation procedures guarantee an absence of hazardous compounds in the treated effluent?..."

Response 17k: U.S. EPA doubts this can be done totally, in that the analytical techniques cannot detect to zero, however discharge will conform to WPDES effluent standards.

Comment 17l- "...There is a need to perform a long term pumping test ...to design an adequate ...recovery system..."

Response 17l: U.S. EPA concurs.

E965Y

RECORD OF DECISION ON REMOVAL ACTION FOR PCB-CONTAMINATED SOILS NEAR SITE D

TWIN CITIES ARMY AMMUNITION PLANT
NEW BRIGHTON, MINNESOTA

JUNE 1989

This Document is Intended to Comply with the National Environmental Policy Act of 1969.

INSTALLATION ENVIRONMENTAL RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT

RECORD OF DECISION ON REMOVAL ACTION

Thermal Treatment of PCB-Contaminated Soils near Site D

SITE: Twin Cities Army Ammunition Plant (TCAAP), New Brighton, Minnesota

STATEMENT OF BASIS AND PURPOSE:

This Record of Decision (ROD) document presents the selected remedial action for remediating soil contaminated with polychlorinated biphenyls (PCBs) near Site D of the TCAAP Superfund site located in New Brighton, Minnesota. The decision document is developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site. The following documents describe the basis for this decision.

INDEX

- Post Action Report on PCB Removal
  Site D
  Twin Cities Army Ammunition Plant
  Wenck & Associates, Inc. — January 31, 1986

- Final Report On-Site Incineration Testing
  of Twin Cities Army Ammunition Site
  New Brighton, MN
  Shirco Infrared Systems Portable Test Unit
  Report No. 833-87-01 — September 24, 1987

- Installation Restoration Program
  Twin Cities Army Ammunition Plant
  Site D - PCB-Contaminated Soil
  Feasibility Study
  Federal Cartridge Company
  Final Report — November 6, 1987

- Interim Remedial Action Plan
  Site D, PCB-Contaminated Soils
  Twin Cities Army Ammunition Plant
  Wenck Associates, Inc. — March 1989

- Endangerment Assessment of PCB Incineration at Site D, Twin Cities Army Ammunition Plant PRC Environmental Management Chicago, IL — March 1989

- Risk Evaluation of the Destruction of PCBs by High-Temperature Treatment of Affected Soils Twin Cities Army Ammunition Plant, Site D Carlos Stern Associates, Inc. Arlington, VA — March 1989

The final remedial action will be selected following completion of the TCAAP Remedial Investigation (RI) and New Brighton/Arden Hills Feasibility Study (FS), currently being conducted by the Department of the Army (DA), and the New Brighton/Arden Hills RI being conducted by the U.S. Environmental Protection Agency (EPA) and the Minnesota Pollution Control Agency (MPCA).

The State of Minnesota has concurred in the selected remedy.

DESCRIPTION OF SELECTED REMEDY:

Approximately 1,400 cubic yards of PCB-contaminated soils will be treated using a mobile thermal treatment system. The mobile system will be transported to TCAAP and assembled for operation. The thermal operation is expected to take approximately three weeks. This remedy is not intended to address the groundwater contamination at TCAAP. Groundwater contamination has been partially addressed by other Interim Remedial Actions. Soil and water contamination will be addressed in the final remedy.

DECLARATION:

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the NCP (40 CFR Part 300), we have determined that the thermal treatment of PCB-contaminated soils near Site D is a cost-effective interim removal action that will be consistent with the final remedial action selected. The TCAAP Remedial Investigation (RI) and New Brighton/Arden Hills Feasibility Study (FS) currently being conducted by the Department of the Army (DA) and the U.S. EPA/MPCA will determine the final remedial action. DA, U.S. EPA, and MPCA have thoroughly discussed this removal action and determined that the treated soil will meet all federal and state requirements. The interim removal action will be considered part of the approved final remedial action and eligible for Department of Defense Environmental Restoration Account

monies. Actual or threatened releases of hazardous substances from the PCB-contaminated soils near Site D, if not addressed by implementing the response action selected in the ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

The selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this remedial action, and is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes a permanent solution to the maximum extent practicable.

DA is currently implementing the DA/EPA/MPCA Federal Facility Agreement (effective 31 December 1987) in order to complete the RI/FS process. A ROD will be prepared for approval of any future remedial actions selected prior to or after completion of the ongoing RI/FS.

Valdas V. Adamkus 8/11/89
Valdas V. Adamkus Date
Regional Administrator
Region V
Environmental Protection Agency

Lewis D. Walker 7/19/89
Lewis D. Walker Date
Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health)
Office of the Assistant Secretary of the Army (Installations and Logistics

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THE DECISION SUMMARY

This Decision Summary provides an overview of the site location and description; site history and enforcement activities; community relations history; scope and role of the response action within the site strategy; summary of site characteristics; summary of site risks; documentation of significant changes; description of remedial action alternatives; summary of comparative analysis of alternatives, including the nine evaluation criteria used to screen the alternatives; the selected remedy; and the statutory determinations. The Decision Summary also explains the rationale for selecting the remedy and how the remedy meets the statutory requirements.

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The Twin Cities Army Ammunition Plant (TCAAP) is a plant owned by the U.S. Army that is located in New Brighton, Minnesota (Figure 1). TCAAP occupies an area of approximately four square miles north of the Saint Paul/Minneapolis area. A number of communities surround TCAAP, including Arden Hills, New Brighton, and Saint Anthony to the south and southwest, Shoreview to the north and east, and Mounds View to the northwest. Residences located near the southwest corner of TCAAP are approximately one mile away from those areas within TCAAP that were identified to be sources of contamination.

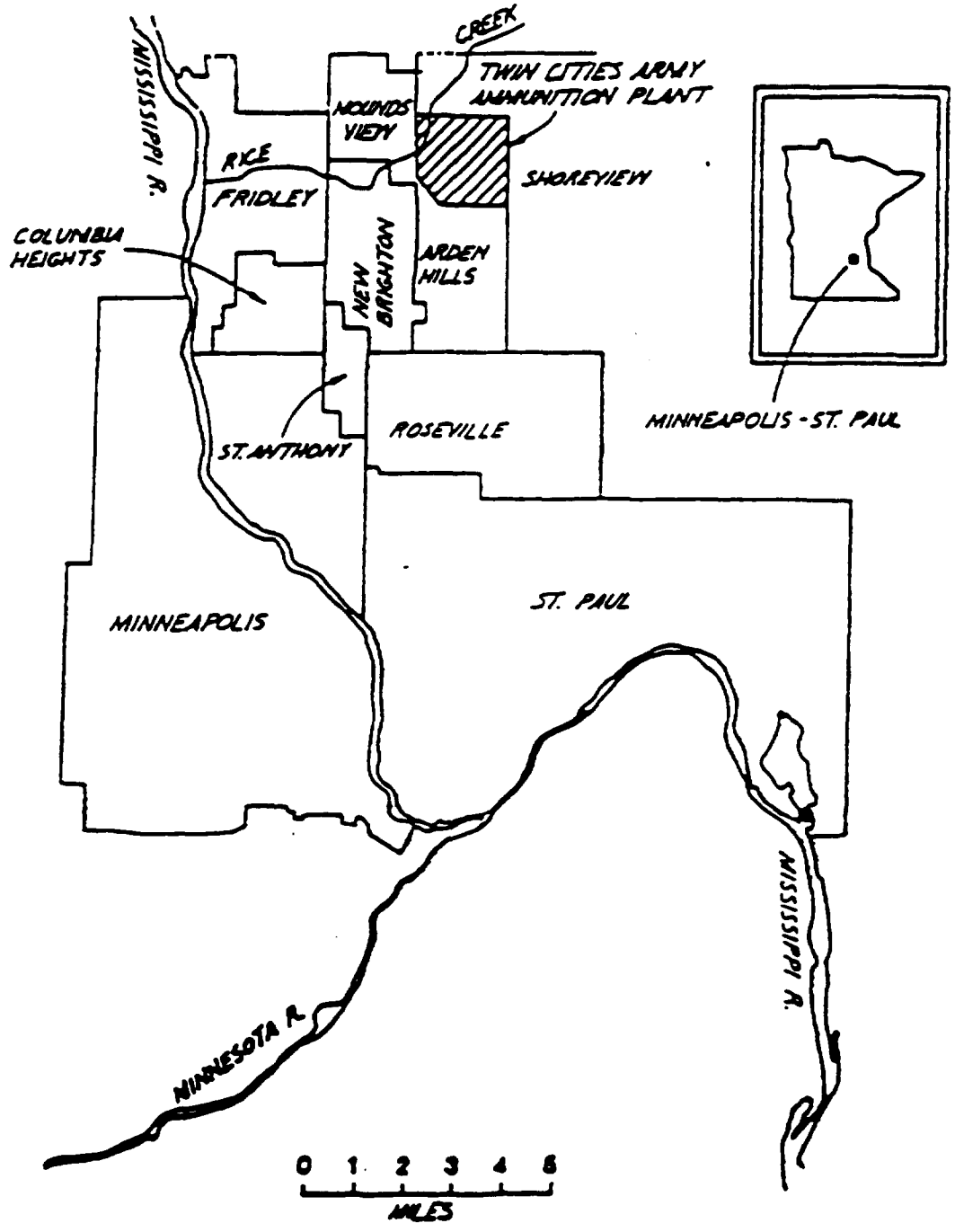
2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

TCAAP manufactured ammunition during major war conflicts. Wastes generated during manufacturing of ammunition were disposed of at several areas within TCAAP. Waste disposal, in turn, resulted in contamination of groundwater beneath and downgradient (southwest) of the TCAAP site. Earlier investigations on the groundwater contamination have identified a total of 14 waste disposal sites on the installation. Figure 2 depicts these sites, which have been designated Sites A through K, 129-3, 129-5, and 129-15. One of these sites is Site D.

To plan and dictate the course of actions necessary to remediate the contaminated areas of the TCAAP site, including Site D, the U.S. Army, the U.S. EPA, and MPCA signed a Federal Facility Agreement (FFA). The FFA was signed under the authority of Section 120 of CERCLA and became effective on December 31, 1987. All remedial investigation (RI) work and interim response actions (IRA) at the site were and are being undertaken in accordance with the stipulations of the FFA.

During the RI work at Site D, soil was found to be contaminated with polychlorinated biphenyls (PCBs). In addition to PCB contamination, other organic and inorganic contaminants were detected. Based on the RI work at the site, a soil gas

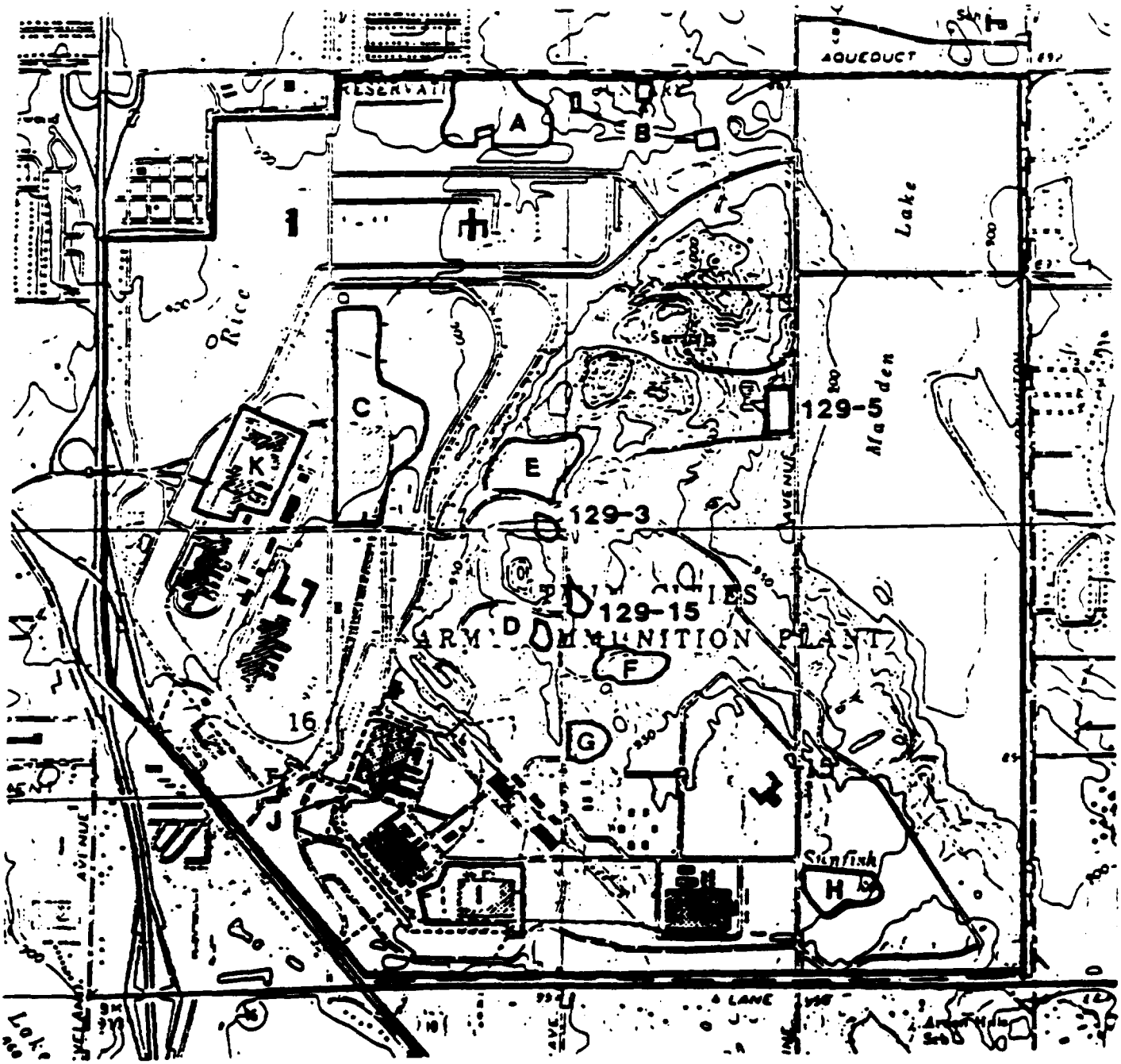
FIGURE 1



General Location Map of the

Twin Cities Army Ammunition Plant

FIGURE 2



Areas of Contamination in the Twin Cities Army Ammunition Plant

extraction system was implemented to remove the source of volatile organic contamination and reduce the potential of migration to the groundwater. In implementing the soil gas extraction system, PCB-contaminated soil was removed, stockpiled, and sealed within plastic liner material.

In November 1987, under the FFA, a feasibility study (FS) was conducted to identify, evaluate, and select the remedial action alternative that would: (1) be most protective of human health and the environment by permanently destroying site contamination; (2) meet all federal, state, and local regulatory requirements; and (3) be cost-effective. Of the five alternatives identified in the FS, on-site thermal treatment of contaminated soil was selected as the most feasible alternative. The FS was supplied to U.S. EPA and MPCA for review and approval. The U.S. EPA and MPCA concurred that the on-site thermal treatment alternative was the most feasible to implement at Site D, consistent with the requirements under CERCLA, SARA, and the NCP.

3.0 COMMUNITY RELATIONS HISTORY

Pursuant to CERCLA Section 113(k), 2 U.S.C.9613(k), and Section 300.67 of the NCP, the public, local authorities, Region V of the U.S. EPA, and the State of Minnesota were all requested to comment on the Interim Response Decision Record and the proposed ROD. Remediation was discussed at the community leaders meeting. One special meeting was held specifically to discuss the on-site thermal treatment. Since this ROD will be signed by the U.S. Army and U.S. EPA, these agencies will respond to each significant comment, criticism, and new data submitted.

Notification of comment period:	24 May 1989
Closing date of comment period:	22 June 1989
Public Meeting:	Held at New Brighton, Minnesota on June 15, 1989

4.0 SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

As described in Section 2.0 of this ROD, soils stockpiled near Site D are contaminated with PCBs, organic, and inorganic contaminants. These soils were excavated, stockpiled, and covered with a liner at the site. If no action were to be taken, the possibility of physical damage to the liner would potentially cause release of the above contaminants to the environment. The liner would have to be maintained and local groundwater monitored for potential adverse impacts indefinitely. Furthermore, the future access or land use of the site would have to be restricted in perpetuity. Therefore, the remedial action sought for alleviating contamination at the site should remove the source of contamination and, using treatment response technology, permanently reduce the mobility, toxicity, or volume of the contaminant mass. This would prevent potential future release, migration, or adverse impacts to human health and the environment.

5.0 SUMMARY OF SITE CHARACTERISTICS

Based on the results of previous investigations at the site, approximately 1,400 cubic yards of contaminated soil were excavated from Site D in 1985 to allow implementation of the soil gas extraction system at the site. The excavated contaminated soil was then stored, pending final disposal, in secure containment near Site D on a 40-mil high-density polyethylene (HDPE) liner, with a 20-mil HPDE cover. Testing of the excavated soil revealed the following average concentrations, in milligrams per kilogram (mg/kg) of the following contaminants:

Constituent	Average Concentration mg/kg
Organics	
PCB	71.1
1,1,1-Trichloroethane	65.2
Tetrachloroethene	2.3
Trichloroethene	341.0
Inorganics	
Arsenic	1.3
Barium	91.8
Lead	85.8

6.0 SUMMARY OF SITE RISKS

U.S. EPA conducted an Endangerment Assessment (EA) on PCB-contaminated soil at Site D. The EA evaluated site risks under two scenarios: (1) no-action, in which it is assumed that contaminated soil is left in place and the public can easily access the site (which is not possible under the present security of the TCAAP), and (2) on-site thermal treatment of excavated soil.

For conducting the EA, the following indicator chemicals were selected: PCBs, organic contaminants (1,1,1-trichloroethane, tetrachloroethene, trichloroethene, and dioxin), and inorganics (arsenic, barium, and lead).

It is believed that organic contaminants may migrate from the site primarily through volatilization and release of fugitive dusts. Because a portion of the area surrounding Site D is contaminated with organic (except PCBs) and inorganic contaminants, fate and transport data were ineffective in determining migration routes for indicator chemicals other than PCBs.

Under the no-action alternative, three exposure scenarios were identified: (1) ingestion of soils, (2) direct contact with soils, and (3) inhalation of volatile organic compounds (VOCs) and particulate air contaminants. Under the probable-case scenario, 6 lifetime excess cancer risks in a population of 10,000 might be induced due to contamination. Under the worse-case scenario, the lifetime excess cancer risk increases to 2 in 1,000 The no-action alternative poses potential risks to human health. These risks exceed the Superfund acceptable risk range of 1 in 10,000 to 1 in 10 million.

One exposure scenario was identified for the on-site thermal treatment alternative: inhalation of stack emissions. The worst-case lifetime excess cancer risk would be 4 in 10 million (equivalent to 1 in 2.5 million). Relative to the no-action alternative, thermal treatment does not present significant human health risks. The potential health risks that may be posed from implementing the remaining four alternatives considered in the FS were not quantified. However, the relative performance of these alternatives with respect to the nine evaluation criteria (presented in Section 9) is discussed in Section 9 of this ROD.

7.0 DOCUMENTATION OF SIGNIFICANT CHANGES

This ROD does not differ significantly from the public comment draft ROD of May 1989. There are no significant changes in the joint decision (by U.S. Army, U.S. EPA, and MPCA) to implement the selected remedy at Site D. This ROD has only been changed from the May 1989 public comment draft ROD to clarify the criteria and basis used in this decision.

8.0 DESCRIPTION OF REMEDIAL ACTION

The FS for remediating PCB soil contamination near Site D identified and evaluated five response action alternatives: (1) no action; (2) transfer of contaminated soils to Honeywell's Retrievable Monitored Containment Structure (RMCS) located near Building No. 502 of TCAAP; (3) off-site disposal; (4) on-site thermal treatment; and (5) off-site thermal treatment.

Alternative A: No Action

Under the no-action alternative, the contaminated soil would remain in the secured soil storage area near Site D. Specific components of the no-action remedial alternative include:

- Continue maintenance of the HDPE liner, site fence, and access gate.

- Leave the contaminated soil in its present location for an undetermined period of time.

Alternative D: On-Site Thermal Treatment

Soil remediation by the on-site thermal treatment method involves the use of a leased portable thermal processing unit at the soil storage area. The thermal treatment technology would eliminate environmental threats posed by leaving the contaminated soil on-site as well as avoid any liability incurred by placing the material in a SCMF. The thermal treatment process involves:

- General site preparation
- Mobilizing thermal processing unit
- Thermal processing of soil
- Disposing of treated soil (ash)
- Demobilization
- Site closure

Implementation Time: Approximately 3 weeks of thermal processing.

Total Cost: $1.2 million

Alternative E: Off-Site Thermal Treatment

This alternative is to transport the contaminated soil and liner to an off-site thermal treatment facility for destruction: it involves the following measures:

- General site preparation
- Load transport vehicles
- Decontaminating loading equipment and transport vehicles
- Off-site transportation/disposal
- Site closure

Implementation Time: 3-7 months

Total Cost: $4.7 - $5.0 million

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section describes the criteria used for evaluating the remedial action alternatives and identifies the strengths and weaknesses of each alternative in satisfying these criteria. It also identifies the legally applicable, relevant, or appropriate requirements (ARARs) with which the remedial actions have to comply.

9.1 EVALUATION CRITERIA

The alternatives are weighed against nine evaluation criteria:

- Overall protection of human health and the environment;
- Compliance with applicable or relevant and appropriate requirements (ARARs);
- Long-term effectiveness and permanence;
- Reduction of mobility, toxicity, or volume (M/T/V);
- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance; and
- Community acceptance.

In addition, the selected remedy must satisfy the statutory requirements of Section 121 of CERCLA as amended by SARA.

9.2 COMPARISON OF ALTERNATIVES

The five remedial action alternatives are compared below in terms of their ability to satisfy the above nine evaluation criteria:

Overall Protection of Human Health and the Environment

Under the no-action alternative (Alternative A), the contaminated soil would be left intact and the potential for releasing contaminants to the environment would still exist because of possible physical damage to the HDPE liner material.

On-site storage in Honeywell's RMCS (Alternative B) and off-site disposal (Alternative C) would alleviate the potential for adverse environmental impacts by storing and monitoring the contaminated soil in approved storage facilities. However, Alternatives B and C do not provide a permanent solution to the

contamination problem but transfer the contaminated soil from its existing location to other disposal areas. Under Alternatives B and C, on-site workers may be exposed to contaminated soils by ingestion or inhalation during removal of the soil from Site D. In addition, Alternative C would pose a potential threat to the surrounding population because contaminated soil would need to be transported off-site.

On-site thermal treatment (Alternative D) and off-site thermal treatment (Alternative E) would provide the greatest degree of protection possible to human health and the environment by permanently destroying contaminants present in the soil. Under Alternatives D and E, on-site workers may also be exposed to contaminants during removal of soil from Site D. Only Alternative D would minimize handling and avoid transportation of the contaminated soil. On the other hand, Alternative E would pose a potential threat to the surrounding population because of the need to transport contaminated soil off-site.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

All alternatives except no-action would achieve ARARs and the requirements of the Federal Facility Agreement (FFA). However, on-site storage and off-site disposal alternatives (Alternatives B and C) do not satisfy the spirit of the land disposal restrictions under the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Act (HSWA) of 1984; nor do these alternatives satisfy the preference of SARA Section 121 for solutions that permanently reduce the mobility, toxicity, or volume (M/T/V) of contamination by implementing a response treatment technology. Under Alternatives B and C, transferring the contaminated soil to the RMCS or off-site (SCMF) would require RCRA manifesting in accordance with Minnesota Rules, Part 7045.0261. Transportation of the contaminated soil would also have to comply with Minnesota Rules, Part 7045.0371. Any applicable RCRA or Toxic Substances Control Act (TSCA) permit(s) would need to be maintained by Honeywell (for the RMCS) or the SCMF for the duration of the storage period.

On-site and off-site thermal treatment alternatives (Alternatives D and E) would be consistent with the preference of SARA for solutions that permanently reduce the M/T/V of the contaminated soil. In addition, Alternative E would have to comply with the manifesting and transportation requirements described above. Both Alternatives D and E would have to comply with the TSCA requirements presented in the Code of Federal Regulations (CFR §761.70). A permit from the Metropolitan Waste Control Commission (MWCC) would be required under Alternative D for discharging scrubber blow-down water to the TCAAP sanitary sewers. Following thermal treatment of the contaminated soil, Site D closure requirements set forth in the FFA would also have to be met.

Long-Term Effectiveness and Permanence

Alternatives A, B, and C would do nothing to remove permanently and effectively the contaminants of concern. Only on-site and off-site thermal treatment (Alternatives D and E) would destroy permanently the contaminants by treating thermally the contaminated soil. According to the TSCS requirements, Alternatives D and E would have to meet a Destruction Removal Efficiency (DRE) performance standard of 99.9999 percent, or greater, to ensure that contaminants are effectively removed from the Site D soil.

Reduction of Mobility, Toxicity, or Volume (M/T/V)

The no-action alternative would not reduce the M/T/V of contamination because, under this alternative, no treatment or containment measures would be implemented. On-site storage and off-site disposal (Alternatives B and C) would reduce the mobility of the contaminants in the short-term by reducing the potential for migration due to infiltration or precipitation. Only on-site and off-site thermal treatment (Alternatives D and E) would permanently reduce the M/T/V of contaminants from the contaminated soil.

Short-Term Effectiveness

Except for the no-action alternative, the remaining alternatives would effectively alleviate the contamination problem at Site D on the short-term basis. The primary short-term concern during implementation of any alternative other that no-action would be with volatilization of VOCs and PCB-contaminated fugitive dust that may be generated during handling of soil. The on-site storage, off-site disposal, and off-site thermal treatment would require more handling of the contaminated soil than on-site thermal treatment. Therefore, the on-site thermal treatment alternative would involve minimal soil handling and would be more effective than the other alternatives on the short-term basis.

Implementability

All considered remedial action alternatives are implementable. The no-action alternative (Alternative A) would only require maintenance of the fence, the HDPE liner, and monitoring of the contaminated soil and ground beneath the site. On-site storage and off-site disposal (Alternatives B and C) would utilize conventional construction equipment such as front-end loaders, bulldozers, and trucks to remove the contaminated soil and transport it to its final destination (on-site to the RMCS or off-site to a SMCF). The FS estimated that it would take approximately 30-60 days to implement Alternative B and 30-60 days to implement Alternative C. On-site and off-site thermal treatment (Alternatives D and E) would implement proven technologies for treating and removing PCBs and VOCs from the contaminated soil. The estimated time for implementing Alternative D is approximately 3 weeks while implementing Alternative E would take 3-7 months.

Cost

The total costs for the remedial action alternatives were presented in the FS for PCB-contaminated soil remediation at the site. These costs are presented below:

Alternative	Description	Total Cost (1989 Dollars)
A	No-Action	$500/month
B	On-Site Storage	$100,000 + Monthly Fee
C	Off-Site Disposal	$500,000 - $1,000,000
D	On-Site Thermal Treatment	$1,200,000
E	Off-Site Thermal Treatment	$4,700,000 - $5,000,000

The costs shown above represent 1989 dollar estimates. The on-site thermal treatment alternative (Alternative D) is the second most expensive alternative after off-site thermal treatment.

State Acceptance

The State of Minnesota fully agrees and supports the on-site thermal treatment alternative. The other alternatives are less acceptable to the State because either they do not provide a permanent remedy for the contamination problem or they do not reduce the M/T/V of the contaminants.

Community Acceptance

From the public meeting held in New Brighton, Minnesota on June 15, 1989, and from no public comments received during the comment period, it appears that the public has no distinct preference as to which alternative is acceptable for remediation of contaminated soil. A total of 41 people attended the June 15th public meeting, of which about 10 were private citizens and not from federal, state, or local agencies.

9.3 IDENTIFICATION OF LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The purpose of this section is to identify the federal and state ARARs that should be applied to the effluent from the thermal treatment system, pursuant to Section 121 of SARA.

The following factors were applied in selecting ARARs:

1. Any standard, requirement, criteria or limitation under federal environmental law may be an ARAR [SARA 121 (d)(2)(A)(1)]. Non-binding advisories, goals, and guidelines are not ARARs.

2. Any promulgated standard, requirement, criteria or limitation under a state environmental law that is more stringent than any federal standard is of general applicability, enforceable by the state, and identified by the state to the U.S. Army in a timely manner, may be an ARAR.

3. Only substantive requirements may be ARARs. Permits, notices, and reporting requirements in federal and state laws do not apply to CERCLA response actions.

Based upon these factors, the intent of the following standards and regulations are applicable federal and Minnesota ARARs:

1. Resource Conservation and Recovery Act (Federal)

2. The Toxic Substances Control Act Regulations (Federal)

3. Standards issued pursuant to the Clean Air Act by the Minnesota Pollution Control Agency (Federal and State)

4. Discharge limitations as related to the Clean Water Act from the scrubber water discharge

5. Occupational Safety and Health Act

At this time there are no known toxic substances, pollutants, or any contaminants, as defined by SARA, migrating from the stockpiled PCB-contaminated soil. The U.S. Army, in conjunction with the U.S. EPA and MPCA, will continue to monitor any toxic substances, pollutants, or contaminants that may migrate from this PCB-contaminated soil pile, and will take appropriate action to avoid imminent and substantial danger to public health or the environment.

Establishing water quality criteria to determine the necessary extent and degree of remediation for groundwater migrating from the TCAAP site is not part of this interim ROD. Such determinations will be based on ARARs or on a risk-based number and will be included in the final RI/FS and ROD. However, a thermal treatment level for the soils will be based upon a PCB concentration of 2 parts per million (ppm) or less to meet the TSCA requirements. Processed soil found to have PCB concentrations of greater than 2 ppm will be returned for retreatment. In the past, the thermal treatment chosen has consistently reduced the PCB concentrations to below detection levels.

10.0 THE SELECTED REMEDY -- ON-SITE THERMAL TREATMENT

This section describes the selected remedy and the rationale for its selection.

10.1 DESCRIPTION OF THE SELECTED REMEDY

A mobile infrared thermal treatment unit owned by the OH Materials (OHM) Corporation will be used on this site to thermally destroy the polychlorinated biphenyls (PCBs) in the soils. The OHM treatment unit has been contracted through the Ecova Company. This unit has a National Toxic Substances Control Act (TSCA) permit to dispose of PCBs.

The mobile thermal treatment process consists of a high-temperature-powered primary chamber with a high-temperature alloy belt conveying system. The secondary chamber is fossil-fuel fired, operated at a temperature of approximately 2,000° Fahrenheit. Combustion off-gases from the secondary chamber will be run through pollution control equipment consisting of a quench section, a scrubber chevron mist eliminator, and a packed column chemical scrubber.

The thermal treatment operation will be performed in accordance with conditions of the TSCA permit and other applicable requirements [40 CFR §761.70(b)(2)]. Comprehensive monitoring of the process streams and complete system checks will be conducted to ensure safe and efficient operating conditions.

Thermally treated soil will be analyzed to ensure a PCB concentration of less than 2 ppm before it is placed at an area near Site D.

Treated wastewater, meeting the regulatory guidelines, will be discharged to the TCAAP sanitary sewer system and ultimately to the MWCC system.

After completing the soil thermal treatment, the equipment used in the process will be decontaminated before being removed off-site.

10.2 RATIONALE FOR SELECTION

The selected alternative is chosen based on the assessment of each criterion listed in Section 9.2. Section 121 of CERCLA stipulates that to be considered for selection in the ROD, an alternative must be protective of human health and the environment and able to attain ARARs, unless a waiver is granted. For those alternatives that met these statutory requirements, the U.S. Army, U.S. EPA, and MPCA focused on the other evaluation criteria, including short-term effectiveness, long-term effectiveness, implementability, permanently reduced M/T/V of contamination, and cost.

Thermal treatment technology satisfies all of these criteria, particularly permanence. On-site thermal treatment was found to be more cost-effective than off-site thermal treatment. Additionally, the short-term impacts associated with off-site treatment, such as increased truck traffic and the transportation of contaminated materials untreated over long distances through public access areas, are considered to be less acceptable than the construction impacts associated with on-site thermal treatment.

The U.S. Army, U.S. EPA, and MPCA also considered nontechnical factors that affect the implementability of a remedy, such as state and community acceptance. Based upon this assessment, taking into account the statutory preferences of CERCLA and SARA, the thermal treatment approach was selected for the site.

11.0 STATUTORY DETERMINATIONS

The interim remedial action selected for implementation at the site is consistent with CERCLA, SARA, and, to the extent practicable, the NCP. The thermal treatment alternative addresses the five statutory criteria in the following manner:

(1) Protects Human Health and the Environment

Thermal treatment will permanently reduce the risks presently posed to human health and the environment by preventing exposure to contaminated soils.

(2) Attains ARARs

This remedy will meet all applicable federal, state, and local ARARs that apply to the site. Federal environmental laws that apply to the selected remedial action at the site include:

- Resource Conservation and Recovery Act (RCRA)
- Clean Water Act (CWA)
- Toxic Substances Control Act (TSCA)
- Clean Air Act (CAA)
- Occupational Safety and Health Act (OSHA)

During removal and thermal treatment of PCB-contaminated soil, air emissions will be monitored and all relevant federal and state standards will be attained. Specifically, the National Ambient Air Quality Standards (NAAQS) will be met through specified techniques for activities, as well as required air monitoring during removal, to ensure that site-specific ambient levels are not exceeded.

OSHA regulations include 29 CFR 1910.120, which specify standards for handling hazardous wastes, and 29 CFR 1910.1000, which sets allowable ambient air concentrations for VOCs in the workplace. Suppressant foams and air-purifying and filtering devices will be used to comply not only with OSHA regulations but with any federal and state air quality standards.

(3) Is Cost-Effective

The estimated cost of on-site thermal treatment may be somewhat higher than several of the other remedial alternatives. However, the U.S. Army, U.S. EPA, and MPCA believe that the selected remedy is cost-effective because it will permanently destroy the PCB contamination at the site.

(4) Employs Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

Thermal treatment technology provides a permanent solution to the PCB problem at the site. Removing and treating the PCB-contaminated soil will reduce the risks posed to human health by virtual complete destruction of PCBs, as well as by eliminating the potential risk of release of PCBs from the soils into groundwater.

(5) Satisfies the Preference for Treatment as a Principal Element to Reduce Mobility, Toxicity, or Volume

Thermal treatment of PCB-contaminated soils will reduce the M/T/V of the contaminated soils and will minimize the threat posed by these soils to human health and the environment.

PUBLIC MEETING
PCB-CONTAMINATED SOILS
INTERIM REMEDIAL ACTION PLAN

JUNE 15, 1989 - 7:00 P.M.
NEW BRIGHTON CITY HALL

Opened at 7:00 P.M.

Clarence Oster: Please, all of you that have not signed up out at the entrance way, please sign up so we can get your name and address and then when we have future such gatherings as this we can make sure that we can get you on the mailing list. This podium over here will be set up for those of you that want to make individual statements following this public meeting. We ask that you use the mike and ask that you state your name so that we can get that all down on tape.

My name is Clarence Oster and I am the Project Manager for the Army out at the TCAAP site. With us in our introduction comments here are Art Kleinrath, who is the Project Manager for EPA, and Mark Schmitt, Project Manager for the MPCA.

The purpose of this meeting - you will hear more of this from Art and Mark - is one of many meetings that we hold for many of the different remedial action programs that we have ongoing out at the Twin Cities Army Ammunition Plant. Some of you have probably attended past public meetings, maybe you have seen public notices on it; but this particular project is one of many of those that we have ongoing and we will have more of these meetings and there will be lots more projects that are going to continue.

So with those introductory remarks, I will turn this over to Art Kleinrath.

Art Kleinrath: I am Art Kleinrath and I work for U.S. EPA out of their Chicago office, Region V. I am assigned by the Superfund Division there to be the Remedial Project Manager at the Twin Cities Army Ammunition Plant. What we are here to talk to about tonight is the proposed thermal treatment of contaminated soils that rests on the TCAAP site. What we are going to be discussing has been considered and studied for quite a long time by the Army, the MPCA, and the U.S. EPA, all in coordination and cooperation with each other. The U.S. EPA believes that this proposed remedy for destruction of the contaminants is the best alternative that we have to do with the soil.

As Clarence mentioned, tonight is part of the decision-making methods that we use in Superfund projects. What we have done is we have collected a set of alternatives - remedies that we can use for the contaminated soils - and we have chosen one and we propose to go forward with it. What we are asking for tonight is public input into that decision-making process, and that can be done

either in written form mailed to the address on the News Sheets that are out front at the door, and taken as oral comments tonight. We will be having a taped transcript of this meeting and each and every comment will be considered before any final decision is made. The responses to those comments would be put in writing in a document called the Responsiveness Summary that would be issued at the same time as the final decision. The procedure that we are following is the procedure that is followed for Superfund and we are desiring your input into this process, but the thing to understand is this is also your right under the law. In order to help separate the questions from the comments, I think it might be a good idea if we took the questions after the presentation separately and will ask for comments to ensure that everybody's comment can get included in the decision-making process. This effort that is culminating this proposal that we are putting forth tonight has been jointly worked on by the Army and the U.S. EPA and the Minnesota Pollution Control Agency. Now what I would like to do is turn over the microphone to Mark Schmitt of the Minnesota Pollution Control Agency.

Mark Schmitt: Thanks, Art. My name is Mark Schmitt and I am Project Manager for the TCAAP site for the Minnesota Pollution Control Agency, and I am here to represent the interest of the State as regards to the proposed remedial action at TCAAP on the thermal treatment of the contaminated soil. I am here to express support and reiterate some of the opinions you have heard already from Mr. Oster and Mr. Kleinrath, that MPCA has for some time now been working rather closely with the Army and with EPA in evaluating the potential remedial action that we are discussing tonight. I am here now and I want to go on the record as saying that the MPCA enthusiastically supports the proposed remedial action. As we will hear later in the program this evening, there are many alternatives that were considered and it's our opinion that the one that is being proposed as the final remedy is far and away the best option. It would have been very easy for the Army to pursue other options that would have been less expensive, but of particular satisfaction to the MPCA is the fact that the Army is choosing an option which will not transplant the contaminated soil but will actually destroy the contaminants in the soil. As a state representative here, I am very interested in hearing your opinion on the proposed remedial action and I want to also assure you that irregardless of the remedial action that ultimately is implemented here, that MPCA staff will be on site to monitor the activities that's going to go on, and with that, I'll turn it over back to Clarence.

Clarence Oster: Thanks, Mark. My remarks are going to be very brief and they are going to involve the Record of Decision, which has been out on public notice for approximately three weeks. Will stay out there so that written comments can still come in until June the 22nd.

The Record of Decision basically uses the analysis of the alternatives and this is what those are based upon, as you can see on this slide. The Technical Feasibility, the Implementation Timeframe, the Regulatory Compliance, Cost, and the Environmental Effectiveness. The five alternatives that were looked at and are listed in the Record of Decision are the ones that you see on the slide. No. 1 of course is no action, which means that you leave the stuff there and you don't do anything with it, which I don't believe anybody feels is a very good idea. The monitoring would continue, etc. The next one talks about transferring it to another storage facility within the TCAAP. The third one is off-site disposal which involves hauling the materials to a hazardous waste landfill out of the state - there are none in Minnesota, so we are dealing with something in Ohio, Illinois, Oklahoma, or some place like that. The fourth alternative is on-site thermal treatment which is the preferred method and that's the one that we are going to discuss more in detail this evening for your information and for your comments and suggestions. Lastly, we looked at off-site thermal treatment which means that you haul the material to a hazardous waste incinerator which might be in Arkansas, Oklahoma, or wherever.

These are the alternatives that were looked at. Again, like I said, the on-site thermal treatment was looked at because of the following reasons: no transportation of hazardous waste is required; it's a permanent solution which everybody likes - it eliminates the future liability; and then, it is the EPA/MPCA/Army preferred alternative. Now, to cover more of what this remedial action plan is, we have consultant Norm Wenck who will show you slides also and he will talk to you in detail about what that remedial action plan is.

Norm Wenck: Thank you, Clarence. Wenck Associates is a consulting engineering firm and we are located out in Wayzata. We have been involved with this project since 1985. The purpose of the overall project was to clean up a contaminated area here called Site D, which is in the center of the Twin Cities Army Ammunition Plant. It is approximately a mile from any direction from the fence line. I am going to show a few slides about taking out this soil, what we did with it, and something else that we are doing with this site that was the reason that we found it. The soils were discovered there contained PCBs. This is a view of the site before they were removed. They were discovered through some drilling, soil samples that were taken. It was decided to remove these soils before another action was taken. They were taken from the site and moved approximately 100 feet to an area that was prepared. We laid down a 40-mil liner, the seams were all heat sealed, the contaminated soil was placed on this liner, it was then sampled and tested, and then we ended up covering the liner and sealing it all around, and it's sort of like a ravioli sitting out there today. It has been monitored over the years. Like I said, it has been there since November-December of '85. It's in a secure area at this time and will continue to be until the action is taken. What we did with that site is built a vacuum system to clean the soils from other organic contaminants that were there. That has been successfully been operating, and it's operating today.

The particular subject tonight that I want to talk about is the remedial action plan which is this document that I am just going to briefly highlight some of the things in the plan. This plan was developed after the selected alternative of on-site thermal treatment was, and only deals basically with the on-site thermal treatment.

As I said, the soil is presently stored there with a security fence. In 1987, a series of demonstration test burns were performed using the technology that's proposed here, and achieved what's called six nines (99.9999%) removal of the PCB contaminants. Tests were performed on the ash and it was found to be not hazardous according to the RCRA requirements. The PCB soils will be treated to below two parts per million, or two milligrams per kilogram. The purpose of the plan is to thermally treat the soils in conformance with what's called TSCA - the Toxic Substances Control Act - and the thermal treatment unit that will be used is presently permitted and has gone through rigorous monitoring and testing to make sure that it will meet the EPA requirements. The work plan, of which I have been talking here, describes the remedial actions and presents the detailed information on that thermal treatment. I am going to be covering mostly in a general manner and then we are going to have Greg McCartney talk about specifically the thermal treatment method and technology.

The soils, as I showed you, are contained in the liner. They are about 1400 cubic yards of soil. The average PCB contamination level is 70 parts per million, or .007% - a very low level. When we removed it, the level, if the soil would have been below 50, it could have basically stayed where it was. It was over the 50 limit at that time and so that's why we had to remove it.

There are seven parts of the remedial action. First will be the site preparation which will be to grade the site, install concrete pads, (you will see some slides of the equipment that will be brought in), and put in the connections for the water, the electricity, the gas, and the sewer discharge. Soil samples will be taken from below the pads to insure that there is nothing there before we start because we will be checking after we finish to see that we did not leave any contamination there. Concrete pads will be surrounded by 10-inch high curbs to prevent any water or rain that happens from running off and also from rain running onto the site. Any run-off or water that's collected during the process will be treated. The concrete will be sealed so that when we are through we will be able to clean it properly. Then equipment will come in. It's contained in about 15 trucks. After this mobilization it will be set up, installed, and you will see some more details on that. There is a start-up and check-out protocol to make sure that everything is working mechanically and electrically, there is computer control and lots of checks that will be performed.

Then we go to the soil handling. If there are over-sized objects to be crushed, there will be a crusher on site to make sure the materials are all one inch or smaller in size. Fuel oil will be mixed to increase the BTU content of the soils, and then will be fed to the incinerator which has a primary chamber, a secondary chamber, and air pollution control devices, gas scrubber. The process is computer controlled and all the time there are operators on-site controlling it. constant monitoring of emissions, constant monitoring of the oxygen, carbon dioxide, and carbon monoxide - which are the parameters to control the process - in addition to temperature. The clean soils come out; they are tested for PCB, and they are held until we get one-day turnaround soil sample analysis so that we know that soils in the cleanup are below 2 mg/l, and then they are stored near the site where they will remain. If they do not meet the level of two parts per million, they will be recycled. There will be other residuals that will result. From scrubber, solid step media, filter media; these again will also be sampled and if they have PCBs they will be incinerated. There are other tests called EP Toxic tests that will be performed. If there are any problems there, these materials might have to be handled as hazardous wastes and they would be drummed and properly handled.

So we have the clean soils, the other residuals, we have permission from the MWCC to discharge any clean water that doesn't contain PCBs that we are using in our process. It is held until the test results come back and then we get permission from the MWCC to discharge that water.

Then the final thing is decontamination of the equipment and of the pad and the work area. We check that, soil sampling, wipe samples on the pad, etc. If there is any contamination, it is taken care of and possibly some of it may be incinerated and then, of course, decontaminated again to make sure we have removed all the soil.

We have a number of things that we are monitoring. I have sort of listed them as I have gone along but we will be monitoring the ambient air, the air on the site and at the property boundary of TCAAP, to take background measurements before we start, and every day will be taking measurements. People from our firm will be doing that because as we get finished with the job we will be certifying that it was done in accordance with the plan. We will be sort of overview of the project as it continues.

The stack emissions, as I have mentioned, will be continuously monitored. The oxygen, CO and CO_2 will be monitored on a continuous basis, continuous records. As mentioned, the soil will be monitored before each batch is classified as clean, and also then as we finish there will be monitoring decontamination of the water that's used, the equipment, the pad, and the area.

There are some other considerations we might just touch on. That is site control - no one will be in the area that isn't required to be there. The area will be surrounded by the same kind of fence that we show around the storage area right now. We have a health and safety plan that prescribes how people dress when they

are working around this and what kind of gloves they wear, overalls and boots, and that level of safety that they need to have while they are working.

Then documentation as I mentioned - we will be on site during the work and will be accumulating all the operational records, the process records, the monitoring records, and the daily logs, and putting them into a documentation report which will be prepared as part of the certification that it was completed in accordance with the plan.

The proposed schedule for the work is broken down into five activities - site preparation from the day of approval to proceed will take three and a half weeks, mobilization just a few days or a half week, putting all the equipment together is two weeks, the actual thermal treatment of the soil will take three weeks. It will be a 24-hour day operation. To decontaminate and demobilize will be another two weeks. It's about a twelve and a half week time period from the time to go ahead to hopefully we will be out of here and gone.

That's the end of my presentation. I would like to introduce Greg McCartney with OH Materials, who is the firm who has been contracted to actually do the thermal treatment.

Greg McCartney: Hello, I'm a project engineer with OH Materials. OH is an environmental services company that has over 20 years of experience in remediating ehvironmental problems. What I want to talk to you about today is the OHM thermal treatment process, which has been chosen as the alternative to be used out at the TCAAP site.

This is a schematic of the process. This type of technology has been used for over 60 years in the metal annealing industries. This is a perfect temperature control type of furnace that can deliver the needed heat for annealing metal parts for the heavy equipment. I want to point out some of the aspects of this unit.

The soil is fed to the unit at this point where it is leveled out and it drops down onto a metal conveyor belt which pulls the waste through the thermal treatment unit. There are electric heating outlets mounted above on this unit which heat the soil up to approximately 1200° Fahrenheit, at which temperature all the organics will leave the soil, thus leaving the soil free of contamination by the time that it exits the unit. The organics are then taken over to a secondary combustion chamber. This is the place where the organics that are contained in the waste are actually destroyed. This chamber is operated at over 2000° Fahrenheit. After this, the organics are combusted in this unit.

This is the primary chamber (slide) being brought onto our first project which was a Superfund project down in Florida. That project consisted of over 18,000 tons of materials that were contaminated to a level that was approximately three times more concentrated than at the TCAAP site.

This is the chamber (slide) being backed onto the site. You can see it's a big piece of equipment.

This is a slide of the conveyor belt which is inside the chamber. This conveyor belt can reach temperatures of 1600° Fahrenheit.

These are the secondary chamber modules (slides) before they were mounted on the trailer; you can see the 13 inches of insulation which assures that the 2000° Fahrenheit chamber on the inside does not come to the outside. The outside skin of this unit is designed to remain less than 150° Fahrenheit.

This is the scrubber trailer (slide) being brought onto the site. This is where the gases are cooled, quenched, and scrubbed of particulars.

This is an overall shot (slide) of the unit as it was set up at the site in Florida. There was a vacant building at this site so we decided to utilize it since in southern Florida you do get quite a bit of rain.

You can see the (slides) primary chamber here, secondary chamber, air pollution control devices, and then the exhaust fan.

You can also see another exhaust fan here (slide). This is an emergency backup exhaust fan. The way this system was designed, it is fail-safe. If we have a power outage, this emergency backup blower will start automatically on an emergency generator and the scrubber pumps will also be operated off this unit in order to include any emissions being discharged during a power outage. The unit is also equipped with many interlocking devices in order to make sure that the permit conditions are maintained.

An aerial shot (slide) of the unit as it was set up at one point.

Control trailer, all the control equipment, computer equipment, monitoring equipment will be in this trailer (slide).

The electrical equipment is located in this trailer - the primary, secondary, and pollution control devices (slide).

The advantages of the infrared process - there are a couple of them - is that the waste has a precise time in the chamber. When it is set for 30 minutes, you know your waste is in there for exactly 30 minutes. There is very accurate temperature control since the heat is put into the unit through the electrical heating elements; you can control the furnace atmosphere; there is a low combustion gas flow since you are indirectly heating the primary chamber; there is a high throughput on this trailer so we can get quite a bit of tonnage through the trailer and thus make the project shorter. There is also minimal mechanical agitation inside this unit.

This is a slide of the computer console; there are two completely redundant systems here so if one fails the other one can be used to control the incinerator. The operator can monitor the site with the video screens. He has two-way communication with the

field and he also has outside communication. On the screen he has all the motors, pumps, and all the electrical monitoring devices shown. If anything was to go out of specifications, the waste feed system automatically shuts down and the operator can know immediately what the problem is and he can resolve it there.

This is the emissions monitoring equipment (slide) that Norm talked about - carbon monoxide, carbon dioxide, and oxygen. They are recorded and monitored on a continuous basis. This information is continuously fed to the computer console and it assures that the proper permit conditions are maintained inside the incinerator during the process.

This is the crushing plant (slide) to assure that the waste is all sized less than one inch before it's placed into the incinerator.

This is the feed hopper (slide) for the incinerator. At that point is the last time the material is exposed to the outside atmosphere; from thereon it is totally enclosed into the primary chamber where it is leveled out and thermally treated. The thermal treatment unit also has negative draft on the entire system. Therefore, if there is a leak from the unit, it is leaked into and not out of the unit.

Picture inside the primary.

The shot inside the secondary where the 2000° temperature and four-second retention time for gasses to release.

This is the air pollution control device and the exhaust stack (slide).

Here is the point (slide) where the soil enters the unit at this far end, you can see the controls here. It comes out this end after it has been decontaminated and is loaded into a truck and transported to an analytical storage area where the verification of the cleanup criteria is established.

This unit has been through a very comprehensive demonstration program with the U.S. EPA out of Washington, DC, the Office of Toxic Substances. We have completed over eight demonstration runs with this unit, during which all of the guidelines and requirements were exceeded for the destruction of PCBs. With that, we have been authorized by the U.S. EPA in order to use this on other sites.

Clarence Oster: That's the conclusion of what this project is and our presentation to you. I guess at this point is when we open it up, and Art indicated we should try to keep it for questions first. So, are there any questions? Again, if you would please, if you would step up to the mike and state your name and I guess it doesn't have to necessarily be to your affiliation, but at least so that we know or we can trace you back to the registration slip.

If there aren't any questions, are there any comments?

My name is Mark Murlowski and I live in New Brighton. I was just curious - is there going to be required to have a performance bond for this particular work through the company that is going to be doing the remedial action? Did bonding ever enter into it?

Clarence - Maybe I can take a shot at that. Performance bond normally does not enter into these that I am aware of, but what has been used in this case is the past testing and, as you heard from OH and from the regulatory agencies, that they have a hazardous waste permit for this unit. So based upon that, is the go ahead to do the work.

Mark Murlowski: ***Where does the ultimate liability rest then, if there was a problem?***

Clarence - I guess the ultimate liability would rest with the Army, who is funding all the remedial action projects.

Greg McCartney: Clarence, I think I might be able to clarify something here. In obtaining our National TSCA permit, we needed to supply financial assurance for the closure of the unit, which is provided to the EPA in Washington. If there was a problem, the EPA in Washington has the funds to demobilize, decontaminate, and remove the incinerator from the site. That is a part of the requirements to obtaining the permit; that way the liabilities are covered.

Mark: ***So liabilities are covered through the government again, rather than through a private firm such as yourself.***

Greg: No, we provide the assurances.

Mark: ***The government holds the assurances?***

Greg: As a private contractor, we have to provide those and they are supplied to the government and they are given the authorization to use it.

Carlos Stern: As I understand it, the payment is based on achieving the performance level, and if they don't achieve the performance level they have to keep doing the job until they do or they don't get paid. The goal that Clarence described is the necessary point for receiving payment.

Mark: ***My question more was with regard to, rather than them being paid for the job done adequately, is in case there was a problem, is there an insurance company that backs up the problem or is there ultimately a performance bond to kick in, that type of thing? I mean, a liability could be tens of millions of dollars where possibly this action is significantly less than that.***

Clarence: I'm not aware of anything like this, unless some of the consultants are. I know the consultants have a real concern about liabilities, etc., and Congress has been fighting with this. If there are some lawyers in the audience, perhaps they may have some idea. Carlos?

Carlos: I'm not a lawyer, but in similar situations my experience has been that unless there is negligence on the part of the contractor, the responsibility basically is with the party that generated the waste. They have the liability now. This is the way to terminate the liability that's there already. If a problem emerges of a type, I don't know what you have in mind, there would be an argument I imagine between the Army and the contractor as to whether they behaved and acted in a professional manner.

Clarence: I could visualize, let's say that we haul this material off site to a landfill in Oklahoma and along the way, either by train or trucks or whatever, there were accidents or something happened and the materials ended up on the roadside and whatever, those materials will still be the responsibility of whoever, in this case the Army, so we would have to go out there and clean it up. We would probably go after that firm that did the work, like Carlos says, to see if they acted in a responsible manner. If it was a complete accident, if a tornado went through or something, well then you know that's something by itself.

Clarence: Are there any other comments from Art or from Mark?

Art: Just in terms of the performance, I think the one thing to really truly remember here is that assurances were performed - in terms of the system that's been set up, in terms of the trace of that system, and in terms of the fact that the contaminated material won't be put to rest permanently until it has already been checked and the operating conditions will be continuously monitored to know that fact in order to ensure that things don't go wrong.

Clarence: Art, what do you do in other Superfund sites where this cleanup goes on and whatever may happen?

Art: Well, there is an indemnification for things that are done under Superfund. In case of situations as the Army, we look at the Army or whatever the party would be.

Clarence: Or if the industry did it, you would look at them to carry it through all the way.

Art: Correct.
Clarence: Are there any other comments, questions. OK, like I said before, if something else comes up, the record will stay open, as the Record of Decision is being advertised, until June 22nd. Thank you very much for attending. We hope that we'll see you at the next one.

Adjourned at 7:45 P.M.

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-89/[illegible]
September [illegible]989

EPA

Superfund Record of Decision:

Big D Campground, OH

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R05-89/101	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Big D Campground, OH First Remedial Action - Final			5. Report Date 09/29/89
			6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address			10. Project/Task/Work Unit No.
			11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000
			14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Big D Campground site is in Kingsville, Ashtabla County, Ohio. The site consists of a 1.2-acre landfill created out of a former sand and gravel quarry. From 1964 to 1976 the site owner accepted approximately 28,000 cubic yards of hazardous materials for disposal which included up to 5,000 drums containing solvents, caustics, and oily substances. A 1986 remedial investigation identified the landfill as the primary source of contamination in soil outside the landfill and ground water underlying the landfill. Ground water contamination is of significant concern because it is migrating towards the drinking water supply wells of nearby residences and Conneaut Creek which is adjacent to and south of the site. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE, other organics, and metals including chromium and lead.

The selected remedial action for this site includes removing and incinerating up to 5,000 buried drums, bulk wastes, and up to 30,000 cubic yards of contaminated soil followed by onsite disposal of nonhazardous ash residue; pumping and treatment of 40,000,000 to 60,000,000 gallons of ground water using an onsite granular activated carbon system followed by onsite discharge to Conneaut Creek; and ground water and surface water monitoring. The estimated present worth cost for this remedial action is $39,000,000, which includes annual O&M costs of $320,000.

17. Document Analysis a. Descriptors

Record of Decision - Big D Campground, OH
First Remedial Action - Final
Contaminated Media: soil, gw
Key Contaminants: VOCs (PCE, TCE), other organics, metals (chromium)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 119
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

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Record of Decision

DECLARATION

SITE NAME AND LOCATION

Big D Campground
Kingsville, Ohio

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Big D Campground site in Kingsville, Ohio, developed in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

The State of Ohio has concurred on the selected remedy.

ASSESSMENT OF SITE

The site consists of a drum and bulk waste disposal area created in a former sand and gravel quarry. Up to 5,000 drums and 30,000 cubic yards of bulk wastes are believed to be buried at the site. Ground water in contact with these wastes is migrating towards nearby residences to the north and into the Conneaut Creek adjacent to and south of the site. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

The selected remedy addresses all risks posed by contamination in the source area (landfill) and ground water. The source area will be excavated and incinerated and the ground water will be collected and treated.

The major components of the remedy include:

- Deed restriction
- Site fencing
- Source area excavation
- Incineration on-site
- Disposal of treated material and backfilling on site
- Ground water collection
- Ground water treatment on-site
- Discharge of treated ground water to Conneaut Creek
- Ground water and surface water monitoring

DECLARATION

The selected remedy is protective of human health and the environment, a waiver can be justified for whatever Federal and state applicable or relevant and appropriate requirement that will not be met, and is cost effective. This remedy satisfies the statutory preference for remedies that employ treatment, reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Because this remedy will result in hazardous substances remaining on-site, the five-year facility review will apply to this action.

Valdas V. Adamkus
Regional Administrator
U.S. EPA, Region V

Sept. 29th, 1989.
Date

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ROD DECISION SUMMARY

I. Site Name, Location and Description

The Big D Campground ("Big D") site is located in Kingsville, Ashtabula County, Ohio, approximately 2.5 miles south of Lake Erie and 50 miles northeast of Cleveland. The site is located south of Creek Road, north of Conneaut Creek and west of, and adjacent to, "Big D Campground" (see Figure 1).

The landfill at the site is approximately 1.2 acres in size and approximately 20 feet deep. The landfill is located on a relatively level surface which gently slopes north towards Lake Erie. Approximately 50 feet south of the southern edge of the landfill the land slopes sharply towards Conneaut Creek (approximate 32% slope).

The site is bordered by Conneaut Creek to the south, a campground to the southeast, open land to the west, residences with small acreage to the north and northwest, and a swamp area approximately 1/2 mile to the north. The residences are located approximately 500 feet north of the site.

Residences within 1/2 mile of the site, north of Conneaut Creek, use ground water for drinking.

II. Site History and Enforcement Activities

The Big D Campground site was initially operated as a sand and gravel quarry which was subsequently filled with hazardous and non-hazardous materials. The active disposal period lasted from 1964-1976.

Most of the materials placed in the landfill were drummed, but some bulk toluene diisocyanate (TDI) was also disposed. It is estimated that 2500 to 5000 drums are buried at the site. The drummed hazardous materials include non-halogenated and halogenated solvents, caustics and oily substances. Other wastes believed to have been disposed of at the site include: spent vacuum pump oil, TDI residue contaminated with monochlorobenzene (MCB) and carbon tetrachloride, earth contaminated with diaminotoluene (TDA) and TDI, fly-ash, trash, monoethanolamine (MEA), off-specification TDI, and TDA and TDI in sample cans and bottles. The vacuum pump oil may have been contaminated with TDI, MCB and trace levels of phosgene. The total volume of hazardous substances disposed of at the site is approximately 28,000 cubic yards.

Preliminary investigations began at the site in 1982. As early as 1982, the major PRP at the site was sent information on these investigations. In December, 1982 the site was proposed for the National Priorities List (NPL) of Superfund sites. On September 8, 1983, the site became final on the NPL. Olin Chemicals Corporation, a major PRP at the site, made comments on this proposed listing in February of 1983. In April 1985, notice letters were sent to three PRPs: Olin Chemicals Corporation (generator), Brenkus Construction

Co. (operator), and Mr. Dreslinski (current site owner). Olin was sent a CERCLA Section 104(e) information request at approximately the same time, to which they responded in July 1985.

Olin's response indicated that they were a substantial contributor of hazardous substances to the Site and would be the focus of RI/FS negotiations. In November 1985, a reminder that notice had been provided and a draft scope of work for the RI/FS was sent to the potentially responsible parties (PRPs). In December 1985, negotiations to conduct the RI/FS began with Olin, the only PRP to respond positively to EPA's request. In early January 1986, technical questions arose and EPA reiterated that a consent order would need to be agreed upon by February 15, 1986 for Olin to conduct the RI/FS. No agreement was reached and EPA terminated the RI/FS negotiation period shortly after February 15, 1986.

Olin continued to be interested in the remediation process and sent letters protesting the termination of the negotiations. Among these was a counter-proposal to do the RI/FS delivered to the Regional Administrator.

The fund-financed RI began in late 1986 and was completed in mid-1988. The final RI, FS and Proposed Plan were released for public comment on July 28, 1989. A public meeting to discuss these documents was held on August 8, 1989. The public comment period ended on August 26, 1989.

Special Notice for RD/RA negotiations will be issued to PRPs before September 30, 1989.

III. Community Relations History

On August 14-15, 1986 Community Relations personnel from the U.S. EPA and ICF Technologies, Inc. travelled to Cleveland, Ohio and drove to the towns of Mentor, Jefferson and Kingsville, Ohio, where they met with and interviewed County and Township officials and residents.

A Fact Sheet was distributed to the public in December, 1986 which discussed the RI scheduled to begin that month. A RI kickoff public meeting was held on February 5, 1987.

On July 28, 1989 the Final RI report, FS report and Proposed Plan were released to the public for comment. The PRPs were sent a copy of the FS and Proposed Plan on July 27, 1989. A public meeting was held on August 8, 1989, in Kingsville, Ohio, to discuss the RI, FS and Proposed Plan, and to receive official comments on the Proposed Plan. The public comment period ended August 26, 1989. Comments received and responses to comments are addressed in the Responsiveness Summary.

IV. Scope and Role of Response Action

The remedial action will address the principal threats at the site; ground water contamination and the source area (landfill) contamination. The RI identified total cancer risks as high as 1×10^{-2} under worst case conditions for ingestion of groundwater. Non-carcinogenic risks were also identified for

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ingestion of groundwater, based on worst case conditions.

The major source of contamination identified at the site is the landfill. Therefore the alternative chosen to remediate contamination at the site will address contamination in the ground water and source area. The site risk objectives will reduce health risks in the groundwater and the soils adjacent to the source area (which may pose a risk based on ingestion or direct contact) to a cumulative Hazard Index of 1.0 or less and a cumulative carcinogenic risk of 10^{-6} or less.

V. Summary of Site Characteristics

The RI investigated the contaminant source area (landfill), soils outside the source area, groundwater and surface water and sediment. Table 1 summarizes the maximum concentrations of indicator chemicals (see V. B. Fate and Transport, page 5) identified in different media at the site.

A. Nature and Extent of Contamination

Source Area

A geophysical survey was performed which indicated a rectangular trench in the northern area of the site (approximate size 1.2 acres). Based on the geophysical survey two test pits were excavated. These pits verified the presence of buried drums (intact and either partially crushed or ruptured), bulk waste and contaminated soil in the source area. Analytical results revealed that the same organic compounds found in the ground water and subsurface soil samples are also present in the source area, but at greater concentrations.

Soils (outside the source area)

The geologic investigation identified five geologic units at the site; three glacially deposited units, one alluvial unit and one bedrock unit. At the upper (northern) portion of the site, the three glacial units overlay bedrock. These three units are not present at the lower (southern) portion of the site where bedrock is overlain by alluvial deposits (see Figure 2).

Surface and subsurface soil samples were collected from nine on-site locations surrounding the source area. Inorganic compounds were detected in isolated areas.

Organic compounds were detected in the soils. Chlorobenzene was the organic compound detected most frequently and at the highest concentrations.

Ground Water

Five hydrogeologic units, which correspond to the site geology described above, were identified at the site; three aquifers and two aquitards. The units present at the upper portion of the site are the water table aquifer (uppermost), the silt-clay aquitard, the hard grey clay till aquitard, and the bedrock aquifer. The units present at the lower portion of the site are the

alluvial aquifer and the bedrock aquifer (see Figure 2).

At the upper portion of the site the water table aquifer is hydraulically separated from the bedrock aquifer. At the lower portion of the site the alluvial aquifer and the semi-confined aquifer are hydraulically connected.

Ground water in the water table aquifer at the upper portion of the site flows both north and south. The approximate location of the ground water divide occurs at the southern edge of the landfill. Ground water flows north towards local discharge points and flows south toward Cornesut Creek. The confined bedrock aquifer locally flows south to Cornesut Creek.

Two rounds of ground water sampling were conducted at wells around the source area, wells located south of the source area near the creek and six off-site residential wells. Shallow wells on-site and near the creek showed concentrations of inorganic contaminants above background levels. Deep on-site wells also have concentrations of some inorganic constituents above background levels.

Organic indicator compounds were detected in shallow on-site wells and wells near the creek. The indicator chemicals (see V. B. Fate and Transport, p. 5) detected include chlorobenzene, 1,2- and 1,4-dichlorobenzene, trans-1,2-dichlorobenzene, diaminotoluene, tetrachloroethane, trichloroethane and vinyl chloride. Deep wells on-site detected organic compounds at low concentrations. This indicates the possibility of vertical contaminant migration through the aquitard at localized areas.

Compounds found in creek wells (lower portion of the site) were the same as those found in shallow wells (upper portion of the site) however the concentrations in the creek wells were considerably less.

One of the six residential wells sampled showed concentrations of inorganic contaminants similar to wells on site. This residential well is not used by the owner but was sampled due to its proximity to the site. The source of the inorganic contamination is probably the site. However, the aquifer from which the residential well is drawing water appears to be above and separate from the water table aquifer in which on-site monitoring wells are located. Past fluctuations in the ground water levels of the water table aquifer could have caused inorganic contamination to migrate into the perched aquifer.

Organic compounds were detected in one of six residential wells (the Dreslinski campground well). This well had been chlorinated with Chlorox Bleach shortly before the sampling occurred. This chlorination is probably the source of chloroform (12 ug/l), bromo-dichloromethane (2 ug/l) and dibromochloromethane (2 ug/l) identified in the sample from that well.

<u>Surface Water and Sediment</u>

Inorganic contamination in the surface water was detected in Cornesut Creek. However, the concentrations of manganese, magnesium, sodium and calcium were only slightly elevated above background levels.

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Organic analytical results indicate the presence of chlorobenzene in Conneaut Creek. The concentrations are much lower than those detected in the ground water and lower than applicable regulatory standards.

Inorganic and organic contaminants were identified in the sediment near the site. The concentrations noted were only slightly above background levels.

B. Fate and Transport

Thirteen of the twenty-five contaminants identified in the source area, soils, ground water and surface water were identified as indicator chemicals. Indicator chemicals were chosen based on factors such as the number of times a chemical was detected, the maximum concentration, and persistence and toxicity to human health and the environment. The indicator chemicals at Big D Campground are listed below:

Inorganics	Organics
barium	chlorobenzene
beryllium	1,2-dichlorobenzene
chromium	1,4-dichlorobenzene
lead	trans-1,2-dichloroethene
nickel	diaminotoluene
	trichloroethene
	tetrachloroethene
	vinyl chloride

Inorganic Contaminants

Inorganic contaminants are present in the source area, surface soils, subsurface soils and ground water. Inorganics in the soils can (1) migrate to Conneaut Creek by runoff from surface soils and move with the Creek, eventually collecting as stream sediment, (2) migrate up from the saturated zone into the unsaturated zone due to fluctuating ground water levels, (3) remain attached to unsaturated subsurface soils, or (4) move with ground water from the source area and subsurface soils.

Inorganics in ground water in the water table aquifer are not expected to migrate to a significant degree, however, part of the source area is in the ground water. Ground water coming in contact with the source area can have contaminant concentrations as high as the solubility limit for specific compounds.

Inorganics present in the alluvial and bedrock aquifers may (1) attach to subsurface soils and not migrate, or (2) discharge to Conneaut Creek and decrease in concentration due to dilution or attaching to creek sediments.

Organic Contaminants

Organics were detected in the source area, surface soils, subsurface soils and ground water. Organics in the source area and soils can (1) migrate to Conneaut Creek by runoff from surface soils and volatilize or accumulate in

stream sediments, and (2) migrate from the source area and soils into ground water by moving vertically via precipitation or fluctuating ground water levels (the bottom of the source area is located in ground water).

The major pathway for organic contaminant movement at the site is by ground water flow. Organics will generally move with the bulk ground water flow and the attachment to soils will be minimal because less than 10 percent silt and clay is present in the sandy water table aquifer; sands do not typically adsorb organics. Organics in the ground water can also diffuse upward from the ground water into the unsaturated zone soils or atmosphere.

Organics in the ground water can discharge into Cannaut Creek where the concentrations of organics will decrease due to dilution, attaching to sediments, sedimentation and aquatic uptake (ingestion). In addition, organic contaminants in the surface water may decrease due to volatilization.

VI. Summary of Site Risks

A. Summary of Exposure Assessment

Six site-specific exposure scenarios were identified:

- -Ingestion of contaminated soil
- -Direct contact with contaminated soil
- -Ingestion of contaminated ground water
- -Incidental ingestion of contaminated surface water
- -Direct contact with contaminated surface water
- -Ingestion of contaminated aquatic life

An exposure scenario based on contaminants in the source area was not evaluated. Limited sampling was conducted in the test pits excavated in the source area. The sampling in the source area was conducted only to get general information on the material in the landfill and to confirm that contaminants identified in the ground water and soils originated in the landfill. Any carcinogenic or non-carcinogenic risks identified through other exposure scenarios also apply to the source area. However the risks in the source area would be greater because the concentration of contaminants in the source area are greater.

Table 2 summarizes the six exposure scenarios identified and the populations associated with each.

B. Toxicity Assessment

This section summarizes significant adverse health effects to humans and the environment posed by the indicator chemicals at the Big D site.

Barium is well absorbed but less toxic than most other metals. Acute doses interfere with the function of all muscle tissue, producing a wide variety of effects. Chronic toxicity, except for lung lesions after inhalation and aquatic toxicity, are not well defined.

Beryllium is very poorly absorbed. It produces irritation at the contact point. Like barium, chronic toxicity, except for lung lesions after inhalation and aquatic toxicity, are poorly defined.

Most chromium toxicity is due to hexavalent chromium. The main effect of overdoses is irritation at the point of contact. Chronic inhalation of hexavalent chromium produces lung tumors. Other target organs are the kidney, blood forming tissues and liver. Chromium is also toxic to aquatic species.

Lead is fairly well absorbed and accumulates in the skeleton. The main toxic effects are on the nervous system. Lead poisoning in children can inhibit growth and produce permanent learning defects. Lead is toxic to fish, however toxicity decreases as water hardness increases.

Nickel is a poorly absorbed metal. The major toxic effects are irritation on contact and allergic sensitization. Inhalation causes respiratory tract tumors.

Chlorobenzene is absorbed after ingestion, absorbed from the lungs and not absorbed through the skin. Acute doses produce irritation and central nervous system depression. Repeated doses cause liver and kidney lesions. Chlorobenzene is moderataly toxic to aquatic species.

1,2-dichlorobenzene and its isomer, 1,4-dichlorobenzene, are very similar in their biological effects, however the 1,2-isomer is usually more potent. Dichlorobenzene is well absorbed by all routes. Acute doses cause irritation, some central nervous system depression, blood toxicity and kidney lesions, but the main effect is liver toxicity. Chronic doses produce similar effects. Dichlorobenzene are more toxic to aquatic species than is chlorobenzene.

Few studies have been performed with trans-1,2-dichloroethene. Its main acute toxic effect is central nervous system depression. Repeated doses affect the liver with some lesser effects on other organs.

Trichloroethene is well absorbed after inhalation and ingestion but poorly absorbed through the skin. Acute doses produce central nervous system depression. Repeated doses produce liver, kidney and peripheral nervous system lesions as well as tumors. Trichloroethene is toxic to aquatic species but much less toxic than the metals of concern.

Tetrachloroethene is similar to trichloroethene but less potent as a central nervous system depressant. It produces liver and lung lesions and tumors in animals. Its toxicity to aquatic species is similar to that of trichloroethene.

Vinyl chloride is carcinogenic to humans and animals. Gaseous vinyl chloride is rapidly absorbed in the lungs and aqueous vinyl chloride is well absorbed from the gastrointestinal tract. Acute exposure produces central nervous system depression. Repeated exposure produces hepatotoxicity. A few large doses or several small doses will produce a variety of effects in humans. In animal studies, vinyl chloride produced some fetotoxicity at very large doses but no teratogenesis. It is mutagenic in a number of in vitro and in vivo systems.

Diaminotoluene is well absorbed orally but less so dermally. Acute doses are irritating and discolor skin and hair. Diaminotoluene is a very potent sensitizer and produces blood and liver lesions. Chronic doses produce liver and other tumors.

C. Risk Characteristics

Using information presented in the previous sections, the actual or potential risks to human health or the environment, associated with contaminants at or released from the site, were assessed. The potential risks associated with each exposure scenario are discussed. Risk levels were calculated by using estimated exposure doses and risk factors established by U.S. EPA.

To determine the non-carcinogenic risks, a hazard index (HI) was calculated for each contaminant of concern for which an allowable chronic intake (AIC) has been established by the U.S. EPA. The HI is the ratio between the estimated exposure dose for each contaminant and the acceptable exposure level for that same contaminant. In all cases, the AIC was used to represent each contaminant's acceptable exposure.

Carcinogenic risks were evaluated in terms of upperbound excess lifetime cancer risks to children who ingest site soils from the upper or lower portions of the site under probable case and worst case conditions. These risks were calculated using the following equation:

Upperbound Excess
Lifetime Cancer Risk = (Average Lifetime Dose) x (Carcinogenic Potency Factor)

Recent U.S. EPA guidance indicates that the target carcinogenic risks resulting from exposures at a Superfund site may range from between 10^{-4} to 10^{-7}. U.S. EPA Region V has a risk policy that cancer risks of 10^{-6} or greater are generally considered unacceptable. Thus, remedial alternatives being considered should be able to reduce total potential carcinogenic risks to levels of 10^{-6} or less.

Table 3 presents a summary of the potential risks associated with the various scenarios evaluated. Potentially significant risks are defined as those with a Hazard Index of 1.0 or greater or a cancer risk of 10^{-6} or greater.

Risk characterization of ingestion of, and direct contact with, contaminated soils outside the source area did not identify any non-carcinogenic or total cancer risks (see Table 3).

Ingestion of ground water identified total cancer risks as high as $1x10^{-2}$ under worst case conditions from all three aquifers. The contaminants associated with these risks are 2,4-diaminotoluene, tetrachloroethene, trichloroethene and vinyl chloride. Trichloroethene contamination levels identified in ground water were up to 1500 times in excess of federal standards for drinking water. Non-carcinogenic risks, based on worst case exposure doses, were also identified for all three aquifers. The primary contaminants associated with these risks are chlorobenzene and tetrachloroethene.

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Chlorobenzene contamination levels identified in ground water were up to 750 times in excess of federal standards for drinking water.

Risks associated with incidental ingestion of contaminated surface water, direct contact with contaminated surface water and ingestion of contaminated aquatic life were not evaluated. Minimal contamination was found in the surface water and the contamination detected which exceeded federal regulations (lead and beryllium) was only found in one downstream sample. Also, contamination detected in the surface water was only slightly above background values.

The potential risks to the environment were evaluated by focusing on the aquatic life in Conneaut Creek next to and downstream of the site. Data on bottom-dwelling populations collected from Conneaut Creek indicated that the biological community downstream of the site may be slightly impaired, however further extensive studies of the data would be required to confirm this. The water quality data were compared to the U.S. EPA's Ambient Water Quality Criteria and no significant impacts were detected. Therefore, releases of contamination from the site may be only slightly impacting Conneaut Creek at this time.

The proposed alterative to remediate contamination at the site will address contamination in the ground water and the source area. The site risk objectives will reduce health risks in the ground water and soils adjacent to the source area (which may pose a risk based on ingestion or direct contact) to a cumulative Hazard Index of 1.0 or less and a cumulative carcinogenic risk of 10^{-6} or less.

VII. Documentation of Significant Changes.

The selected remedy and the preferred alternative presented in the Proposed Plan is alternative number 9 - On-Site Incineration, Ground Water Treatment. There are no significant changes.

VIII. Description of Alternatives

Nine alternatives were evaluated in detail in the Feasibility Study. Alternatives numbers 2 through 5 were not in full compliance with ARARs because ground water treatment was not included. The FS details all nine alternatives. Alternative 1, the no-action alternative, was also not in compliance with ARARs, however it is being retained as a baseline for comparison to other alternatives. Therefore Alternative number 1 and numbers 6 through 9 are summarized below.

A. <u>Alternative 1 - No Action</u>

1. Treatment Components

No treatment will occur.

2. Containment Components

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Wastes will not be contained.

3. Institutional Controls

Institutional controls will not be implemented.

4. Estimated Time for Implementation.

None

5. Estimated Capital, O&M, and Present Worth Costs

All costs are $0.

6. ARARs

This alternative does not comply with ARARs.

B. Alternative 6 - Source Area Containment, Treatment of Ground Water Outside the Contained Area.

1. Treatment Components

This alternative would collect ground water in the water table aquifer with two interceptor trenches. Ground water in the alluvial, semi-confined bedrock and confined bedrock aquifers would be collected with extraction wells. The ground water will be treated on-site in a granular activated carbon (GAC) system. However, should pilot testing during the design phase indicate that pretreatment, such as sand filtration, ozonation or air stripping, is needed to achieve necessary removal efficiencies of certain compounds, the system will be adjusted accordingly. The estimated volume of contaminated ground water is 40 to 70 million gallons.

After treatment the effluent will be discharged to Conneaut Creek.

The cleanup levels to meet risk objectives for ground water are based on future use scenario. The ground water treatment will reduce risks posed from ingesting ground water to a cumulative Hazard Index of 1.0 or less and a cumulative cancer risk of 10^{-6} or less.

Interceptor trenches, extraction wells and GAC treatment are easily implemented.

2. Containment Components

This alternative would contain the buried drums, bulk wastes and contaminated soils by placing a multilayer cap over the source area. The cap would reduce infiltration and contaminant migration to the ground water. The cap would cover approximately a 3-acre area (120,000 square feet) and would be a soil-synthetic membrane cap.

This alternative would contain the source area by surrounding the buried drums, bulk wastes and contaminated soils with a slurry wall to prevent horizontal migration of contamination. The slurry wall would be installed three feet into the hard grey clay unit underlying the water table aquifer and the source area. The slurry wall would be approximately 25 feet deep, 3 feet thick and 1,100 feet long.

The wastes in the source area consist of buried drums (approximately 2,500 to 5,000 drums) bulk wastes and contaminated soils (approximately 25,000 to 30,000 cubic yards) contained in an area approximately 1.2 acres on the surface and 20 feet deep. Risks posed by materials in the landfill were not calculated because a representative sample was not able to be obtained. Limited sampling identified that contamination in the landfill was the same as that identified in other media except at greater concentrations (See Table 1).

3. Institutional Controls

A fence will be installed around the perimeter of the capped area to limit access to the site.

Deed restrictions would be placed on the land which would be capped to prevent future excavation or construction activities. Deed restrictions would be placed on property overlying the contaminant plume and source area to prohibit installation or use of drinking water wells in the three aquifers identified at the site.

Long-term operation and maintenance would exist to maintain the cap. Annual cap inspections and vegetation mowing will reduce the likelihood of cap failure. Long term cap maintenance would be required to correct settlement, erosion and other problems. The cap may need to be replaced after 30 years to prevent infiltration and contaminant migration.

Residual risk would remain from the drums, bulk wastes and contaminated soils in the source area since they will not be removed or treated. Long term ground water monitoring in the water table aquifer will be necessary to identify if the slurry wall fails. The expected life of a slurry wall is 30 years.

4. Estimated Time for Implementation

The slurry wall and cap construction should take 1 to 1.5 years, which includes testing, design, bidding, and construction. The ground water collection and treatment system will take 6 to 12 months, which includes testing, design, bidding, and construction. The total estimated time for completion is 1.5 to 2.5 years. A ground water collection time of 20 to 60 years would be required to reach risk objectives for ground water in all three aquifers. This estimate is based upon the amount of time necessary to remove contaminants from the saturated portion of the aquifer immediately below the source area and all contamination which has already migrated from the source area.

5. Costs

Estimated capital costs: $5,000,000
Estimated present worth: $8,000,000
Estimated annual O&M costs: $ 360,000

6. ARARs

Ground water treatment must comply with chemical specific ARARs for barium (MCL = 1,000 ug/L), chromium (MCL = 50 ug/L), 1,4-dichlorobenzene (MCL = 75 ug/L), trichloroethene (MCL = 5 ug/L), and vinyl chloride (MCL = 2 ug/L).

Action specific ARARs are listed on Table 4.

C. Alternative 7 - On-Site Incineration, Vitrification, Ground Water Treatment

1. Treatment Components

This alternative would remove buried drums from the source area (approximately 2,500 to 5,000 drums) and incinerate the drums on-site. Contaminated soils will remain in the source area. Ash remaining after incineration, approximately 500 cubic yards, will be placed back in the source area. The ash and soils will be stabilized by in-situ vitrification. A soil contamination study will be conducted prior to vitrification to identify the extent of contamination. An estimated 25,000 to 30,000 cubic yards of soil and ash will need to be vitrified. After vitrification, the area would be backfilled to original grade with clean native soil.

Ground water in the water table aquifer would be collected with two interceptor trenches. Ground water in the alluvial, semi-confined bedrock and confined bedrock aquifers will be collected with extraction walls. The collected ground water will be treated on-site in a granular activated carbon system. If necessary, additional pretreatment of ground water will be implemented, see alternative 6. The estimated volume of contaminated ground water is 40 to 70 million gallons.

After treatment the effluent will be discharged to Cornsaut Creek

The cleanup levels to meet risk objectives for the ground water are based on a future use scenario. The ground water treatment will reduce risks posed from ingesting ground water to a cumulative Hazard Index of 1.0 or less and a cumulative cancer risk of 10^{-6} or less.

Vitrification technology is still developmental and very few contractors are available to implement the technology.

Incineration, interceptor trenches, extraction walls and GAC treatment are easily implemented.

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2. Containment Components.

This alternative does not include any containment components.

3. Institutional Controls.

The site will be fenced to limit access and to contain the source area (excavation area), drum staging area, on-site incinerator, and the ground water treatment system.

Deed restrictions will be placed on property overlying the source area and contaminant plume to prohibit installation or use of drinking water wells in the three aquifers identified at the site.

After incineration of drums and vitrification of soils, no long term monitoring or O&M would be required at the source area.

Once ground water risk objectives are met long term monitoring will not be necessary because the source area is stabilized.

4. Estimated Time for Implementation.

Drum removal, incineration and vitrification are expected to take 2 to 2.5 years which includes design, bid, mobilization, test burn, vitrification, demobilization, and backfill activities.

The preparation activities for ground water collection, treatment, and discharge would take 1.5 to 2.5 years for testing, design, bidding, and construction activities and would be concurrent with the source area remediation. 20 to 60 years is the estimated time to collect and treat all ground water to meet risk objectives (see alternative 6).

5. Costs

Estimated capital costs	$36,000,000
Estimated present worth:	$39,000,000
Estimated annual O&M costs:	$ 350,000

6. ARARs

Chemical specific ARARs are the same as those for alternative 6.

Action specific ARARs are listed in Table 4.

D. <u>Alternative 8 - Off-Site Incineration, Ground Water Treatment</u>

1. Treatment Components

This alternative would remove buried drums (approximately 2,500 to 5,000 drums), bulk wastes and contaminated soils (approximately 25,000 to 30,000 cubic yards) from the source area. The removed materials will be

transported off-site to a RCRA permitted commercial incinerator. Drums, bulk wastes and contaminated soils will be removed until the bottom of the landfill or the water table is encountered. However, if drums or bulk wastes are located within the saturated zone, they will be removed. The water table is located approximately 17 feet below ground surface and the depth of the landfill is approximately 20 feet. After drums, bulk wastes and contaminated soils are removed, the excavated area will be sampled around the edges from the ground surface to 8 feet below the surface. The sampling will determine if soils, which may pose an exposure risk from ingestion or direct contact, have been removed. If necessary, more soils will be removed until the exposure risk is eliminated.

The excavated area will be backfilled with materials similar to native soils and graded and seeded.

Ground water in the water table aquifer will be collected with two interceptor trenches. Ground water in the alluvial, semi-confined bedrock and confined bedrock aquifers will be collected with extraction wells. The collected ground water will be treated on-site in a granular activated carbon system. If necessary, additional pretreatment of ground water will be implemented, see alternative 6. The estimated volume of contaminated ground water is 40 to 70 million gallons.

After treatment the effluent will be discharged to Connaut Creek.

The cleanup levels to meet risk objectives for the ground water are the same as in alternative 7.

Excavation, backfilling, interceptor trenches, extraction wells and GAC treatment are easily implemented.

2. Containment components

This alternative does not include any containment components.

3. Institutional Controls

Access to the site will be controlled by installing a fence. The fence will surround the source area, the drum staging area to prepare materials for shipment, and the ground water treatment system.

Deed restrictions will be placed on property overlying the source area and contaminant plume to prohibit installation or use of drinking water wells in the three aquifers identified at the site.

After removal and transport of buried drums, bulk wastes and contaminated soils, no long term monitoring of the landfill will be necessary.

Once ground water risk objectives are met, long term monitoring will not be necessary because the source of contamination has been removed.

4. Estimated time for Implementation

Excavation and transport are expected to take 2.5 to 3 years, which includes design, bid, removing drums, bulk wastes and contaminated soils, transport to an incinerator and backfilling the excavated area.

Preparation activities for ground water collection, treatment and discharge would take 1.5 to 2.5 years for testing, design, bidding and construction activities. These activities would be concurrent with source area remediation. 20 to 60 years would be required to collect and treat all ground water to risk objectives (see alternative 6).

5. Costs

Estimated capital costs: $63,000,000
Estimated present worth: $67,000,000
Estimated annual O&M costs: $ 420,000

6. ARARs

Chemical specific ARARs are the same as those for alternative 6.

Action specific ARARs are listed on Table 4.

E. Alternative 9 - On-Site Incineration, Ground Water Treatment

1. Treatment Components

This alternative will remove all buried drums (approximately 2,500 to 5,000 drums), bulk wastes and contaminated soils (approximately 25,000 to 30,000 cubic yards) from the source area. The removed materials will be incinerated on-site. All drums, bulk wastes and visibly contaminated soils will be removed until the bottom of the landfill or the water table is encountered. However, if drums or bulk wastes are located within the saturated zone, they will be removed. The water table is located approximately 17 feet below ground surface and the depth of the landfill is approximately 20 feet. After drums, bulk wastes and visibly contaminated soils are removed, the excavated area will be sampled around the edges from the ground surface to 8 feet below the surface. The sampling will determine if soils, which may pose an exposure risk from ingestion or direct contact, have been removed. If necessary, more soils will be removed until the exposure risk is eliminated.

The materials remaining after incineration will be placed back into the excavated area. It will be confirmed during test burns, prior to start up of the incinerator, that the ash is able to be delisted. The area will be backfilled with materials similar to native soils to bring it back to original grade.

Ground water in the water table aquifer will be collected with two interceptor trenches. Ground water in the alluvial, semi-confined bedrock

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and confined bedrock aquifers will be collected with extraction wells. The collected ground water will be treated on-site in a granular activated carbon system. If necessary, additional pretreatment of ground water will be implemented, see alternative 6. The estimated volume of contaminated ground water is 40 to 70 million gallons.

After treatment, the effluent will be discharged to Cornsaut Creek.

The cleanup levels to meet risk objectives for the ground water are the same as those for alternative 7.

Excavation, backfilling, interceptor trenches, extraction wells and GAC treatment are easily implemented.

The implementability of the on-site incinerator is affected by the ability to meet state and local regulations applicable to this technology. Excavated material sampling, test burns and ash analyses will be required prior to initiating the incineration activities. The incineration system must meet performance requirements and air emission discharge requirements. The implementability of the alternative also depends on the incinerator ash being able to be delisted.

2. Containment Components.

This alternative does not include containment components.

3. Institutional Controls.

Access to the site will be controlled by a fence which will surround the source area, drum staging area, on-site incinerator and the ground water treatment system.

Deed restrictions will be placed on property overlying the source area and contaminant plume to prohibit installation or use of drinking water wells in the three aquifers identified at the site.

No long term monitoring of materials in the excavated area will be necessary.

Once ground water risk objectives are met, long term monitoring will not be necessary.

4. Estimated time for Implementation

Source area remediation, including design, bidding, mobilization, test burning, incineration set up, treatment, demobilization and backfilling activities are estimated to take 2 to 2.5 years.

Preparation activities for ground water collection, treatment, and discharge will take 1.5 to 2.5 years for testing, design, bedding, and construction activities. These activities will be concurrent with source area remediation. 20 to 60 years will be required to collect and treat

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all ground water to meet risk objectives (see alternative 6).

5. Costs

Estimated Capital Costs: $36,000,000
Estimated Present Worth: $39,000,000
Estimated Annual O&M Cost: $ 320,000

6. ARARs

Chemical specific ARARs are the same as those identified for Alternative 6.

Action specific ARARs are listed on Table 4.

IX. Summary of the Comparative Analysis of Alternatives

A. Overall Protection of Human Health and the Environment.

Alternatives 8 and 9 are the most protective of human health and the environment. The source area drums, bulk wastes and contaminated soils are incinerated and the ground water is collected and treated until ground water risk objectives are met.

Alternative 7 protects the human health and the environment in the same manner as Alternatives 8 and 9, except that long term protection of vitrification is not certain.

Alternative 6 protects human health and the environment by containing the source area and treating the ground water however, the risk of contamination breaching the containment system will remain.

Alternative 1 is not protective of human health and the environment.

B. Compliance With ARARs

Alternatives 6, 7, 8 and 9 comply with ARARs.

Alternative 1 does not comply with ARARs.

C. Long-Term Effectiveness and Permanence.

Long-term risks are eliminated for alternatives 8 and 9 because the source of contamination (the source area) is removed and incinerated and ground water will be collected and treated until it meets risk objectives.

Alterative 7 provides long term effectiveness and permanence by incinerating the drums and vitrifying the ash and contaminated soils in the excavated area, however the long-term effectiveness of vitrification is not known. This alternative also collects and treats ground water as in alternative 8 and 9.

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Alternative 6 reduces risks by containing the source area and collecting and treating ground water. However the source of contamination (the landfill) remains, presenting a possible future risk that contamination will breach the containment system.

Alternative 1 does not provide long term effectiveness because the risks are not removed.

D. Reduction of Toxicity, Mobility and Volume

Alternatives 7, 8 and 9 reduce toxicity, mobility, and volume of the source area and ground water contamination.

Alternative 6 reduces mobility of the source area by containing it and reduces toxicity, mobility and volume of ground water contamination by collecting and treating ground water.

Alternative 1 does not reduce toxicity, mobility or volume of contamination.

E. Short-Term Effectiveness

Alternatives 7 and 9 present a high risk to human health and the environment during incineration but this can be reduced by the application of engineering controls. Implementation of both alternatives will take approximately 2 to 2.5 years. These alternatives meet risk objectives.

Alternative 8 presents a moderate risk during incineration because incineration will be done off-site. Implementation will take 2.5 to 3 years. This alternative meets risk objectives.

Alternative 6 presents minimal risks to the human health and the environment. Implementation will take 1.5 to 2.5 years. This alternative meets risk objectives however the source area will remain, presenting a future risk.

Alternative 1 does not present any risks to the public because no remediation will occur. Risk objectives will not be met.

F. Implementability

Alternatives 6 and 9 are easily implemented and the technologies are proven.

Alternative 8 may present an implementation problem because only one RCRA-permitted incinerator is currently located near the site.

Few contractors are available to implement vitrification for alternative 7.

Alternative 1 does not involve any technologies which will be implemented.

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G. Cost

	Estimated Capital Costs	Estimated Present Worth Costs	Estimated Annual O&M Costs
Alt. 1	$ 0	$ 0	$ 0
Alt. 6	$ 5,000,000	$ 8,000,000	$ 360,000
Alt. 7	$36,000,000	$39,000,000	$ 350,000
Alt. 8	$63,000,000	$67,000,000	$ 420,000
Alt. 9	$36,000,000	$39,000,000	$ 320,000

H. State

The Ohio EPA concurs with the U.S. EPA's chosen alternative to remediate contamination at the site.

I. Community Acceptance

A public meeting was held in Kingsville, Ohio on August 8, 1989. During the meeting the community expressed general acceptance of the proposed remedial alternative. Specific concerns included additional monitoring of residential wells, community safety during excavation and incineration and the exact location of ground water collection trenches north of the site.

Response to comments submitted by the public during the public comment period are presented in the Responsiveness Summary Section.

X. The Selected Remedy

The selected remedy to address contamination at the site is alternative 9 which involves excavation of buried drums, bulk wastes and contaminated soils in the source area (see Figure 3). All drums, bulk wastes and visibly contaminated soils will be removed until the bottom of the landfill or the water table is encountered. However, if drums or bulk wastes are located within the saturated zone, they will be removed. The water table is located approximately 17 feet below ground surface and the depth of the landfill is approximately 20 feet. After all drums, bulk wastes and visibly contaminated soils are removed, the excavated area will be sampled around the edges from the ground surface to 8 feet below the surface. The sampling will determine if soils, which may pose an exposure risk from ingestion or direct contact, have been removed. If necessary, more soils will be removed until the exposure risk is eliminated.

The non-combustible material and ash remaining after incineration will be used as backfill material in the excavated area as long as the ash is able to be delisted. Backfill similar to existing strata will be put in the excavated area. The top two feet of backfill will be soil which will be graded and seeded so to allow infiltration of precipitation and aid movement of any

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remaining contaminants out of the native soils to the ground water collection/treatment system.

The ground water collection system will collect ground water in the water table aquifer with two interceptor trenches; one at the downgradient edge of the plume and one at the north end of the source area, see Figure 4. The exact placement of the trenches will be decided after completion of a pre-design ground water study. This study will involve confirming what was presented in the RI, south of the site, and installing and sampling additional monitoring wells which will better define the geology north of the site and will determine how far contamination has migrated from the site.

The study will initially concentrate on the area north of the site where the plume may have migrated. This area will be determined based on ground water modelling and results from the last round of ground water sampling during the RI. If ground water contamination has not migrated to this theoretical point, additional wells will be installed closer to the source area until the boundary of the plume is identified. Conversely, if contamination has migrated beyond the theoretical limit, additional wells farther from the source area will be installed in order to place bounds on the location of the plume. The full extent of migration will be established prior to designing the ground water collection and treatment system.

Ground water in the alluvial and semi-confined bedrock and confined bedrock aquifers will be collected with 30 extraction wells. During the pre-design ground water study, the bedrock units will be sampled and the hydrogeology of those units will be confirmed. The collected ground water will be treated with granular activated carbon on-site and discharged to Cornsaut Creek. If it is determined, during a pilot field test or a bench scale test that additional pretreatment, such as sand filtration, ozonation or air stripping, is necessary to achieve removal efficiencies of certain compounds, the system will be adjusted accordingly.

Ground water monitoring wells will be installed north of each interceptor trench to monitor for any contamination bypassing the trenches. The existing shallow and deep wells on the lower portion of the site will monitor for any contaminant migration bypassing the extraction wells. A collection time of 20 to 60 years will be required to reach ground water cleanup levels in the water table aquifer. This estimate is based upon the amount of time necessary to remove contaminants from the saturated portion of the aquifer immediately below the source area and all contamination which has already migrated from the source area. If contaminant concentrations change over time, the sampling program may be modified. Cleanup levels for the alluvial/bedrock aquifer should be met within 3 years.

Surface water monitoring will be implemented at 3 locations in Cornsaut Creek (one upstream, one downstream, and one adjacent to the site).

The site risk objectives, which alternative 9 will meet, will reduce risks posed by contamination in the ground water to a cumulative Hazard Index of 1.0 or less and a cumulative carcinogenic risk of 10^{-6} or less.

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XI. Statutory Determinations

A. Protection of Human Health and the Environment

The selected remedy will eliminate risks posed by contamination in the source area. These risks will be eliminated by incinerating the contents of the landfill. Risks posed by ingestion of ground water at the site will be eliminated by a ground water collection and treatment system.

Short-term risks to the community could be introduced by inhalation of air emissions from excavation or on-site incineration, or by direct contact with excavated material or contaminated surface water run off. Air emissions will be monitored and would be reduced by air pollution control systems when necessary. Risks from direct contact would be reduced by controlling site access. Surface water runoff controls would reduce the potential for contaminant migration from staged materials.

Workers would be in Level B protection during excavation activities. Protection against dermal contact and inhalation would be provided during staging, sampling, and loading activities as required. Air monitoring would assist in determining which activities require worker protection and the level of protection required.

B. Attainment of ARARs

The selected remedy is expected to attain all ARARs. The one problem which may arise is if the incinerator ash is not able to be delisted and backfilled in the excavated area. If the ash is not delistable, it will have to be handled as a hazardous waste. The selected remedy assumes that the characterization of the ash will allow the State of Ohio to waive their solid waste regulation regarding the final deposition of the ash. The State of Ohio has agreed to consider such a waiver when analysis of the ash is available.

The following chemical specific ARARs will be met by the selected remedy:

Barium	MCL = 1,000 ug/L
Chromium	MCL = 50 ug/L
1,4-Dichlorobenzene	MCL = 75 ug/L
Trichloroethene	MCL = 5 ug/L
Vinyl Chloride	MCL = 2 ug/L

The remedial action risk objectives for the site are based on reducing health risks posed by contamination in the ground water to a cumulative Hazard Index of 1.0 or less and a cumulative carcinogenic risk of 10^{-6} or less.

Table 5 presents the individual concentrations of indicator chemicals which will be used in computing the cumulative risks for ground water and the upper 8 feet of the source area soil.

The Agency has not identified location specific ARARs.

Action specific ARARs which apply to the selected remedy are listed on Table 4.

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C. Cost Effectiveness

The selected remedy is cost effective. It is protective of human health and the environment, attains ARARs and provides long-term protectiveness. The long-term protectiveness is achieved by excavation and incineration of the source area and treatment of contaminated ground water. The selected remedy is less costly than alternative 8 while providing equal protectiveness. Alternative 1 is less expensive than the selected remedy however alternative 1 does not provide overall protection of human health and the environment and does not attain ARARs. Alternative 6 is less expensive than the selected remedy however this alternative does not provide long-term protectiveness of human health and the environment. In alternative 6 the source of contamination is not removed but contained, which presents a possible future risk of a breach of the containment structure. Alternative 7 is the same cost as the selected remedy however the selected remedy is easier to implement.

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

The selected remedy was determined to be the most appropriate solution to remediate the contamination at the site. The selected remedy is protective of human health and the environment and eliminates long-term risks by removing and incinerating the source area contamination. Alterative 8 is also equally protective and eliminates risks but the selected remedy is more cost effective. The selected remedy poses risks to the public and workers during implementation of the source area excavation and incineration (2 to 2.5 years duration) however, once this is completed the risks from the source area are eliminated, the toxicity, mobility and volume of the source area are eliminated and the protection of human health and the environment are maximum because the future risks of contamination from the source area is eliminated (compare to Alternative 6).

Ground water collection and treatment will eliminate risks posed to the public within 20 to 60 years, eliminate toxicity, mobility and volume of contamination in the ground water and will maximize protection of the human health and the environment. If the source area is not removed (see alternative 6), ground water cleanup will take an infinite amount of time if a breach of the containment structure occurs. The estimated time to collect and treat ground water, 20 to 60 years, is based upon the amount of time necessary to remove contaminants from the saturated portion of the aquifer immediately below the source area and all contamination which has already migrated from the source area.

Once ground risk objectives are met, long term monitoring will not be necessary.

Source area and ground water remediation are easily implemented and proven technologies (compare to alternative 7).

The selected remedy complies with ARARs.

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E. Preference for Treatment as a Principal Element

The selected remedy uses treatment as a principal element to remediate risks posed by ground water contamination and source area contamination.

Treatment of the source area will involve excavating buried drums, bulk wastes and contaminated soils followed by incineration of these materials on-site.

Treatment of the ground water contamination will involve collecting ground water from the three aquifers identified on-site and treating ground water with granular activated carbon.

Table 1
Maximum Concentration Detected

Inorganics	Source Area (mg/kg)	Soils (mg/kg)	Ground Water (ug/L)	Surface Water (ug/L)
barium	154	204	3,813	76
beryllium	-	1.5	3	1.5
chromium	21.7	28	132	18
lead	136	25	146	21
nickel	34	45	134	28

Organics	Source Area (ug/kg)	Soils (ug/kg)	Ground Water (ug/L)	Surface Water (ug/L)
chlorobenzene	12,000,000	59,000	75,000	22
1,2-dichlorobenzene	7,500	9,300	210	-
1,4-dichlorobenzene	16,000	4,300	430	-
trans-1,2-dichloroethene	-	21	14,000	-
diaminotoluene	-	-	70	-
trichloroethene	3,300	46	7,500	-
tetrachloroethene	63,000,000	3,624	2,300	-
vinyl chloride	180,000	41	12	-

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TABLE 2

EXPOSURE PATHWAYS AND EXPOSED POPULATIONS
(UNDER TWO SITE USE SCENARIOS)
EVALUATED IN THE ENDANGERMENT ASSESSMENT FOR
THE BIG D SITE
(Page 1 of 2)

Exposure Pathway	Exposed Population	Comments
	Present Use	
Direct Contact with Surface Water	Children and adults 1 to 70 years of age involved in recreational activities such as hunting, fishing, swimming, or boating along or in Conneaut Creek adjacent to or downgradient of the Big D site.	The human population most likely to be exposed are guests at Big D and Locust Lane Campgrounds, as well as persons living along Creek Road, South Ridge Road, and Reed Road near the site.
Incidental Ingestion of Surface Water	Same as for direct contact with surface water above.	Same as for direct contact with surface water above.
Ingestion of Aquatic Life	Children and adults 1 to 70 years of age ingesting fish and other aquatic animals caught from portions of Conneaut Creek adjacent to or downgradient of the Big D site.	The human population most likely to be exposed are guests at Big D and Locust Lane Campgrounds, persons living along Creek Road, South Ridge Road, and Reed Road near the site, as well as residents of the City of Kingsville.
Future Use -- Construction of Houses or Other Buildings On-site		
Ingestion of Soils	Children 2 to 6 years of age either living on-site or visiting the site.	The human population most likely to be exposed include: children vacationing at either Big D or Locust Lane Campgrounds; those children living along Creek Road, South Ridge Road, and Reed Road; as well as any children living in residences constructed on-site while other buildings are being constructed on-site. Exposure is expected to occur approximately 96 days/year under probable case conditions and 160 days/year under worst case conditions.

TABLE 2

EXPOSURE PATHWAYS AND EXPOSED POPULATIONS
(UNDER TWO SITE USE SCENARIOS)
EVALUATED IN THE ENDANGERMENT ASSESSMENT FOR
THE BIG D SITE
(Page 2 of 2)

Exposure Pathway	Exposed Population	Comments
	Future Use -- Construction of Houses or Other Buildings On-site	
Direct Contact with Soils	Same as for ingestion of soils above.	Same as for ingestion of soils above.
Ingestion of Ground Water	Children and adults 1 to 70 years of age ingesting ground water from water supply wells near and downgradient of the site.	At the upper portion of the site, ground water exists in two hydraulically unconnected aquifers: the water table aquifer and the bedrock aquifer. The human population most likely to be exposed are those persons along Creek Road who use private wells screened in the water table aquifer. At the lower portion of the site, ground water exists in two hydraulically connected aquifers: the alluvial overbank aquifer; and the bedrock aquifer; with recharge from the water table aquifer. No drinking water wells completed in these aquifers were identified downgradient of the site.

Additional Pathways: These include the same pathways described above under Present Use with the following addition. The exposed populations for these pathways under future use conditions will include persons living in any residences constructed on-site.

Note:

See the text for more information concerning exposed populations and assumptions used in exposure calculations.

Table 3

Summary of Potential Risks Associated With the Big D Campground

Exposure Scenario	Total Cancer Risks[1]		Noncarcinogenic Hazard Index[2]	
	Probable Case	Worst Case	Worst Case Child	Worst Case Adult
Ingestion of Contaminated Soil				
Upper Portion of Site	-[3]	$1x10^{-10}$	<1	<1
Lower Portion of Site	-	$2x10^{-9}$	<1	<1
Direct Contact with Contaminated Soils				
Upper Portion of Site	-	$3x10^{-12}$	<1	<1
Lower Portion of Site	-	$5x10^{-11}$	<1	<1
Ingestion of Ground Water				
Upper Portion of Site				
Water Table Aquifer	$6x10^{-6}$	$1x10^{-2}$	290	82
Bedrock Aquifer	-	$4x10^{-5}$	5.4	1.6
Lower Portion of Site				
Alluvial Overbank and Bedrock Aquifer	-	$6x10^{-3}$	24	6.6

Notes:
1 Total Cancer Risk = Average Lifetime Dose x Carcinogenic Potency Factor
2 Noncarcinogenic Hazard Index = Exposure Dose ÷ Acceptable Chronic Intake
3 Not Available or Not Calculated

Table 4
Action Specific ARAR's

Law, Regulation, or Standard	Source of Regulation	Description	Type of ARAR
FEDERAL			
Hazardous Waste Management System: General	CFR 260, et.seq.	RCRA regulates the generation, transport, storage, treatment, and disposal of hazardous wastes. CERCLA (Section 104 (c)(3)(B) specifically requires that hazardous substances generated from remedial actions be disposed of at facilities in compliance with Subtitle C of RCRA.	A
Resource Conservation and Recovery Act (RCRA) standards applicable to generators of hazardous waste	RCRA Subtitle C Section 3002, 40 CFR 262	Section 262 establishes standards for generators of hazardous wastes. This section requires that generators comply with the requirements for identification, accumulation, recordkeeping, and reporting.	A
RCRA standards for owners and operators of hazardous waste treatment, storage, and disposal facilities.	RCRA Subtitle C Section 3004, 40 CFR 264 and 265, and Federal Law 71:3101	These regulations establish minimum standards that define the acceptable management of hazardous wastes. These include the design and operation, monitoring, recordkeeping, closure, and post-closure requirements for hazardous waste management facilities.	A
Land Disposal Restrictions	RCRA Subtitle C Section 3004, 40 CFR 268	These regulations identify wastes that are from land disposal and establish treatment requirements necessary before these wastes can be land disposed.	A

A = Applicable
R&A = Relevant and Appropriate

Table 4 (cont.)

Law, Regulation, or Standard	Source of Regulation	Description	Type of ARAR
EPA-administered permit programs: The Hazardous Waste Permit Program	RCRA Subtitle C Section 3005, 40 CFR 270 and 124	These regulations cover the basic EPA permitting, monitoring, and reporting requirements for hazardous waste management facilities.	A
Standards of Performance for New Stationary Source	Clean Air Act, 40 CFR 60	These regulations establish the general provisions and performance standards for stationary sources of air emissions.	A
Safe Drinking Water Act	Safe Drinking Water Act, 40 CFR 141 through 143	This Act establishes maximum contaminant levels (MCL) and MCL goals (MCLG) at levels that would result in no known or potential adverse health affects. MCLs are enforceable health goals. In addition, this Act establishes guidelines for secondary drinking water standards.	A
Clean Water Act	Clean Water Act Section 301-308	This Act establishes non-enforceable guidelines for water quality that, when not exceeded, reasonably protect human health and aquatic life.	A
National Pollutant Discharge Elimination System (NPDES)	Clean Water Act Section 402, 40 CFR 122, 123, 125, and 136	This regulation sets forth requirements for point source discharge of water into public surface waters.	A
Occupational Safety and Health Act (OSHA)	29 CFR 1910	This Act establishes guidelines, requirements, and regulations to provide for the health and safety of workers conducting remedial action activities.	A

A = Applicable
R&A = Relevant and Appropriate

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Table 4 (cont.)

Law, Regulation, or Standard	Source of Regulation	Description	Type of ARAR
STATE			
Ohio Solid and Hazardous Waste Disposal Law	Ohio Revised Code (ORC) 3734.02(H)	This regulation prohibits excavation and construction activities without authorization from the Ohio Director of Environmental Protection.	A
	Ohio Revised Code 3734.05(C)	This regulation defines criteria and requirements that need to be included in a hazardous waste facility operating permit.	A
Ohio Solid Waste Disposal Regulations	Ohio Administrative Code (OAC) 3745-27-02	This regulation states that no provision of 3745-27 or 3745-37 shall exempt parties from compliance with any federal regulation or any section of the Ohio Revised Code.	A
	OAC 3745-27-05	This regulation specifies that solid waste in Ohio must be managed by landfilling, incineration, compositing, or approved methods not prohibited by OAC 3745-27.	A
	OAC 3745-27-06	This regulation requires that the plans for new solid waste disposal facilities specify the design features for on-site solid waste disposal activities.	A
	OAC 3745-27-07	These regulations require that the operator incinerate waste materials as soon as possible and that incinerator operations comply with chapters 3704 and 6111.	A

A = Applicable
R&A = Relevant and Appropriate

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Table 4 (cont.)

Law, Regulation, or Standard	Source of Regulation	Description	Type or ARAR
	OAC 3745-27-08	These regulations establish the general performance requirements for the operation of solid waste disposal facilities.	A
	OAC 3745-27-10	These regulations establish the general performance requirements for the closure of sanitary landfills.	R & A
Ohio Hazardous Waste Management Regulations	OAC 3745-50 through 3745-69	These regulations closely parallel the federal regulations described in 40 CFR 264 and establish minimum standards for the acceptable management of hazardous wastes.	A
Ohio Water Quality Standards	OAC 3745-01 (-03, -04, -05, and -07)	These regulations establish performance standards for the collection of samples and maintenance of existing surface water. They prohibit nuisance discharges and define water use and criteria that should be maintained.	A
Ohio Air Pollution Regulations	OAC 3745-15-07	This regulation prohibits air pollution nuisance emissions not regulated under 3745-17, 3745-18, 3745-21, or 3745-31. The substantive requirements of these regulations are applicable to alternatives that would produce air emissions.	A
	OAC 3745-15-16	This regulation establishes stack height guidelines for point sources of air emissions.	A
Ohio Particulate Matter Standards	OAC 3745-17 (-02,-05, -07, and --09)	These standards specify maximum ambient air particulate levels and establishes emission limits for opacity and capacity.	A

A = Applicable
R&A = Relevant and Appropriate

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Table 4 (cont.)

Law, Regulation, or Standard	Source Regulation	Description	Type of ARAR
Ohio Sulfur Dioxide Standards	OAC 3745-18 (-02, -04, and -06)	These establish standards, methods of measurement, and allowable emission rates for sulfur dioxide.	A
Ohio Regulations for Carbon Monoxide, Photochemically Reactive Materials, Hydrocarbons, and related materials	OAC 3745-21 (-02, -03, and --05)	These regulations set ambient air quality standards, establish acceptable methods for the measurement of ambient air quality, and prohibit the degradation of ambient air quality set in 3745-21-02.	A
Ohio Regulations for Carbon Monoxide, Photochemically Reactive Materials, Hydrocarbons, and related materials	OAC 3745-21-07	These regulations establish rules to control the emission of organic materials from new stationary sources.	A

A = Applicable
R&A = Relevant and Appropriate

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Table 5

CLEANUP LEVELS BASED ON INGESTION OF
INDICATOR CHEMICALS IN GROUND WATER

Chemical	Ground Water Concentration (ug/L) Based on Hazard Index of 1.0[1]		Ground Water Concentrations (ug/L) Based on Upperbound Lifetime Cancer Risks of:
	Adult Exposure	Child Exposure	10^{-6} [2]
SHALLOW GROUND WATER AT UPPER PORTION OF THE SITE (WATER TABLE AQUIFER)			
Chlorobenzene	945	270	NA[3]
2,4-Diaminotoluene	NA	NA	1.1×10^{-2}
Tetrachloroethene	700	200	6.9×10^{-1}
Trichloroethene	NA	NA	3.2
Vinyl Chloride	NA	NA	1.5×10^{-2}
DEEP GROUND WATER AT UPPER PORTION OF THE SITE (CONFINED BEDROCK AQUIFER)			
Chromium (Cr^{+3}/Cr^{+6})	35,000/175	10,000/50	NA
Nickel	350	100	NA
Tetrachloroethene	NA	NA	6.9×10^{-1}
GROUND WATER AT LOWER PORTION OF THE SITE (ALLUVIAL OVERBANK AND SEMI-CONFINED BEDROCK AQUIFER)			
Barium	1995	570	NA
Chlorobenzene	945	270	NA
2,4-Diaminotoluene	NA	NA	1.1×10^{-2}
Tetrachloroethene	700	200	6.9×10^{-1}
Trichloroethene	NA	NA	3.2

1 Based on Hazard Index = Exposure Dose/Acceptable Chronic Intake and assuming an ingestion rate of 1 L/day and a body weight of 10 kg for children and an ingestion rate of 2 L/day and a body weight of 70 kg for adults.

2 Based on the following assumptions for adults: ingestion rate = 2 L/day; body weight = 70 kg; frequency of contact = 365 days; years of exposure = 70 years

3 NA = Not applicable

Table 5 (cont.)

CLEANUP LEVELS BASED ON INGESTION AND DIRECT CONTACT
WITH CONTAMINATED SOURCE AREA SOIL

	Soil Concentrations (mg/kg) Based on Hazard Index of 1.0		Soil Concentrations (mg/kg) Based on Upperbound Lifetime Cancer Risk of 10^{-6}	
Chemical	Ingestion[1]	Direct Contact[2]	Ingestion[3]	Direct Contact[4]
Chlorobenzene	1.2×10^3	4.1×10^4	NA[5]	NA
Tetrachloroethane	3.4×10^2	2.7×10^3	1.2×10^1	3.9×10^1
1,4-Dichlorobenzene	NA	NA	23	7.4×10^2
1,2-Dichlorobenzene	NA	NA	23	7.4×10^2

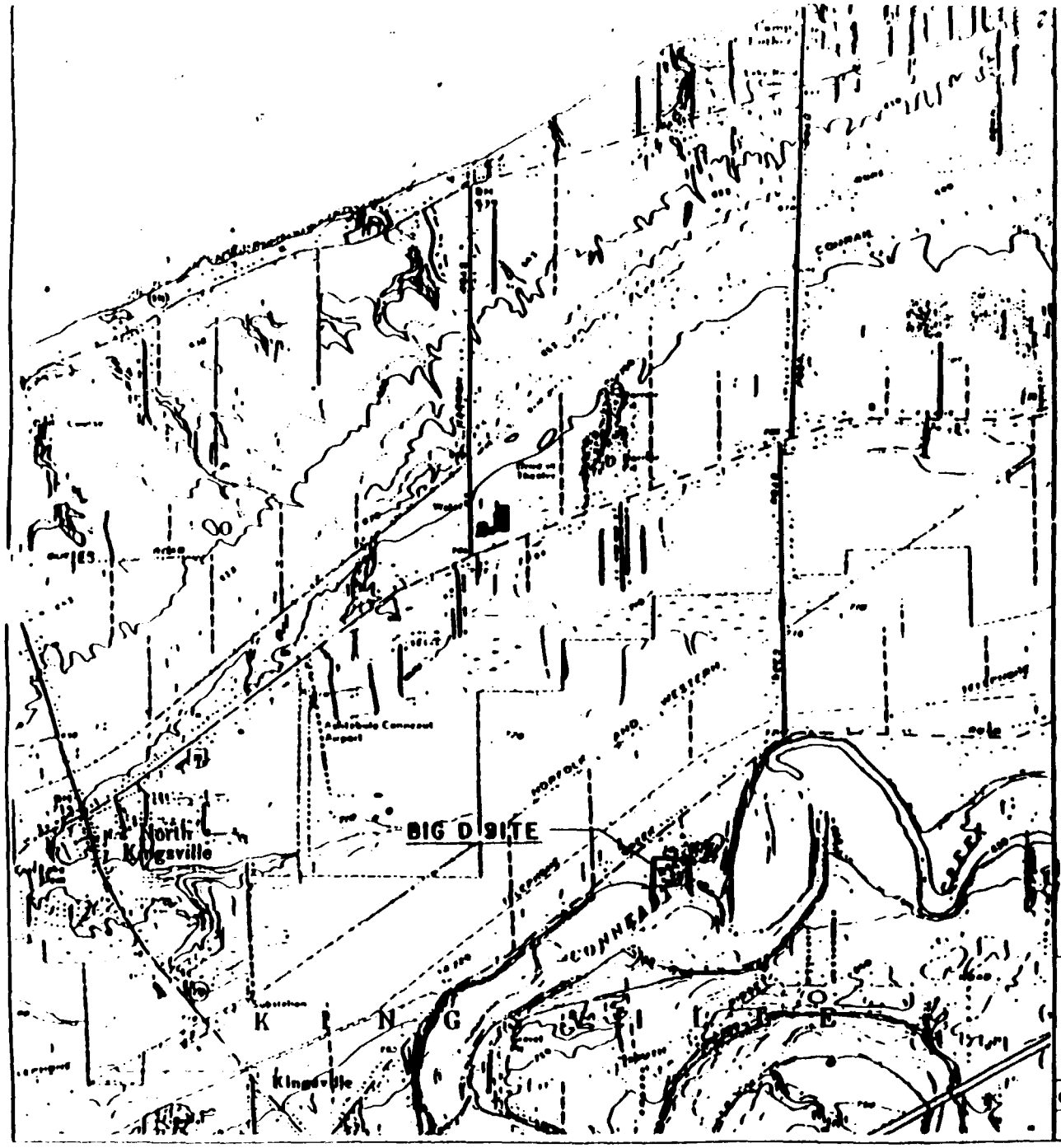
1 Based on an ingestion rate of 1.0×10^{-3} kg/day for worst case and an average body weight for children of 17 kg.

2 Based on an exposure amount of 3.75×10^{-4} kg/day, an average body weight for children of 25 kg, and a percent absorption of 5 percent for organic compounds.

3 Based on an ingestion rate of 1.0×10^{-3} kg/ day for worst case, an average body weight for children of 17 kg, and exposure frequency of 160 days, and 5 years of exposure.

4 Based on an exposure amount of 3.75×10^{-4} kg/day, an average body weight for children of 25 kg, a percent absorption of 5 percent for organic compounds, an exposure frequency of 144 days per year, and 12 years of exposure.

5 NA = Not Applicable



N

1000 0 1000 2000 3000 4000 5000
FEET

1 0 1
KILOMETER

CONTOUR INTERVAL 10 FEET

ROAD CLASSIFICATION

Heavy duty — Light duty
Medium duty — Unimproved dirt

OHIO

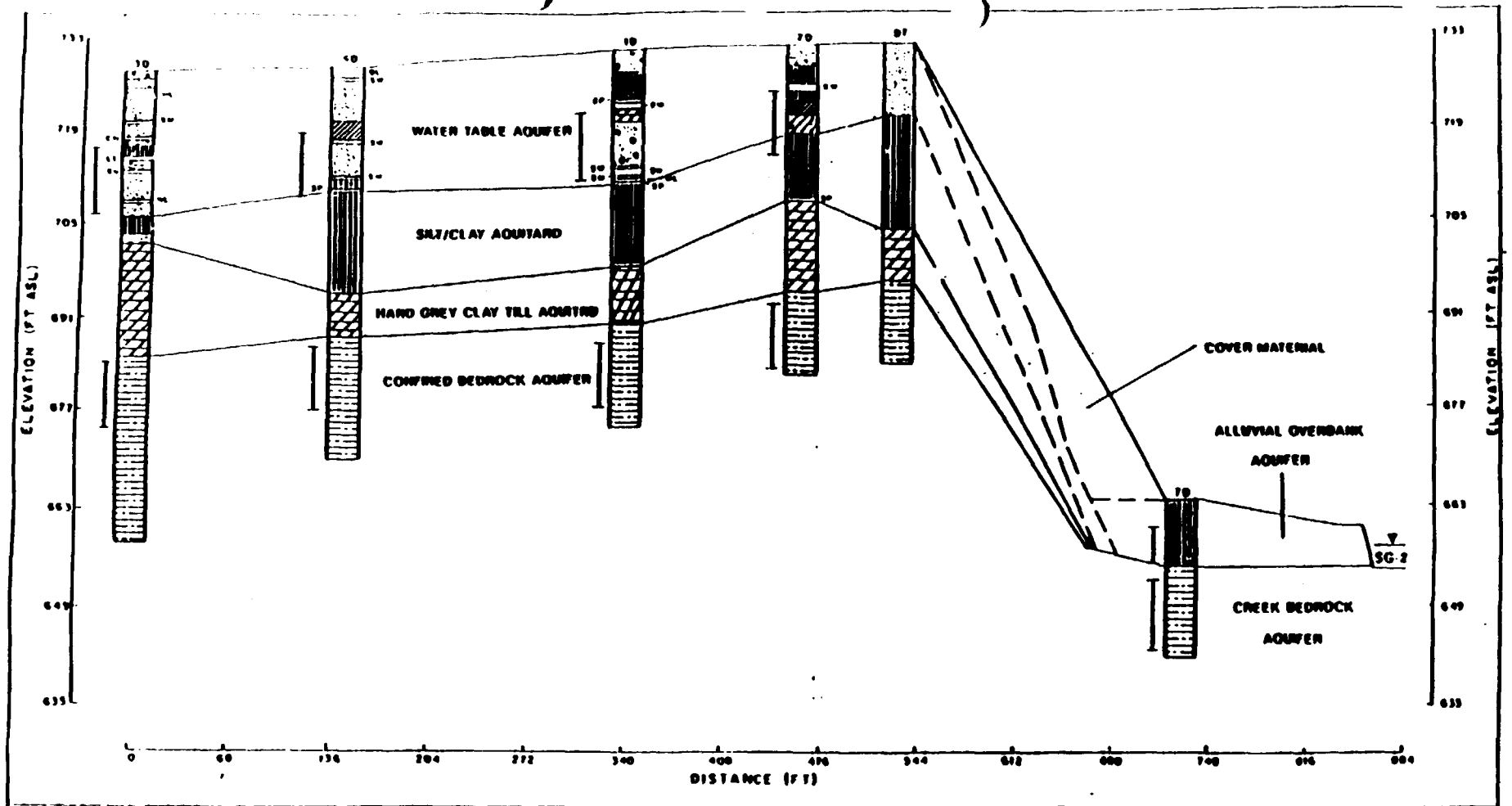
QUADRANGLE LOCATION

NOTE: Reproduced from USGS 1979

FIGURE 1
TOPOGRAPHIC MAP OF
NORTH KINGSVILLE QUADRANGLE

CREATED: 1/10/89	REVISED: 1/10/89	drwg

PRC ENVIRONMENTAL MANAGEMENT, INC.



LEGEND

E Static water level (May 1997)

Note: D7 was completed by Olin prior to the RI.

SCREENED INTERVAL

SC, SM, SP, SW, ML, CL, OL, CH, MH, ML/CL, CL/ML, BR

PROJECT: BIG D CAMPGROUND

FILE: W64532R1

LOCATION: KINGSVILLE

FIGURE 2

GEOLOGIC CROSS SECTION
10 SG2

PRC Environmental Management Inc

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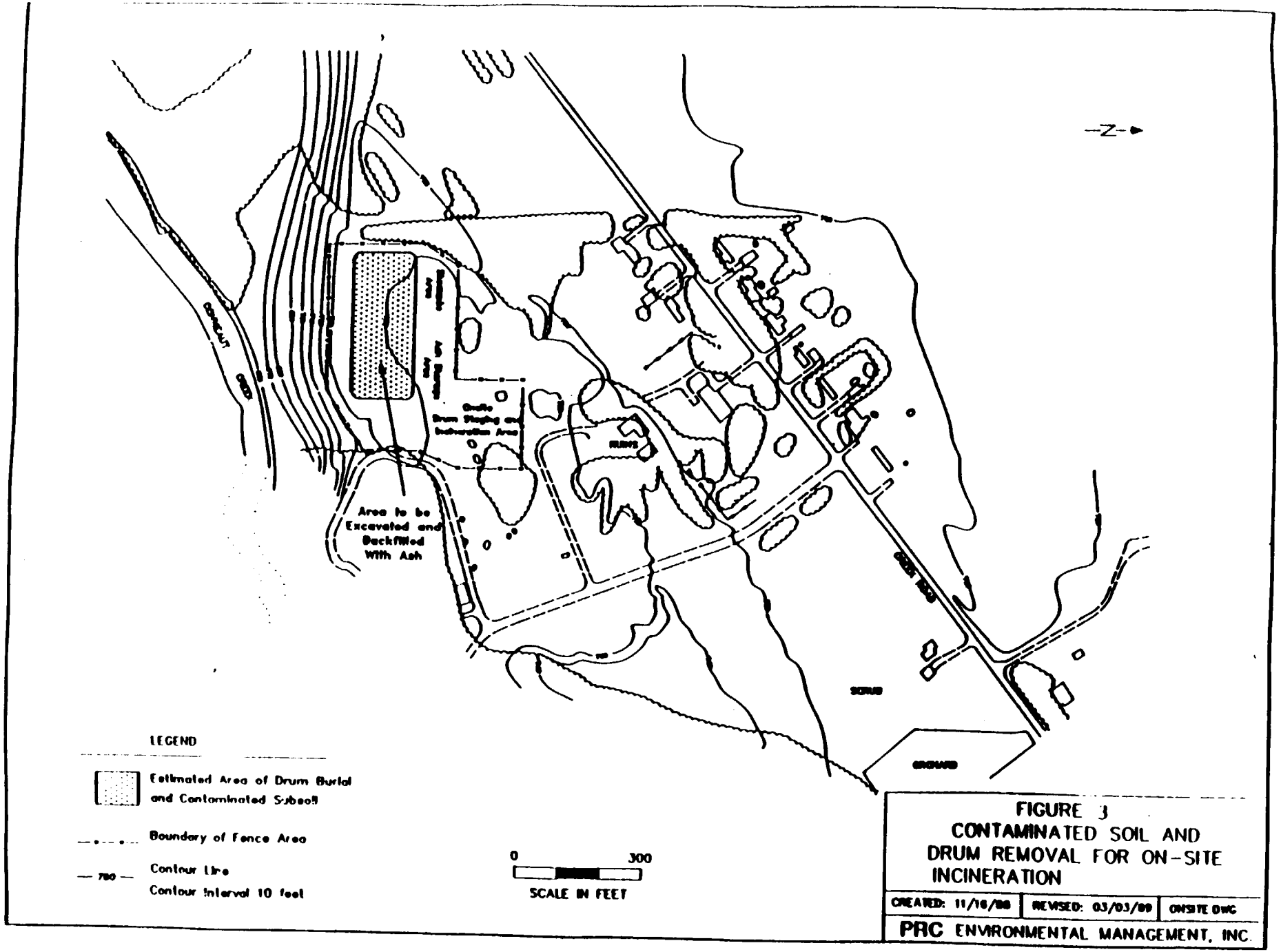

FIGURE 3
CONTAMINATED SOIL AND DRUM REMOVAL FOR ON-SITE INCINERATION

CREATED: 11/16/88	REVISED: 03/03/89	ONSITE DWG

PRC ENVIRONMENTAL MANAGEMENT, INC.

3/3

RESPONSIVENESS SUMMARY

BIG D CAMPGROUND SUPERFUND SITE
KINGSVILLE, OHIO

SEPTEMBER 1989

Produced by

PRC Environmental Management, Inc.
and
ICF Technology Incorporated

Work Assignment No.	:	01-51B1
EPA Region	:	5
Date Produced	:	September 29, 1989
ARCS Contract No.	:	68-W8-0084
Site No.	:	OHD980611735
Site Manager	:	Ron Reising
Telephone No.	:	(312) 856-8700
EPA RPM	:	Janice Bartlett
Telephone No.	:	(312) 886-5438

U5

RESPONSIVENESS SUMMARY:

BIG D CAMPGROUND SUPERFUND SITE
KINGSVILLE OHIO
SEPTEMBER 1989

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Appendix A: Submitted Community Comments

Appendix B: Submitted Olin Chemicals Corporation Comments

Appendix C: Transcript of public hearing held on Tuesday, the 8th day of August, 1989 at the Kingsville Fire Hall, Kingsville, Ohio

Appendix D: Submitted Ohio Environmental Protection Agency Comments

4.0

INTRODUCTION

This document is the Responsiveness Summary for the Big D Campground Superfund Site, located in Kingsville, Ohio. According to Superfund law, before the United States Environmental Protection Agency (U.S. EPA) can sign a Record of Decision, it is required to review and respond to comments received regarding any proposed remedial action to be taken at a site. Comments from the Kingsville community were submitted to U.S. EPA during a public comment period that was held from July 28 to August 26, 1989 and the public comments received are summarized on the following pages.

The Responsiveness Summary is split into three sections. Section 1 contains a summary of the comments received from community members and is followed by U.S. EPA's response. Section 2 contains a summary of comments received from the Olin Chemicals Corporation and also is followed by U.S. EPA's response. Finally, Section 3 presents comments from the Ohio Environmental Protection Agency and U.S. EPA's responses. In addition, the appendices include copies of all comments submitted as well as a transcript from the public hearing held on August 8, 1989 in Kingsville, Ohio.

Each summarized comment is followed by an alpha-numeric reference code indicating the source of the comments. The key to the reference code is as follows:

A) "Transcript of public hearing held on Tuesday, the 8th day of August, 1989, at the Kingsville Fire Hall, Kingsville, Ohio." Following the letter "A" is the page number, followed by the line number.

B) "Comments on the RI/FS Reports Big D Campground Superfund Site," Submitted by Olin Chemicals Corporation, August 25, 1989. Following the letter "B: is the page number.

C) Comments from Mr. and Mrs. Norma Thorpe, August 8, 1989.

D) Comments from Tim Baird, August 8, 1989.

E) Comments from Tracey Dreslinski, August 8, 1989.

F) Comments from the Ohio Environmental Protection Agency.

SECTION 1: SUMMARY OF COMMUNITY COMMENTS AND U.S. EPA RESPONSES

Adequacy of Sampling and Monitoring

Comment: We live directly south of the dump and want our soil and water tested. No one has ever tested it. [C]

U.S. EPA Response:

The soils and ground water which were found to be contaminated at the site are not connected to soils and ground water south of the landfill (south of the Creek). The erosion of the Creek has caused the separation. The Creek has eroded soils down to the deep bedrock which eliminates the pathway of soil contamination moving south of the Creek. Ground water flow also is interrupted by the Creek. The Hydrogeologic Investigation conducted during the RI shows that ground water flows toward and into the Creek, therefore cross-contamination of ground water cannot occur.

In addition, during the Remedial Investigation, two residential wells were sampled south of the Creek. The results of this sampling did not indicate that any contamination has migrated south of the Creek. No soil sampling was conducted off-site in residential areas.

U.S. EPA does not feel it is necessary to test any ground water or soils on property south of the Creek because a pathway for migration does not exist.

Comment: We support the Remedial Alternative #9 and hope that U.S. EPA can proceed to implement it as soon as possible. Until you do start the procedure, we would hope you would do more frequent water and soil testing. We suggest that you test all parties in the immediate area of the site, and make the test results available to them. [C]

Will drum samples or well samples be taken during the remedial action? [A,73,14]

U.S. EPA Response:

U.S. EPA sampled six residential wells in May, 1987 and the Ohio Environmental Protection Agency (Ohio EPA) conducted limited residential well sampling in September, 1988. These residential wells did not exhibit any ground-water contamination; however, U.S. EPA recognizes the need for further monitoring of residential drinking water wells.

U.S. EPA and Ohio EPA will arrange further sampling of residential drinking water wells north of the Creek, primarily on Creek Road. The results of this sampling event will be sent to the owners of the wells sampled. During the

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remedial action, ground water will be monitored to insure that the contaminant plume does not bypass the northern interceptor trench and the extraction wells by the Creek. Sampling of drums to be removed from the landfill will be conducted prior to incineration during the remedial action.

Comment: When was the last time Mr. Baird's well was sampled? Mr. Baird's well was not sampled by Ohio EPA six months ago. [D]

U.S. EPA Response:

Mr. Baird's well, located at 3740 Creek Road, was sampled by the U.S. EPA in May, 1987. During this sampling round, the owner's name was listed as "Ramison".

Comment: We are concerned about those residents who have wells that are inside the defined plume area. Apparently the State did some sampling less than six months ago, but not all of the wells were sampled. We need to be assured that all the wells in the area are safe for us to use. [A,23,14]

U.S. EPA Response:

The plume area was defined based on numerous pieces of information, such as known concentrations of contaminants found in wells around the landfill, the ground-water flow direction and the type of soils the water is moving through However, sampling done at the selected homes indicates that contamination is not present. In addition, during sampling events at residential wells, it was observed that the water table was very shallow (approximately five feet deep) compared to the water table on-site which is located at approximately 15-20 feet below the surface. This difference in water levels indicates that the residential wells are probably screened in a perched aquifer which is separated from, and above, the water table aquifer identified on site.

In order to verify that contamination of ground water has not occurred, U.S. EPA and Ohio EPA will arrange to conduct further sampling of residential wells north of the site, primarily on Creek Road. The results of this sampling event will be sent to the owners of the wells.

An additional ground water study will also be conducted to determine exactly where ground water contamination is located; how far it has migrated from the site. This study will involve installing more monitoring wells and sampling these wells to determine the extent of contamination.

Comment: It seems that U.S. EPA did not collect enough soil samples to accurately characterize the effect of site contamination on the soil. [A,25,20]

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U.S. EPA Response:

During the RI soil samples were collected from nine borings around the landfill. These samples were selected based on screening with an organic vapor detector. The general sampling locations were just above the water table, just below the water table, just above the hard grey till geologic unit, and at the base of the hard grey till unit. U.S. EPA feels these samples characterize the soil contamination on site.

Comment: U.S. EPA doesn't know what's in the landfill. [A,68,6]

At one point, Olin Chemicals Corporation was scared about thylene gas leaks. It killed people working for them. [A,66,20] U.S. EPA says that it has no written information on whether thylene is in the landfill. U.S. EPA should be able to get Olin Chemicals Corporation to say what is in the landfill. [A,67,10]

We don't know what's dumped in that landfill because U.S. EPA cannot get a hold of Olin Chemicals Corporation or cannot press them into telling us what is in that landfill, and I think you better get on the ball here and try to find out what's in there, how far that landfill is going to seep into everybody's property along Creek Road--across Conneaut Creek and do something about it, because we haven't done anything about it so far. [A,86,17]

U.S. EPA Response:

On December 2, 1985, U.S. EPA sent letters to several companies in Kingsville and Ashtabula, Ohio, including Olin Chemicals Corporation. These letters requested all information the companies may have had concerning the operations at the Big D Campground site. Responses to those letters identified wastes which were disposed of in the landfill. Olin Chemicals Corporation identified four RCRA listed hazardous wastes which were disposed of in the landfill: centrifuge and distillation residue from toluene diisocyanate (TDI) production; benzene, 1-3-diisocyanatomethyl; chlorobenzene; toluenediamine (TDA). In addition, Olin identified the following materials which may have been transported to the site for disposal: spent vacuum pump oils, TDI residue contaminated with monochlorobenzene (MCB) and carbon tetrachloride, earth contaminated with TDA and TDI spills, flyash, trash, monoethanolamine (MEA), off-spec TDI, and TDA and TDI in sample cans and bottles. The vacuum pump oil may have been contaminated with TDI, MCB and trace phosgene. Thylene was not identified as having been put in the landfill.

During the RI, two test pits were excavated in the landfill to verify the presence of buried drums and other wastes. This sampling confirmed that there are materials similar to what Olin described, i.e., buried drums and bulk wastes, in the landfill. During this excavation several samples of drum contents, contaminated soils and other wastes were taken to characterize the type of contamination in the landfill. This sampling identified that contamination from the materials in the source area was similar to that found in the ground water and soils and that the contamination is migrating away

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from the landfill.

Ground Water

Comment: If U.S. EPA just used a computer model to project the location of the groundwater plume, then you have no specific evidence from monitoring wells. [A,74, 23] When it comes time to install the trenches and the groundwater monitoring system, if the groundwater plume has been defined to be larger, then it is not necessary to install those trenches where you show them. They may very well be much closer to the actual site. [A,75,5] If it takes two trenches to do the job, they could both be located south of the homes. [A,75,14]

U.S. EPA Response:

The computer model which estimates the location of the ground-water plume uses the concentrations of contaminants detected in the monitoring wells to estimate the extent of the plume. See pages 4-18 of the RI report, which discusses that the level of contamination of chlorobenzene was used to determine the extent of the plume.

The location of the northern extraction trench will depend on the extent of the plume, which will be determined after further ground-water study. This trench will be installed at the downgradient (northern) edge of the plume. If it is determined that the northern edge of the plume is south of the homes on Creek Road, the northern trench will be located south of the homes.

Comment: The plume area is just an estimated area, and it seems that the plume could be moving in another direction. When will U.S. EPA know for sure the exact area of contamination so that a remedy can be designed? It appears that U.S. EPA could have collected more samples do accurately define the areas of contamination. [A,24,15]

U.S. EPA Response:

The direction of ground-water flow determines the direction of movement of the contaminant plume. Ground-water movement was determined based on water level measurements taken during the RI. See the RI report page 3-7 for details.

A further ground-water study will be conducted to determine a more precise extent of ground-water contamination. This study should be completed within the next year and one half and will provide information necessary to place and construct the ground-water cleanup system.

The ground-water samples which were collected during the RI identified that ground-water contamination does exist and that the source of contamination is the landfill, from which the contamination is migrating. The RI ground-water

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study was conducted to obtain this information. When the RI was in the planning stages, it was not known in what direction ground water was flowing, what type of contamination existed, or the geology of the site.

Comment: Isn't it true that Olin Chemical Corporation, at some point, placed a clay cap over the site and has a monitoring well and run-off trench that are still in place? [A,45,12] It must be true that whatever contamination has taken place through groundwater seepage took place prior to 1983 or 1984 when Olin Chemicals Corporation put the clay cap on the waste and installed the water collection trench. [A,46,2]

U.S. EPA Response:

In December, 1978, Olin Chemicals Corporation installed three wells near the Creek (see RI, Page 1-12). In December, 1983, Olin installed 11 additional monitoring wells. In March, 1983, Olin submitted evidence to U.S. EPA that it covered, regraded, and seeded the landfill. The wells and cover are still in place.

The earliest sampling done by the U.S. EPA was April, 1982, which identified ground-water contamination. While it is not known exactly when contaminant migration occurred, the potential for migration has existed since the first wastes were deposited and will continue for as long as wastes remain.

Comment: I would like more information about the ground-water treatment plant. How long will it be in place? [A,56,8] How long will it be in operation? [A,56,24]

We are the people who are living in those houses that will be between the trenches. People will be working and digging and going in and out of there for 20 years. It will change out whole quality of life. [A,57,7]

I am concerned about the location of the trenches. I'd like to know where they are going to be before I make a comment on the Proposed Plan. I'd hate to see the trenches go south through the row of homes where I live. [A,101,18]

I think that people should be immediately reimbursed for any damage to their property that U.S. EPA causes when the trenches are being built. [A,102,19]

I worry about the property values. Since this has come out in the Star Beacon anybody people perceive that property values around the site are worth squat. Nobody is going to by that property now. When U.S. EPA get done, will all the property owners get an affidavit saying that the property is safe and that property values have been restored?

I'm an independent real estate appraiser. I'm not directly affected as the property owners are, but I'm going to be indirectly affected because I'm going to end up appraising some of the properties in the area. The Federal Home Loan Bank made a statement pertaining to values. The Federal Home Loan Bank

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has issued a memorandum or a statement that now as an independent appraiser I have to notify on the appraisal report of any property that's within one mile of a Superfund site. I don't want to speak for the underwriters, but when they see a situation like this, to me that means a big red flag, and I guess there's going to be some type of value diminished. This is a big project for a small community to fathom. [A.116.6]

U.S. EPA Response:

The ground water collection system will collect ground water in the water table aquifer with two interceptor trenches; one at the downgradient edge of the plume and one at the north end of the source area. The exact placement of the trenches will be decided after completion of a pre-design ground-water study. This study will involve installing and sampling additional monitoring wells which will better define the geology north of the site and will determine how far contamination has migrated from the site.

The trenches will be in place for approximately 20-60 years. The trenches will be installed underground to a depth of approximately 25 feet, will be filled with a permeable material to collect ground water, and should not be noticeable after they are reseeded. Once the trenches are installed and operational, personnel will not be "working and digging and going in and out" of resident's property because the ground water collection process is done by the trenches. Personnel will only be required to work on the trenches for regular maintenance checks or if a problem arises with the ground-water collection system. Personnel will be working in the ground-water treatment plant which will be located on the site.

U.S. EPA and Ohio EPA will attempt to design the placement of the trenches to minimize the impact to residences in the vicinity of the trenches. The agencies will attempt to repair to its original condition any property that is damaged during installation of the trenches.

Ground water in the alluvial and semi-confined bedrock and confined bedrock aquifers will be collected with 30 extraction wells. The collected ground water will be treated with granular activated carbon on-site and discharged to Conneaut Creek.

Ground-water monitoring wells will be installed north of each interceptor trench to monitor for any contamination bypassing the trenches. The existing shallow and deep wells on the lower portion of the site will monitor for any contaminant migration bypassing the extraction wells.

A collection time of 20 to 60 years will be required to reach ground-water cleanup levels. This estimate is based upon the amount of time necessary to remove contaminants from the saturated portion of the aquifer immediately below the source area and all contamination which has already migrated from the source area. If contaminant concentrations change over time, the sampling program may be modified.

The site will be fully cleaned up once the landfill contamination is

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incinerated and the contaminated ground water clean up is completed. The agencies will then remove the site from the National Priorities List and will it will no longer be a Superfund site.

U.S. EPA cannot guarantee that property values will not be affected. The primary purpose of U.S. EPA is to protect public health and the environment. The Agency believes that the selected remedy will best address environmental impacts and future health risks posed by site conditions. U.S. EPA will attempt to minimize other impacts posed by the remedy.

Comment: Suppose U.S. EPA finds contamination in water wells, then what happens? How will we be provided with water if the water wells are found to be contaminated? [A, 70,17]

What we were told before was that if they found any wells that are contaminated, U.S. EPA would hook everyone into either Conneaut or Ashtabula, and Olin Chemicals Corporation would have to pay for it. Does that still stand? [A,71,7]

U.S. EPA Response:

If contamination migrates from the site and is discovered in residential drinking water wells, U.S. EPA, in conjunction with Ohio EPA, will provide an alternate drinking-water source. One way to provide an alternate drinking-water source would be to hook-up residents to a nearby municipal water source. The U.S. EPA would try to get the PRPs to pay for the hook-up. If necessary the U.S. EPA would pay the costs and attempt to regain costs at a later date from Potentially Responsible Parties (PRPs).

Distribution of Information

Comment: Information from U.S. EPA should be sent to all Kingsville residents concerning the Big D Campground site, especially if there should ever be an evacuation. [C] If U.S. EPA continues to take samples, conduct tests, and monitor the residents that live nearby should be notified. (A,40,2)

U.S. EPA Response:

The U.S. EPA mailing list for the site was established based on interest shown by residents who attended public meetings held in 1987 and 1989. Whenever new information is released to the public or a public meeting is scheduled, a notice is published in a local paper to advise all residents. The U.S. EPA will advise residents living near the site of work scheduled to be conducted on-site.

Any evacuation plan, which would be prepared by U.S. EPA would contain the

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names, addresses, and phone numbers of all residents in the immediate vicinity of the site.

Incineration

Comment: I am concerned about the proposed incinerator. The specifics of the incinerator must be explained to the community. For example, will the incinerator have a scrubber as part of the system? [A,23,7] What type of incinerator will it be? [A,31,18] Is there going to be a lot of noise during operation of the incinerators? [A,82,13]

U.S. EPA Response:

The U.S. EPA will mail a fact sheet on incineration to all persons on the mailing list. As soon as the specific incinerator to be used is chosen, further information will be sent to the residents on the mailing list and, if interest warrants, a meeting will be scheduled to provide additional information.

Excavation

Comment: The wind primarily comes out of the northwest and I live downwind from the site. As you plan to dig up material at the site that will be incinerated, precautions must be taken. Is there any danger to the people who live downwind of the site while U.S. EPA is digging up and transporting contaminated material? [A,22,9]

U.S. EPA Response:

Air monitoring will be conducted during excavation to ensure on-site worker protection and to monitor the air quality near the site for residents.

Comment: You are proposing excavation, but at a prior public meeting we were told that if the wastes were just dug up, there could be more problems, like another Love Canal. Now, if you go in there and start digging won't you have the same concerns? [A,58,9]

U.S. EPA Response:

The RI report identifies types of contaminants at the site. Information on the types of wastes placed in the landfill also has been obtained from Olin Chemicals Corporation. There is no indication nor any reason to believe that this site will turn into another Love Canal. However, safety precautions and

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contingency plans to handle any emergency situations will be established prior to beginning any excavation work at the site.

Comment: During the excavation activities, it seems that there should be an independent party that monitors the contractors. [A,88,16]

How many U.S. EPA employees will actually be on the site? Does U.S. EPA actually do some of the testing? [A,79,12]

We are concerned about U.S. EPA's power to make sure that the cleanup is done properly. [A,49,21]

U.S. EPA Response:

During the design and construction phases of the project ahead, the U.S. Army Corps of Engineers will have a leading role. In the actual removal and incineration phases of the project, the Corps will procure the contractors and provide the necessary oversight as well. U.S. EPA and Ohio EPA's role will be assure that any public health threat is addressed, that the public is informed of the progress of site clean up and that U.S. EPA's Record of Decision is carried out in full. If the responsible parties implement the cleanup, U.S. EPA and the Corps will provide oversight of all activities pursuant to a court-entered Consent Decree.

It is not possible to estimate how many persons will actually be on site during any one phase of the remedial action.

Contingency Plans

Comment: I am concerned that U.S. EPA's Proposed Plan does not contain contingencies to address problems that may still occur. For example, suppose that during the excavation process some of the drums burst, what would happen? [A,33,24]

U.S. EPA stated that if something unexpected happens it will be eventually detected through monitoring activities. We are concerned about residents in the area of the site in the event that something happens, like leaking toxic vapors. What happens to nearby residents until the excavation takes place? [A,35,5] If something goes wrong at the site, say that gas is coming off the site at a higher level than it should, we want to know that U.S. EPA won't delay in fixing the problem. [A,51,24] We are concerned about your contingency plans so that we can be assured that the cleanup will be conducted properly. [A,69,18]

U.S. EPA Response:

During the remedial design, contingency plans will be prepared to handle

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emergency situations which may occur during the remedial action. As soon as an emergency situation was detected, which would entail excavation or some other measure, residents would be notified. The U.S. EPA would not neglect to tell residents of an emergency situation as its purpose is to protect human health and the environment.

Once the remedial design is completed, prior to beginning the remedial action, the design plans and related documents will be made available to the public at the repository located in the Kingsville Public Library.

General

Comment: Alternative #9 says that you are going to prohibit the use of the water wells. Is that what you're going to do? Everybody has a well. [A,72,3] The fact sheet says,"...EPA would prevent the use or installation of groundwater supply wells in the area of the site..." [A,72,15]

U.S. EPA Response:

The use or installation of drinking water wells located in the contaminated aquifer will be prohibited. If contamination related to the site is found in residential drinking-water wells, the U.S. EPA, in conjunction with the Ohio EPA, will provide an alternate drinking-water supply. The actual extent of the contaminated ground-water plume will be better defined after completion of the additional ground water study.

Comment: I would like to know why U.S. EPA does not give the community any direct answers. U.S. EPA says "I'm not sure," or, "we're going to have to monitor more." Why doesn't U.S. EPA have someone talk to the community who knows more about the site and understands the issues. [A,88,23]

I think that the representatives from the U.S. EPA here tonight have tried to divide and conquer these people by stating, "that later on we will answer your questions on a one-to-one basis."

It is really hard for me to be in favor or not in favor of a remedial plan when we don't have any specific information. U.S. EPA can't tell us where the trenches are going to be placed or the location of the plume. How can the community make a comment on this? We don't know who's going to be affected by this. [A,95,15]

I think that before we accept or disapprove anything we should have a field representative or an engineer from the U.S. EPA who is familiar with this area, who is familiar with the dump, who knows what's going on, to come out and explain the issues to the people of Kingsville. [A,100,11]

When such time as you people come back with a solid workable plan then I'll give a comment on whether I feel it's to my benefit or not. I believe that

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you should have another meeting when you come back with a solid plan, not just a proposal. [A,102,11]

U.S. EPA Response:

At the public meeting, the only types of questions which U.S. EPA deferred to be answered later or were not able to answer were either specific questions posed by residents living near the site, i.e., issues such as standing water in their backyards, and specific questions on the remedial action, or the location and type of incinerator to be used on-site. Information about residential concerns was not known prior to the meeting. If U.S. EPA and Ohio EPA had been aware of these concerns prior to the meeting, these questions could have been researched. The design specifications of the remedial action will be developed during the remedial design phase. Therefore it was not possible during the Proposed Plan public hearing to tell the community exactly where the interceptor trenches will be located, or what type of incinerator will be used on site, and what type of scrubber it will have. During the remedial design phase all the specifics of the remedial action will be decided. Once the remedial design is completed the remedial action cleanup of the site will begin.

The RI and Feasibility Study (FS) identified the type of contamination at the site, what media have been affected by the contamination, and the general extent of migration of the contamination. Using this environmental data, the U.S. EPA and Ohio EPA developed a Proposed Plan which outlines the best way to address the contamination at the site. During the Proposed Plan and public comment period, the Agencies asked the public to comment on the concepts presented in the Proposed Plan. The information currently available will be fine-tuned during the remedial design to gather engineering data, such as exactly where to place the trenches and what type of incinerator will best handle the wastes at the site.

U.S. EPA's Remedial Project Manager and Ohio EPA's Project Coordinator designated for the site are the technical contacts. They oversee all work done at the site, solve problems which arise, and review all documents produced, in general, manage the site.

Comment: Was there a fire on the site about 10 to 12 years ago? If so, what effect would the fire have on conditions at the site? [E]

I've seen the landfill, or have heard of the landfill on Creek Road being ablaze, on fire.

U.S. EPA Response:

The only information located about a fire in the area was one which did not occur at the Big D Campground site. Fiberglass wastes were dumped alongside Conneaut Creek at a site on Creek Road approximately one mile west of the Big D site. That site apparently caught fire several years ago.

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Comment: We are concerned that U.S. EPA will pick another less protective alternative for addressing contamination issues at the site. [A,41,7] If funds run out, U.S. EPA may pick a cheaper remedy. [A,43,2]

U.S. EPA Response:

The Proposed Plan discusses U.S. EPA's preferred alternative for cleaning up the site. Once the Record of Decision (ROD) is signed the remedy is finalized and cannot be changed without notifying the public, beginning a second public comment period for the new remedy and signing another ROD.

If funding problems occurred, the remedial action may be slowed but U.S. EPA would not choose a cheaper remedy simply to save money. The remedy chosen with this ROD is the most cost effective and protective of human health and the environment.

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SECTION 2: SUMMARY OF OLIN CHEMICALS CORPORATION COMMENTS AND U.S. EPA RESPONSES

Acetone

Comment: The organic compounds detected in the deep wells are primarily acetone, methene chloride, and chlorobenzene. Section 4.3.3 of the RI report notes that acetone, methylene chloride, chlorobenzene, toluene, and trichlorethylene were detected in some field and/or laboratory blanks up to 305.8 ppb of total VOA's. Acetone was used as a rinse in decontamination of ground water sampling equipment. This is especially troubling since acetone is the compound reported in the highest concentrations and with the greatest frequency in the deep wells. [B,2]

U.S. EPA Response:

Only one field blank sample had other organic compounds than acetone and methylene chloride (field blank sample BD-FB2-01). This was a field blank of a bladder pump which was not used in sampling any of the deep wells. As stated in the RI report, the compounds found in field blank samples were compared to the analytical results and, when appropriate, the analytical results were eliminated from consideration. Furthermore, neither acetone, methylene chloride, or toluene were used in calculating potential risks.

Comment: Section 4.3.3.3 of the RI states "Acetone, a common field and laboratory contaminant was the only compound detected during both sample rounds in a single deep well." If acetone is not included, the detected total VOA concentrations in the deep wells exceed 10 ppb only in one sample (34.2 ppb in the first sample from Well 4D). The latest measurement from Well 4D was 0 ppb. [B,3]

U.S. EPA Response:

Table 4-5 in the RI report identifies acetone separately in the distribution of organic contaminants at the site. Total VOAs are not listed. As stated above, acetone was not used in calculating potential risks.

Ground Water

Comment: Chemical data presented in the RI report about ground water from the confined bedrock aquifer raises serious concerns with respect to the validity of the RI data. Specifically, we are concerned about the following:

1. Validity of the ground water samples and analysis from the deep wells (those screened in the unit designated the confined bedrock aquifer) is questionable.

2. Significance of the low, inconsistent concentrations detected in the deep aquifer is doubtful.

3. Temporal patterns in the data suggest that the concentrations in ground water from the deep wells may result from residual contamination introduced to this depth by drilling for installation of the monitor wells.

4. Well development was not sufficiently defined and may not have been properly done. [B,2]

U.S. EPA Response:

U.S. EPA does not believe that there is any problem with the data obtained from deep wells.

The significance of low concentrations of contaminants found in the deep aquifer is important. Tetrachloroethene found in one deep well has a 5.1 x 10^{-6} cancer risk.

All deep wells were constructed by properly casing off the upper aquifer followed by continued drilling into the deep aquifer using equipment not used in the water table aquifer (as discussed in Appendix A of the RI report). Temporal patterns may be indicative of pulses of contamination being released from the landfill. Well 2D showed an increase in chlorobenzene concentrations between round 1 and 2.

Wells were developed using a surge block coupled with repeated bailing and pumping (as discussed in Appendix A of the RI report). U.S. EPA believes well development was conducted properly.

Comment: The spanned period of four months, for well sampling and analysis, is insufficient to make ground-water quality conclusions. The data for repeated samples from any single deep well is inconsistent. For example, subsequent samples resulted in the following total VOA concentrations.

- well 1D 0 to 76 ppb
- well 2D 1,100 to 118 to 0 ppb
- well 3D 628.6 to 48 to 0 ppb
- well 4D 71.2 to 900 to 0 ppb
- well 5D 5,922 to 0 ppb
- well 6D 430 to 38 ppb [B,3]

In the last ground-water sampling event, four of the six wells did not report any detectable VOAs. Even if the sampling and analysis results were not of

questionable validity the data would not necessarily demonstrate contamination of the confined bedrock aquifer. The data for total VOAs listed above illustrate a general trend of decreasing concentration with succeeding samplings.

U.S. EPA Response:

The deep well analytical results are not inconsistent. As discussed above, it is not unusual for contaminants in the ground water to move in pulses which will vary the concentration of contaminants found in the ground water throughout the year.

In addition, the total VOA concentrations listed in this comment are not correct. Wells 2D, 3D, and 4D did not show 0 ppb total VOAs in the last sampling event. As discussed in the footnotes of Table 4-10 of the RI report, these samples were analyzed for extractables but not analyzed for volatiles.

Comment: Dedicated sampling equipment should have been used to avoid problems of equipment contamination during sampling. Because of the presence in the blank samples of the same contaminants reported to be present in the samples and the inconsistent results from repeated samplings, the ground-water sample and analysis results do not indicate significant concentrations of organics in the deep ground water. [B,3]

This suggests that the detected organic compounds could be the result of contamination from shallower zones that was carried into the deeper aquifer during drilling for installation of the deep monitor wells. Repeated purging and sampling of a well would gradually reduce the constituent concentrations resulting in lower detected concentrations with repeated samplings and perhaps invalidate the conclusion that no deep contamination exists. [B,4]

U.S. EPA Response:

The field blank sample which showed organic compounds other than methylene chloride and acetone (BD-FB2-01) was a sample from a bladder pump. This sampling pump was not used to sample the deep wells. All other field blank samples indicate that decontamination procedures were adequate and did not introduce organic compounds into the samples (with the exception of acetone and methylene chloride which are common lab contaminants).

Comment: It should be noted that in comparing production well contaminant concentrations with site monitoring-well concentrations in the same aquifer, lower concentrations may occur in dynamic systems such as production wells in comparison to stagnant systems such as monitoring-wells. The use of monitoring well data applied to production well consumption may overstate the health risk. [B,15]

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U.S. EPA Response:

In order to prevent sampling of "stagnant systems", purging is done prior to sampling. Furthermore, MCLs are based on water quality from a "tap" or faucet.

Comment: The data in Appendix C of the RI report does not indicate the volume of water that was removed from each well during development and during purging for each sampling event. This information is necessary to evaluate the validity of the ground water samples. [B-4]

U.S. EPA Response:

Five to 40 gallons of water were removed from the deep wells during development, 15 to 60 gallons were removed from the shallow wells during development, and 25 to 70 gallons were removed from the creek wells during development. The exact quantity removed was dependant on well yield. In all cases, wells were developed until the water form the wells was clear and as sediment-free as possible. Conductivity, pH and temperature were also monitored.

Comment: Boreholes 2D, 3D, and 4D were advanced 10 to 20 feet deeper than the planned well depth. On attempting to plug the bottom of these boring cement bentonite grout rose in the borehole through the screened interval. Borehole 2D was apparently properly plugged and abandoned and the well was installed in a new borehole adjacent to the first location. Borehole 3-D, however, was drilled out using a core barrel. Borehole 4-D was flushed with water to remove the rout. The adequacy of the measures for wells 3-D and 4-D is questionable and residual grout in the wells may impact quality of water samples from these wells. The procedure used for the borehole 2-D should also have been used for 3-D and 4-D. [B,4]

U.S. EPA Response:

The U.S. EPA decided not to abandon and redrill wells 3D and 4D because the wells were able to be redrilled through the grout (3D) and flushed (4D). It was determined that the presence of grout would not impact the quality of samples acquired from these wells.

Comment: Northward movement of shallow ground water is stated as fact. This is not documented and is not justified by the data in the RI report. Table 3-1 (p.3-16 of the RI report) shows some higher ground water elevations north of wells 1S, 5S and 4S. For example, water levels in 3S, the northern most monitor well, and RW3 (a residential well located about 600 feet north of the reported ground water divide at the site) were 712.90 feet and 719.83 feet, respectively, on September 26, 1987, and higher than the wells immediately to the south. In fact, the ground water elevation was higher in

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the northern most shallow monitor well, MW-3S, than in well to the south of it on four of the six dates on which ground water elevation measurements were reported. Ground-water elevation in RW3 was 720.07 feet msl on May 16,1987, higher than monitor wells located to the south. Furthermore, it is difficult to predict a contour of 714 feet as shown in Figure 3-3 (p.3-8 of the report) with the existing ground-water elevation data. This contour was drawn considerably north of well 3S, the northern most monitor well and the northern most data point. Also, the water level around the 712 feet contour line in Figure 3-4 (p.3-9) can be interpreted in other ways. For instance, an east-west trough could exist instead of a closed depression. [B,8]

U.S. EPA Response:

U.S. EPA interprets ground-water movement in the water table aquifer is to the north. This is substantiated by the water level measurements taken in monitoring wells on-site, and presented in Table 3-1 of the RI report. Water level measurements obtained from residential wells are not used to contour ground-water flow because the ground water in residential wells has different characteristics from ground water in monitoring wells on site (determined from review of inorganic data and the use of modified stiff diagrams). In addition, northern flow of the shallow ground water is substantiated by the presence of contamination from the landfill being detected in all shallow ground-water monitoring wells north of the landfill.

Contour line 714 on Figure 3-3 of the report was drawn only 75 feet north of well 3S and was estimated using standard contouring techniques. Contour line 712 on Figure 3-4 could indicate and east-west trough but is not supported by any data collected during the RI. The U.S. EPA believes that the ground-water flow interpretations presented in Figures 3-3 and 3-4 are appropriate.

Comment: In the modeling of the plume, it has been assumed that the water table aquifer is infinite in extent. This assumption is contradictory to the actual physical characteristics. In fact, data were not presented that verify that the aquifer is continuous in the area included in the model. Also the model did not account for the vertical recharge from the surface. [B,11]

U.S. EPA Response:

The model was used as a tool to estimate the extent of contamination based on existing site data. The assumption of an infinite aquifer and no vertical recharge are common assumptions in analytical models. These assumptions were noted in the selection of the model and the results are accordingly used as just one tool in remedy selection.

Comment: The Princeton Model is limited to modeling a single source with a single ground-water flow direction. The study used a combination of results from multiple model runs as a weighted average of concentration with respect to discharges from the two source areas. Theoretically, since it is not based

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on solute mass balance or mass conservation, the weighted average concentration may deviate remarkably from the true value at each location. It is, therefore, essential to verify the results by running other models (analytical or numerical) and comparing the results. No indication of model verification was submitted.

In light of the above, we suggest that the following be considered further:

1. Obtain water level data for additional dates and provide more data points further north.

2. Utilize another analytical model to verify the Princeton Model's results with the same given assumptions;

3. After adequate data is obtained, refine the assumptions and use other analytical or numerical models to obtain results based on more realistic physical conditions. A numerical model or combination of analytical and numerical models is highly recommended since it can better simulate the subsurface conditions at the Big D site;

4. Sensitivity analysis of the responses of ground water flow and contaminant transport with respect to changes in the hydrogeological parameters is essential since the input values are based on assumed values and may differ very significantly from the actual conditions. No sensitivity analysis is reported in the RI. [B,12]

U.S. EPA Response:

Confirmation of ground-water data was not determined to be necessary during the RI/FS because U.S. EPA will be obtaining further information on ground-water flow and the extent of the plume during a pre-design study, as discussed in the FS and ROD. This study will involve confirming what was presented in the RI report, south of the site, and installing and sampling additional monitoring wells which will better define the geology north of the site, the ground-water flow, and how far contamination has migrated from the site.

The study will initially concentrate on the area north of the site where the plume may have migrated. This area will be determined based on ground-water modelling and results from the last round of ground-water sampling during the RI. If ground-water contamination has not migrated to this theoretical point, additional wells will be installed closer to the source area until the boundary of the plume is identified. Conversely, if contamination has migrated beyond the theoretical limit, additional wells farther from the source area will be installed in order to place bounds on the location of the plume. The full extent of migration will be established prior to designing the ground water collection and treatment system.

Comment: The estimated extent of shallow ground water contamination to the

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north of the site is based solely on the predications from the analytical modal and actual ground water data are limited to the southern edge of the area modeled. Contradictions exist between the model and the available data and numerous unverified assumptions are present in the analytical model and the estimation of contaminant extent. Evaluation of the extent of contamination requires collection of actual hydrogeologic and water chemical data within the area modeled. The actual extent may vary significantly from what has been predicted in the RI report, as is indicated by the available data for residential wells. [B,13]

U.S. EPA Response:

The limitations of the ground-water model are discussed above. We agree that residential well water quality data does not support the northern extent of the plume. That is the purpose of the pre-design ground water study which the U.S. EPA will conduct to define the extent of the contaminant plume. Based on the information gathered during this study, the actual placement of collection trenches and extraction wells can be designed.

In addition, soil gas sampling was conducted to assist in verifying the location of the modelled plume. This investigation detected target compounds in the soil gas in areas of the predicted plume extent north of any ground-water sampling point (see Appendix J of the RI report).

Comment: Table I of Appendix H of the RI report lists the ground water velocity used in the model as 3.64×10^{6}cm/sec. This equivalent to about 1,030,000 feet per day. Presumably this is a typographical error. What ground water velocity was used? [B,13]

U.S. EPA Response:

The correct velocity used in the model is 3.64×10^{-6} cm/sec.

Comment: The data presented in the RI report is not adequate to verify that the shallow aquifer is continuous to the north of the site. Additional measuring points are necessary to define the direction of the ground water movement from the site. [B,8]

U.S. EPA Response:

It is appropriate to assume that the aquifer is continuous because there is no evidence to indicate otherwise. As discussed above, an additional study of the extent of the plume, the ground water and the geology north of the site will be conducted during a pre-design study prior to finalizing the remedial design.

6-6

Comment: Page 3-7 of the RI report states that since the unusually low water table elevations in the fall do not represent normal site conditions, ground-water flow systems have been discussed using May 1987 data. If this is the case, ground-water flow to the north would be primarily uni-directional as indicated by Figure 3-3. This is contradictory to the two-lobed contaminant plum used in the analytical model and depicted in Figure 4-6 (p.4-19 of the RI report). The pattern of a two-lobed plume could be simulated under the initial condition of two-directional ground water flow as depicted in Figure 3-4 (p.3-9 of the RI report). With the available data, the conclusions arrived at on p.3-7 and p.4-18 of the RI report regarding the northward movement and the two-lobed plume are not substantiated. It should be noted that seasonal fluctuations in the ground water elevation occur even in normal precipitation years and the measurements during the RI may reflect normal trends although the actual elevations would vary from year to year. It is possible that the northern portion of the site exhibits a seasonal reversal of flow direction. [B,8]

U.S. EPA Response:

The flow direction in figure 3-3 and 3-4 are not markedly different. The test pit investigation indicated the presence of two separate source areas which are divided by undisturbed soils. In addition, ground-water level measurements and contamination detected in all wells north of the landfill indicate northern movement of ground water. The presence of a northern plume of contamination was verified by soil gas sampling. If a seasonal reversal of flow direction does occur, it does not change any conclusions reached by U.S. EPA.

Comment: Page 4-12 of the RI report states that well RW-3 "is probably not screened in the same water bearing unit as the monitoring wells at the Big D site. Well construction, recharge rates, and static water level indicate this well receives water from a localized perched water table zone." The basis for this conclusion is not documented in the RI. The data presented in the RI report (Table 1 of Appendix C) does not distinguish the aquifer at RW-3 from that at RW-1, RW-2, RW-4 and the onsite monitor wells completed in the water table. Table 1 of Appendix C (see volume II of Final RI Report) lists RW-3, RW-1, RW-2 and RW-4 as screened in the overburden (assumed based on discussions with owners). No hydrogeologic analysis or other data is presented to indicate that RW-3 is not screened in the same aquifer as the other residential wells or the shallow onsite monitor wells. The ground water elevation in RW-3 is higher than in the northern most shallow onsite monitor wells and this may reflect a ground-water elevation surface for the water table different from that assumed in the RI rather than necessarily indicating a different aquifer. It should be noted that the RI report also indicates that the water table aquifer onsite is a perched aquifer in the over burden. [B,8]

U.S. EPA Response:

The discussion regarding the water-bearing unit in which RW-3 is screened, applies to all residential wells. The discussion on page 4-12 of the RI report only mentioned well RW-3 because inorganic contaminants were detected in this well. The basis for the conclusion is information obtained by utilizing modified stiff diagrams which indicate a different ground water chemistry in residential wells compared to on-site monitoring wells. The water table aquifer on-site is not a perched aquifer because an unsaturated zone does not exist below this aquifer. However a perched water table aquifer was discovered during the soil gas investigation at sample number SG-19 (see Appendix J of the RI report, p.4).

Comment: According to the RI report, one of the stated reasons for the two-lobed contaminant plume is surface water recharge from the drainage swale at the northern end of the site. If the drainage swale is a significant source of recharge, the local ground water flow would be expected to be southward from the south side of the swale and northward from the north side of the swale (i.e., a ground water divide). This is contradictory to the statement in the RI report that ground water moves northward. [B,10]

U.S. EPA Response:

The effect of the drainage swale does not appear to be significant in altering ground-water flow to a degree which could be seen in ground-water elevations obtained during the RI. However, as stated in the RI report, the drainage swale may be one reason for the two-lobed plume.

Comment: Residential well RW2, located at 3700 Creek Road, does not show any chlorobenzene contamination or other contamination believed to come from the site. However, Figure 4-6 shows that the computer simulation predicts that there is about 3mg/l of chlorobenzene in the vicinity of RW2. The detection limit for chlorobenzene is .005mg/l. The accuracy of the transport model is implied in the RI report to be about one order of magnitude, but in this case is in error by at least a factor of 600. The assumptions on which the model is based may not be valid. [B,10]

U.S. EPA Response:

This comment is not clearly understood because RW2, located at 3700 Creek Road, is not shown on Figure 4-6 of the RI report. U.S. EPA assumes that this is a typo, and the comment applies to RW3.

RW3 was not installed by U.S. EPA and is therefore not constructed for the purpose of monitoring the water table aquifer. As discussed above, evidence indicates that this well in installed in a perched aquifer above the water table aquifer.

6-5

Soil

Comment: Two background soil samples were collected, both from the same location. The RI then states that "As shown in Table 4-1 the highest borehole concentrations for all compounds except silver exceeded the concentrations detected in the two background samples. The highest concentrations of each inorganic compound detected in the test pits exceeded the concentrations in both background samples with the exception of antimony, arsenic, beryllium, cobalt, iron, cyanide, selenium, thallium, and vanadium." These are true statements, however, it should be noted that this does not necessarily indicate elevated concentrations in the soil borings and test pits relative to the two background samples. Most of the inorganic constituents analyzed are present in varying concentrations in soil samples as a result of natural processes. The naturally occurring concentrations will vary from location to location and will exhibit a statistically distributed range of values which is dependent on the number of samples of the total population of samples which have been analyzed. That is, if the range for a very small number of samples is compared to the highest value observed from a much greater number of samples collected from the same population, it is expected that some values will exceed the range of the small number of samples. Since many more samples were analyzed from boreholes and test pits than from background locations, it should be expected that some values will exceed the range exhibited by the background samples. Note that the lowest concentrations of the borehole and test pit samples for the inorganic constituents are also lower than or equal to (for not detected) that lowest values for the two background samples. The comparisons used and conclusions reached are statistically invalid. [B,10]

U.S. EPA Response:

Inorganics in the soil pose no significant risks with the exposure scenarios evaluated for this site.

Comment: Soil gas concentration contours have not been provided to help evaluate the validity of the estimated extent of the ground-water contamination plume, as shown in Figure 4-6 of the RI report (p.4-19). Further verification of the results is necessary. [B,11]

U.S. EPA Response:

Limited sampling points, extreme stratification of the soils, and wet conditions prevented U.S. EPA from confidently contouring soil gas data.

As state above, additional pre-design studies of the ground water north of the site will be conducted.

Risk

Comment: For Tables in chapter 6, the upper bound excess lifetime cancer risk value mathematically should be reported with three significant digits to obtain more uniform calculation results. Also, in the selection of soil ingestion rates - the soil ingestion values presented in the EPA Superfund Exposure Assessment Manual (SEAM) p. 168, Table A-5 are presented by age group and are more accurate. The information in this reference also provides time periods for various ingestion rates making the assumption of years of soil ingestion unnecessary. [B,13]

The worst case soil ingestion of $1x10^{-3}$ was selected. Is the basis for selecting this value valid? See page 6-5. [B,26]

U.S. EPA Response:

The Superfund Public Health Evaluation Manual (SPHEM) suggests that the upper bound cancer risk be reported with one significant figure. The assumption for soil ingestion and the use of a $1x10^{-3}$ kg/day soil ingestion rate are based on a U.S. EPA directive issued on January 27, 1989.

Comment: The scenario used regarding direct contact with contaminated soils extent of exposure (p.6-6) assumes that future direct contact with soils will involve soil up to 8 feet below the ground surface. The basis of the assumption (depth of 8 feet rather than surface soil) needs to be presented. Use of surface soil would probably result in significantly lower exposure. The exposure via this pathway is zero. [B,14]

U.S. EPA Response:

The assumption for future soil exposure assumes that houses will be constructed at the site and soil will be excavated to eight feet to install a basement (p. 6-2 to 6-3 in RI).

Comment: On page 6-6 of the RI report, the potential dermal exposure is estimated to be 1 mg soil/cm^2 body area. This estimate is high, a value of 0.6 mg soil/cm^2 is more accurate (Lepow, 1975). The value of 1 mg soil/cm^2 overestimates the health risk and this should be stated. The Superfund Public Health Evaluation Manual (SPHEM) states that the uncertainties of each assumption make during the risk evaluation process and the resulting over or underestimation of health risk must be clarified. Evaluation of the impacts of assumptions was not made for any exposure assumptions. [B,14]

U.S. EPA Response:

The U.S. EPA chose the value of 1 mg/cm^2 to be a median value. The commentor

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cited a value of 0.6 mg/cm^2 while U.S. EPA's Superfund Exposure Assessment manual cites (Harger 1979) values of 1.45 mg/cm^2 for potting soil and 2.77 mg/cm^2 for clay. the U.S. EPA believes 1 mg/cm^2 to be a reasonable compromise between the various literature values.

Comment: The basis for the selection and use of an additional carcinogenic potency factor for calculating dermal exposures was not stated. The impact of the use of these factors in addition to the use of factors developed for ingestion of contaminants on the overall risk estimate was not discussed. [B,14]

U.S. EPA Response:

The use of potency factors for dermal exposures is based on the fact that a percentage of the chemical will pass across the skin and enter the blood stream. Therefore U.S. EPA applied an absorption factor to the dosage calculation which reflected the amount (percentage) that would cross the skin barrier and enter the blood stream.

Comment: It is stated on page 6-11 of the RI report that the sampling results for the residential wells did not reveal any inorganic or organic contaminants that could be attributed to releases from the Big D site. It should have been stated that for incomplete exposure pathways there is no actual risk. (See Reference SPHEM, Page 36, first column, second paragraph). There is no potential risk associated with the site ground water at this time due to an incomplete exposure pathway. Risk is overestimated because it is assumed that the pathway is complete at this point. The potential for future risk exists only if a production well is placed in a location completing the exposure pathway. [B,15]

U.S. EPA Response:

The RI report acknowledges that no one is currently exposed and that the risks are based on the assumption of future exposure. The risks are estimated based on a series of assumptions for future exposures associated with contamination of nearby residential wells or drinking water wells completed on-site or off-site at some time in the future. Actual or threatened releases of hazardous substances from the site may present an imminent and substantial endangerment to public health, welfare, or the environment if contaminants in the landfill and migrating from the landfill are not addressed.

Comment: When referring to risk, it should be clarified in the RI report that the future is based on a period of 70 years for risk assessment purposes, not an infinite time period. [B,15]

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U.S. EPA Response:

An exposure may last longer than 70 years. This time frame is used to estimate lifetime risk from exposure. If the source is not removed, it is possible that exposure could continue for longer periods.

Comment: The RI report states that both acute and chronic exposures for the potential ingestion of ground water were evaluated. Only chronic hazard index values can be found in the RI report. [B,15]

U.S. EPA Response:

Only chronic hazard indices were evaluated. The statement "Potential ingestion of ground water ... was evaluated ... for both acute and chronic exposures" (p.6-12 of RI report) relates acute and chronic exposures to noncarcinogenic and carcinogenic effects, respectively.

Comment: For infrequently found contaminants, geometric mean concentrations were not calculated and the contaminant was not evaluated under probable conditions. In order to evaluate these contaminants under probable case conditions, the geometric mean can be calculated utilizing a concentration equivalent to one-half the detection limit for that specific contaminant when there are "non-detectable" levels. This approach more accurately estimates the actual or probable exposure. [B,15]

U.S. EPA Response:

The assumptions used by the U.S. EPA exclude the infrequently found contaminants from analysis under the probable case exposure. This also assumes that these contaminants will not cause an unacceptable risk under the probable case exposure. In addition, risks have already been identified in ground water, this method would only increase the risks already identified.

Comment: It is stated in the RI report that extrapolations from animal studies do not address human-animal differences in absorption. This is not true - all effect levels obtained from chronic animal studies are multiplied by a safety factor of 10 to account for interspecies variation. It is also states that the ACI and CPF calculations assume that the human body absorbs 100% of the contaminant, the same extent as an experimental animal. For most compounds this is not true. The reasons for excluding the percent contaminant absorbed in equations 6-1 and 6-2 in the RI report are not satisfactory. However, by assuming 100% is absorbed, the estimated dose is higher and the calculated risks are more conservative. [B,16]

The RI states that 1% inorganic and 5% organic dermal exposure assumptions would be used, these percentages <u>are</u> used in equations 6-1 and 6-2 in Appendix H of the RI report. [B,16]

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U.S. EPA Response:

The assumption made by U.S. EPA was that no adjustment in the dosages for ingestion exposure would have to be made to account for the absorption rate in man. The ACI and CPF are based on a dose ingested or administered not on a dose absorbed into the blood stream. Although 100% is absorbed into the blood stream, the U.S. EPA assumed that inorganic contaminants would absorb into the blood stream at a rate that is one percent of the rate of absorption via ingestion. This absorption for organics was five percent.

Comment: The BCF values quoted for chlorobenzene range from 10 to 4185. A value of 465 was selected and the basis for this selection is not stated. A more conservative approach would be to use the highest value. Recalculations using BCF of 4185 gives a HI of 0.32 which is still in the acceptable range. [B,16]

U.S. EPA Response:

The BCF chosen by U.S. EPA related to the species found in Conneaut Creek.

Comment: In chapter 6 of the RI report, the estimated dose and HI should have been calculated for barium, lead, and beryllium. [B,16]

U.S. EPA Response:

The U.S. EPA felt that it was appropriate to only perform qualitative analysis of these contaminants due to a lack of good BCF data for these metals.

Comment: The estimated dose for chlorobenzene is 9.5E -01 not 9.21 E 01 mg/kg. (See page 6-16 of the RI report) The HI is 3.5 E -02 not 3.4 x E -02. [B,17]

U.S. EPA Response:

The error is noted. The risk is still not significant.

Comment: In Appendix H of the RI report it is stated that exposure dose is equal to 10,230 mg/kg exposure dose should equal 10.230 mg/kg or 10,230 ug/kg. [B,17]

U.S. EPA Response:

The exposure does should be 10,230 ug/kg/day and this value was used in all

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calculations.

Comment: A discrepancy exists in the average body surface area of a child used in the risk assessment. Although EPA (1985) stated the average surface is 1200 cm^2, the 1988 Superfund Assessment Manual (Page 127) quotes that the dermal area of a child is 9400 cm^2. [B,18]

U.S. EPA Response:

The difference between sources is noted. However, the existing risk is well below the acceptable range and using the newer value would lower the dose and resultant risk even further.

Comment: The derivations and calculations of the carcinogenic potency factors and noncarcinogenic acceptable daily intake values should be discussed in more detail. In addition a discussion of the safety factors included in the calculations should be included. This information is necessary to determine the validity of the conclusions. [B,18]

U.S. EPA Response:

Since this information is readily available from U.S. EPA's IRIS data base, it was not included within the report.

Comment: Two of the ADI values i.e. those for barium and beryllium which were used in the study differed from the values quoted in the 1986 EPA Exposure Manual. If some other source was used, it should be referenced.e In the case of barium, the value differed by 11% but in the case of beryllium, the figure used, 5.00E-03, was one order of magnitude less sensitive than the value of 5.00E-04 quoted in the 1986 EPA manual. In the text it was inferred that a 1987 revision of the Toxicity data was the source of some of the ADI values. A full reference to this manual was not made as a footnote to the appropriate tables. [B,18]

U.S. EPA Response:

The full reference is given under footnote (a) in the table.

Comment: Risks were evaluated on future site use (residential scenario). Risk associated with present use needs to be discussed.

U.S. EPA Response:

At present none of the residential ground water wells at the site are contaminated with chemicals related to the site. Therefore, no completed

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human exposure route exists at the Big D site and no risks were calculated for present exposures.

Comment: The procedure to calculate the exposure dose is different - the intake factors defined below are not the same. Why are these values different?

$$\text{Intake factor} = \frac{\text{exposure dose}}{\text{maximum concentration}} \quad [B,25]$$

U.S. EPA Response:

U.S. EPA followed the general procedures for calculating exposure dosages found in U.S. EPA's Superfund Health Evaluation Manual. This document calls for two different methods for calculating dosages - one for exposure to non-carcinogenic chemicals and another for exposure to carcinogenic compounds.

Comment: Calculations for worst and probable case conditions for soil ingestion utilized maximum and mean concentrations as well as frequency of exposure. Calculations for worst and probable case conditions for water ingestion utilized maximum and mean concentrations and frequency of exposure was excluded. The use or non-use of a frequency factor requires explanation. [B,25]

U.S. EPA Response:

The U.S. EPA assumed that the water ingestion would be relatively uniform in the exposure scenarios given and therefore did not include frequency of contact as a factor in the calculations.

Comment: It is stated that the environmental exposure considered the most likely to occur is the ingestion of aquatic life that inhabits Conneaut Creek. No rationale was presented to support this statement, nor was the risk for this exposure route calculated. Please explain. [B,25]

U.S. EPA Response:

The exposure route at the site that could occur under the present conditions is the ingestion of aquatic life. People catch and eat fish caught in Conneaut Creek. As discussed in the RI report the potential risk to human health from ingestion of aquatic life from Conneaut Creek is virtually zero.

Comment: The rationale for including the factor frequency of contact (days) in the exposure dose equation of 365 days (6-1) is not clear. Frequency of exposure is not generally considered in calculating a hazard index. [B,26]

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U.S. EPA Response:

Since U.S. EPA focused on the chronic exposure to non-carcinogenic chemicals, the EPA felt that it was appropriate to average the exposure dose over a one-year (365 days) exposure. It was felt that if the dose was calculated by not taking into account frequency of contact this could overestimate the exposure to these chemicals.

Comment: The WQC for chlorobenzene was quoted as 7.2E-04 ug/L for consumption of drinking water and aquatic organisms and 7.4E-04 ug/L for the consumption of aquatic organisms only from a 1980 EPA reference. A more recent reference, EPA SPHEM, 1986, gives WQC value of 488 ug/L for chlorobenzene for both consumption of aquatic organisms and drinking water and for the consumption of drinking water only. [B,26]

The WQC for chlorobenzene taken from a 1980 EPA reference is 7.2E-04 and 7.4E-04. The EPA manual gives a value of 488. [B,26]

U.S. EPA Response:

The mistaken value reported was for hexachlorobenzene, the correct value for chlorobenzene is 488 ug/L. The correct value was used in the comparison, so no change in the text is needed (see p. 6-26 of RI report).

Test Pits

Comment: On page 4-3 of the RI report it is stated that "based on the results of the test pit excavation the estimated volume of contaminated fill is 25,000 to 35,000 cubic yards." Were the fill estimates actually made from conversations with the transporter, from the geophysics, or from the test pits? It is not clear. The actual calculations and assumptions used should be presented. [B,19]

On page 4-3 of the RI report landfill volumes are "estimated from the geophysical survey to be 35,000-52,000 cubic yards." There is no discussion upon which that statement is based. [B,19]

U.S. EPA Response:

The estimated volume and location of the source area is based on information from the transporter, the generator, geophysical survey, and test pits. The actual volume will only be known when excavation is complete.

Comment: On page 7-1 of the Summary of Conclusions of the RI report, the statement is made "Based on the geophysical survey and the test pit excavation

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the air of relatively high concentrations of contaminants is much lower than for other alternatives. The only disadvantage listed for Alternative 6 relative to some other alternatives is that the long term risk (presumably of release of slow moving contaminants to ground water) is expected to be higher. Such releases can be detected by monitoring and since the ground water moves very slowly, allows considerable time for corrective measures before human exposure would occur. The short term risk of exposure to relatively high concentrations from fast moving air releases during alternatives requiring extensive excavation allows little time for response and appears to represent the greater risk to human health. [B,20]

U.S. EPA Response:

U.S. EPA has determined that the selected remedy is the most appropriate solution to remediate the contamination at the site. The selected remedy is the most protective of human health and the environment, eliminates long term risks, reduces toxicity, mobility and volume, is easily implemented and complies with ARARs. The selected remedy poses risks to the public and workers during implementation of the source area excavation and incineration (2 to 2.5 years duration) however, these short-term risks can be reduced by application of engineering controls and, once the incineration is completed, the risks from the source area are eliminated. Alternative 6 does not reduce toxicity or volume of the source area and does not provide long-term protectiveness of human health and the environment because the source area will not be removed. Slurry walls have an expected lifetime of 30 years. If a breach of the slurry wall occurs, ground-water monitoring should detect it. However, as long as source materials are allowed to remain within the water table the chance for migration exists. Numerous reconstructions of the containment system may need to be implemented before the total risk is gone. With the selected remedy, once the source area is removed no additional releases of contamination could occur and the direct contact of source materials with the water table is removed. Only contamination which has already migrated from the source area would need to be collected and treated. And, once the source area is removed and incinerated and ground water risk objectives are met, long term monitoring will not be necessary.

Comment: Onsite incineration will require a high volume flow of water for operation. The discussion of incineration does not identify the source or discuss the availability of this water and the associated cost. Ready availability of this volume of water is questioned since discussion of a soil bentonite slurry wall barrier on page 3-55 indicates that water for construction of the slurry wall would have to be obtained from an unspecified off site location. Availability of the larger volume of water for onsite incineration is thus questionable. [B,21]

U.S. EPA Response:

The volume of water required for incineration cannot be determined until the incinerator is selected during the remedial design. The source of water

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results, it is estimated that there are two source areas with a combined volume of 25,000 to 35,000 cubic yards." Supporting documentation for this conclusion was not found. [B,19]

U.S. EPA Response:

The estimated volume of the source area is discussed above. The identification of two possible source areas was determined based on the test pit investigation. The test pit investigation indicated the presence of two separate source areas which are divided by undisturbed soils. However, this will not be confirmed until excavation is in progress.

Drums

Comment: In the FS report, several references to the RI report are made (pp. ES-3, 1-31, 2-5, etc.) stating "that 2,500-5,000 drums may be buried within the suspected drum boundary" inferred from the aforementioned fill volumes. No documentation correlating either the geophysical results to the fill volumes, or the geophysical results to a total number of buried drums was presented in the RI or FS reports. Again, the calculations and assumptions used to obtain this estimate should be provided. Also, the geophysical survey detects metal pieces, rods, etc., which might be present in the soil. These might influence the results to a great extent and might have erroneously been interpreted as indicating the presence of drums. The report makes no mention of such possible errors. [B,20]

U.S. EPA Response:

The number of drums estimated to be in the source area is based on discussions with the transporter. The transporter indicated that from the mid-60s to the mid-70s, he may have transported over 6000 drums of liquid to the site. The test pit investigation indicated that fewer drums may be in the source area. For estimating purposes, a range of 2500 to 5000 drums was selected. Until the landfill is excavated, the exact number of drums can not be determined.

Remedial Alternatives

Comment: Table ES-1 indicates that alternative 6, source area containment, treatment of ground water outside contaminated area, complies with all ARARS and is protective for soils and ground water. It also indicates that it is easily implemented with proven technologies. Table ES-1 indicates that alternatives 2 and 6 have minimal risk during remediation, alternatives 4 and 8 have moderate risk and alternatives 3, 5, 7, and 9 have high risk. Alternative 6 also is indicated as requiring relatively short time to implement. Of the alternatives developed in the FS, Alternative 6 appears to have distinct advantages during the remediation when the risk for release to

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needed for incineration will be determined during the design phase of the remedial action.

Comment: During screening of remedial technologies all solidification/stabilization techniques except in situ vitrification were eliminated. It appears that one technology was not considered and that other technologies were eliminated without adequate test data. The technology now exists to use large diameter augers through which a stabilization fixation slurry is pumped. The auger mixes the slurry with the waste material and contaminated soils, drums would be ruptured and the contents fixed within the slurry. This technology is not subject to the same limitations as the other solidification/stabilization technologies listed on Figure 2-1. In addition, other stabilization techniques were eliminated based on questions of effectiveness and possible leaching. Bench scale tests should have been completed prior to elimination to determine if effective treatment mixes are available. In addition, excavation and offsite incineration of intact drums combined with stabilization of the soil and ruptured drums should be considered. It does not appear that these alternatives were considered. [B,24]

U.S. EPA Response:

The solidification technologies suggested are not proven technologies and were eliminated from further consideration for that reason.

Comment: Neither the description of each alternative nor the cost estimate table for each alternative present adequate detail to determine if all essential elements of the alternative have been considered and to determine if the cost estimates are consistent and accurate. [B,25]

U.S. EPA Response:

The estimates list the elements that comprise the total costs. The costs estimates were used to compare alternatives and have an expected accuracy between -30 to +50 percent, as discussed in the FS report, p. 4-2.

<u>Incineration</u>

Comment: The area allocated for incineration in each onsite incineration option as illustrated on the referenced figures appears to be substantially less than that required by available transportable incinerators with the required ancillary facilities. The area allocated is only about 250 feet by 300 feet. A much larger area is required. [B,21]

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U.S. EPA Response:

Preliminary information from a mobile incinerator supplier indicated that the space selected was adequate. The actual space needs will be determined after a mobile incinerator is chosen during the remedial design. Adequate space is available on site to expand.

Comment: The FS report states "The ash content of the contaminated soil is assumed to be 70 percent; the water content is assumed to be 20 percent and the heating value is assumed to be 2,000 Btu per pound." The RI and FS reports do not present laboratory test data which are commonly used to provide data for evaluating incineration suitability and characteristics of incinerator ash. Tests for Btu content, total chlorine content, percent of ash, and NO are commonly used for evaluating suitability for incineration and should be determined prior to selecting the remedial alternative. [B,21]

U.S. EPA Response:

Incineration is suitable for materials in the landfill because the contaminants of concern present in the soils and drums are easily incinerated. Discussions with vendors of mobile incinerators verified that based on soil conditions and level of contaminants present in the soils that incineration is easily implemented. Further tests will be performed as part of the remedial design to optimize incinerator operation, as discussed in the FS report. Incineration of soils and liquid is a proven technology.

Comment: The FS report states "the volume of ash remaining is estimated to be 18,000 to 21,000 cubic yards". This represents 30% reduction in volume from the in situ volume. Since the bulk of material to be incinerated is soil with low organic content it is likely that the volume reduction will be much less than that presented and in fact may be very small. In addition, the excavated soil will undergo expansion or "fluff" resulting in a volume increase relative to in situ volume. If the ash requires treatment prior to disposal this will further increase the volume. [B,22]

U.S. EPA Response:

The incinerator ash will be disposed back into the excavated area as long as it is able to be delisted. If the reduction of volume is less than 30%, there will still be plenty of space to dispose the ash. The actual volume of materials in the landfill and soils/ash remaining after incineration can only be determined after excavation and incineration.

Comment: The FS report states "In addition to the ash remaining after incineration, residuals from air pollution control would probably consist of sludge and wastewater requiring treatment if a wet design is used and solid fly ash if a dry design is used." The issue of disposal of air pollution

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control wastes should be evaluated in much greater detail prior to selection of a remedial option as this can have significant environmental and cost impact on an incineration alternative. [B,22]

No test results for total chlorine content of the contaminated material were presented. This is a critical parameter for evaluation of incineration alternatives. Since the primary contaminants include chlorinated organics the air pollution control wastes can be expected to contain significant chloride content. [B,22]

Treatment of wet scrubber waste water to remove chloride is generally not feasible and is expensive, resulting in either a concentrated brine or a high salt content solid both requiring offsite disposal. Similarly, dry scrubber systems, result in a high salt content solid. Stabilization of such solids with fly ash is likely to result in significant leaching of chloride to ground water and surface water. Disposal onsite of wastes from either wet or dry design air pollution control systems would most likely result in significant chloride pollution of Conneaut Creek potentially with considerable environmental damage. Testing of total chlorine content, calculation of chlorine mass balances for incineration air pollution control systems and evaluation of associated costs and environmental impact should be undertaken before selecting a remedial option. [B,22]

U.S. EPA Response:

The use of wet or dry scrubbers will be addressed during the remedial design. Discussions with vendors of mobil incinerators indicated a preference for dry scrubbers.

Costs associated with the air pollution control facilities are included in the capital costs associated with incineration. The actual costs are dependant on the incinerator selected.

No tests were run on total chlorine because a representative sample of materials in the landfill was not able to be obtained. As discussed in the FS report, prior to final design a test burn will be run.

Comment: With reference to incinerator ash the FS states "if delisting is not possible, the material would need to be disposed of in a RCRA landfill as discussed in alternatives E and F." Construction and operation of onsite RCRA landfill would require long term maintenance. If the waste is successfully delisted it would still remain a nonhazardous waste. Backfilling of the ash was not discussed with respect to compliance with State requirements for landfilling nonhazardous waste. [B,23]

U.S. EPA Response:

The selected remedy assumes that the characterization of the ash will allow the State of Ohio to waive their solid waste regulation regarding the final

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deposition of the ash. The State of Ohio has agreed to consider such a waiver when analysis of the ash is available.

Excavation

Comment: Mechanical excavation is expected to extend about 30 feet deep for all source control alternatives except containment. The contaminated material occurs within 50 feet of a very steep slope leading to Conneaut Creek. No strength data was presented in the RI/FS reports for the soil. However, stability of the excavation at such depths is uncertain. An outward failure with release of contaminated material to Conneaut Creek is a risk which has not been addressed in the RI/FS reports. Such a failure could result in far greater risk to public health and the environment than is presented by the site in its present condition. Strength data for the soil should be obtained and a geotechnical evaluation of the risk associated with excavation should be undertaken prior to selection of a remedial alternative. [B,23]

U.S. EPA Response:

Any strength data needed prior to excavation will be generated during the remedial design. During test pit excavation, the walls were extremely stable. However, if the southern wall of the landfill is not stable, the slope soils could easily be removed and stored during excavation and replaced after excavation is completed.

Comment: The FS report states "The conditions at the Big D site are favorable because the depth of drums and the drums are expected to be in generally good condition based on the results of the test pit excavation." The RI report (page 5 of Appendix I) however, states that "Over half the drums observed were either partially crushed or ruptured." The above conclusion concerning the excavation of drums is inconsistent with the test pit results presented in the RI. It should be noted that excavation of the drums would be expected to result in rupture of many of the drums which may be currently intact. [B,24]

U.S. EPA Response:

The drums observed during the test pit excavation, which were not ruptured, were in good physical condition. Excavation of these drums should not result in rupture. If drums in a less stable condition do rupture during excavation, the contents of the drum and newly contaminated soils would be collected and incinerated.

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General

Comment: Instead of undertaking the dye study during the sampling period, the dye study should have been completed first so that the location of the stations could be based on the hydrodynamic flow of the creek, rather than the approach that was used where the dye study revealed that the siting of the stations may have resulted in the collection of samples in areas not representative of the flow of the creek. [B,17]

U.S. EPA Response:

The dye study was done prior to collecting samples during the second round. It would have been better to perform the dye study prior to the first round, however the data collected is still valid.

Comment: As uptake and absorption are extremely important parameters in the movement of both inorganic and organic pollutants, and as both pH and organic carbon content of soil have a major influence on the chemodynamics of the compounds, these parameters should have been measured in order to better assess the movement of these compounds in the environment. [B,17]

U.S. EPA Response:

This information would have been useful, however it was not necessary to the purpose of the RI and FS. The determination of the nature and extent of contamination and the risks posed to public health and the environment were not affected by the lack of this data.

Comment: A reference to Table 6-16 in the RI report for the ambient water quality criteria was made. No such table exists in the report. Rather, the data was taken from Table 6-9. The source of the AWQC for lead was not referenced. [B,19]

U.S. EPA Response:

Table 6-9 was the correct reference. The reference for lead is listed on page 6-52 of the RI report.

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Comment: Alternative 9 requires that delisted ash will be backfilled into the source material excavation. The delisted ash is considered a solid waste under Ohio law and ORC 3734-02-G provides a method for the Director of Ohio EPA to determine if disposal at the Big D site would not pose any adverse effects to public health or the environment. The ROD should indicate that OEPA Solid Waste regulations are ARARs for ash disposal on-site and authority to exempt any substantive requirements of those regulations rests with the OEPA. [F.]

U.S. EPA Response:

The ROD identifies all ARARs submitted by the State of Ohio which apply to the clean-up at the site. The ROD also identifies that a request for a waiver of Ohio's Solid Waste Regulations has been forwarded to the Ohio EPA.

Comment: The FS report and the proposed plan should have considered the possibility that the incinerator ash might not meet the substantive requirements of RCRA delisting. During the remedial design, determination will be made about the treatability of contaminated source materials. If incineration does not produce a delistable ash then the ash material will have to be handled as a hazardous waste. Alternative 7 might be retained or considered as a backup for this eventuality. [F.]

U.S. EPA Response:

If the ash is not delistable, alternative 7, which entails placing the ash back in the landfill and vitrifying the ash and contaminated soils, could not be implemented, either. If the ash is not delistable then the State of Ohio's Solid Waste Regulations would require it be disposed of as a RCRA hazardous waste. Vitrification is simply another containment option and will not meet the Ohio's solid waste ARARs any more than the selected remedy will.

Comment: As noted in section 7.2 of the RI report, and as we discussed in the past, the extent of off-site migration of ground water contamination can not be verified without further sampling of ground water. The ROD should address specific activities that will occur during a pre-design project. What is the extent of the study that is needed to adequately define the extent of ground-water contamination. The ROD should include objectives and suggest methods for determining the complete extent of off-site ground-water contamination and for characterizing the hydrogeology necessary in order to design the extraction systems. Any further investigation of the extent of ground-water contamination should also be designed to address the concerns of local residents that were presented during the August 8, 1989 public meeting. Ohio EPA will provide the information that our Division of Groundwater has obtained about water usage in that area nd any well sample results that you do

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not already have. [F,]

U.S. EPA Response:

This has been added to the Record of Decision.

Comment: In section 3.3 of the FS report, process options for the treatment of ground water are evaluated based on effluent goals from Table 3.1. The substantive requirements of the National Pollutant Discharge Elimination System program as administered by the Ohio EPA Division of Water Pollution Control will ultimately determine the choice of treatment methodologies designed and implemented at this site. While risk based objectives are used as goals for clean-up of a contaminated site, the concentration limits for a discharge are set by the NPDES program based on the water quality of the receiving stream, flow rates, and other factors including implementation of Best Available Technology. It is likely that detailed treatability studies and design review will show that process options in addition to GAC will be required to adequately treat the ground water prior to discharge. [F,]

U.S. EPA Response:

If it is determined that further ground water treatment is necessary prior to discharge, it will be implemented, and has been noted in the ROD.

Comment: The ROD should indicate that cleanup goals will be based on cumulative risks. Though multiple exposure pathways did not pose significant risks in the RI it is possible that other risks will be documented during pre-design or later phases of the project. Any final clean-up standards should be based on risks calculated from cumulative exposure from all possible exposure routes. [F,]

U.S. EPA Response:

The ROD states that clean-up goals are based on cumulative risks.

BIGRES.TWO/2
9/27/89

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APPENDIX A

Tracey Oresinski
2347 Plymouth Jacksville N.O.
Ontario Ca

[illegible] 10-12 yr olds?

Norman Thorpe
3709 S. Ridge Rd.
Kingsville, Ohio 44048
216 - 224-0350

We are directly South of the dump, and want our soil & water tested. No one has ever tested it.

South Ridge has no city water.

Tim Baird
3740 Creek RD
Kingsville OH.

concerned about
when was the last time this
his well was sampled? His well
was not sampled by OEPA six months
56" to water table

Received
8-14-89

Name Mr. & Mrs. NORMAN THORPE

Address 3709 S. Ridge Rd.

Kingsville, Ohio ZIP 44048

Affiliation Self

Phone 216 - 224-0350

S-11

Question: We are for the Remedial Alternative # 9 & hope you can proceed to implement it as soon as possible.

Until you do start this procedure we would hope you would do more frequent water & soil testing to all parties in the immediate area, & make the tests available to them.

Also, information should be sent to all Kingsville residents concerning this problem. Especially if there should be an evacuation.

Please send info. on the incineration process.

facis
n St.

APPENDIX B

COMMENTS ON THE RI/FS REPORTS
BIG D CAMPGROUND SUPERFUND SITE

Submitted by:

Olin Chemicals Corporation

August 25, 1989

To:

U.S. Environmental Protection Agency - Region 5

Woodward-Clyde Consultants

Consulting Engineers, Geologists, and Environmental Scientists
2822 O'Neal Lane, Baton Rouge LA 70896

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Olin CHEMICALS

P.O. BOX 248, LOWER RIVER ROAD, CHARLESTON, TN 37310
(615) 336-4386

VERRILL M. NORWOOD
Vice President
Environmental Affairs

August 23, 1989

Ms. Gina Weber
Office of Public Affairs (5PA)
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Attention: 5HS-11

Re: Big D Campground Superfund Site
Comments on the RI/FS Reports

Dear Ms. Weber:

Olin Chemicals Corporation retained Woodward-Clyde Consultants to review the Remedial Investigation and Feasibility Study (RI/FS) report prepared by U.S. EPA - Region V for the Big D Campground Superfund Site. This report is dated June 1989 and supplied to us under cover of Janice Bartlett of EPA's letter dated July 27, 1989.

There are significant comments on the Remedial Investigation (RI) report and serious concerns on the validity of the data used, various assumptions that were made and conclusions arrived at. The Feasibility Study (FS) report is very inadequate in that it did not evaluate all feasible alternates and for the alternates selected for further consideration, complete evaluation was not done.

Specific comments referring to individual pages in the RI/FS report prepared by Woodward-Clyde Consultants are attached hereto. We want to bring to your attention the following major technical flaws in the RI/FS reports:

- Ground water flow and quality characterization is based on six water elevation and two sampling temporal data points over a period of only 4 months and is completely inadequate.

- Review of the two ground water quality data obtained from the deep wells for RI/FS strongly suggest that contamination may have been introduced by drilling during installation of the wells.

- The data do not support the conclusion reached regarding a definite northward movement of ground water flow. The results of the groundwater model and assumptions made therein are in serious question as a result.

- Various assumptions used on the Risk Assessment are highly questionable.

- No sound scientific or technical basis for the estimate on number of drums at the site has been presented. We do not believe that the number can be anywhere near 2500 or 5000 as stated in the RI/FS reports.

- We question the design and location of the groundwater recovery trenches and more importantly the very need for the recovery trenches.

- On source control, some of the recommended alternates have not been fully evaluated. For example: the geotechnical stability of the very steep slope leading to Conneaut Creek - while excavating up to 30 feet is very questionable and could endanger the creek severely and could pose serious construction safety problems. Additionally, the pros and cons of on-site incineration were not studied in sufficient detail. To be specific, on-site incineration could lead to higher risk to the environment and public health than even a no action alternate.

- Certain very viable alternates such as in-situ solidification and stabilization were not considered.

Olin would be most happy to discuss these comments at your earliest convenience. If you have any questions, please call me at 615/336-4395.

Very truly yours,

Verrill M. Norwood, Jr.

Verrill M. Norwood, Jr.

VMN:lbr
1167
Enclosure

cc: Ms. Janice Bartlett

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COMMENTS ON BIG D CAMPGROUND, KINGSVILLE, OHIO REMEDIAL INVESTIGATION - FEASIBILITY STUDIES (RI/FS)

INTRODUCTION

Detailed below are Woodward-Clyde Consultants' comments on Olin Chemicals' Big D site at Kingsville, Ohio. These comments have been made following a thorough review of the following documents:

(i) U.S. EPA - Hazardous Site Control Division
Contract No. 68-01-7251
Final RI Report, Big D Campground, Kingsville, Ohio
June 1989; WA 48-5LB1.1 Volumes I and II

(ii) U.S. EPA - Region V (Waste Management Division)
Contract No. 68-W8-0084
Final FS Report, Big D Campground, Kingsville, Ohio - June 1989;
WA 01-5LB1

COMMENTS ON THE REMEDIAL INVESTIGATION REPORT:

Remedial Investigation

Page ES-4: The Executive Summary of the RI states that "Organic Compounds were detected in samples from most deep wells at low but significant concentrations. The contamination is probably the result of vertical migration of contaminants through the hard grey clay unit at localized areas or possibly the result of past site activities."

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The chemical data presented in the RI for ground water from the confined bedrock aquifer raises serious concerns with respect to the validity of the RI data:

1. Validity of the ground water samples and analyses from the deep wells (those screened in the unit designated the confined bedrock aquifer) is questionable.
2. Significance of the low, inconsistent concentrations detected in the deep aquifer is doubtful.
3. Temporal patterns in the data suggest that the concentrations in ground water from the deep wells may result from residual contamination introduced to this depth by drilling for installation of the monitor wells.
4. Well development was not sufficiently defined and may not have been properly done.

The organic compounds detected (see attached Table 1) in the deep wells are primarily acetone, methylene chloride and chlorobenzene. As noted in Section 4.3.3 of the RI, acetone, methylene chloride, chlorobenzene, and toluene (also detected in some of the deep well samples) and trichlorethylene were detected in some field and/or laboratory blanks up to 305.8 ppb of total VOA's. Acetone was used as a rinse in decontamination of ground water sampling equipment. This is especially troubling since acetone is the compound reported in the highest concentrations and with the greatest frequency in the deep wells.

G7

As stated in Section 4.3.3.3 "Acetone, a common field and laboratory contaminant was the only compound detected during both sample rounds in a single deep well." If acetone is not included, the detected total VOA concentrations in the deep wells exceed 10 ppb only in one sample (34.2 ppb in the first sample from Well 4D). The latest measurement from Well 4D was 0 ppb.

All of the wells were sampled and analyzed on two or three dates. This spanned a period of 4 months and is insufficient to make ground water quality conclusions. The data for repeated samples from any single deep well are inconsistent.For example, subsequent samples resulted in the following total VOA concentrations.

- well 1D0 to 76 ppb
- well 2D1,100 to 118 to 0 ppb
- well 3D628.6 to 48 to 0 ppb
- well 4D 71.2 to 900 to 0 PPB
- well 5D5,922 to 0 ppb
- well 6D430 to 38 ppb

In addition, dedicated sampling equipment should have been used to avoid problems of equipment contamination during sampling. Because of the presence in the blank samples of the same contaminants reported to be present in the samples and the inconsistent results from repeated samplings, the ground water sample and analysis results do not indicate significant concentrations of organics in the deep ground water. Note in the last sampling event, four of the six wells did not report any

detectable VOAs. Even if the sampling and analysis results were not of questionable validity the data would not necessarily demonstrate contamination of the confined bedrock aquifer. The data for total VOAs listed above illustrate a general trend of decreasing concentration with succeeding samplings. This suggests that the detected organic compounds could be the result of contamination from shallower zones that was carried into the deeper aquifer during drilling for installation of the deep monitor wells. Repeated purging and sampling of a well would gradually reduce the constituent concentrations resulting in lower detected concentrations with repeated samplings and perhaps invalidate the conclusion that no deep contamination exists.

The data in Appendix C (see Volume II of the Final RI report), does not indicate the volume of water that was removed from each well during development and during purging for each sampling event. This information is necessary to evaluate the validity of the ground water samples.

APP.A. (See Volume II of Final Remedial Investigation Report)

P. 15 Boreholes 2D, 3D and 4D were advanced 10 to 20 feet deeper than the planned well depth. On attempting to plug the bottom of these boring cement bentonite grout rose in the borehole through the screened interval, Borehole 2D was apparently properly plugged and abandoned and the well was installed in a new borehole adjacent to the first location. Borehole 3-D, however, was drilled out using a core barrel. Borehole 4-D was flushed with water to remove the rout. The adequacy of the measures for wells 3-D and 4-D is questionable and residual

grout in the wells may impact quality of water samples from these wells. The procedure used for the borehole 2-D should also have been used for 3-D and 4-D.

TABLE 1

ORGANIC COMPOUNDS DETECTED IN DEEP WELLS

Concentrations in Parts Per Billion (ppb)

	Well 1D		Well 2D			Well 3D			Well 4D			Well 5D		Well 6D	
	1st	2nd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	1st	2nd
Volatiles															
Chlorobenzene				8		2J			2.2J			82J			
Methylene Chloride						5.4			11			110J			
Tetrachloroethene												30J			
Toluene						1.2J									
Acetone		74	1100	110		620	48		26	900		5700		430	38
2-Butanone									32						
Benzene		2J													
Total Vols	0	76	1100	118	0	628.6	48	0	71.2	900	0	5922	0	430	38
Acid Ext.															
Phenol									2.4J						
Total Acid Ext.	0	0	0	0	0	0	0	0	2.4	0	0	0	0	0	0

J = Estimated value. Used when estimating a concentration for tentatively identified compounds where a 1:1 response factor is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria and the result is less than the specified detection limit, but greater than zero.

Woodward-Clyde Consultants

TABLE 1 CONTINUED

ORGANIC COMPOUNDS DETECTED IN DEEP WELLS

Concentrations in Parts Per Billion (ppb)

Sampling	Well 1D		Well 2D			Well 3D			Well 4D			Well 5D		Well 6D	
	1st	2nd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	1st	2nd
Base/Neut. Ext.															
Isophorone					5J									3J	
Bis (2-ethylhexyl) phthlate	2.7J										3J				
Diethylphthalate								4J							
Total B/N ext	2.7	0	0	0	5	0	0	4	0	0	3	0	3	0	0

J = Estimated value. Used when estimating a concentration for tentatively identified compounds where a 1:1 response factor is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria and the result is less than the specified detection limit, but greater than zero.

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Final - 8/89

Woodward-Clyde Consultants

Page 3-7: (a) Northward movement of the shallow ground water is stated as fact. This is not documented and is not justified by the data in the RI. Table 3-1 (p. 3-16) shows some higher ground water elevations north of wells 1S, 5S and 4S. For example, water levels in 3S, the northern most monitor well, and RW3 (a residential well located about 600 feet north of the reported ground water divide at the site) were 712.90 feet and 719.83 feet, respectively, on September 26, 1987 and higher than the wells immediately to the south. In fact, the ground water elevation was higher in the northernmost shallow monitor well, MW-3S, than in wells to the south of it on four of the six dates on which ground water elevation measurements were reported. Ground water elevation in RW3 was 720.07 feet msl on May 16, 1987, higher than monitor wells located to the south. Furthermore, it is difficult to predict a contour of 714 feet as shown in Figure 3-3 (p. 3-8) with the existing ground water elevation data. This contour was drawn considerably north of well 3S, the northern most monitor well and the northern most data point. Also, the water level around the 712 feet contour line in Figure 3-4 (p.3-9) can be interpreted in other ways. For instance, an east-west trough could exist instead of a closed depression. In addition, the data presented in the RI is not adequate to verify that the shallow aquifer is continuous to the north of the site. Additional measuring points are necessary to define the direction of the ground water movement from the site.

(b) Paragraph 1 states that since the unusually low water table elevations in the fall do not represent normal site conditions, ground water flow systems have been discussed using May 1987 data. If this is the case, ground water flow to the north would be primarily uni-directional as indicated by Figure 3-3. This is contradictory to the two-lobed contaminant plume used in the analytical model and depicted in Figure

4-6 (p.4-19). The pattern of a two-lobed plume could be simulated under the initial condition of a two-directional ground water flow as depicted in Figure 3-4 (p.3-9). With the available data, the conclusions arrived at on p. 3-7 and p. 4-18 regarding the northward movement and the two-lobed plume are not substantiated. It should be noted that seasonal fluctuations in ground water elevation occur even in normal precipitation years and the measurements during the RI may reflect normal trends although the acutal elevations would vary from year to year. It is possible that the northern portion of the site exhibits a seasonal reversal of flow direction.

Page 4-12: The RI states that well RW-3 "is probably not screened in the same water bearing unit as the monitoring wells at the Big D site. Well construction, recharge rates, and static water level indicate this well receives water from a localized perched water table zone." The basis for this conclusion is not documented in the RI. The data presented in the RI (Table 1 of Appendix C) does not distinguish the aquifer at RW-3 from that at RW-1, RW-2, RW-4 and the onsite monitor wells completed in the water table. Table 1 of Appendix C (see Volume II of Final RI Report) lists RW-3, RW-1, RW-2 and RW-4 as screened in the overburden (assumed based on discussions with owners). No hydrogeologic analysis or other data is presented to indicate that RW-3 is not screened in the same aquifer as the other residential wells or the shallow onsite monitor wells. The ground water elevation in RW-3 is higher than in the northern most shallow onsite monitor wells and this may reflect a ground water elevation surface for the water table different from that assumed in the RI rather than necessarily indicating a different aquifer. It should be noted that the RI also indicates that the water table aquifer onsite is a perched aquifer in the over burden.

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p. 4-18: (a) One of the stated reasons for the two-lobed contaminant plume is surface water recharge from the drainage swale at the northern end of the site. If the drainage swale is a significant source of recharge, the local ground water flow would be expected to be southward from the south side of the swale and northward from the north side of the swale (i.e. a ground water divide). This is contradictory to the RI's stated northward direction of the ground water movement.

(b) Residential well RW2, located at 3700 Creek Road, does not show any chlorobenzene contamination or other contamination believed to come from the site. However, Figure 4-6 shows that the computer simulation predicts that there is about 3mg/l of chlorobenzene in the vicinity of RW2. The detection limit for chlorobenzene is .005mg/l. The accuracy of the transport model is implied in the RI to be about one order of magnitude, but in this case is in error by at least a factor of 600. The assumptions on which the model is based may not be valid.

p. 4-5 Two background soil samples were collected, both from the same location. The RI then states that "As shown in Table 4-1 the highest borehole concentrations for all compounds except silver exceeded the concentrations detected in the two background samples. The highest concentrations of each inorganic compound detected in the test pits exceeded the concentrations in both background samples with the exception of antimony, arsenic, beryllium, cobalt, iron, cyanide, selenium, thallium and vanadium." These are true statements, however, it should be noted that this does not necessarily indicate elevated concentrations in the soil borings and test pits relative to the two background samples. Most of the inorganic constituents analyzed are present in varying concentrations in soil samples as a result of natural processes. The naturally occurring concentrations will vary from

location to location and will exhibit a statistically distributed range of values which is dependent on the number of samples of the total population of samples which have been analyzed. That is, if the range for a very small number of samples is compared to the highest value observed from a much greater number of samples collected from the same population, it is expected that some values will exceed the range of the small number of samples. Since many more samples were analyzed from boreholes and test pits than from background locations, it should be expected that some values will exceed the range exhibited by the background samples. Note that the lowest concentrations of the borehole and test pit samples for the inorganic constituents are also lower than or equal to (for not detected) the lowest values for the two background samples.

The comparisons used and conclusions reached are statistically invalid.

p. 4-20: Soil gas concentration contours have not been provided to help evaluate the validity of the estimated extent of the ground water contamination plume, as shown in Figure 4-6 (p. 4-19). Further verification of the results is necessary.

Appendix H: (1) (see Volume II of Final RI Report) In the modeling of the plume, it has been assumed that the (water table aquifer is infinite in extent. This assumption is contradictory to the actual physical characteristics. In fact, data were not presented that verify that the aquifer is continuous in the area included in the model. Also the model did not account for the vertical recharge from the surface.

(2) The Princeton Model is limited to modeling a single source with a single ground water flow direction. The study used a combination of results from multiple model runs as a weighted average of concentration with respect to discharges from the two source areas. Theoretically, since it is not based on solute mass balance or mass conservation, the weighted average concentration may deviate remarkably from the true value at each location. It is, therefore, essential to verify the results by running other models (analytical or numerical) and comparing the results. No indication of model verification was submitted.

In light of the above, we suggest that the following be further considered:

1. Obtain water level data for additional dates and provide more data points further north.

2. Utilize another analytical model to verify the Princeton Model's results with the same given assumptions;

3. After adequate data is obtained, refine the assumptions and use other analytical or numerical models to obtain results based on more realistic physical conditions. A numerical model or a combination of analytical and numerical models is highly recommended since it can better simulate the subsurface conditions at the Big D site;

4. Sensitivity analysis of the responses of ground water flow and contaminant transport with respect to changes in the hydrogeological parameters is essential since the input values are based on assumed values and may differ very significantly

from the actual conditions. No sensitivity analysis is reported in the RI.

General comment on estimated extent of shallow ground water contamination.

The estimated extent of shallow ground water contamination to the north of the site is based solely on the predictions from the analytical model and actual ground water data are limited to the southern edge of the area modeled. Contradictions exist between the model and the available data and numerous unverified assumptions are present in the analytical model and the estimation of contaminant extent. Evaluation of the extent of contamination requires collection of actual hydrogeologic and water chemical data within the area modeled. The actual extent may vary significantly from what has been predicted in the RI, as is indicated by the available data for residential wells.

Table 1 of Appendix H ,See Volume II of Final RI Report

Table 1 lists the ground water velocity used in the model as 3.64×10^5 cm/sec. This is equivalent to about 1,030,000 feet per day. Presumably this is a typographical error. What ground water velocity was used?

Tables 6-2b, 6-3b, 6-4b,6-5b, 6-6b, 6-7b, 6-8b:

The upperbound excess lifetime cancer risk value mathematically should be reported with three significant digits to obtain more uniform calculation results.

Selection of soil ingestion rates - The soil ingestion values presented in the EPA Superfund Exposure Assessment Manual (SEAM) p. 168,

Table A-5 are presented by age group and are more accurate. The information in this reference also provides time periods for various ingestion rates making the assumption of years of soil ingestion unnecessary.

p. 6-6: Direct contact with contaminated soils/Extent of exposure ...this scenario assumes that future direct contact with soils will involve soil up to 8 feet below the ground surface. The basis of this assumption (depth of 8 feet rather than surface soil) needs to be presented. Use of surface soil would probably result in significantly lower exposure. The exposure via this pathway is zero.

p. 6-8: The potential dermal exposure is estimated to be 1 mg soil/cm^2 body area. This estimate is high, a value of 0.6 mg soil/cm^2 body area is more accurate (Lepow, 1975). The value of 1 mg soil/cm^2 overestimates the health risk and this should be stated. The Superfund Public Health Evaluation Manual (SPHEM) states that the uncertainties of each assumption made during the risk evaluation process and the resulting over or underestimation of health risk must be clarified. Evaluation of the impacts of assumptions was not made for any exposure assumptions.[1]

The basis for the selection and use of an additional carcinogenic potency factor for calculating dermal exposures was not stated. The impact of the use of these factors in addition to the use of factors developed for ingestion of contaminants on the overall risk estimate was not discussed.

[1]Lepow, M.L. et al. Envir.Res., 10 415-426 (1978).

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p. 6-11: It is stated that the sampling results for the residential wells did not reveal any inorganic or organic contaminants that could be attributed to releases from the Big D site. It should have been stated that for incomplete exposure pathways there is no actual risk. (See Reference SPHEM, Page 36, first column, second paragraph). There is no potential risk associated with the site ground water at this time due to an incomplete exposure pathway. Risk is overestimated because it is assumed that the pathway is complete at this point. The potential for future risk exists only if a production well is placed in a location completing the exposure pathway.

It should also be noted that in comparing production well contaminant concentrations with site monitoring well concentrations in the same aquifer, that lower concentrations may occur in dynamic systems such as production wells in comparison to stagnant systems such as monitoring wells. The use of monitoring well data applied to production well consumption may overstate the health risk.

p. 6-12: When referring to risk, it should be clarified that the future is based on a period of 70 years for risk assessment purposes, not an infinite time period. It is stated that both acute and chronic exposures for the potential ingestion of ground water were evaluated. Only chronic hazard index values can be found on the RI.

For infrequently found contaminants, geometric mean concentrations were not calculated and the contaminant was not evaluated under probable case conditions. In order to evaluate these contaminants under probable case conditions, the geometric mean can be calculated utilizing a concentration equivalent to one-half the detection limit for

110

that specific contaminant when there are "non-detectable" levels. This approach more accurately estimates the actual or probable exposure.

p. 6-8, 3rd Paragraph

It is stated that extrapolations from animal studies do not address human-animal differences in absorption. This is not true - all effect levels obtained from chronic animal studies are multiplied by a safety factor of 10 to account for interspecies variation.

It is also stated that the ACI and CPF calculations assume that the human body absorbs 100% of the contaminant, the same extent as an experimental animal. For most compounds this is not true.

The reasons for excluding the percent contaminant absorbed in equations 6-1 and 6-2 are not satisfactory. However, by assuming 100% is absorbed, the estimated dose is higher and the calculated risks are more conservative. Also, it was stated elsewhere that 1% inorganic and 5% organic dermal exposure assumptions would be used. These percentages are used in eq. 6-1 and 6-2 in Appendix H.

p. 6-15

The BCF values quoted for chlorobenzene range from 10 to 4185. A value of 465 was selected and the basis for this selection is not stated. A more conservative approach would be to use the highest value. Recalculations using BCF of 4185 gives a HI of 0.32 which is still in the acceptable range.

Extent of exposure - Estimated doses and HI should have been calculated for barium, lead and beryllium.

p. 6-28	The estimated dose for chlorobenzene is 9.5 E -01 not 9.21 E 01 µg/kg. (See page 6-16) The HI is 3.5 E-02 not 3.4 x E-02.
Appendix H-5	exposure dose = 10,230 mg/kg should be 10.230 mg/kg or 10,230 µg/kg

p. 4-26

Location of sampling stations based on flow of dye

Instead of undertaking the dye study during the sampling period, the dye study should have been completed first so that the location of the stations could be based on the hydrodynamic flow of the creek, rather than the approach that was used where the dye study was performed after the stations had been sited. The dye study revealed that the siting of the stations may have resulted in the collection of samples in areas not representative of the flow of the creek.

p. 5-3

Measurement and documentation of pH in the soils and water samples.

As uptake and absorption are extremely important parameters in the movement of both inorganic and organic pollutants, and as both pH and organic carbon content of the soil have a major influence on the chemodynamics of the compounds, these parameters should have been measured in order to better assess the movement of these compounds in the environment.

p. 6-8

Average body surface of child.

A discrepancy exists in the average body surface area of a child used in the risk assessment. Although EPA (1985) stated that the average surface is 1200 cm^2, the 1988 Superfund Assessment Manual (Page 127) quotes that the dermal area of a child is 9400 cm^2.

p. 6-32

Uncertainties.

The derivations and calculations of the carcinogenic potency factors and noncarcinogenic acceptable daily intake values should be discussed in more detail. In addition a discussion of the safety factors included in the calculations should be included. This information is necessary to determine the validity of the conclusions.

p. 6-37 to 6-60

Calculations

Two of the ADI values i.e. those for barium and beryllium which were used in the study differed from the values quoted in the 1986 EPA Exposure Manual. If some other source was used, it should be referenced. In the case of barium, the value differed by 11% but in the case of beryllium, the figure used, 5.00E-03, was one order of magnitude less sensitive than the value of 5.00E-04 quoted in the 1986 EPA manual. In the text it was inferred that a 1987 revision of the Toxicity

data was the source of some of the ADI values. A full reference to this manual was not made as a footnote to the appropriate tables.

p. 6-57

Source of ambient water quality criteria.

A reference to Table 6-16 for the ambient water quality criteria was made. No such table exists in the report. Rather the data was taken from Table 6-9. The source of the AWQC for lead was not referenced.

Geophysics

(1) On page 4-3 of the RI report (Vol.I) landfill volumes are "estimated from the geophysical survey to be 35,000-52,000 cubic yards." There is no discussion upon which that statement is based. Later, on the same page, is the statement "based on the results of the test pit excavation the estimated volume of contaminated fill is 25,000 to 35,000 cubic yards." Were the fill estimates actually made from conversations with the transporter, from the geophysics, or from the test pits? It is not clear. The actual calculations and assumptions used should be presented.

(2) On page 7-1 of the Summary of Conclusions of the RI report (Vol.I), the statement is made "Based on the geophysical survey and the test pit excavation results, it is estimated that there are two source areas with a combined volume of 25,000 to 35,000 cubic yards." Again, supporting documentation for this conclusion was not found.

(3) In the FS report, several references to the RI report are made (pp. ES-3, 1-31, 2-5, etc.) stating "that 2,500-5,000 drums may be buried within the suspected drum boundary" inferred from the aforementioned fill volumes. No documentation correlating either the geophysical results to the fill volumes, or the geophysical results to a total number of buried drums was presented in the RI or FS reports. Again, the calculations and assumptions used to obtain this estimate should be provided. Also, the geophysical survey detects metal pieces, rods, etc., which might be present in the soil. These might influence the results to a great extent and might have erroneously been interpreted as indicating the presence of drums. The repjort makes no mention of such possible errors.

Comments On Feasibility Study (FS) Report

Table ES-1

Table ES-1 indicates that alternative 6, source area containment, treatment of ground water outside contaminated area, complies with all ARARS and is protective for soils and ground water. It also indicates that it is easily implemented with proven technologies. Table ES-1 indicates that alternatives 2 and 6 have minimal risk during remediation, alternatives 4 and 8 have moderate risk and alternatives 3, 5, 7, and 9 have high risk. Alternative 6 also is indicated as requiring relatively short time to implement. Of the alternatives developed in the FS, Alternative 6 appears to have distinct advantages during the remediation when the risk for release to the air of relatively high concentrations of contaminants is much lower than for other alternatives. The only disadvantage listed for Alternative 6 relative to some other alternatives is that the long term risk (presumably of release of slow moving contaminants to ground water) is expected to be higher. Such releases

can be detected by monitoring and since the ground water moves very slowly, allows considerable time for corrective measures before human exposure would occur. The short term risk of exposure to relatively high concentrations from fast moving air releases during alternatives requiring extensive excavation allows little time for response and appears to represent the greater risk to human health.

2-23 to 2-36, 3-35 to 3-37

Onsite incineration will require a high volume flow of water for operation. The discussion of incineration does not identify the source or discuss the availability of this water and the associated cost. Ready availability of this volume of water is questioned since discussion of a soil bentonite slurry wall barrier on page 3-55 indicates that water for construction of the slurry wall would have to be obtained from an unspecified offsite location. Availability of the larger volume of water for onsite incineration is thus questionable.

Figs. 3-7, 3-8 and 3-9

The area allocated for incineration in each onsite incineration option as illustrated on the referenced figures appears to be substantially less than that required by available transportable incinerators with the required ancillary facilities. The area allocated is only about 250 feet by 300 feet. A much larger area is required.

P 3-37

The FS states "The ash content of the contaminated soil is assumed to be 70 percent; the water content is assumed to be 20 percent and the heating value is assumed to be 2,000 Btu per pound." The RI and FS do not present laboratory test data which are commonly used to provide data for evaluating incineration suitability and characteristics of incinerator ash. Tests for Btu content, total chlorine content, percent

ash, and NO_x are commonly used for evaluating suitability for incineration and should be determined prior to selecting the remedial alternative.

P. 3-37

The FS states "the volume of ash remaining is estimated to be 18,000 to 21,000 cubic yards". This represents a 30% reduction in volume from the in situ volume. Since the bulk of the material to be incinerated is soil with low organic content it is likely that the volume reduction will be much less than that presented and in fact may be very small. In addition, the excavated soil will undergo expansion or "fluff" resulting in a volume increase relative to in situ volume. If the ash requires treatment prior to disposal this will further increase the volume.

p. 3-37

The FS states "In addition to the ash remaining after incineration, residuals from air pollution control would probably consist of sludge and wastewater requiring treatment if a wet design is used and solid fly ash if a dry design is used." The issue of disposal of air pollution control wastes should be evaluated in much greater detail prior to selection of a remedial option as this can have significant environmental and cost impact on an incineration alternative. No test results for total chlorine content of the contaminated material were presented. This is a critical parameter for evaluation of incineration alternatives. Since the primary contaminants include chlorinated organics the air pollution control wastes can be expected to contain significant chloride content.

Treatment of wet scrubber waste water to remove chloride is generally not feasible and is expensive, resulting in either a concentrated brine or a high salt content solid both requiring offsite disposal. Similarly, dry scrubber systems, result in a high salt content solid. Stabilization of such solids with fly ash is likely to result in significant leaching of

chloride to ground water and surface water. Disposal onsite of wastes from either wet or dry design air pollution control systems would most likely result in significant chloride pollution of Conneaut Creek potentially with considerable environmental damage. Testing of total chlorine content, calculation of chlorine mass balances for incineration air pollution control systems and evaluation of associated costs and environmental impact should be undertaken before selecting a remedial option.

p. 3-38

With reference to incinerator ash the FS states "if delisting is not possible, the material would need to be disposed of in a RCRA landfill as discussed in alternatives E and F." Construction and operation of an onsite RCRA landfill would require long term maintenance. If the waste is successfully delisted it would still remain a nonhazardous waste. Backfilling of the ash was not discussed with respect to compliance with State requirements for landfilling nonhazardous waste.

p. 2-29 and 2-30

Mechanical excavation is expected to extend about 30 feet deep for all source control alternatives except containment. The contaminated material occurs within 50 feet of a very steep slope leading to Conneaut Creek. No strength data was presented in the RI/FS for the soil. However, stability of the excavation at such depths is uncertain. An outward failure with release of contaminated material to Conneaut Creek is a risk which has not been addressed in the RI/FS. Such a failure could result in far greater risk to public health and the environment than is presented by the site in its present condition. Strength data for the soil should be obtained and a geotechnical evaluation of the risk associated with excavation should be undertaken prior to selection of a remedial alternative.

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p. 2-30

The FS states " The conditions at the Big D site are favorable because the depth of drums and the drums are expected to be in generally good condition based on the results of the test pit excavation." The RI, page 5 of Appendix I, however, states that "Over half the drums observed were either partially crushed or ruptured." The above conclusion concerning the excavation of drums is inconsistent with the test pit results presented in the RI. It should be noted that excavation of the drums would be expected to result in rupture of many of the drums which may be currently intact.

p. 2-28 and Figure 2-1

During screening of remedial technologies all solidification/stabilization techniques except in situ vitrification were eliminated. It appears that one technology was not considered and that other technologies were eliminated without adequate test data. The technology now exists to use large diameter augers through which a stabilization fixation slurry is pumped. The auger mixes the slurry with the waste material and contaminated soils, drums would be ruptured and the contents fixed within the slurry. This technology is not subject to the same limitations as the other solidification/stabilization technologies listed on Figure 2-1. In addition, other stabilization techniques were eliminated based on questions of effectiveness and possible leaching. Bench scale tests should have been completed prior to elimination to determine if effective treatment mixes are available.

In addition, excavation and offsite incineration of intact drums combined with stabilization of the soil and ruptured drums should be considered. It does not appear that these alternatives were considered.

General Comment

Neither the description of each alternative nor the cost estimate table for each alternative present adequate detail to determine if all essential elements of the alternative have been considered and to determine if the cost estimates are consistent and accurate.

p. 1-47:

Risks were evaluated on future site use (residential scenario). The risk associated with present use needs to be discussed.

Table 1-11a, and 1-16a:

The procedure to calculate the exposure dose is different - the intake factors defined below are not the same. Why are these values different?

$$\text{Intake factor} = \frac{\text{exposure dose}}{\text{maximum concentration}}$$

Water ingestion and soil ingestion tables

Calculations for worst and probable case conditions for soil ingestion utilized maximum and mean concentrations as well as frequency of exposure. Calculations for worst and probable case conditions for water ingestion utilized maximum and mean concentrations and frequency of exposure was excluded. The use or non-use of a frequency factor requires explanation.

p. 1-42:

It is stated that the environmental exposure considered the most likely to occur is the ingestion of aquatic life that inhabits Conneaut Creek. No rationale was presented to support this statement, nor was the risk for this exposure route calculated. Please explain.

The rationale for including the factor frequency of contact (days) in the exposure dose equation 365 days
(6-1) is not clear. Frequency of exposure is not generally considered in calculating a hazard index.

p. 1-45 Table 1-10 WQC for the consumption of aquatic organisms only -The reference for these values was not given.

The WQC for chlorobenzene taken from a 1980 EPA reference is 7.2E-04 and 7.4E-04. The EPA manual gives a value of 488 - same units.

The WQC for chlorobenzene was quoted as 7.2E-04 μg/L for consumption of drinking water and aquatic organisms and 7.4E-04 μg/L for the consumption of aquatic organisms only from a 1980 EPA reference. A more recent reference, EPA SPHEM, 1986, gives WQC value of 488 μg/L for chlorobenzene for both consumption of aquatic organisms and drinking water and for the consumption of drinking water only.

p. 1-49 The worst case soil ingestion of $1x10^{-3}$ was selected. Is the basis for selecting this value valid? See page 6-5

APPENDIX C

OhioEPA
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Richard F. Celeste
Governor

August 25, 1989

Janice Bartlett
Project Coordinator
USEPA Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Dear Ms. Bartlett:

The Ohio EPA would like the Record of Decision for the Big D Campground Superfund Site to address the following comments. Our comments are intended to address a few outstanding concerns about the implementation of the proposed plan that have not been included in the administrative record. Alternative 9 should provide a remedy that is protective of human health and the environment if these concerns are addressed during or prior to the Remedial Design.

The four main comments below address our concerns about Solid waste issues, alternatives to delisting of incinerator ash, groundwater investigations and groundwater treatability. The fifth comment addresses risk objectives for the project.

1. Alternative 9 requires that delisted ash will be backfilled into the source material excavation. The delisted ash is considered a solid waste under Ohio law and ORC 3734-02-G provides a method for the Director of OEPA to determine if disposal at the Big D site would not pose any adverse effects to public health or the environment. The Record of Decision should indicate that OEPA Solid Waste regulations are ARARs for ash disposal on-site and authority to exempt any substantive requirements of those regulations rests with the OEPA.

2. The FS and the proposed plan should have considered the possibility that the incinerator ash might not meet the substantive requirements of RCRA delisting. During the RD determinations will be made about the treatability of contaminated source materials. If incineration does not produce a delistable ash then the ash material will have to be handled as a hazardous waste. Alternative 7 might be retained or considered as a backup for this eventuality.

3. As noted in section 7.2 of the RI and as we have discussed in the past the extent of off-site migration of groundwater contamination can not be verified without further sampling of groundwater. The Record of Decision should address specific activities that will occur during a pre-design project. What is the extent of the study that is needed to adequately define the extent of groundwater contamination. The ROD should include objectives and suggest

1-5

methods for determining the complete extent of off-site groundwater contamination and for characterizing the hydrogeology necessary in order to design the extraction systems. Any further investigation of the extent of groundwater contamination should also be designed to address the concerns of local residents that were presented during the August 8, 1989 public meeting. OEPA will provide the information that our Division of Groundwater has obtained about water usage in that area and any well sample results that you do not already have.

4. In the section 3.3 of the FS process options for the treatment of groundwater are evaluated based on effluent goals from Table 3.1. The substantive requirements of the National Pollutant Discharge Elimination System program as administered by the OEPA Division of Water Pollution Control will ultimately determine the choice of treatment methodologies designed and implemented at this site. While risk based objectives are used as goals for cleanup of a contaminated site, the concentration limits for a discharge are set by the NPDES program based on the water quality of the receiving stream, flow rates, and other factors including implementation of Best Available Technology. It is likely that detailed treatability studies and design review will show that process options in addition to GAC will be required to adequately treat the groundwater prior to discharge.

5. The ROD should indicate that cleanup goals will be based on cumulative risks. Though multiple exposure pathways did not pose significant risks in the RI it is possible that other risks will be documented during pre-design or later phases of the project. Any final cleanup standards should be based on risks calculated from cumulative exposure from all possible exposure routes.

If you have any question about these comments do not hesitate to contact us.

Sincerely,

Daniel V. Markowitz Ph.D.
Environmental Scientist
Division of Emergency and Remedial Response

cc. Fran Kovac, Legal
Rod Beals, NEDO DERR
Kathy Davidson, CO DERR
Jennifer Tiell, CO DERR

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