DECLARATION STATEMENT

RECORD OF DECISION

SITE NAME AND LOCATION

Ludlow Sand & Gravel Site
Town of Paris
Oneida County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Ludlow Sand and Gravel Site in the Town of Paris, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601, et. seq., 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. 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 New York has concurred with the selected remedy.

DESCRIPTION OF THE REMEDY

The remedial alternative presented in this document is the first operable unit of the Ludlow Sand and Gravel Site. It consists of control of the landfill materials, leachate seeps, soil and sediment around the landfill and groundwater which may be currently in contact with the fill materials. These activities constitute the first Operable Unit at this site; subsequent operable units will deal with off-site contamination in the groundwater, wetlands and gravel pit.

This Record of Decision calls for the following actions:

1. Approximately 10,000 cubic yards of contaminated soil and sediment adjacent to the landfill will be consolidated into the landfill. During design, a soil/sediment sampling program will be implemented to fully define the extent of soils to be consolidated.

2. An impermeable cover will be installed over the landfill to control runoff and minimize infiltration of water. This cover will comply with closure requirements of RCRA Subtitle C (40 CFR Section 264.310).

3. Leachate from leachate seepage areas and residual leachate formed from the landfill will be collected (see Figure 3).

4. Dewatering the landfill by using either a passive drain system or an active extraction well system. Details of the dewatering system will be determined during pre-remedial design activities. If it is determined during the pre-design field activities that there is no groundwater mound in the landfill or if the water in contact with the fill material is not contaminated, the dewatering may not be implemented.

5. Upgradient groundwater controls will be implemented to lower and maintain the ground water table from being in contact with the waste material. The details of a passive or active ground water table lowering system will be determined during the pre-remedial design field activities. If the cap alone lowers the groundwater table below the fill material, upgradient control of the groundwater may not be implemented.

6. If dewatering of the landfill is implemented, treatment of the collected contaminated leachate/ground water will be performed at an on-site facility. Alternatively, if dewatering is not necessary and the volume of water is small, the leachate will be collected and transported off-site to a permitted disposal facility that will accept the waste. The effluent from an on-site treatment plant would be discharged to an intermittent stream.

7. Perimeter fencing (including the wetlands) will be installed.

8. In accordance with New York State Law, deed restrictions governing future use of the property will be duly filed.

9. A long-term water quality monitoring program will be implemented which will include quarterly monitoring of on-site and off-site groundwater, surface water and potable water supply wells.

DECLARATION

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, I have determined that 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 actions and is costeffective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. Because treatment of the principal threats at the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy.

Because this remedy will result in hazardous substances remaining on-site, 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.

9-30-88

Date

William J. Muszynski

William J. Muszynski, P.E.
Acting Regional Administrator

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

LUDLOW SAND AND GRAVEL SITE

TOWN OF PARIS, ONEIDA COUNTY, NEW YORK

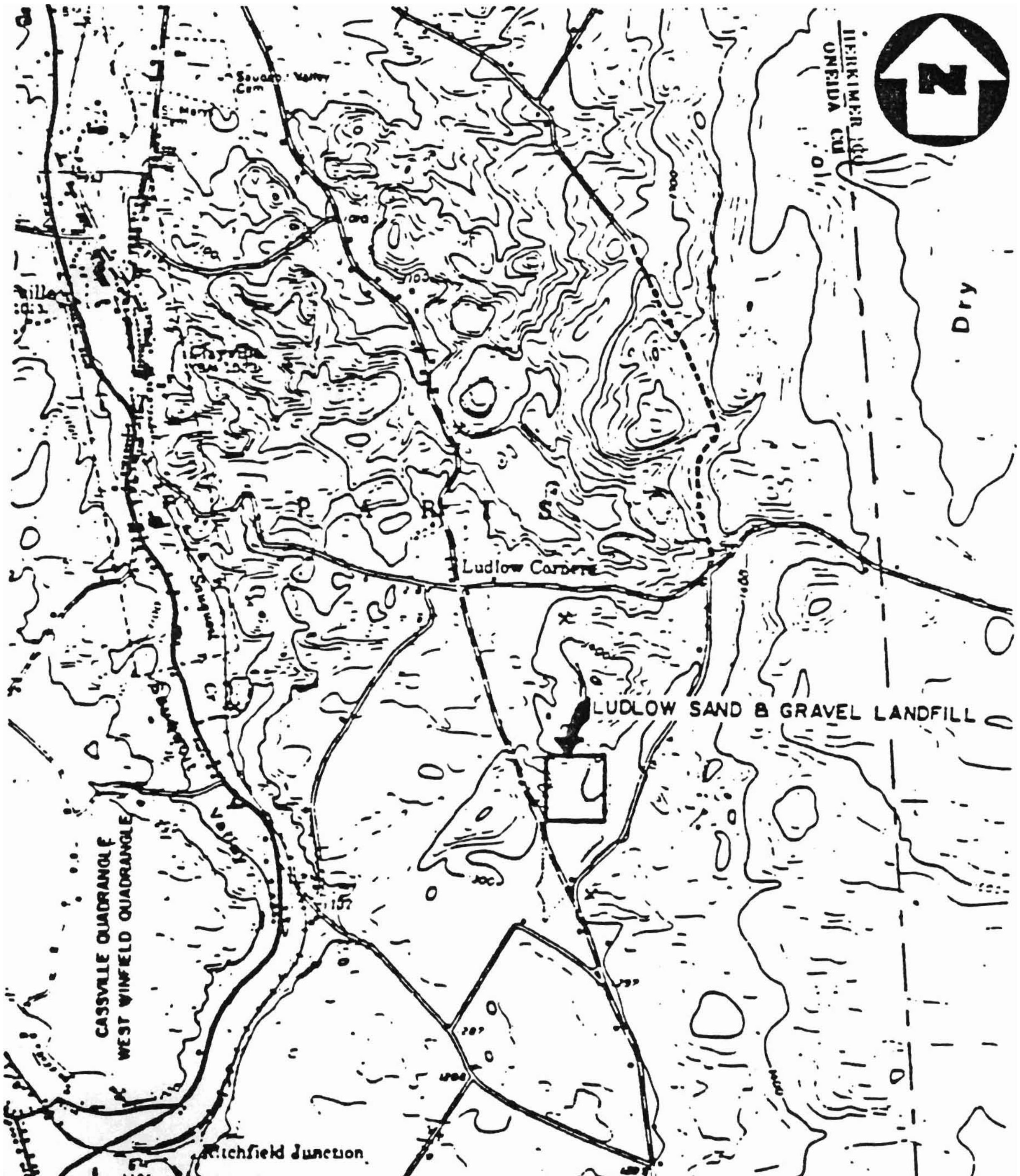
SITE LOCATION AND DESCRIPTION

This remedy addresses source control of the Ludlow Sand and Gravel Site as the first operable unit. It consists of source control of the landfill and surficial leachate seeps, management of the soils and sediments around the landfill, management of the groundwater which may be in contact with the fill materials, and control of residual leachate.

The Ludlow Sand and Gravel Site is located about six miles south of Utica in Oneida County, New York. The small community of Clayville in the Town of Paris is approximately 2 miles southeast of the landfill. (see Fig. 1) The Ludlow Sand and Gravel Site includes a gravel pit and landfill on a 130 acre block of land owned and operated by Mr. James Ludlow. Surrounding the landfill is an extensive gravel pit also operated by Mr. Ludlow and rural residential and agricultural land. A smaller area to the north and west of Holman City Road includes the operator's office, maintenance buildings, and a smaller construction debris disposal site. The Ludlow Sanitary Landfill property also includes a New York State designated wetland south and east of the fill area.

The landfill is in a groundwater recharge zone to the principal aquifer along Sauquoit Creek. The Creek serves as a major discharge point for groundwater flowing from the uplands. Soils in the overburden underlying the site have been characterized as a complex sequence of unconsolidated glacial sediments that vary in composition. Three types of glacial sediments have been identified at this site: till, glaciofluvial deposits, and lacustrine deposits. To the east and south of the site, the glacial deposits are overlain by deposits from a marsh which consist of silts, clay and peat. The bedrock underlying the glacially deposited overburden consists of limestone dolomites, and shale. These plates are part of the Remedial Investigation [RI] report and are available for viewing at the EPA Region II office, Clayville Library and City of Utica Library.

Water supplies in the area are mainly used for domestic and agricultural purposes with two (2) municipally owned public water supplies within two miles of the site. The Sauquoit Valley Water District is a spring source located approximately one (1) mile upgradient of the Site's groundwater flow patterns. The Village of Clayville's water system is located approximately three quarters of a mile northwest of the landfill. This system consists of a supply well 81 feet deep that has a capacity of



BASE MAP IS A PORTION OF THE U.S.G.S. CASSVILLE, NY QUADRANGLE (7.5 MINUTE SERIES, 1943, CONTOUR INTERVAL = 20'), AND THE WEST WINFIELD, NY QUADRANGLE (7.5 MINUTE SERIES, 1943, CONTOUR INTERVAL = 20')

SOURCE: NUS Corp

CDM
environmental engineers, scientists
planners & management consultants

Figure 1

Geographic Location Plan

Ludlow Sanitary Landfill Site, Town of Paris, New York

about 70 gallons per minute. The only individual water supply wells within 1000 feet of the landfill are three (3) homeowner wells along Mohawk Street located upgradient to groundwater flow around the landfill. Eight (8) additional homeowner wells are located between 1000 and 3000 feet from the landfill.

SITE HISTORY

Disposal at the Ludlow Sand and Gravel Site has occurred for the past 20 years. The earliest records are from 1966, when there were complaints from local residents of dumping in the area. Various organizations and individuals have been involved in disposal at the site during these years. Since the late 1960s, the site has been owned and operated as a landfill and gravel pit by Mr. James Ludlow of Holman City Road, Clayville, New York, or corporations of which he is president and chief executive officer.

The gravel pit is quite extensive. It occupies about 30 acres north of the landfill area. Gravel from the pit is sold for use as well as used on the landfill for refuse cover. In the past, notoriety of the landfill was largely based on aesthetic considerations. Large areas of the landfill were left uncovered, and a strong landfill odor could be detected at a considerable distance. Truck haulage records have been well kept since the late 1970s. These records document a diversity of wastes disposed of in the landfill. This documented waste consists of both domestic wastes and septic tank effluent. In addition, a variety of industrial wastes including, but not limited to, dyes, waste oils, metallurgical cooling oils and animal parts from a meat processing plant were disposed at the landfill.

Complaints continued about the site with a variety of legal actions taken against Mr. Ludlow. In late 1982, trace quantities of PCBs were detected in the leachate pools located at the southern portions of the property. These samples were used in the development of a Hazard Ranking Score (HRS) for the landfill. A HRS score was assigned to this site which placed it on the United States Environmental Protection Agency's (USEPA) list of priority hazardous waste sites known as the Superfund National Priorities List (NPL).

In July 1987, Federal Judge McAvoy (Binghamton District Court) executed a Federal Court Order requiring operations to cease at the landfill on or before February 15, 1988 at 2:00 pm. Mr. Ludlow ceased operation of the landfill as scheduled and is presently negotiating final closure requirements with New York State.

ENFORCEMENT STATUS

The Ludlow Sand and Gravel NPL site has an extensive history of legal response actions. In spite of this, Mr. Ludlow has never operated with a permit in compliance with New York State Regulations. As early as 1966, Ludlow was cited by State inspectors for a variety of improper or illegal waste disposal practices. To bring this landfill into compliance with State regulations, Mr. Ludlow has signed numerous administrative consent orders with the New York State Department of Environmental Conservation (NYSDEC) to perform the necessary work. Non-compliance with the requirements of these orders resulted in enforcement through the New York State Department of Law. The site became an NPL site in 1982. In 1984, a draft cooperative agreement was written to request funds from the USEPA to perform a Remedial Investigation/ Feasibility Study (RI/FS) at the site. Prior to submission of this agreement to the USEPA, the New York State Department of Law (NYSDOL) and the NYSDEC made a last attempt to negotiate with Mr. Ludlow for site investigation and remedial action.

Although negotiations again failed with Mr. Ludlow, Special Metals, Inc. of Utica agreed to pursue the necessary RI/FS at the site. Special Metals, a potentially responsible party at the site entered into negotiations with the State to perform the work requested. On September 10, 1984 negotiations were concluded and an Administrative Consent Order was executed with this third party to accomplish the required RI/FS. O'Brien and Gere Consulting Engineers were engaged to perform the work necessary to fulfill this Administrative Consent Order. The final document was prepared and submitted to the State during June, 1986. The State commenced a CERCLA enforcement action against Ludlow that same year.

The State of New York reviewed and commented on the documents submitted by O'Brien & Gere in a response to Special Metals, Inc. dated September 16, 1986. The document presented by O'Brien and Gere recommended remedial alternatives for closure of the landfill which were less stringent than Federal and State requirements. Subsequently, Mr. Ludlow's attorney engaged Dunn Geoscience to perform additional investigations to refine the O'Brien and Gere investigatory work. A second investigation report with a final closure plan was submitted to NYSDEC for review. In July 1987, Federal District Court Judge Thomas McAvoy ordered the landfill to close effective February 15, 1988 at 2:00 p.m. and ordered the partial payment of response costs to the State. Final closure would be required pursuant to Federal and State regulations. Concurrent with the PRP's additional investigations, the USEPA engaged Camp, Dresser and McKee, Inc. (CDM) to evaluate and perform a supplemental RI/FS at the site in response to New York State's request to assist in evaluating the cost of alternatives.

The supplemental RI/FS was then conducted due to the USEPA's decision that more information was needed concerning the remedies as presented by the State and the responsible parties. This supplemental RI/FS report was released to the public during the public comment period in August 1988.

SCOPE OF DECISION

As with many Superfund sites, the problems at the Ludlow Sand & Gravel site are complex. As a result, EPA and NYSDEC have divided the work into two smaller units or phases referred to as "operable units."

Currently defined operable units at the Ludlow site are:

- Operable Unit One: Source control of contaminated soils, sediment, leachate seeps and ground water in contact with wastes.

- Operable Unit Two: Off-site migration of ground water, potential contamination of wetlands and gravel pits.

This decision document defines the remedial activities to be conducted as part of Operable Unit One.

REMEDIAL INVESTIGATION

An RI/FS was performed from October 1984 to June 1986 by O'Brien and Gere, contractor of Special Metals Inc., pursuant to a NYSDEC Consent Order. The study area for the RI/FS concentrated on the landfill where wastes were obviously disposed. A supplemental Site Investigation (SI) was conducted by the firm of Dunn GeoScience Corp., Mr. James Ludlow's consultant, at the landfill and at the gravel pit north of the landfill. EPA also tasked its technical support contractor, CDM, to perform a supplemental RI/FS in compliance with SARA. Figure 2 summarizes the locations of the monitoring wells and borings installed during the field activities.

During the RI and subsequent Site Investigation, a number of field activities and laboratory analyses (i.e. geophysical techniques, monitoring well installation, ground water sampling and analyses, soil boring analyses, surface water and sediment sampling and analyses, leachate sampling and analyses) were implemented.

A. Contaminant Distribution

1. Landfill Material

Ten borings distributed in a circular configuration were drilled within the landfill to determine the depth and chemical composition of waste material (O'Brien & Gere 1986) (see figure 2). On the average, two samples per boring were submitted for analysis. Samples were analyzed for volatile organics, benzene, toluene and xylene (BTX), polychlorinated biphenyls (PCBs), and seven extractable metals.

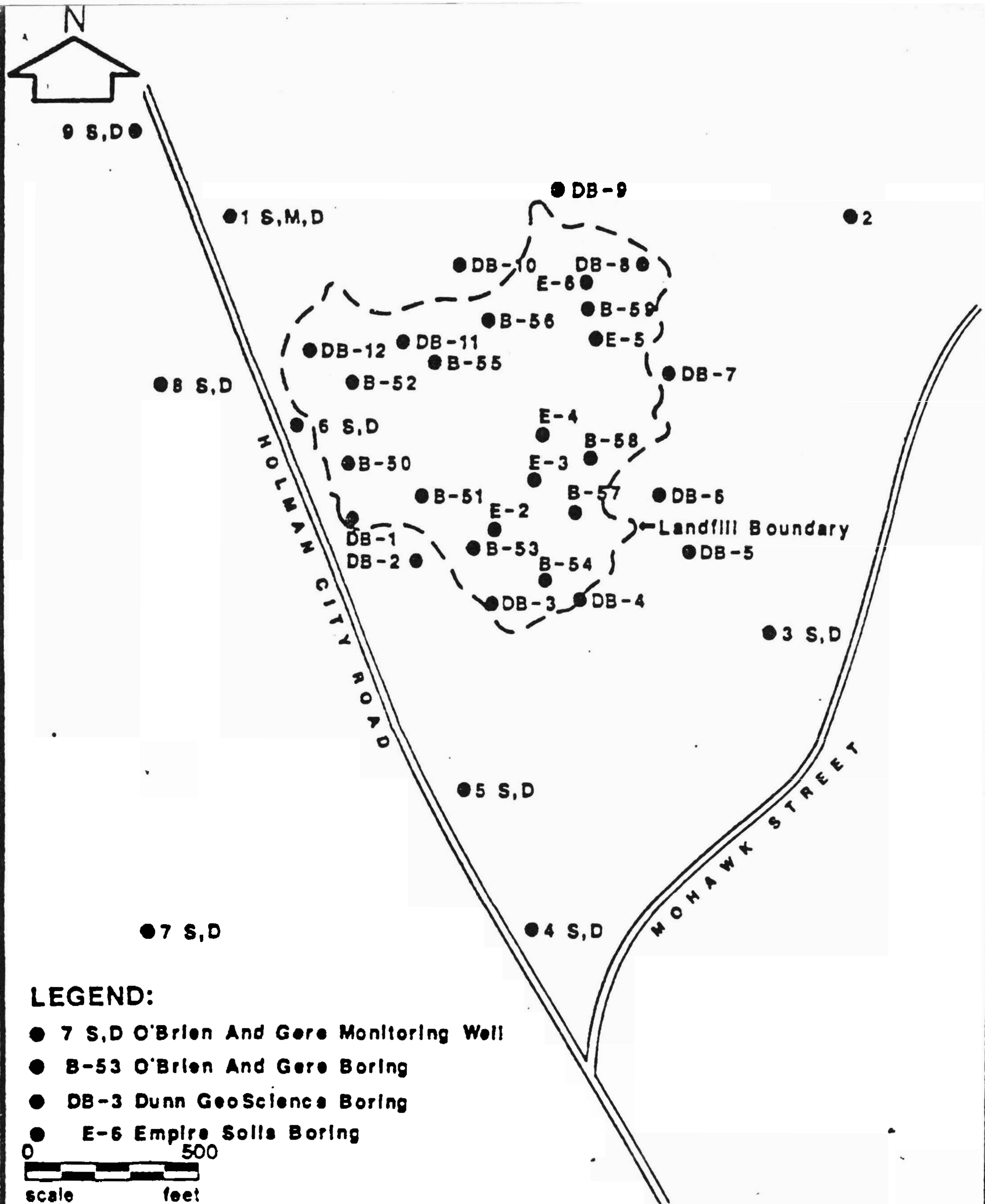
A number of volatile organic compounds (VOCs) were detected throughout the landfill. VOCs encountered included methylene chloride, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethene, 1,1,1-trichloroethane, benzene, trichloroethene, tetrachloroethene, toluene, chlorobenzene, ethylbenzene and xylene. Total VOCs ranged in concentration from .012 ppm to 657 ppm. Areally, VOCs were well distributed throughout the landfill, and vertically within the subsurface. Total VOCs at location 51, 52, 53, 55, 56, 57, 58 and 59 were above 1 ppm. At location 55, the highest concentration of VOCs was detected at 11 feet below grade; however, VOCs were still detected at 25 feet below grade. (See tables 1A-B).

Detectable concentrations of PCBs were found in boring locations 54 and 57 on the southeast portion of the fill. PCBs were detected at 19 feet in boring 54 at a concentration of 6100 ppm. This boring is located in the northwest portion of the landfill (O'Brien & Gere, 1986). Concentrations of total phenols varied across the landfill from less than 0.1 ppm to 89 ppm (O'Brien & Gere 1986). Phenols were widely distributed throughout the landfill, both areally and vertically.

2. Leachate

Leachate samples were collected from five leachate pools or seeps surrounding the base of the landfill. Three seeps on the south and east side of the fill were sampled twice and analyzed for conventional parameters (BOD, chloride, COD, pH, Conductivity, TC TIC, TOC and TOX) PCBs, total phenols and metals. One sample was composited from four small seeps areas off the north base of the fill and analyzed for the full hazardous substance list (HSL) compounds (except PCBs and pesticides), TKN, COD and sulfate by Dunn GeoScience.

The pool directly south of the fill exhibited the highest concentrations of chloride, COD, conductivity, total carbon and TOX. The two pools south of the fill also contained PCBs in concentrations ranging from 0.0004 ppm to 0.0036 ppm. The pH of the leachate ranged from 7.2 to 7.5 (O'Brien & Gere and Dunn GeoScience). (see table 2)



CDM
environmental engineers scientists & management consultants

Figure 2

Well And Boring Locations

Ludlow Sanitary Landfill Site, Town Of Paris, New York

TABLE 1A

SUBSURFACE SOIL BORING SAMPLES FROM LUDLOW LANDFILL
—Organic Analysis[a]
Samples Collected by O'Brien & Gere Engineers
1984

Chemicals[c] (ug/kg wet weight)	B-50 9'[b]	B-51 6'	B-51 19'	B-52 8'	B-52 22'	B-53 4'	B-53 12'	B-54 12'	B-54 19'
Volatiles									
Benzene	<100	<100	17,000	170,000	<100	<100	<100	<100	<100
Bromodichloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	<100	<100	<100	<100	<100	<100	<100	<100	<100
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
Carbon tetrachloride	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chlorobenzene	NA	NA	<100	<100	NA	NA	NA	NA	NA
Chloroethane	<10	<10	<10	<10	<10	<10,	<10	<10	<10
Chloroform	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chloroethyl vinyl ether	<100	<100	<100	<100	<100	<100	<100	<100	<100
Chloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	<10	46	<10	<10	17	<10	<10	<10	<10
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	<100	180	1,900	13,000	<100	850	<100	<100	130
Freon 113	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	12	550	39	1,200	13	<10	<10	<10	20
1,1,2,2-Tetrachloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	<10	<10	<10	51	<10	<10	<10	<10	<10
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	<10	<10	<10	97	<10	<10	<10	<10	<10
Toluene	<100	900	27,000	5,900	<100	<100	<100	<100	<100
Vinyl chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10
	<100	300	3,000	4,300	<100	<100	150	<100	240
Phenols (total)	<200	3,300	NA	<100	<100	<100	<200	2,200	1,500
PCB[d]	<2000	<2000	<2000	<1000	<1000	<1000	<2000	<2000	6,100,000
Inorganics[E] (mg/l)									
Cadmium	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Chromium	<.01	<.01	<.01	<.01	<.01	<.01	0.02	<.01	<.01
Iron	NL	NL	NL	NL	NL	NL	NL	NL	NL
Lead	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Manganese	0.13	2.2	0.06	0.32	<.01	0.01	0.48	<.01	0.12
Nickel	0.06	0.06	0.13	0.06	0.1	0.04	0.21	<.01	<.01
Zinc	<.01	4.1	<.01	2.0	<.01	<.01	0.33	<.01	0.15

Footnotes:

[a] Source: Remedial Investigation/Feasibility study-Ludlow Sanitary Landfill, O'Brien & Gere, June 1986.

[b] The number presented under each boring location (i.e. B-50) is the depth of the bottom of the split barrel sample below grade.

[c] OB & G analyzed the soil borings for volatile organics, phenols, PCBs and 7 extractable metals.

[d] PCBs were reported on a dry weight bases.

[E] The inorganic analyses are based on samples from an extract utilizing the 40 CFR 261 Extraction Potential procedure.

NA — The chemical was not analyzed for in the sample.

NL — The data has been crossed out in the O'Brien & Gere RI/FS Appendix and is therefore not legible.

TABLE 1B

SUBSURFACE SOIL BORING SAMPLES FROM LUDLOW LANDFILL
—Organic Analysis[a]
Samples Collected by O'Brien & Gere Engineers
1984

Chemicals[c] (ug/kg wet weight)	B-55		B-56		B-57		B-58		B-59	
	11'	25'	7'	13'	14'	22'	8'	16'	11'	22'
Volatiles										
Benzene	<100	<100	34,000	39,000	<100	<100	160	<100	<100	<100
Bromodichloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Carbon tetrachloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chlorobenzene	<100	<100	<100	<100	<100	NA	3,300	<100	<100	<100
Chloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroform	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chloroethyl vinyl ether	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Chloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	2,500	<10	<10	<10	43	<10	<10	170	<10	<10
1,2-Dichloropropane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	74,000	<100	9,700	12,000	140	240	1,800	1,400	1,300	2,400
Freon 113	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	570	15	150	140	<10	<10	<10	<10	57	41
1,1,2,2-Tetrachloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	17,000	23	<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	65	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	3,000	24	<10	<10	<10	13	<10	<10	44	<10
Toluene	260,000	<100	370	2,000	210	<100	1,300	2,600	850	290
Vinyl chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Xylenes	300,000	<100	<100	520	240	370	2,700	3,700	330	460
Phenols (total)	<700	500	2,500	89,000	700	1,200	2,500	<100	<200	<100
PCB[d]	<3000	1,700	<1000	<1000	3,500	4,700	<2000	<3000	<2000	<2000
Inorganics[E] (mg/l)										
Cadmium	<.01	<.01	<.01	<.01	<.01	NA	<.01	<.01	<.01	<.01
Chromium	<.01	<.01	<.01	<.01	<.01	NA	<.01	<.01	<.01	<.01
Iron	NL	NL	NL	NL	NL	NA	NL	NL	NL	NL
Lead	<.01	<.01	<.01	<.01	<.01	NA	<.01	<.01	<.01	<.01
Manganese	0.3	<.01	0.92	<.01	0.23	NA	0.14	0.02	0.64	<.01
Nickel	<.01	0.02	0.03	0.15	0.1	NA	0.08	0.05	0.04	0.02
Zinc	<.01	<.01	0.02	<.01	0.02	NA	<.01	<.01	0.05	<.01

Footnotes:

[a] Source: Remedial Investigation/Feasibility study-Ludlow Sanitary Landfill, O'Brien & Gere, June 1986.

[b] The number presented under each boring location (i.e. B-50) is the depth of the bottom of the split barrel sample below grade.

[c] OB & G analyzed the soil borings for volatile organics, phenols, PCBs and 7 extractable metals.

[d] PCBs were reported on a dry weight bases.

[E] The inorganic analyses are based on samples from an extract utilizing the 40 CFR 261 Extraction Potential procedure.

NA — The chemical was not analyzed for in the sample.

NL — The data has been crossed out in the O'Brien & Gere RI/FS Appendix and is therefore not legible.

TABLE . 2

LEACHATE ANALYSES

Samples Collected by O'Brien & Gere Engineers and Dunn Geoscience[a] 1984–1987

Parameters (ug/l)	North Seep 5/13/87	East Seep 10/25/84	East Seep 5/17/85	South East Seep 10/25/84	South East Seep 5/17/85	South Seep 10/25/84	South Seep 5/17/85
Volatiles							
Acetone	430	NA	NA	NA	NA	NA	NA
2-Butanone	540	NA	NA	NA	NA	NA	NA
Toluene	34	NA	NA	NA	NA	NA	NA
Xylenes (total)	3.5	NA	NA	NA	NA	NA	NA
Phenols (total)	188	<1	7	2	<1	2	3
PCB's	NA	0.1	<0.1	1.7	3.6	0.4	2.2
BOD5 (mg/l)	NA	15	12	3	18	21	12
COD (mg/l)	2,900	108	83	88	132	142	160
TC (mg/l)	NA	78	60	84	82	180	64
TIC (mg/l)	NA	20	25	37	36	130	21
TOC (mg/l)	NA	58	35	47	46	50	43
TOX[b] (mg/l)	NA	90,100	54,64	180,190	180,230	350,360	250,300
TKN (mg/l)	116	NA	NA	NA	NA	NA	NA
Sulfate (mg/l)	<10	NA	NA	NA	NA	NA	NA
Chloride (mg/l)	NA	52	51	121	101	210	199
pH	NA	7.2	7.2	7.6	7.5	7.5	7.4
Inorganics (mg/l)							
Arsenic	0.012	NA	NA	NA	NA	NA	NA
Barium	0.21	NA	NA	NA	NA	NA	NA
Calcium	180	NA	NA	NA	NA	NA	NA
Chromium	0.011	<.01	<.01	<.01	<.01	<.01	<.01
Iron	10	6.7	0.99	0.35	2.11	5.4	1.7
Magnesium	89	NA	NA	NA	NA	NA	NA
Manganese	3.4	0.33	2.2	0.13	0.7	0.17	0.13
Nickel	0.044	<.01	<.01	<.01	<.01	<.01	<.01
Potassium	200	NA	NA	NA	NA	NA	NA
Sodium	380	NA	NA	NA	NA	NA	NA
Zinc	0.62	<.01	0.02	<.01	0.02	0.01	<.03
Cyanide	0.075	NA	NA	NA	NA	NA	NA

[a] Source: Remedial Investigation/Feasibility Study-Ludlow Sanitary Landfill, O'Brien & Gere, June 1986 and Supplemental Investigation – Ludlow NPL Site, Dunn Geoscience Corporation, October 1987.

[b] Duplicate samples were collected for TOX. Both concentrations are reported.

NA — The chemical was not analyzed for in the sample.

Four volatile organic compounds were detected in seeps north of the fill. The compounds detected included acetone (0.43 ppm), 2-butanone (0.54 ppm), and toluene (0.034 ppm). In addition, concentrations of cyanide, total recoverable phenolics, iron and manganese (10 and 3.4 ppm) exceeded NYSDEC surface water standards. Values for TKN and COD were elevated.

Leachate and associated sediments were collected and analyzed by CDM's field team in 5 pools surrounding the landfill in January 1988. Organic concentration were elevated in the north seep area. The east, southeast and southern seep areas which are mixed with surface/ground water have less than .050 ppm of organic contamination. The north side seeps exhibited the greatest concentration of contamination with 17.6 ppm detected. Conventional parameters were elevated in the seeps. PCBs were only detected in the sediments on the south seep. Metals concentrations were elevated for iron and manganese in all samples. (see tables 3A-K)

3. Surface Water

During the course of the remedial investigation and site investigation, conducted by O'Brien & Gere and Dunn GeoScience respectively, a cumulative total of nine surface water samples were collected in three phases at three locations. Samples collected during the first two phases were analyzed for conventional parameters (BOD_5, COD, pH, conductivity, chloride, TOC, TIC, total carbon, TOX), PCBs, phenols, and metals (Cd, Cr, Fe, Hg, Mn, Ni, Pb, Zn).

Sample results revealed a slight degradation in surface water quality across the site. Concentrations of BOD_5, COD, iron and manganese increased adjacent to and downstream of the site. In addition, PCBs were detected at a concentration of 0.0005 ppm downstream of the site, west of Holman City Road. Concentrations of all HSL volatile organics were below the method detection limit. (see table 4)

4. Ground water

During the course of the RIs, nine monitoring well clusters were installed upgradient and downgradient of the landfill.

Only wells located directly adjacent to the landfill exhibited any negative impact from the landfill on groundwater quality with the exception of PCBs in well 5D and 6S. Organic concentrations are very low and restricted to the shallow aquifer. Low concentrations of metals appear in both aquifers. A further characterization of the groundwater will be performed during a subsequent RI/FS, which will constitute the second operable unit for this site.

TABLE 3A

LEACHATE AND ASSOCIATED SEDIMENT-ORGANIC ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Chemical	South Seep LE-5 BP 740 (µg/l)	South Seep LE-5 duplicate BP 741 (µg/l)	South Seep SD-5 BP 749 (µg/kg)	South Seep SD-5 duplicate BP 748 (µg/kg)
Volatiles				
Methylene Chloride	R	R	R	R
Acetone	R	R	2,100 B	2,600 B
2 - Butanone	ND	ND	370	610
Chloromethane	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	ND
1,2 - Dichloroethene	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
4 - Methyl - 2 pentanone	ND	ND	ND	ND
2 - Hexanone	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
Xylene (total)	ND	ND	420	510
Chlorobenzene	ND	ND	220	320
Semivolatiles				
Benzoic acid	15 J	25 J	ND	ND
Pentachlorophenol	ND	ND	ND	ND
4 - Methyl phenol	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND
Phenol	ND	ND	ND	ND
Di-n-butyl phthalate	ND	ND	ND	ND
Butyl benzyl phthalate	ND	ND	ND	940 J
Bis (2-ethylhexyl) phthalate	ND	3 J	5,900	910 J
1,4 - Dichlorobenzene	3 J	ND	1,300 J	1,200 J
1,3 - Dichlorobenzene	ND	ND	720 J	730 J
1,2 - Dichlorobenzene	ND	ND	800 J	920 J
Naphthalene	4 J	ND	670 J	ND
2 - Methyl naphthalene	ND	ND	ND	ND
Phenanthrene	ND	ND	540 J	ND
Fluoranthene	ND	ND	580 J	ND
Pyrene	ND	ND	390 J	ND
Benzo (b) fluoranthene	ND	ND	390 J	ND
Benzo (k) fluoranthene	ND	ND	350 J	ND
PCB'S	ND	ND	19,000	2,200
PH	6.7	6.9	7.2	7.4

TABLE 3B

LEACHATE AND ASSOCIATED SEDIMENT-ORGANIC ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Chemical	East Seep LE-3 BP 738 (µg/l)	East Seep SD-3 BP 746 (µg/kg)	Southeast Seep LE-4 BP 739 (µg/l)	Southeast Seep SD-4 BP 747 (µg/kg)
Volatiles				
Methylene Chloride	R	R	R	R
Acetone	R	R	R	R
2 - Butanone	5 J	ND	ND	ND
Chloromethane	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	ND
1,2 - Dichloroethene	ND	ND	ND	ND
Chloroform	ND	51	ND	ND
4 - Methyl - 2 pentanone	ND	ND	ND	ND
2 - Hexanone	ND	ND	ND	ND
Toluene	11	ND	ND	500
Ethylbenzene	ND	ND	ND	200
Xylene (total)	ND	ND	ND	1,300 E
Chlorobenzene	ND	ND	ND	ND
Semivolatiles				
Benzoic acid	20 J	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND
4 - Methyl phenol	ND	ND	ND	ND
N-Nitrosodiphenylamine	ND	ND	ND	ND
Phenol	ND	ND	ND	ND
Di-n-butyl phthalate	ND	91 J	ND	8,700 J
Butyl benzyl phthalate	ND	430 J	ND	100,000
Bis (2-ethylhexyl) phthalate	15	310 J	16	R
1,4 - Dichlorobenzene	ND	ND	ND	45,000
1,3 - Dichlorobenzene	ND	ND	ND	8,800 J
1,2 - Dichlorobenzene	ND	ND	ND	8,100 J
Naphthalene	ND	ND	ND	38,000
2 - Methyl naphthalene	ND	ND	ND	180,000
Phenanthrene	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
Benzo (b) fluoranthene	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND	ND
PCB'S	ND	ND	ND	ND
PH	7.6	7.0	7.0	9.8

TABLE 3C

LEACHATE AND ASSOCIATED SEDIMENT-ORGANIC ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Chemical	North Seep LE-1 BP 736 (µg/l)	North Seep SD-1 BP 744 (µg/kg)	North Seep LE-2 BP 737 (µg/l)	North Seep SD-2 BP 745 (µg/kg)
Volatiles				
Methylene Chloride	R	R	3,500 B	R
Acetone	R	R	2,200 B	290 B
2 - Butanone	45 J	ND	2,700	620 E
Chloromethane	ND	ND	26	ND
Chloroethane	ND	ND	16	ND
1,1 - Dichloroethane	ND	ND	17	ND
1,2 - Dichloroethene	ND	ND	4 J	ND
Chloroform	ND	ND	22	ND
4 - Methyl - 2 pentanone	ND	ND	22	ND
2 - Hexanone	ND	ND	13	ND
Toluene	ND	ND	400	130
Ethylbenzene	ND	ND	3	ND
Xylene (total)	ND	ND	12	ND
Chlorobenzene	ND	ND	ND	ND
Semivolatiles				
Benzoic acid	410	ND	3,300 J	980 J
Pentachlorophenol	12 J	ND	ND	ND
4 - Methyl phenol	17 J	ND	4,900	930
N-Nitrosodiphenylamine	ND	ND	ND	ND
Phenol	ND	ND	510 J	ND
Di-n-butyl phthalate	ND	ND	ND	ND
Butyl benzyl phthalate	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	ND	ND	ND	ND
1,4 - Dichlorobenzene	ND	ND	ND	ND
1,3 - Dichlorobenzene	ND	ND	ND	ND
1,2 - Dichlorobenzene	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
2 - Methyl naphthalene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND
Benzo (b) fluoranthene	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND	ND
PCB	ND	ND	ND	ND
PH	7.7	7.4	6.7	7.6

TABLE 3D

LEACHATE AND ASSOCIATED SEDIMENT-INORGANIC ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Inorganics (µg/l)	South Seep LE-5 mBM 975 unfiltered		South Seep LE-5 duplicate mBM 976 unfiltered		South Seep LE-5 mBM 216 filtered		South Seep LE-5 duplicate mBM 217 filtered		Field Blank mBP 246 unfiltered	
Aluminum	56.7	B	63.3	B	39.6	B	41.5	B	40.4	B
Antimony	ND		ND		ND		ND		ND	
Arsenic	ND		4.1	B	ND		ND		ND	
Barium	175	B	238		129	B	131	B	3.1	B
Beryllium	ND		ND		ND		ND		1.2	B
Cadmium	ND		ND		ND		ND		ND	
Calcium	143,000		154,000		139,000		144,000		320	B
Chromium	ND		5.4	B	6.6	B	6.6	B	ND	
Cobalt	ND		ND		ND		ND		ND	
Copper	ND		ND		ND		ND		28.5	
Iron	24,800		45,600		13,700		14,100		76.7	B
Lead	3.1	BW	5.7	S	3.3	BW	1.6	BW	ND	
Magnesium	38,000		41,400		365,000		38,300		94.2	B
Manganese	465		507		444		463		ND	
Mercury	ND		ND		ND		ND		ND	
Nickel	20.4	B	21.7	B	17.8	B	21.7	B	ND	
Potassium	89,800		97,800		86,700		91,400		324	B
Selenium	ND		ND		1.5	BW	ND		ND	
Silver	ND		ND		ND		ND		ND	
Sodium	131,000		142,000		125,000		133,000		ND	
Thallium	ND		ND		ND		ND		ND	
Vanadium	ND		ND		ND		2.4	B	ND	
Zinc	30		42.5		27.6		25.3		ND	
Cyanide	ND		ND		NR		NR		ND	

TABLE 3E

LEACHATE AND ASSOCIATED SEDIMENT-INORGANIC ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Inorganic (mg/kg) dry weight	South Seep SD-5 mBP 244		South Seep SD-5 deep mBP 245			
Aluminum	8,150	E	8,680	E		
Antimony	ND		ND			
Arsenic	ND		ND			
Barium	212	BEJ	252	EJ		
Beryllium	1.9	B	1.6	B		
Cadmium	ND		7.8	*		
Calcium	27,200	*	62,000	*		
Chromium	26.5		49.1			
Cobalt	ND		16.7	B		
Copper	R		R			
Iron	26,400		53,200			
Lead	29.5	*	24.2	*		
Magnesium	4,620	B	9,640			
Manganese	331	*	865	*		
Mercury	ND		1.1			
Nickel	29.7	B	98.7			
Potassium	R		R			
Selenium	4.0	BWJ	2.7	BWJ		
Silver	ND		ND			
Sodium	R		R			
Thallium	ND		ND			
Vanadium	15.8	B	22.9	B		
Zinc	249	E*	726	E*		
Cyanide	ND		ND			

TABLE 3F

LEACHATE AND ASSOCIATED SEDIMENT-INORGANIC ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Inorganics (µg/l)	North Seep LE-1 mBM 971 unfiltered		North Seep LE-1 mBP 247 filtered		North Seep LE-2 mBM 972 unfiltered		North Seep LE-2 mBP 497 filtered	
Aluminum	1,190		1,150		584		259	
Antimony	ND		ND		ND		ND	
Arsenic	ND		4.1	BW	10	S	8.5	B
Barium	110	B	104	B	611		552	
Beryllium	ND		ND		ND		ND	
Cadmium	ND		ND		ND		ND	
Calcium	65,800		62,800		549,000		518,000	
Chromium	7.3	B	8.5	B	55.2		48.2	
Cobalt	6.2	B	ND		23.5	B	22.2	B
Copper	18.5	B	14.1	B	33.3		20.5	B
Iron	8,750		6,330		183,000		157,000	
Lead	6.6	S	4.9	BS	ND		6.9	S
Magnesium	43,900		42,600		99,400		94,800	
Manganese	945		869		16,700		15,900	
Mercury	0.2		0.2		ND		ND	
Nickel	52.9		44.2		85.2		79.9	
Potassium	125,000		122,000		214,000		202,000	
Selenium	ND		ND		ND		ND	
Silver	ND		ND		ND		ND	
Sodium	201,000		196,000		380,000		359,000	
Thallium	ND		ND		ND		ND	
Vanadium	4.7	B	4.5	B	7.9	B	5.8	B
Zinc	76.0		68		483		414	
Cyanide	ND		NR		ND		NR	

TABLE 3G

LEACHATE AND ASSOCIATED SEDIMENT-INORGANIC ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Inorganics (µg/l)	East Seep LE-3 mBM 973 unfiltered		East Seep LE-3 mBP 499 filtered		Southeast Seep LE-4 mBM 974 unfiltered		Southeast Seep LE-4 mBP 500 filtered	
Aluminum	243		180	B	98.4	B	107	B
Antimony	ND		ND		ND		ND	
Arsenic	ND		ND		ND		ND	
Barium	14.1	B	10.5	B	202		213	
Beryllium	ND		1.8	B	ND		ND	
Cadmium	ND		ND		ND		ND	
Calcium	17,200		13,800		99,800		104,000	
Chromium	ND		ND		ND		ND	
Cobalt	ND		ND		ND		ND	
Copper	13.4	B	11.5	B	ND		ND	
Iron	829		711		2,660		2,510	
Lead	3.1	B	1.0	B	2.4	BW	2.5	BW
Magnesium	4,550	B	4,200	B	28,600		30,100	
Manganese	119		87.4		3,760		3,910	
Mercury	ND		ND		ND		ND	
Nickel	ND		ND		ND		8.1	B
Potassium	4,050	B	3,760	B	26,600		27,800	
Selenium	ND		ND		ND		ND	
Silver	ND		ND		ND		ND	
Sodium	4,770	B	4,340	B	36,600		39,000	
Thallium	ND		ND		ND		ND	
Vanadium	ND		ND		ND		ND	
Zinc	15	B	ND		43.5		48.5	
Cyanide	ND		NR				NR	

TABLE 3H

LEACHATE AND ASSOCIATED SEDIMENT-INORGANIC ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Inorganic (mg/kg) dry weight	North Seep SD-1 mBP 240		North Seep SD-2 mBP 241		East Seep SD-3 mBP 242		East Seep SD-4 mBP 243	
Aluminum	10,200	E	6,410	E	14,400	E	9,350	E
Antimony	ND		ND		ND		ND	
Arsenic	9.5	SNJ	15.1	SNJ	20.6	SNJ	7.4	SNJ
Barium	44.8	BEJ	33.9	BEJ	188	EJ	30	BEJ
Beryllium	0.74	B	0.45	B	1.3	B	ND	
Cadmium	ND		1.3	*	ND		ND	
Calcium	3,840	*	115,000	*	5,950	*	43,200	*
Chromium	14.7		9.5		17.7		57.3	
Cobalt	10.1	B	6.7	B	6.5	B	14.2	
Copper	59		38.1		33.5		81.8	
Iron	27,000		18,700		28,300		9,360	
Lead	7.1	S*	7.7	*	25.6	*	30.6	S*
Magnesium	4,480		12,200		3,470		224,000	
Manganese	690	*	508	*	2,050	*	242	*
Mercury	ND		ND		0.2		0.3	
Nickel	23.7		17.5		22.1		95.5	
Potassium	R		R		R		R	
Selenium	ND		ND		0.38	BWJ	ND	
Silver	ND		ND		ND		5.0	NJ
Sodium	R		R		R		R	
Thallium	ND		ND		ND		ND	
Vanadium	17.2		12.5	B	26.4		8.5	B
Zinc	117	E*	80.1	E*	97.3	E*	57.5	E*
Cyanide	ND		ND		ND		ND	

TABLE 3I

LEACHATE AND ASSOCIATED SEDIMENT-CONVENTIONAL ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Conventional Parameters	North Seep LE-1 3557-01 unfiltered	North Seep LE-1 3557-01F filtered	North Seep LE-2 3557-02 unfiltered	North Seep LE-2 3557-02F filtered	East Seep LE-3 3557-03 unfiltered	East Seep LE-3 5557-03F filtered
Hardness (mg/l)	341	NR	1,640	NR	49.8	NR
Alkalinity (mg/l)	798	NR	2,000	NR	37.9	NR
TDS (mg/l)	1,390	NR	4,900	NR	126	NR
TSS (mg/l)	113	NR	406	NR	9.5	NR
Sulfates (mg/l)	14.7	NR	<5	NR	12.5	NR
Nitrates (mg/l)	1.2	<0.1	0.19	0.22	1.2 J	1.4
Ammonia (mg/l)	75	NR	166	NR	0.84	NR
TKN (mgl)	72.9	74.8	180	180	1.2 J	1.7 J
TOX (µg/l)	333 J	370 J	369 J	359 J	14.5 J	69.1 J
Total petroleum Hydrocarbons (mg/l)	<1	NR	7.9	NR	<1	NR
Oil and grease (mg/l)	2.1 J	NR	273	NR	<1	NR
BOD_5 (mg/l)	88.5	67.2	703 J	637 J	13.9	7.6
COD (mg/l)	2,280	940	3,500 J	5,600 J	380	372
TOC (mg/l)	116	107	1,920	1910	6.9	7.7

TABLE 3J

LEACHATE AND ASSOCIATED SEDIMENT-CONVENTIONAL ANALYSIS

Samples Collected by Camp Dresser & McKee Inc.

January 19, 1988

Conventional Parameters	Southeast Seep LE-4		South Seep LE-5		South Seep LE-5 duplicate	
	3557-04 unfiltered	3557-04F filtered	3557-05 unfiltered	3557-05F filtered	3557-06 unfiltered	5557-06F filtered
Hardness (mg/l)	399	NR	482	NR	563	NR
Alkalinity (mg/l)	492	NR	924	NR	1,060	NR
TDS (mg/l)	550	NR	1,150	NR	1,270	NR
TSS (mg/l)	12	NR	125	NR	151	NR
Sulfates (mg/l)	14.8	NR	15	NR	13	NR
Nitrates (mg/l)	0.17 J	0.51 J	0.53 J	0.91 J	0.3 J	1.1 J
Ammonia (mg/l)	32.5	NR	78.5	NR	101	NR
TKN (mgl)	27.4	26.8	R	136	R	482
TOX (µg/l)	85 J	94.9 J	236 J	238 J	142 J	152 J
Total petroleum Hydrocarbons (mg/l)	<1	NR	<1	NR	<1	NR
Oil and grease (mg/l)	<1	NR	<1	NR	<1	NR
BOD_5 (mg/l)	3.0	3.4	17.3	12.3	13.6	10.3
COD (mg/l)	56	56	164	144	136	144
TOC (mg/l)	17.6	17.6	43.2	41	41.3	38.8

NR - The analysis was not requested by CDM

R - Data was rejected. It did not pass EPA QA requirements

J - Data has been qualified as an estimated value

TABLE 3K

Footnotes:

- R - Data was rejected. It did not meet EPA QA requirements.
- LE - Aqueous portion of the leachate seep area.
- SD - Sediment from the leachate seep area.
- ND - Sample was not detected at the method detection limit.
- B - The analyte was also detected in the blank.
- J - Data has been qualified as an estimated value.
- E - Indicates an estimated value due to the presence of interferences.
- S - Indicates the value was determined by Method of Standard Addition.
- W - Indicates spike sample recovery is not within control limits.
- N - Indicates matrix spike sample recovery is not within control limits.
- * - Indicates the laboratory duplicate analysis is not within control limits.

TABLE 4

Surface Water Samples - Organic and Inorganic Analyses

Samples Collected by O'Brien & Gere Engineers

Parameter	Units	Location 62 10/25/84	Location 62 5/17/85	Location 65 10/25/84	Location 65 5/17/85	Location 70 10/25/84	Location 70 5/17/85
BOD5	mg/l	lt 1	11	lt 1	lt 1	lt 1	2
Cadmium	mg/l	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01
Chloride	mg/l	4	6	5	9	2	4
COD	mg/l	15	44	lt 1	12	lt 1	9
Chromium	mg/l	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01
Iron	mg/l	0.38	0.81	0.34	0.11	0.25	0.05
Mercury	mg/l	lt 0.0005	lt 0.001	lt 0.0005	lt 0.001	lt 0.0005	lt 0.001
Manganese	mg/l	0.12	0.16	0.10	0.06	0.14	0.02
Nickel	mg/l	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01
Lead	mg/l	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01
PCB	mg/l	lt 0.0001	0.0005	lt 0.0001	lt 0.0001	lt 0.0001	lt 0.0001
pH	s.u.	8.0	7.1	8.1	7.2	8.1	7.2
Phenol	mg/l	lt 0.001	lt 0.001	lt 0.001	lt 0.001	lt 0.001	lt 0.001
Conductivity	umhos/cm	250	240	440	370	430	370
Total Carbon	mg/l	24	24	24	28	14	34
TIC	mg/l	9	4	12	16	10	15
TOC	mg/l	15	20	12	12	4	19
TOX-1	mg/l	lt 10	lt 10	lt 10	lt 10	lt 10	lt 10
TOX-2	mg/l	lt 10	12	lt 10	lt 10	lt 10	lt 10
Zinc	mg/l	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01	lt 0.01

5. Subsurface Gases

The lack of vents or manholes within the landfill precluded sampling gases emanating from decomposing waste within the fill. The detection of volatile organics within the landfill soils and leachate leads to a preliminary hypothesis that gases may be emanating from the landfill. There is a definite landfill odor associated with the site. Sanitary landfills are known to contain methane, a product of the decomposing waste. Limited air monitoring performed during the field activities did not detect volatile organic compounds. A potential landfill gas problem has not been identified to date.

EXPOSURE SCENARIOS FOR THE SITE

The following exposure scenarios have been developed to address site conditions:

EXPOSURE TO CONTAMINATED SOILS

PCBs and VOCs were detected in the landfill borings and the leachate sediments. PCBs were detected in the soils adjacent to the south seeps. In the wetland areas, soil/sediment samples were only analyzed for PCB contamination. The principal routes of exposure to PCBs absorbed to soils at this site would be through inhalation and ingestion. Dermal adsorption may also occur, however, PCBs sorb to soil particles thereby reducing the dermal adsorption rate significantly. Because exposure to subsurface soils in the landfill is highly unlikely, only exposure to the PCBs in surface soils adjacent to the landfill and sediments in the seep areas were considered in this assessment. As seen in tables 5A-C, PCB concentrations at the site (excluding the landfill) range from 2 to 482 ppm. It has been assumed for purposes of this assessment that children who may enter the area through the wetlands would be exposed to these areas. The daily exposure over a lifetime was calculated using the frequency of contact (10 events per year) and the duration of contact (6 years) averaged over a 70 year lifetime. The lifetime intake was used to calculate the incremental lifetime cancer risks. A risk of 4×10^{-7} (4 out of ten million) exists under the most probable case from dermal contact with the PCB contaminated soil with a 5×10^{-5} risk calculated for the worst case scenario. For ingestion of PCB contaminated soil for the most probable and worst case scenarios, the risks are 2×10^{-7} and 9×10^{-6}, respectively.

TABLE 5A

SOIL SAMPLES COLLECTED BETWEEN THE LANDFILL AND THE PONDED WETLANDS[a]

Samples Collected by O'Brien & Gere Engineers
1984-1985

Sample No.	Depth (inches)	PCB (total)[b] (mg/kg wet weight)	Pcts total solids	Calculated PCB (total) (mg/kg dry weight)
62	c	<1	71.29	<1
63	c	19	21.85	87
64	c	7	19.00	37
65	c	<1	38.31	<1
66	c	23	46.37	51
67	c	3	53.11	6
68	c	<1	68.27	<1
69	21	<1	62.35	<1
76	0	<1	27.79	<1
76	52	<1	78.58	<1
77	0	<1	27.37	<1
77	20	<1	85.21	<1
78	0	<1	39.16	<1
78	39	<1	82.37	<1
79	0	<1	26.00	<1
79	21	<1	61.45	<1
80	0	<1	22.41	<1
80	20	<1	42.38	<1
82	0	<1	45.01	<1
82	12	<1	72.12	<1
83	0	<1	37.82	<1
83	20	<1	82.99	<1
83	20 dup	<1	81.17	<1
86	0	4.2	15.43	27
86	58	<1	56.89	<1
87	0	<1	80.33	<1
87	21	<1	82.58	<1
88	0	<1	79.73	<1
88	0 dup	<1	86.62	<1
89	0	<1	59.80	<1
89	0 dup	<1	81.59	<1
90	0	52	NA	NA

TABLE 5B

SOIL SAMPLES COLLECTED BETWEEN THE LANDFILL AND THE PONDED WETLANDS[a]

Samples Collected by O'Brien & Gere Engineers
1984-1985

Sample No.	Depth (inches)	PCB (total)[b] (mg/kg wet weight)	Pcts total solids	Calculated PCB (total) (mg/kg dry weight)
90	0 dup	97	52.82	184
90	8	9.4	71.99	13
91	0	14	NA	NA
91	0 dup	25	63.18	40
91	9	1.5	78.22	2
92	0	<1	70.79	<1
92	36	<1	83.75	<1
93	0	<1	89.33	<1
93	6	<1	87.29	<1
94	0	<1	29.66	<1
94	53	<1	49.11	<1
96	0	4.2	35.39	12
96	8	<1	73.75	<1
97	0	<1	62.85	<1
97	21	<1	76.93	<1
98	0	<1	87.14	<1
98	17	<1	85.35	<1
99	0	11	17.36	63
99	0 dup	2.1	NA	NA
99	17	<1	78.38	<1
100	0	3.1	17.18	18
100	0 dup	1.1	NA	NA
100	16	<1	85.50	<1
101	0	<1	26.05	<1
102	0	2.6	53.18	5
102	9	<1	60.41	<1
103	0	<1	39.53	<1
103	9	<1	46.12	<1
104	0	<1	50.55	<1
104	8	<1	72.65	<1
105	0	<1	23.41	<1
105	26	<1	65.32	<1

TABLE 5C

SOIL SAMPLES COLLECTED BETWEEN THE LANDFILL AND THE PONDED WETLANDS[a]

Samples Collected by O'Brien & Gere Engineers
1984-1985

Sample No.	Depth (inches)	PCB (total)[b] (mg/kg wet weight)	Pcts total solids	Calculated PCB (total) (mg/kg dry weight)
106	0	<1	17.24	<1
106	29	<1	45.16	<1
107	0	90	18.69	482
107	47	<1	54.57	<1
108	0	<1	13.95	<1
108	55	<1	NA	NA
109	0	<1	19.41	<1
109	51	<1	39.38	<1
110	d	2.7	84.56	3
111	d	<1	90.58	<1
112	d	<1	50.74	<1
113	d	<1	19.18	<1
114	d	<1	23.30	<1
115	d	<1	35.70	<1
116	d	<1	56.37	<1
117	d	<1	26.51	<1
118	d	<1	33.87	<1
119	d	1.6	20.91	8
120	d	<0.5	20.35	<0.5
121	d	<0.5	32.70	<0.5
132	d	<0.5	91.47	<0.5
133	d	<0.5	75.88	<0.5
134	d	<0.5	86.78	<0.5

[a] Source: Remedial Investigation/Feasibility Study, Ludlow Sanitary Landfill, O'Brien & Gere, June 1986.

[b] PCB's were measured as mg/kg wet weight.

[c] A composite sample was taken from 0-24 inches.

[d] Depth of sample collected for analysis is unknown.

NA-Percent solids was not analyzed for in the sample/Not Applicable.

EXPOSURE TO LEACHATE SEEPS/SURFACE WATER

Children who access the site or wildlife which are in the vicinity could come in contact with the leachate seeps located around the landfill. Due to the type and concentration of the contaminants detected in the leachate seeps, dermal absorption of or inhalation of volatilized contaminants would not necessarily by itself be expected to cause a risk to children or wildlife. However, activity in the seeps could release contaminants or suspended contaminated sediments. Release of contaminants or suspension of contaminated sediments could present a risk to children or wildlife who come in contact with the seeps. Because the north side seep is not diluted by groundwater, this seep is the most contaminated and risks from activity in this seep could potentially be greater.

EXPOSURE TO AIR

There is a risk from inhalation of PCBs which volatilize from the surface soil. This risk ranges from 8×10^{-7} to 2×10^{-6}. As expected, as the depth of PCB concentration increases, the risks due to volatilization decrease.

EXPOSURE TO GROUND WATER

Currently the fill material is in contact with the groundwater in some locations at the landfill. This presents a potential for contaminants to leach from the fill to the groundwater and migrate offsite. Presently, very few contaminants have been detected in the monitoring well downgradient from the site. It may be possible that the plume may have skirted the present monitoring wells. Off-site groundwater contamination will be addressed in the next operable unit and will include the possible installation of additional monitoring wells for further groundwater investigations.

To determine the total risk to a child from the site the risks from each exposure route can be added to obtain the total risk. Adding the risks from dermal absorption, ingestion and inhalation of PCBs from contact with the site gives a total risk of 1×10^{-6} for the most probable case and 6×10^{-5} for the worst case for the assumption presented.

Private wells located downgradient of the site were sample by the New York State Department of Health (NYSDOH) and O'Brien & Gere. They did not indicate contamination by the landfill, therefore, no potential public health risk presently exists. An off-site groundwater study will be conducted as part of the second operable unit.

ENVIRONMENTAL ASSESSMENT

Under present conditions, infiltration of precipitation into the landfill will continue. The potential migration of contaminants within the landfill will also continue. The leachate seeps would remain. PCBs would remain in sediments where they would be bio-accumulated within benthic organisms as well as transient organisms inhabiting the areas surrounding the landfill and the wetlands. Biota sampling conducted by the NYSDEC Division of Fish and Wildlife has indicated the presence of PCBs in the biota in the area. Additional studies need to be performed to adequately characterize the extent of PCB contaminants in the local biota. In addition, the leachate seeps located north of the landfill contain volatile organics which have leached from the landfill. These contaminants may have an adverse impact on the local biota which inhabit these areas. Fencing will minimize site access and decrease the likelihood of either large domestic or wild terrestial vertebrates contacting the leachate seep areas and PCB-contaminated soils adjacent to the wetlands. However, it will not be effective in preventing the wildlife from contacting the areas, or preventing exposure in the food chain. Leachate seeps present at the site have the potential to be disturbed during activity around the site or during heavy rainfall. Disturbance of these areas may cause release of contaminants from the sediments to the water column. Because the leachate areas east, southeast and south of the landfill are flooded with surface and/or groundwater, degradation of these water bodies could occur. This would result in an adverse impact to aquatic life, vegatation and wildlife that may use these areas as a water source.

Infiltration of precipitation would also increase the likelihood of contaminants entering groundwater. Because part of the land-fill is in contact with the groundwater, there is an additional potential for contaminants to migrate into groundwater. Evidence to date from monitoring wells located downgradient of the landfill does not indicate contamination of groundwater. However, additional information is needed to determine if groundwater in the area is being adversely impacted by the landfill. The impacts of the landfill on off-site groundwater will be addressed in the second operable unit.

HEALTH ASSESSMENT

To assist in determining the impact of the site on public health and the environment, the Agency for Toxic Substances and Disease Registry (ATSDR) prepared a Health Assessment for the Ludlow landfill. Human exposure pathway and public health implications were defined accordingly:

HUMAN EXPOSURE PATHWAYS

The contamination of the site may result in human exposure via the following exposure pathways:

1. PCBs were detected in leachate from the landfill and in sediment from the wetlands area. No PCBs were detected in surface soils from the landfill area. Human contact with PCB-contaminated sediments and leachate could result in PCB exposures by ingestion or by dermal absorption. The uptake of PCBs by plants and animals in the wetlands area could also result in human exposure, if biota from the wetlands were used as food.

2. Residents near the site rely on private wells for their potable water supply. Although these wells currently do not contain detectable contamination, the potential migration of contaminated groundwater from the landfill and wetlands areas may result in contamination of these wells.

PUBLIC HEALTH IMPLICATIONS

PCBs were detected in leachate samples from the landfill and in sediment samples from the wetlands at concentrations as high as 482 ppm. On one occasion, PCBs were also detected in water from two groundwater monitoring wells located downgradient of the landfill.

Trespassers or children who play in the unfenced wetlands could ingest small amounts of contaminated sediments or could absorb PCBs through dermal contact with the sediments. There is considerable uncertainty in estimating the amount of soil a child ingests or the amount of soil-skin contact. Furthermore, PCBs are strongly attracted to the organic matter in soil, and this attraction would reduce their bioavailability. Because of these uncertainties, it is not possible to accurately quantify the health risks resulting from exposure to PCB-contaminated soil. However, it is possible that long-term exposure to PCB-contaminated sediments could increase an individual's lifetime risk of cancer.

PCBs are lipophilic and are resistant to chemical and biological degradation. Therefore, PCBs can bioaccululate significantly in organisms living in a PCB-contaminated environment.

There were several potable, private wells located downgradient of the landfill. Analyses of water samples from these wells did not demonstrate any contamination. However, low concentrations of PCBs (0.2 ppb and 0.3 ppb) were detected, on one occasion, in water from two monitoring wells located hydraulically downgradient from the landfill. In addition, several VOCs (methylene chloride, 1,1-dichloroethane) were detected in on-site soil borings and at low concentrations (1 ppb) in monitoring wells. Water from monitoring wells also contained chlorides, total dissolved solids, total organic halides, and conductivity in excess of background concentrations. These findings demonstrate that groundwater downgradient from the site has been impacted by the landfill and that future contamination of off-site private wells is possible. Monitoring may be needed to detect this contamination, since low level contamination of the wells might not be detectable by odor or by taste.

COMMUNITY RELATIONS HISTORY

Local government officials were informed of the investigations to be performed by the responsible parties after the original Administrative Consent Order for the RI/FS was executed. During the study, residential water supplies were sampled and analyzed. Routine questions from the local government officials were generally handled through the NYSDEC, NYSDOH and NYSDOL. Public comment has also been performed on the Final RI/FS report prepared by Camp, Dresser and McKee. During the public comment period, a public meeting was held on September 15, 1988 at the Sauquoit High School located in the Town of Paris, Oneida County, New York. The public comment period was extended to September 21, 1988. All pertinent documents were provided to the public in two repositories located near the site.

Development of Remedial Action Alternatives

The objective is to develop alternatives that protect human health and the environment and encompass a range of hazardous waste management options for the Ludlow site.

Thirteen alternatives are presented in this section organized into five catergories:

- Category I - Limited-action alternative.
- Category II - Source control/containment with little or no treatment.
- Category III - Alternatives that contain treatment as a major component.
- Category IV - Alternatives that lower the groundwater table with little or no associated treatment and collect water in contact with the fill material.
- Category V - Alternatives that collect leachate for treatment in an on-site treatment facility.

Table 6 presents these alternatives and their subcategories.

TABLE 6

Remedial Action Alternatives:	Description:	Cost:
I	Limited Action with Restricted Site access and land use and water quality monitoring.	Capital $350,700 Ann. O&M $ 81,100 * Pres. $1,597,400 **
IIA	Containment of contaminated soil, sediment and leachate from the landfill and seep areas.	Capital $9,281,600 Ann. O&M $396,100 Pres. $15,370,600
IIB	On-site consolidation of contaminated soil and sediment from the seep followed by containment of contaminated soil and sediment, leachate on the landfill.	Capital $8,939,500 Ann. O&M $364,900 Pres. $14,548,900
IIIA	On-site thermal treatment of contaminated soils and sediment in the seep areas, off-site disposal of treated soils and sediments, off-site treatment of wastewater and passive venting of landfill gas.	Capital $17,170,600 Ann. O&M $364,900 Pres. $22,780,000
IIIB	On-site thermal treatment of contaminated soils and sediments from the seep areas, on-site disposal of treated soils and sediments, off-site treatment of wastewater and passive venting of landfill gas.	Capital $14,906,000 Ann. O&M $364,900 Pres. $20,515,400
IIIC	On-site thermal treatment of contaminated soils and sediments from the seep areas, off-site disposal of treated soils and sediment, on-site treatment of wastewater and passive venting of landfill gas.	Capital $15,883,200 Ann. O&M $364,900 Pres. $21,492,300

* Annual operation and maintenance costs

** Present worth: current value of capital expenditure and operation and maintenance

TABLE 6 (continued)

Remedial Action Alternative:	Description:	Cost:
IIID	On-site thermal treatment of contaminated soils and sediments from the seep areas, on-site disposal of treated soils and sediments, on-site treatment of wastewater and passive venting of landfill gas.	Capital: $13,617,900 Ann. O&M: $364,900 Pres. $19,227,300
IVA	Initial landfill dewatering with groundwater table lowering using a passive system with discharge to the intermittent stream.	Capital: $4,404,000 Ann. O&M: $58,900 Pres. $4,945,400
IVB	Initial landfill dewatering with groundwater table lowering using an active system with discharge to the intermittent stream.	Capital: $2,688,000 Ann. O&M: $67,600 Pres. $3,727,200
VA	Passive leachate collection and treatment with discharge to the intermittent stream.	Capital: $1,877,500 Ann. O&M: $370,000 Pres. $9,777,400
VB	Active Leachate collection and treatment with discharge to the intermittent stream.	Capital: $1,877,500 Ann. O&M: $370,000 Pres. $7,565,300

SCREENING OF REMEDIAL ALTERNATIVES

The objective of Alternative Screening is to narrow the list of potential alternatives (based on their effectiveness, implementability, and cost) that will be evaluated in detail. The screening process preserves a range of the most promising alternatives that includes treatment as a major component, as well as the no-action and containment alternatives.

EFFECTIVENESS

Alternatives are evaluated in terms of their effectiveness in permanently reducing the toxicity, mobility and volume of hazardous substances and in the expected degree of protection afforded to human health and the environment.

IMPLEMENTABILITY

Alternatives are evaluated in terms of their technical feasibility and the location, reliability and availability of technologies considered. Included in this criterion are the ability to monitor, maintain or replace technologies over time (operation and maintenance) and the administrative feasibility of implementing the alternative.

COST

Cost is an important factor when comparing alternatives which provide similar results in terms of effectiveness and implementability. It provides a basis for discriminating among remedial alternatives that contain treatment as a major component. Both construction and long-term operation and maintenance costs are evaluated. Alternatives that provide similiar treatment but require substantially greater costs may be eliminated from further evaluation. Cost is not used as a basis of comparision between the no-action (Category I) or containment (Category II) alternative and the (Category III) alternatives which involve treatment as a major component.

Innovative technologies are carried through the screening process if there is a reasonable assurance of better treatment performance or implementability, fewer or less environmental impacts or lower costs than other technologies for a similar level of performance.

Remedial Alternatives IIIE and IIIF are not judged to be cost effective, since they are substantially more costly than the other category III alternatives while providing no greater level of waste treatment or protection of public health and the environment.

DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

As a result of the screening process, a total of five Remedial Action alternatives are addressed, with four of these containing subcategories, i.e., Alternatives II, III, IV and V. Listed below is a description of each of the 5 alternatives and their subcategories evaluated in the FS. This is followed by an evaluation and comparison of the alternatives in terms of nine criteria which relate directly to factors mandated by SARA including §121(b)(d) (A-G). The nine criteria are:

1. Overall protection of human health and the environment
2. Compliance with applicable or relevant and appropriate requirements (ARARs),
3. long-term effectiveness and permanence,
4. Reduction of toxicity, mobility or volume,
5. short-term effectiveness,
6. implementability,
7. cost,
8. community acceptance,
9. state acceptance

ALTERNATIVE I - LIMITED ACTION: RESTRICTED ACCESS AND LAND USE AND WATER QUALITY MONITORING

This alternative consists of the following:

- No on-site remediation;
- Implementation of site security measures which include a six-foot high chain link fence, and warning signs to restrict access;
- Air and water quality monitoring which includes quarterly sampling and analysis of surface water, groundwater and private and public potable water supply wells for Target Compound List (TCL) compounds;
- Property deed restrictions to limit future site development;
- The estimated total present worth cost is $1,597,400.00.

Alternative IIA - CONTAINMENT OF WASTE AND CONTAMINATED SOIL AND SEDIMENT, TREATMENT OF LEACHATE AND PASSIVE VENTING OF LANDFILL GAS

This alternative consists of the following:

- Implementation of all activities required for Alternative I;
- Site preparation including removal of existing vegetation, regrading the site and applying the final cover layer;
- Installation of surface and shallow groundwater drainage diversion systems.
- Pumping and collecting leachate from seepage pools;
- Transportation of leachate to an off-site facility for treatment and disposal;
- Implementation of a soil boring program to more accurately determine the boundaries of contamination and volume of soil remediation;
- Installation of a passive landfill gas venting system;
- Installation of a low permeability landfill cap;
- The estimated total present-worth cost is $15,370,600.

ALTERNATIVE IIB - ON-SITE CONSOLIDATION OF CONTAMINATED SOIL AND SEDIMENT FROM THE LEACHATE SEEP AREAS FOLLOWED BY CONTAINMENT OF CONTAMINATED SOIL AND SEDIMENT, TREATMENT OF LEACHATE AND PASSIVE VENTING OF LANDFILL GAS

This alternative consists of the following:

- Implementation of all activities required for Alternatives I and IIA
- Consolidation of the contaminated soils and sediment from the leachate seep areas on the landfill surface prior to installation of a RCRA Subtitle C low permeability cap;
- The estimated total present-worth cost is $14,548,900.

The difference in this alternative is that the landfill cap would be extended to the graded landfill boundary, but would not extend over the leachate seep areas. Contaminated materials would be consolidated with the existing landfill surface. The leachate seepage areas would be cleared prior to consolidation. The excavated areas would be backfilled with clean soil, regraded and seeded.

ALTERNATIVE IIIA - EXCAVATION AND ON-SITE THERMAL TREATMENT OF CONTAMINATED SOILS AND SEDIMENTS FROM LEACHATE SEEP AREAS, OFF-SITE DISPOSAL OF TREATED SOILS AND SEDIMENTS, OFF-SITE TREATMENT OF WASTEWATER AND PASSIVE VENTING OF LANDFILL GAS.

This alternative consists of the following:

- Implementation of all activities required for Alternative I;
- Implementation of Alternative IIA except the cap would be extended only to the graded landfill, and not over the leachate seepage areas;
- Initiation of a soil boring program to more accurately determine the boundaries of contamination and volume of soil requiring remediation;
- Excavation of contaminated soil and sediment in the seep areas;
- Backfilling of excavated seepage areas;
- Construction of a storage lagoon to receive leachate and runoff from the soil staging area;
- On-site thermal treatment of contaminated soil and sediment;

- Off-site disposal of treated soil and sediment and water;
- Decontamination of all excavation and processing equipment on site;
- The estimated total present-worth is $22,780,000.

<u>ALTERNATIVE IIIB</u> - <u>EXCAVATION AND ON-SITE THERMAL TREATMENT OF CONTAMINATED SOILS AND SEDIMENTS FROM LEACHATE SEEP AREAS, ON-SITE DISPOSAL OF TREATED SOILS AND SEDIMENTS, OFF-SITE TREATMENT OF WASTEWATER AND PASSIVE VENTING OF LANDFILL GAS</u>.

This alternative is essentially identical to the Alternative IIIA with the exception that the disposal of treated soil would be done on-site.

The estimated total present-worth cost is $20,515,400

<u>ALTERNATIVE IIIC</u> - <u>EXCAVATION AND ON-SITE THERMAL TREATMENT OF CONTAMINATED SOILS AND SEDIMENTS FROM LEACHATE SEEP AREAS, OFF-SITE DISPOSAL OF TREATED SOILS AND SEDIMENTS, ON-SITE TREATMENT OF WASTEWATER AND PASSIVE VENTING OF LANDFILL GAS</u>

This alternative is essentially identical to Alternative IIIA with the exception that treatment of leachate and surface runoff would be performed on-site.

The estimated total present-worth cost is $21,492,300

<u>ALTERNATIVE IIID</u> - <u>EXCAVATION AND ON-SITE THERMAL TREATMENT OF CONTAMINATED SOILS AND SEDIMENTS FROM LEACHATE SEEP AREAS, ON-SITE DISPOSAL OF TREATED SOILS AND SEDIMENTS, ON-SITE TREATMENT OF WASTEWATER AND PASSIVE VENTING OF LANDFILL GAS</u>

This alternative is essentially identical to Alternative IIIC with the exception that disposal of treated soils and sediments would be done on-site.

The estimated total present-worth cost is $19,227,300

ALTERNATIVE IVA- INITIAL LANDFILL DEWATERING WITH GROUNDWATER TABLE LOWERING USING A PASSIVE SYSTEM WITH DISCHARGE TO THE INTERMITTENT STREAM

This alternative consists of the following:

- Installation of a landfill leachate dewatering system;
- On-site treatment of leachate/ground water;
- Installation of subsurface drains to maintain the separation of the groundwater from the waste;
- Discharge of collected and treated groundwater to the intermittent stream;
- The estimated total present-worth cost is $4,945,400.

ALTERNATIVE IVB- INITIAL LANDFILL DEWATERING WITH GROUNDWATER TABLE LOWERING USING AN ACTIVE SYSTEM WITH DISCHARGE TO THE INTERMITTENT STREAM

This alternative is essentially identical to IVA with the exception that extraction wells would be used to lower the groundwater table to prevent the water from contacting the waste. The extraction system would then be used to maintain this lower groundwater table.

The estimated present-worth cost is $3,727,200.

ALTERNATIVE VA- PASSIVE LEACHATE COLLECTION AND TREATMENT WITH DISCHARGE TO THE INTERMITTENT STREAM

This alternative consists of the following:

- Installation of subsurface leachate collection drains (trench or pipe subsurface drains);
- On-site treatment of leachate and groundwater;
- Discharge to the intermittent stream;
- The estimated total present-worth cost is $9,777,400.

ALTERNATIVE VB- ACTIVE LEACHATE COLLECTION AND TREATMENT WITH DISCHARGE TO THE INTERMITTENT STREAM

This alternative consists of the following:

- Installation of subsurface leachate collection wells (extraction well system);
- On-site treatment of leachate and groundwater;
- Discharge to the intermittent stream;
- The estimated total present-worth cost is $7,565,300.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Overall Protection of Human Health and the Environment

The limited action alternative (I) is not considered to be protective of human health and the environment, except for the added protection that would be afforded by limiting site access by the use of site security measures. The public health threat would still exist from exposure to the contaminated soil, sediments and leachate seep areas. No control would be instituted to minimize groundwater contact with the waste, therefore, contaminants would be transported to the principal aquifer below the site.

Installation of a high quality impervious/multi-layer cap over the landfill and the leachate seep areas (IIA) or installation of a cap coupled with consolidation of sediments and soils from the seep area to an area under the cap (IIB) will reduce the amount of potential leachate generated by infiltration of rain water through the landfill.

Restriction of site access and installation and maintenance of the impervious cap will substantially decrease direct contact with landfill soils and sediment. Potential adverse impacts will also be reduced by eliminating landfill leachate seeps by reducing the infiltration of rainfall into the landfill, and the venting of landfill gas.

The public health impacts for treatment of contaminated soil/sediment from the seeps area (Alternative IIIA-D) are similar to those described above. Under these alternatives, contaminated soils/sediment from the seepage areas and near the wetland will be treated instead of capped in place (IIA) or consolidated and put under the cap (IIB). Dermal contact of soil/sediment from the landfill and seep areas will be eliminated.

If capping alone does not depress the water table below the lowest point of refuse deposition, further lowering of the groundwater table through the use of upgradient groundwater controls (Alternatives IVA-B) will reduce the mechanism for transport of contamination from the landfill.

If additional field studies confirm the presence of a groundwater mound beneath the landfill surface, initial dewatering of the landfill will reduce the risk of future groundwater contamination at the site by controlling the release of potentially contaminated leachate from the landfill. Rather than allowing uncontrolled flow of the mounded groundwater from the landfill into the underlying aquifer, dewatering will remove the material in a controlled and environmentally sound manner. Combined with capping of the landfill, which would eliminate dermal contact of contaminated soil, the impacts on public health and the environment will be greatly reduced in an effective, controlled manner.

Installation of a leachate collection system (Alternative VA and VB) will achieve a similar reduction of risk to the public and the environment as the dewatering and groundwater table lowering option. Combining this alternative with the capping option will reduce the potential for dermal contact and inhalation of the contaminants.

Compliance with ARARs

The limited action Alternative (I) does not meet the ARARs for the site nor fulfill the requirements which would apply to the site for source control action as it does not eliminate the potential for exposure due to dermal contact, inhalation and ingestion of the contaminated material.

The containment alternatives (IIA and IIB) would meet the ARARs for this site. They consist of New York State Hazardous Waste Management System (6 NYCRR Part 370-373) and RCRA Subtitle C closure requirements. Treated effluent from on-site or off-site treatment facilities would meet all ARARs (ie., NYCRR Part 703.6 - 703.7, TOG 1.1.1, 6 NYCRR Parts 750-757 and 700-705) prior to discharge.

Alternatives IIIA-D will meet all ARARs. The ARARs required for land disposal of treated soil and sediment are the RCRA treatment standards applicable at the time of remedial action. Thermally treated materials at the site would be in compliance with the set standards.

Dewatering, groundwater table lowering and leachate collection system options will meet ARARs established for the site. These include the New York State Pollution Discharge Elimination System (SPDES), Ambient Water Quality Standards and Guidance Values and Freshwater Wetlands Act for the treated effluent from the treatment plant.

Long-Term Effectiveness and Permanence

Capping and treatment of the contaminated soil/sediment from the seep areas are expected to substantially reduce the volume and mobility of contaminated leachate emanating from the landfill resulting from rain water permeating the cap. However, capping alone may not prevent leachate generation resulting from groundwater passing through the waste. Therefore, dewatering followed by groundwater table lowering (Alternatvie IVA-B) will ensure the mounded groundwater currently saturated in the waste will be extracted and treated. The groundwater table lowering will ensure that any lateral flow to the landfill will be intercepted. The groundwater table lowering system would also maintain the groundwater table so it would not be in further contact with the waste.

A leachate collection system (Alternative VA and B) will provide a moderate level of long-term effectiveness because waste will remain as a potential source of contamination. The leachate collection system will be operating indefinitely because the waste will always be in contact with the groundwater as opposed to dewatering the existing contaminated groundwater and maintaining the groundwater table so it will not be in contact with the waste.

The integrity and longevity of the landfill cap, dewatering system and/or leachate collection system should be assured under the required 30-year post-closure operation and maintenance plan. Long term monitoring and maintenance includes a 30-year post closure groundwater monitoring program, inspection and repair of security access-control and vegetative cover as necessary. Monitoring of surface water, groundwater and residential wells will ensure detection of potential threats to human health.

Reduction of Toxicity, Mobility and Volume

The evaluation criterion dealing with the reduction of toxicity, mobility or volume of contaminants is applied only to alternatives having waste reduction/treatment components. Alternatives IIA and IIB do not include any treatment. Alternatives IIIA-D would involve thermal treatment of the contaminated soil/sediment in the seep areas. Thermal treatment would reduce toxicity, since organics would be destroyed and it would also reduce mobility. Depending on the organic content of the sediments in the seep areas, the volume of soil could also be reduced. Alternatives IVA-B and VA-B would involve treatment of leachate extracted groundwater before discharge. These alternatives involve treatment which would significantly reduce toxicity, mobility and volume of the contaminants.

Short-Term Effectiveness

If the presence of a groundwater mound within the landfill is confirmed by additional field studies, a dewatering system (i.e. Alternatives IVA or IVB) would be more effective in the short term. Active dewatering would lower the water table more quickly, which would enable the remedy to be effective within a shorter time frame.

There are some short-term risks posed with Alternatives IIA-B and IIIA-D during construction. Grading the landfill could result in releases of dust to the atmosphere. Traffic flow along the neighboring roads would increase because trucks would carry materials for construction of the cap, etc. However, dust suppression techniques can be implemented. Construction impacts to on-site workers who come in direct contact with contaminated soils or wastes during construction activities can be minimized through the use of personal protection equipment.

Short-term risks associated with Alternatives IVA-B and VA-B occur during the installation of the landfill dewatering system, and leachate collection system. Both consist of drilling into the landfill which might pose an unknown hazardous situation to the workers. However, these risks can be mitigated by implementation of a comprehensive site health and safety plan and use of proper construction techniques and engineering controls.

Implementability

The implementability of each alternative is based on the technical feasibility, administrative feasibility and the availability of services and materials for the alternative. All of the alternatives are technically feasible. Although the alternatives are technically feasible, the characteristics of the intermittent stream may present design problems relative to the amount and quality of water that can be discharged to the stream. All alternatives involve technologies which have been used regularly in the past for hazardous waste landfills and have demonstrated performance records. All the alternatives are administratively feasible. Treated effluent from the dewatering, groundwater table lowering system and leachate collection system is expected to meet SPDES requirements for discharge to the stream. An on-site thermal treatment unit will have a destruction efficiency of 99.9999%. (This is based on destruction of PCBs). Redisposal of the treated materials would comply with RCRA standards.

Cost

A summary of the costs for each alternative is provided in Table 6.

Alternative IIIA-D are not expected to offer significant increases in protectiveness to public health and the environment or short-term efectiveness or long-term effectiveness for the increased cost.

State Acceptance

The New York State Department of Environmental Conservation concurs with the selected remedy.

Community Acceptance

The community supports the selected remedy. During the public comment period, only the Potentially Responsible Parties (PRPs) submitted written comments; these comments are addressed in the attached Responsiveness Summary.

Selected Remedy

The selected remedial alternative for operable unit one was arrived at by evaluating the remedial alternatives presented in the feasibility study prepared by CDM as the most appropriate solution for meeting the requirements established in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. Section 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA), and the requirements of its governing regulations, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 C.F.R. Part 300.

The selected remedy for the Ludlow Sand & Gravel site consists of a modification of Alternative IIB combined with Alternative IVA or IVB. This remedy consists of the following components:

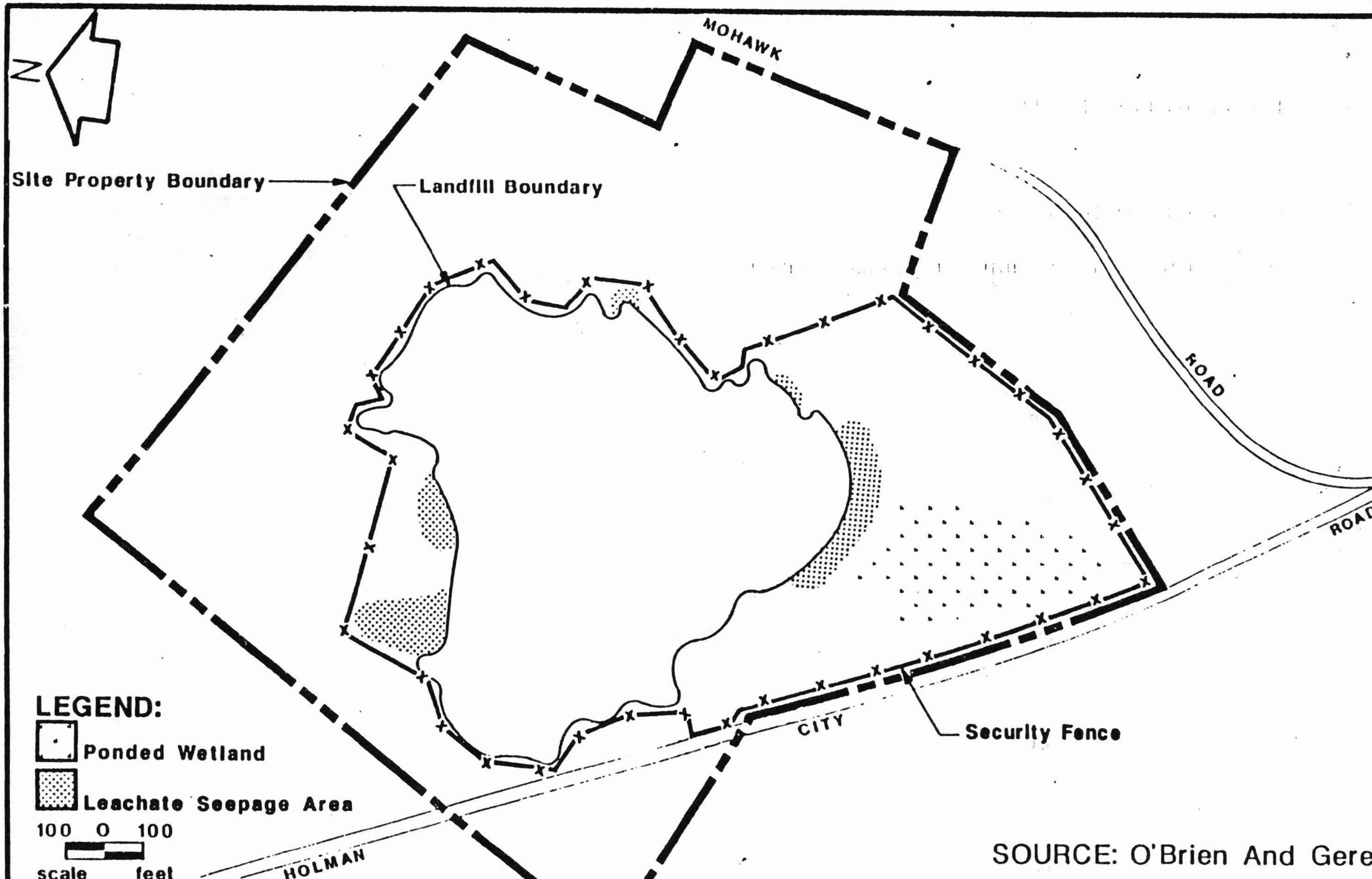
1. Prior to installation of the landfill cover, approximately 10,000 cubic yards of contaminated soil and sediment adjacent to the landfill will be consolidated into the landfill. During design, a soil/sediment sampling program will be implemented to fully define the area to be consolidated under the landfill cover.

2. An impermeable cover will be installed over the landfill to control runoff and minimize infiltration of water. This cover will comply with closure requirements of RCRA Subtitle C (40 CFR Section 264.310).

3. Leachate from leachate seepage areas and residual leachate formed from the landfill will be collected (see Figure 3).

4. Dewatering the landfill by using either a passive drain system or an active well system. Details of the dewatering system will be determined during pre-remedial design field activities. If it is determined during pre-design field activities that there is no groundwater mound in the landfill or if the water in contact with the fill material is not contaminated, the dewatering may not be implemented.

5. Upgradient groundwater controls will be implemented to lower and maintain the groundwater table from being in in contact with the waste material. The details of a passive or active groundwater table lowering system will be determined during the pre-remedial design field activities. If the cap alone lowers the groundwater table below the fill material, upgradient groundwater control of the groundwater may not be implemented.



CDM

environmental engineers, scientists planners & management consultants

Figure 3-

Area Of Restricted Access

Ludlow Sanitary Landfill Site, Town Of Paris, New York

6. If dewatering of the landfill is implemented , treatment of the collected contaminated leachate/groundwater will be performed at an on-site facility. Alternatively, if dewatering is not necessary and the volume of water is small, the leachate will be collected and transported off-site to a permitted disposal facility that will accept the waste. The effluent from an on-site treatment plant will be discharged to an intermittent stream.

7. Perimeter fencing (including the wetlands) will be installed.

8. In accordance with New York State Law, deed restrictions governing future use of property will be duly filed.

9. A long-term water quality monitoring program will be implemented which will include quarterly monitoring of on-site and off-site groundwater, surface water and potable water supply wells.

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

STATUTORY DETERMINATION

Protection of Human Health and the Environment

The selected remedy will protect the public health and the environment primarily by separating the source of contamination from potential routes of exposure. Installation of the multi-layer impermeable cap will effectively prevent exposure of the public to the landfill materials. The cap, in conjunction with the control of the groundwater/leachate in the landfill, is expected to be effective in stopping further leachate seeps and groundwater contamination. The cap also prevents infiltration of precipitation into the landfill which is the major contributing source of water to the landfill. Other potential routes of exposure (i.e. dermal contact, ingestion, inhalation of contaminants) from the Ludlow site will be mitigated by this remedy.

There will be short-term risks involved in this remedy during the on-site consolidation of contaminated soil, construction of the cap, construction of the dewatering system and groundwater/residual leachate controls. During the construction period, traffic flow and fugitive dust will increase. These potential risks will be reduced by the implementation of a comprehensive health and safety plan that addresses the safety of workers and receptors during remedial activites at the site.

Attainment of ARARs

The selected remedy will attain all applicable or relevant and appropriate Federal and State requirements.

New York State Hazardous Waste Management System (6 NYCRR Part 370-373) and RCRA Subtitle C are considered relevant and appropriate for the closure of the Ludlow site. These regulations affect all aspects of hazardous waste management for the site. They involve treatment, storage, or disposal of hazardous wastes originating from the Ludlow site.

Treated effluent will be discharged to the stream unless there is an impact to the wetland. Treated effluent for discharge will be designed to meet substantive requirements of the New York State Pollution Discharge Elimination System (SPDES) (6 NYCRR Parts 750-757 and 701.5), Technical Operations Guidance Series (700 1.1.1.) Ambient Water Quality Standards and Guidance Values (April 1987) and all groundwater and surface standards, and Freshwater Wetlands (6 NYCRR Part 663-665). An environmental assessment will be performed to help meet the substantive requirements of SPDES.

Air emissions will comply with the New York State Air Pollution Control Regulations (6 NYCRR Part 201,202 and 219).

Although not an ARAR, the TSCA PCB Spill Cleanup Policy Final Rule (40 CFR 761) provides useful guidance for remediating sites with PCB contamination. The TSCA policy established requirements for decontaminating spills in both restricted and nonrestricted access areas. A cleanup level of 10 ppm of PCBs is established for this area. Soil will be excavated to a minimum of 12" and replaced with clean fill and vegetated.

Cost Effectiveness

The selected remedy will provide an overall effectiveness proportionate to its cost such that it represents a reasonable value for the money.

RESPONSIVENESS SUMMARY

LUDLOW SAND AND GRAVEL SUPERFUND SITE

TOWN OF PARIS, NEW YORK

September 29, 1988

Prepared by:

U.S. Environmental Protection Agency
Region II

RESPONSIVENESS SUMMARY

FOR THE PROPOSED REMEDIAL ACTION
AT THE LUDLOW SAND AND GRAVEL SITE
TOWN OF PARIS, NEW YORK

I. Introduction

In accordance with U.S. Environmental Protection Agency's (EPA) Community Relations policy and guidance, EPA's Region II Office held a public comment period from August 31, 1988 to September 21, 1988 to solicit comments on remedial alternatives for the Ludlow Sand and Gravel Superfund site. As part of the selection process, Region II published a proposed remedial action plan (PRAP) describing EPA's preferred alternative and issued a public notice announcing a public meeting.

EPA, in conjunction with the New York State Department of Environ mental Conservation (NYSDSEC) on the New York State Department of Law (NYSDOL) held the public meeting to present the PRAP on September 15, 1988 at the Sausquoit Valley Central School. Aprroximately 50 community members attended, along with several State and local officials. Copies of the PRAP were distributed at the meeting and were available in the two information repositories. Before receiving public comment, the Agency provided a brief overview of the Ludlow Sand and Gravel Superfund site, the decision-making process, the findings of the Remedial Investigation/Feasibility Study, and the preferred alternative. Community members were then invited to submit comments and questions to the officials present at the meeting.

The purpose of this Responsiveness Summary is to document EPA responses to comments and questions raised during the public comment period. EPA officials were joined in some of the responses at the public meeting by State and local officials.

II. The Proposed Remedy

A. Containment

1. A local official asked if there would be any problems with consolidation of PCB-contaminated soils and sediments on the landfill.

   EPA Response: No. One reason for consolidating these materials on the landfill itself is cost. The consolidated materials actually have lower levels of PCB contamination than the landfill material.

2. A local official asked for the expected duration of the intermediate cap.

   EPA Response: The exact time has not been established yet because it is necessary to determine how much the intermediate cap sinks. Use of the intermediate cap will prevent the permanent cap from being damaged due to anticipated sinking. (Note: Dean Sommers stated the final cap would be constructed within 1 year)

3. One citizen asked if the percentages of leachate from precipitation versus groundwater were known. He expressed concern that a landfill cap may not completely stop migration of contaminants.

   EPA Response: A water budget has been developed for the landfill and approximately 24,000 gallons per day is entering the 18 acre landfill. In addition to capping the landfill, the PRAP also calls for a "groundwater cut-off" to divert or actively pump upgradient groundwater to further lower the water table, if necessary to eliminate contact of the groundwater with the landfill. The specific methodology to be used will be determined in the upcoming pre-design stage.

B. Groundwater

1. A local official asked if the information in the Proposed Remedial Action Plan (PRAP) was correct concerning the lower cost and better reliability of the active system for lowering the groundwater table level relative to the passive system. He stated that the community preferred the active system. He also asked if there was flexibility in locating an on-site treatment facility.

   EPA Response: The answers to both questions are yes. EPA believes that the active system is less costly and more reliable than a passive system. This does not mean that a passive system would not be effective in dewatering the groundwater in the landfill.

   The location of the treatment system shown on the PRAP is conceptual; the actual location will be based on the design and field conditions.

2. A resident asked if the dewatering which could occur during remedial activities for this operable unit would affect studies for the second operable unit.

EPA Response: This situation is currently being addressed. There will be close coordination among the parties performing both operations to minimize any effects. It is highly likely that the groundwater studies for the second operable unit will be completed prior to the dewatering operation.

3. One resident asked how deep the groundwater diversion would extend.

   EPA Response: At its highest elevation, the landfill is approximately 40 feet deep. Any diversion would extend at least below the landfill bottom. Specifics will be worked out in the design stages and will be based upon additional subsurface investigations.

C. On-Site Treatment

1. One attendee asked for a description of thermal treatment.

   EPA Response: Thermal treatment is high temperature treatment, (e.g. incineration) one of the ways employed to destroy PCBs. Thermal treatment will decrease the quantity, toxicity and mobility of PCB contamination.

2. A citizen asked where wells 5D and 6S (cited in the PRAP) are located. He also asked where the intermittent stream cited in Alternatives IIIC and IIID is located, and for more details about potential discharges.

   EPA Response: The location of the wells was indicated on a map from the CDM Supplemental Remedial Investigation/ Feasibility Study Report, which is available to the public at the information repositories. The intermittent stream was also identified on the same map and described as flowing through the wetlands. Pre-design studies will determine the volume to be discharged for each alternative. If the volume of water was determined to be too large for the stream to handle then the discharge would not be allowed through the wetlands. Rather, the discharge will be diverted or circumvented around the ponded wetlands to ensure that contaminated sediments in this pond would not be disturbed.

   A local resident asked whether on-site treatment facilities might compromise safety, especially if additional wastes were generated.

EPA Response: Treatment systems are designed to have minimal environmental effects. In addition, all contaminants resulting from the treatment process will be disposed of off-site (the exact destination to be determined by the nature of the contaminants) and effluents will meet minimum quality standards. Only the surrounding soils and sediments which are less contaminated than the landfill material will remain on site.

D. Other

1. A resident expressed concern about the Clayville Public Water Supply, which is hydraulically downgradient from the site, and asked if there were any plans to monitor this supply.

   EPA Response: The Oneida County Health Department and the New York Department of Environmental Control have taken a "broad look" at local water supplies and found them to be unaffected. A plan currently under consideration would have monitoring wells installed between the landfill and nearby residences which would detect off-site migration of contaminants.

2. A local official asked if time frames could be provided for remedial activities. He also questioned whether the set-aside fund established roughly 1 year prior to the landfill's closure could be used to initiate action as soon as possible.

   EPA Response: If EPA undertakes remediation, the design work will start in January, 1989; actual construction would begin in approximately Spring of 1990. DEC Response: It is estimated that if the responsible parties undertake remediation, design work would begin in April 1989 with construction starting in Summer or Fall 1989. The final decision as to whether or not the responsible parties will undertake the response should take place within the next 4 weeks. Use of the set-aside fund would not noticeably speed up the process since more information and design work is needed before actual construction begins (if all information needs were currently satisfied, EPA could use Superfund monies to initiate remedial activities). In addition, the fund only contains roughly $500,000, which will not cover many of the costs involved.

III. Contamination Concerns

A. Groundwater

1. A local official requested that EPA monitor municipal wells for all chemicals of conern, which may not be included in current testing regimes.

2. A resident who lives within a mile of the site expressed concern over the frequency of well testing and asked what levels of contamination are "acceptable."

<u>EPA Response</u>: A private well survey was conducted by the Oneida County Health Department in 1984, with more tests done in 1986, 1987 and 1988 (the Health Department is not involved with "monitoring", i.e., continual sampling). Survey results have not indicated any groundwater problem. Some residential samples had elevated levels of iron and manganese, but the results could be due to natural processes. No volatile organic compounds (VOCs) were found. Acceptable levels are guidelines below which treatment is not required by law. <u>County Health Department Response</u>: Residents with an indiction of a problem are urged to contact their County Health Department.

B. Extent of Contamination

1. A local resident asked if the extent of contamination below the site was known.

<u>EPA Response</u>: No, it is not known how far down the contamination extends. A separate study (Operable Unit 2) will be performed to establish how far any contaminated groundwater has migrated from the site. If additional field studies confirm the presence of a groundwater mound beneath the landfill surface, initial dewatering of the landfill will reduce the risk of future groundwater contamination at the site by controlling the release of potentially contaminated leachate from the landfill. Rather than allowing uncontrolled flow of the mounded groundwater from the landfill into the underlying aquifer, dewatering will remove the material in a controlled and environmentally sound manner. Combined with capping of the landfill, which would eliminate dermal contact of contaminated soil, the impacts on public health and the environment will be greatly reduced in an effective, controlled manner.

2. One citizen and a local official asked if contaminants left on the site a long time ago would be detected.

   EPA Response: There is a possibility that contaminants that left the site a long time ago may not have been detected. Usually these materials leave a trace of contamination that would be detected in the monitoring wells. PCBs, in particular, tend to adsorp to soil, and do not migrate very far.

C. Air Pollution

1. An attendee asked if there was any indication of air pollution.

   EPA Response: Air monitoring performed during the Remedial Investigation found no off-site contamination using HNu and/or OVAs. Elevated levels were found at the soil borings immediately after boring in the landfill. However, at the breathing zone these values were significantly reduced. A survey of the site with a HNu did not detect levels of gross contamination. No Air Samples have been collected to date.

D. Health Effects

1. A citizen requested more detailed information on the health effects of the volatile organic compounds (VOCs) mentioned in official opening statements.

   EPA Response: Both carcinogenic and non-carcinogenic compounds were found in the leachate seeps and the landfill. Camp, Dresser & McKee Inc. (CDM, a contractor for EPA) has performed an endangerment assessment to evaluate health risks associated with these compounds. At present the seeps do not pose a risk due to limited potential for contact. There is a potential for risk should the sediments be disturbed and resuspended into the water column or should the seeps become more accessible.

E. Off-Site

1. A citizen asked whether off-site contamination had been found in the gravel pit. Because gravel is still being sold commercially, he expressed concern about possible off-site transportation of contaminated materials.

DEC Response: Gravel is not being sold from the pit in question. Commercially sold sand and gravel come from an area located farther north on Holman City Road. At this time, there has been no indication of PCB-contaminated deposits in the gravel pit and the responsible parties are conducting further investigations. PCBs have been found in an area north of the gravel pit. This area, along with the wetlands and gravel pit, will comprise the second operable unit. The present meeting, however, focuses on remedial alternatives for the first operable unit -- source control management of the landfill.

2. A member of the community asked if there has been any indication of wetlands contamination. In addition, since the wetland is located between the landfill and the surrounding community, he questioned why remediation efforts were not directed from the "outside in."

   EPA Response: PCBs have been found in the wetland and a fence surrounding the wetland is included in the plans for the first operable unit. The division of tasks into operable units allows the government to undertake certain activities before information is obtained on all aspects of the site. The PRPs are currently conducting additional studies in order to better determine the degree of contamination in the wetlands. This additional information will be incorporated into plans for the second operable unit. Remediation efforts are being directed to eliminate the continuing source of contamination as a first step. Once the source is eliminated conditions should not deteriorate "outside" and efforts to define and correct "outside" problems can be implemented.

3. One local resident wanted to know how the landfill's location on a groundwater recharge zone relates to the quality of Sauquoit Creek; more specifically, is it still safe to fish in the creek?

   DEC Response: A groundwater recharge zone is a geological statement. A principal aquifer is composed of sand and gravel deposits of considerable depth with the ability to hold and release water. New York State keeps track of all aquifers which could provide drinking water and monitors land use for their protection. PCBs were found in two samples taken next to the landfill, but the results could not be duplicated. If PCBs are not found, it is unlikely they have traveled one mile away to Sauquot Creek. Furthermore, PCBs tend not to migrate very far through soil. Therefore, it is still safe to fish in the creek.

4. A resident inquired about the contents of the Kehoe Road Dump.

   EPA Response: The Kehoe Road Dump is located near the Ludlow complex and was used for construction and demolition debris. Although the Kehoe Road Dump hasn't been tested, there is no evidence that hazardous substances were disposed of at this location.

5. A community member wanted to know who has jurisdiction to "spot check" a nearby ravine for illegal dumping, and if anyone has checked this particular location.

   EPA Response: The NYSDEC has enforcement officers in every region of the State. If anyone knows of or suspects illegal dumping, they are urged to contact the appropriate DEC region. The ravine in question was checked on May 11, 1988 by a NYSDEC regional inspector.

IV. General Questions and Comments

A. Responsible Parties

1. A lawyer representing the Ludlows asked that the status of legal actions be explained.

   State Response: New York State commenced a lawsuit against the Ludlows following the principle of joint/several liability. The Ludlows, in turn, sued other Potentially Responsible Parties (PRPs) including Chesebrough Ponds, Utica Cutlery, and Special Metals. Because Superfund deals with hazardous substances and wastes, anyone who generated hazardous substances at the Ludlow site can be a PRP.

2. A lawyer representing the Ludlows asked about the policy on household hazardous waste.

   EPA Response: The Ludlow site is listed on the NPL because of the disposal of hazardous wastes and hazardous substances by industrial generators. CERCLA defines PRPs as that individuals who generate, or transport hazardous substances to the site, along with current and past owners and operators. EPA does not currently consider municipalities generating solely household waste to be responsible parties at the Ludlow site.

B. Other

1. One attendee asked if migration problems detected in the future would be addressed and what sort of timetable would be ivolved?

   EPA Response: Yes, operable unit 2 is designed to address problems relating to contaminant migration by going through the same process as operable unit 1: i.e. remedial investigation, alternatives identification and selection of remedy. The timetable for action depends on the nature of the contamination found. If a substance of a very threatening nature is identified, an emergency removal would be initiated under Superfund authorities. Otherwise it is estimated that one year to eighteen months will be required for the studies relating to the second operable unit.

2. A citizen wanted to know if a copy of the transcript would be made available.

   EPA Response: Yes. The transcript of the meeting will become part of the public record when finished and placed in the information repositories listed in the PRAP. Citizens may also call Lisa Peterson, EPA Region II Public Affairs Specialist for the Ludlow site, at (212) 264-2515 and request a copy.

RESPONSE TO WRITTEN COMMENTS

Detailed technical comments were received from a number of Potentially Responsible Parties.

The NYSDEC, USEPA and Dunn GeoScience, consultant to Ludlow were in agreement on several of the main components require for remediation of the Ludlow NPL site. Those items which are agreed on conceptually include:

- capping the landfill
- consolidation of contaminated soils back onto the landfill prior to capping
- leachate management (surficial)
- upgradient groundwater control
- long-term monitoring

In addition, EPA has proposed to dewater the landfill either actively or passively based on further pre-design work to determine which method will be most effective. The primary difference between the Dunn GeoScience proposal and EPA proposed plan is the technology to be implemented for detwatering the landfill. Dunn GeoScience proposes to let the landfill naturally dewater where EPA proposes to implement either a passive (trenches, drains) or active (wells) system to dewater the landfill in a controlled manner. Further discussions are presented in the text that follows under response to dewatering.

Technical Questions/Concerns

1. Comments received by Whiteman, Osterman & Hanna (WOH), attorney for James and Kevin Ludlow, owners and operators of Ludlow Sand & Gravel, Inc. and Ludlow Sanitary Landfill,Inc. and Bond, Schoeneck and King (BSK), attorney for Special Metals Corporation (SMC) expressed concern about dividing the site into two operable units. They feel that certain remedial alternatives for other areas may be precluded if the source control remedial alternative is implemented prior to completing the second operable unit RI/FS.

   EPA Response:

   Various studies performed at the Ludlow Sand and Gravel Site have provided the data to enable the EPA to determine that the site poses a significant threat to the public health and the environment and would require at least a source control remedy. Regardless of the findings of subsequent investigations, source control measures need to be implemented. Dividing the remedial action into operable units will allow the source control work to begin without further delay. Failure to control the source could lead to the continued spread of contamination potentially requiring more extensive remedial measures.

The selected remedy will be designed prior to implementation of the remedial measures. The time required for this design phase may be sufficient for the completion of remedial investigation activities in the wetlands and in the gravel pit.

In general, any initial operable unit remedy selected by EPA should be consistant with overall remedial activities at the site. EPA has often implemented source control measures at landfills as a first operable unit. In these cases, as is the case with the Ludlow site, EPA cannot envision any circumstance where the control of the source would be inconsistant with the final remedy.

2. Concerns were raised by BSK and Beveridge & Diamond, P.C. (B&D) attorney for Chesebrough Ponds, Inc. on EPA selecting 6NYCRR Part 370 to 373 and RCRA Subtitle C Closure instead of 6NYCRR Part 360, Closure for Solid Waste Landfills.

Comments were received by Dunn GeoScience, consultant to Ludlow in the Conceptual Site Remediation and Closure Plan and its Amendments regarding the proposed cap.

EPA Response:

RCRA Subtitle C and 6NYCRR Part 373-3 are considered relevant and appropriate for the Ludlow Sand & Gravel Site. Since the presence of PCBs and hazardous substances have been identified as being present in the landfill and leachate seep areas and under New York State regulations PCBs are classified as a hazardous waste, RCRA Subtitle C and 6NYCRR Part 370-3 are to be use closure of the landfill.

EPA fully agrees with Dunn GeoScience that caps other than that presented in the Supplemental RI/FS report prepared by CDM may be appropriate for implementation at this site as long as the cap meets the performance criteria stated in 40 CFR 264.310. The composition of the RCRA Subtitle C cap must meet the regulatory requirements and performance criteria. The final cover must be designed and constructed to:

1) Provide long-term minimization of migration of liquids through the closed landfill.

2) Function with minimum maintenance.

3) Promote drainage and minimize erosion or abrasion of the

cover.

4) Accommodate settling and subsidence so that the cover's integrity is maintained; and

5) Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

Recommended guidance has been developed for EPA meeting these five (5) regulatory requirements. Although alternative designs could also meet the five regulatory requirements, these designs must be able to demonstrate that they meet the requirements prior to approval of the cap design. The RCRA guidance for covers for uncontrolled hazardous waste sites specifies that covers should as a minimum consist of the following :

-- vegetated top cover
-- middle drainage layer
-- low permeability bottom layer
    -- $\geq$ 20 mil synthetic liner - upper component (may be optional)
    -- $\geq$ 2 feet clay layer - lower component

Dunn GeoScience proposes to use 24 inches of clay and does not propose to use a synthetic liner. As stated above, as long as the requirements and the performance criteria are met, the composition of the cover can be varied.

The conceptual cap presented in the Supplemental RI/FS report prepared by Camp, Dresser & McKee, Inc. was produced on a planning level for EPA and cannot be compared to the closure plan which is written for a different purpose. The cost generated for the cap presented in the Supplemental RI/FS followed the available guidance on preparation of cost estimates for feasibility studies. The guidance states that typically the study estimated costs provide an accuracy of +50% to -30% and are prepared using data available from the RI. Sources of cost data include vendor's quotation and Means Cost Estimating Indices and relevant experience at other sites. In no way is this estimate to be considered final. The use of this number is to allow EPA to budget for the remedial alternative should EPA have to implement the remedy at this site and for analysis of cost effectiveness among the other alternatives.

3. Comments were received that management of leachate around the perimeter of the landfill should be included in the landfill closure. However, CDM's method is not technically feasible.

EPA Response:

EPA proposes to pump and collect the 5 surficial leachate seeps surrounding the landfill. In order to place the cap over the site and excavate the contaminated sediments in the seeps, these areas should be free of water. If after pumping and collecting the leachate in the seeps, the area accumulates water from off site ,some sort of diversion ditching may be necessary. We are in agreement that if the volume to be discharged into the intermittent stream is large, the stream may need to be diverted from entering through ponded wetlands (as proposed by O'Brien & ·Gere in the June 1986 RI/FS). Prior to any ditching operation additional work would need to be performed to evaluate the depth of the ditches and its impact on the wetlands.

4. Comments were received that incorporation of a boring program during preliminary design will needlessly delay implementation of the selected remedy.

   EPA Response:

   The purpose of the boring program is to collect additional information to better define the volumes to be excavated in the seeps areas. This program could occur during pre-design activities and can be performed quickly so implementation of the remedy will not be delayed.

5. Comments received from BSK, WOH and B&D regarding the cost effectiveness of EPA's selected remedy.

   EPA Response:

   As stated above, the estimated costs in the Supplemental RI/FS report provide an accuracy of +50% to -30% and are prepared using data available from the RI. These costs are to provide a basis for differentiating among remedial alternatives that achieve similar objectives. However, the final( ) will reflect the flexibility in the design of the remedy. Costs are used as a basis of comparison between alternatives within each category (i.e. no-action, containment, treatment as a major component, dewatering and groundwater table lowering and leachate collection). These estimates cannot be compared on an equal basis to the plan prepared by Dunn GeoScience. In addition, the cost estimates prepared in the O'Brien & Gere RI/FS report dated June 1986 have not been updated to reflect 1988 costs.

6. Dunn GeoScience agrees with upgradient groundwater controls however they prefer the passive system. O'Brien & Gere disagrees with the upgradient groundwater controls

because only a small percentage of the refuse is in contact with the groundwater.

EPA Response:

EPA feels that upgradient active or passive groundwater controls are necessary to maintain the separation of the groundwater from contact with the waste. This groundwater table maintenance system will prevent groundwater from flowing laterally allowing any waste material to remain in contact with the groundwater and which allow a potential release of contaminants into the aquifer. EPA agrees with Dunn GeoScience that a passive system may meet the remedial objectives. Based upon data obtained during the pre-design field activities, this groundwater table maintenance system can be done passively or actively. If it can be determined after installation of the cap, that the upgradient groundwater table is below the fill material, then upgradient controls may not be necessary because the objective of lowering the groundwater table below the waste is already met.

7. Comments received from WOH and BSK state that 40 CFR Part 264 and 6NYCRR Part 373 do not require an existing landfill to be dewatered as part of closure. In addition, groundwater sampling indicated virtually no groundwater contamination or extremely low concentrations of contaminants at the landfill.

EPA Response:

EPA does not dispute the fact that the levels of contaminants detected in the groundwater monitoring wells are relatively low at the present time. However, the information available regarding the nature of hazardous substances found in the landfill dictates a conservative approach for the protection of public health and the environment.

EPA proposes to dewater the landfill by an active or passive system. Based on volatile organics and PCB data collected from soil borings in the landfill and the leachate seeps surrounding the landfill which show evidence of contamination, EPA believes the mound of groundwater in contact with the waste is contaminated. EPA is concerned that this mound of leachate/contaminated groundwater may discharge into the underlying aquifer. Once the cap is placed on the site, the leachate may become more concentrated since infiltration, which may be diluting the contaminants, is cut off. Dewatering is felt to be necessary to minimize potential degradation of the underlying aquifer and to ensure protection of public health and the environment.

As part of this alternative, extracted water will be treated at an on-site treatment plant and the treated water will be handled and discharged in an appropriate manner.

However, additional testing will be performed prior to construction of the cap and if it is determined that there is no mound in the landfill or the water in contact with the fill material is not contaminated, then dewatering will not be implemented. If dewatering of the landfill is not necessary then an on-site treatment facility will probably not be necessary or cost effective. Therefore, off-site treatment and disposal will be implemented in its place.

Although low levels of contaminants have been found in the groundwater to date, EPA believes that, due to the complex geology at the site, the groundwater has not been properly characterized. A separate RI/FS for the second operable unit will be performed to further investigate off-site migration.

It should be noted that Dunn GeoScience, consultant to Ludlow has proposed enhanced monitoring at the site to ensure that any potential contamination which may leave the landfill after the cap is placed will be detected. They have proposed during the first two years to perform quarterly monitoring. If during sampling the data indicates a problem, they proposed these wells could double as recovery wells to "capture contaminated groundwater and abate off-site migration". They propose to add "additional recovery wells" if necessary "at the appropriate time". Onsite treatment would be used for treatment of extracted water.

Unfortunately by the time the contamination is detected in these wells and if necessary, additional wells are installed and the on-site treatment system is designed and installed upgradient, the contamination will be migrating downgradient towards the residential wells and the Clayville municipal water supply wells. The off-site migration of contaminated groundwater is the focus of the second operable unit. EPA proposes that the extraction of water presently in the fill in a controlled manner is a more prudent approach then allowing the potential contaminated groundwater to leave the landfill and enter the underlying aquifer.

8. A comment was raised as to whether treatment and disposal would occur on-site or off-site.

<u>EPA Response:</u>

If during pre-design, it is determined that dewatering the landfill is not necessary and passive upgradient groundwater control versus active control is selected, then the volume of water generated during the remedial action will be small enough to be treated and disposed of off-site at an approved location. If dewatering of the landfill leachate generates large volumes of water, then onsite treatment and disposal will be cost effectiveness. The decision for onsite versus offsite treatment and disposal will occur after the pre-design tests are completed.

9. A comment was received that the treatment schematic for leachate will not meet the desired effluent quality for discharge to the wetlands due to oxygen-demanding organics present in the leachate.

<u>EPA Response:</u>

EPA does not agree that this treatment concept presented in the FS would not meet the desired effluent quality although the exact process may require modification. As stated in the Supplemental RI/FS report prepared by CDM, a treatability study will be performed to determine the most efficient method of treatment, which will then be designed and implemented. The treatment plant must produce effluent capable of maintaining groundwater and surface water standards. 6NYCRR Part 700 groundwater and surface water would apply.

10. There are inaccuracies in the PRAP on the concentrations of substances in the groundwater and surface water.

<u>EPA Response:</u>

1,1- dichloroethane was incorrectly reported in the PRAP as 0.023 ppm. The correct value was 0.0023 ppm. The concentration of PCBs in the surface water downgradient of the site was 0.0005 ppm.

11. Comments received from B&D stated that the criteria and data were improperly used or applied in arriving at conclusions and in calculating risks associated with the site and that the health risks and potential environmental impacts associated with exposure to constituents has been grossly exaggerated.

<u>EPA Response:</u>

No further information was provided by B&D to determine which data was used improperly and why they considered risks exaggerated. EPA used the data supplied by O'Brien & Gere, Dunn GeoScience, the NYSDEC and samples collected by CDM, contractor to EPA to develop the feasibility study (FS). Based on the available data , alternatives were developed to provide for source control of the landfill materials. Additional studies identified in the FS need to be performed to refine assumptions made and further define the methods to be used to achieve the objectives of source control. (i.e. passive versus active upgradient control of the groundwater to lower the groundwater table below the landfill material).

EPA does not believe the risks are overstated nor exagerrated. The Ludlow landfill contains hazardous substances which pose a direct contact, ingestion and inhalation threat to the public. There is both a release and a potential for further release to the environment. The remedy selected controls the release by isolating the waste materials preventing exposure through direct contact or release to groundwater. EPA believes the risk assessment to be sound and has received no information to the contrary.

12. Comments were received from B&D stating that a substantial increase in risks would exist in drilling borings through the landfill.

EPA Response:

It has not yet been determined if an active or passive dewatering system will be used at the site. If an active system is selected to achieve these objectives and it is determined that the wells need to be put into the landfill, worker health and safety becomes a concern. There are ways to mitigate these potential hazards and drilling wells into landfill has been accomplish at a number of hazardous waste sites (i.e. LiPari Landfill, Kin-Buc, and Lone Pine in New Jersey).

13. One PRP commented that there would be a potential for contaminants in the landfill to enter the underlying aquifer if wells were installed into the landfill.

EPA Response:

These potential problems can be mitigated by installing double-cased or triple-cased wells if it is determined to be necessary.

14. BSK and B&D stated that the public comment period was too short and fails to comply with statutory requirements of CERCLA and SARA. B&D also stated that " CERCLA requires that the notice of the PRAP must be given to all potentially affected parties", and notice should have been given to those municipalities which used the landfill as they may be PRPs under CERCLA.

EPA Response:

Section 117 of CERCLA requires EPA to provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the facility. EPA has complied with this section of the statute; both a public meeting and a reasonable opportunity for submission of meeting and a reasonable opportunity for submission of comments were provided.

No specific length of comment period is mandated by the statute itself. The National Contingency Plan at 40 CFR Part 300.67(d), requires a comment period, following the release of the Feasibility Study, of "not less than 21 calendar days." EPA believes a 22 day period is reasonably adequate to allow for public comment.

EPA sent a copy of the PRAP to each of the named defendants (including third-party defendants) in New York State's pending suit seeking remediation of this site. In addition, public notice was published in a newspaper of general circulation near the site. The PRAP and the studies done were placed in two publicly accessible document repositories near the site. EPA made a good faith effort to seek out comments of all affected members of the public, and allowed adequate time for comments to be submitted.

Response to letter from Hans G. Arnold, Commissioner, Department of Solid Waste Management to Caroline Kwan, USEPA, dated June 22, 1988

North Gravel Pit: Questions 1a to 1d

Response: The North Gravel pit is not part of this operable unit source control study and will be addressed under the second operable unit RI/FS. It has come to EPA's attention that Dunn GeoScience, consultant to Ludlow, has performed additional investigations in this area. We suggest you contact the NYSDEC and NYSDOL to obtain additional information.

Wetland Areas: Question 2a

Response: The wetlands area (Ponded area) is not part of this operable unit. The soils adjacent to the south end of the landfill will be consolidated on top of the landfill and capped to prevent direct contact. Leachate management will also be implemented to eliminate further migration of contaminants from the site. During heavy rains or high water flow, there is a potential for the sediments to be disturbed and the PCBs adsorbed to the organic matter in the ponded wetlands to become suspended in the water column and potentially migrate with the water. It is our understanding that the culvert at the Holman City road adjacent to the ponded wetlands has prevented water from leaving this area.

Soils Under Landfill: Questions 3a and 3b

Response 3a: Such a pathway is possible but not likely. It is more likely that contamination is moving towards existing seeps, which are mostly in the southern end of the landfill and along a portion of the northern face. Also, downward movement may be occurring throughout a wide portion of the landfill, although there are no wells in the geological units below the landfill to demonstrate whether a downward gradient exists or not. Evidence of a downward gradient however is strong in the western portion of the landfill where monitoring well pair (#6) is located just beyond the edge of the landfill.

Response 3b: There are sufficient data points to know that there is a potential off-site groundwater quality problem. Contaminants in the leachate collected at the landfill have been mobile enough to move from the edge of the landfill. They may be mobile enough to move into the groundwater below the landfill. To date, insufficient information on off-site groundwater quality exists to state whether contamination has moved in the groundwater away from the landfill and into the surrounding aquifer materials. Vertically arranged monitoring wells in and surrounding the landfill are needed to the wetlands. This would limit access to the site where PCBs and other hazardous substances are present.

- Excavation of contaminated soil needs to be performed in any area identified as having a concentration of 10 ppm or greater of PCBs, and not just area C and D as stated in the closure plan.

- The cap must meet RCRA Subtitle C, 40 CFR 264 and 6NYCRR Part 370-373 regulations and performance criteria.

- The cap should include gas venting.

- Surficial leachate must be collected from all 5 seeps areas.

- Area designated by the PRP as A, B, C & D do not adequately depict all the areas of contamination. Additional areas include the north side seeps and the soil adjacent to the southern seep which is contaminated with PCBs above 10 ppm.

- A 3 year phased closure is not acceptable. This point is moot since NYSDEC closed the landfill on February 15, 1988 pursuant to a Federal Court Order.

- A location for discharge of treated water was not identified. The treatment system should be relooked at based on additional data collected by CDM at each seep location.

- The proposed perimeter leachate collection system will only collect lateral flow. The proposed passive groundwater control system will prevent upgradient lateral flow from entering the landfill. However the closure plan allows for natural dewatering of the water in contact with the landfill materials. EPA believes that this water may be contaminated and therefore must be collected in a controlled environment and treated appropriately.

- No provisions are made for rainfall runoff from the cap.

Specific Comments

- While the PRPs have agreed to grade the landfill to a minimum of 5% slope on top and 33% on the sides, it appears that no calculations have been performed to determine what amount of settlement and subsidence will occur. EPA/540/2-85/002 recommends that the slope after settlement and subsidence should be between 3% to 5%. This will be important if groundwater is lowered to an elevation below the bottom of the landfill materials.

- The Closure Plan Amendment indicates that the filter fabric between the lateral drainage layer (B-2) and the underlying hydraulic barrier (C) may be deleted pending laboratory testing. The filter fabric between these two layers should testing. The filter fabric between these two layers should not be eliminated, in fact additional filter fabric should be placed between the hydraulic barrier and the overlying drainage barrier (D-1) and between the drainage layer (D-1) and the filter layer (D-2) to prevent clogging of the higher permeability drainage layers.

- Design parameters should be provided for the clay layer during design which meet the performance standards of 40 CFR Part 264 and 6NYCRR Part 373.

- The clay should have a maximum permeability of 10-7 cm/sec. Nuclear densitometer readings should be taken as per ASTM D2922. The frequency of testing will be determined in design, however, it is suggested that 9 reading per acre per lift be used. The results of each test should be compared to the most recent moisture density curve to assure that the proper percent compaction and the required permeability are being obtained. The calibration of each nuclear densitmeter reading should be checked daily by comparsion to density measured on the same material by ASTM methods.

Shelby tube samples from undisturbed samples should be used to measure clay permeability. At least one per acre per lift (but no fewer than one per lift) should be reported.

- the filter layer proposed in the Closure Plan should be increased to meet the minimum vegetative layer thickness of 24 inches as recommended by EPA/540/2-85/002.