Focused Feasibility Study

North Gravel Pit

Ludlow Sanitary Landfill

August 1991

O'BRIEN & GERE

2290.042

FOCUSED FEASIBILITY STUDY

LUDLOW SANITARY LANDFILL
NORTH GRAVEL PIT

AUGUST 1991

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TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

Tables (continued)

FIGURES

APPENDICES

EXECUTIVE SUMMARY

The Ludlow Sanitary Landfill site is located about six miles south of Utica in Oneida County, New York. The site was placed on the National Priorities List (NPL) in 1983. Remediation of the site was initiated during 1990 in accordance with a Consent Judgment signed by Chesbrough Ponds, Inc., the Ludlow defendants, New York State Department of Environmental Conservation (NYSDEC), New York State Attorney General's Office, and Special Metals Corporation. A component of the agreed to remediation was the excavation of PCB contaminated soil from the "North Gravel Pit area" and the placement of that material within the on-site landfill to be capped as part of remediation.

Excavation of the PCB contaminated soils began in September 1990 and continued, weather permitting, until visually stained cemented gravel and trees were detected in April 1991. Supplemental testing of the soils was conducted and excavation resumed in June 1991 with oversight and concurrence of the NYSDEC. The excavation continued until the presence of visually stained soil beneath the debris was detected later in June. Supplemental studies have been conducted to define the vertical and horizontal extent of PCB contamination.

The objective of this Focused Feasibility Study is to define appropriate remedial action for PCB contaminated soils in the North Gravel Pit area. The FFS develops and screens potential remedial alternatives. A detailed analysis of alternatives was performed to provide the basis for selecting an action that will be protective of human health and the environment and consistent with the National Contingency Plan.

Table ES-1 summarizes the evaluation of the remedial alternatives according to the seven criteria specified. The evaluation was used to select Alternative B as the preferred alternative for the North Gravel Pit Area. Further description, discussion and analysis of the alternatives are presented in Sections 5 and 6.

TABLE ES-1

SUMMARY OF REMEDIAL ALTERNATIVES

Criteria	Alternative A	Alternative B	Alternative C	Alternative D
Key Components	Fill excavation and regrade for drainage. Fence & monitor. Deed restrictions.	Excavate to achieve area mean PCB concentration of 5 mg/kg. Fill excavation and regrade for for drainage. Fence & monitor. Deed restrictions.	Excavate to achieve area mean PCB concentration of 3 mg/kg. Fill excavation and regrade for drainage. Fence & monitor. Deed restrictions.	Fill excavation, apply five foot thick cap including 2 feet of clay barrier. Fence & monitor. Deed restrictions.
1. Overall Protection Human Health and the Environment	Protective for direct contact and ground water users.	Protective for direct contact and ground water users.	Protective for direct contact and ground water users.	Protective for direct contact and ground water users.
2. Compliance with ARARs	Complies with ARARs excepting TSCA landfill and possibly NYS Ground Water Standards.	Complies with ARARs excepting TSCA landfill. Use same waiver as for rest of site. Expected to meet NYS Ground Water Standards.	Complies with ARARs excepting TSCA landfill. Use same waiver as for rest of site. Expected to meet NYS Ground Water Standards.	Complies with ARARs except for TSCA landfill. Could apply for waiver. May not meet NYS Ground Water Standards.
3. Long-Term Effectiveness				
• Magnitude of Residual Risks	Moderate potential for on-site ground water contamination with PCBs.	Minimal residual risk due to ground water contamination on-site.	Minimal residual risk due to ground water contamination on-site.	Moderate potential for on-site ground watern contamination with PCBs.
• Adequacy of Controls	Adequate	Adequate	Adequate	Adequate
• Reliability of Controls	Reliable	Reliable	Reliable	Reliable
4. Reduction of Toxicity, Mobility and Volume through Treatment				
• Treatment Process and Remedy	No Treatment Involved	No Treatment Involved	No Treatment Involved	No Treatment Involved

Revised 10 August 1991

TABLE ES-1

SUMMARY OF REMEDIAL ALTERNATIVES

Criteria	Alternative A	Alternative B	Alternative C	Alternative D
• Amount of Hazardous Material Destroyed or Treated	None since no treatment process involved	None since no treatment process involved	None since no treatment process involved	None since no treatment process involved
• Irreversibility of Treatment	No Treatment Involved	No Treatment Involved	No Treatment Involved	No Treatment Involved
• Type and Quantity of Treatment Residues	None	None	None	None
5. Short-Term Effectiveness • Protection of Community During Remedial Action	Not applicable: no remedial action involved.	All on-site activities, no effect anticipated.	All on-site activities, no effect anticipated.	Increase in truck traffic to bring clay to site (70 loads). Minimal impact.
• Protection of Workers During Remedial Action	No short-term risk	Health and Safety Plan protection for workers.	Health and Safety Plan protection for workers.	Health and Safety Plan protection for workers.
• Environmental Impacts	No impact expected.	No impact expected.	Will require clearing and grubbing forested hillside (0.5 acres)	Will require clearing and grubbing forested hillside (0.5 acres)
• Time to Meet Response Objectives	More than 30 years due to long halflife of PCBs.	Within one month of construction start.	Within two months of construction start.	Within three months of construction start.
6. Implementability Technical Feasibility • Ability to Contract and Operate	Easy since monitoring wells already exist, and common fill and earthmoving equipment are available on-site.	Standard construction techniques used. No future operational requirements.	Standard construction techniques used. No future operational requirements.	Standard construction techniques used. Minimal maintenance.
• Reliability of Technology	Monitoring is reliable.	Reliable since waste will be removed.	Reliable since waste will be removed.	Reliable, has been widely used and proven.

Revised 10 August 1991

TABLE ES-1

SUMMARY OF REMEDIAL ALTERNATIVES

Criteria	Alternative A No Action	Alternative B (5 mg/kg mean)	Alternative C (3 mg/kg mean)	Alternative D Multimedia Cap
• Ease of Undertaking Additional Remedial Action if Necessary	If monitoring indicates future action necessary, supplemental action not difficult.	Efforts would be easily expanded if necessary during implementation and not difficult afterwards.	Efforts would be easily expanded if necessary during implementation and not difficult afterwards.	Efforts would be easily expanded if necessary during implementation and not difficult afterwards.
• Monitoring Considerations	Long-term monitoring required.	Limited long-term monitoring required.	Limited long-term monitoring required.	Long-term monitoring required.
Administrative Feasibility • Coordination with Other Agencies	Minimal coordination as agency oversight availabe on-site now.	Minimal coordination as agency oversight available on-site now.	Minimal coordination as agency oversight available on-site now.	Minimal coordination as agency oversight available. now.
Availability of Services and Materials • Availability of Treatment, Storage Capacity, and Disposal Services	No treatment, storage or disposal required.	No treatment or storage required. Transportation and disposal available on-site with direct on-site access routes for most material, off-site management of less than 10 CY available.	No treatment or storage required. Transportation and disposal available on-site with direct on-site access routes for most material, off-site management of less than 10 CY available.	No treatment, storage, or disposal required.
• Availability of Necessary Equipment, Specialists, and Material	Readily available locally	Readily available locally	Readily available locally	Readily available locally
• Availability of Technologies	None required	Readily available locally	Readily available locally	Readily available locally
Costs • Total Capital Cost	$185,000	$319,000	$394,000	$208,800
• Annual O&M $/year	$7,000	$5,000	$5,000	$9,000
• Present Worth 5.0% Discount and and 30 Years	$293,000	$396,000	$471,000	$346,800

Revised 10 August 1991

SECTION 1 - INTRODUCTION

1.1 Background

The Ludlow Sanitary Landfill was placed on the NPL in 1982. During the period 1984-1986, investigations were conducted which resulted in the submission of a Remedial Investigation Feasibility Study Report in June 1986 (O'Brien & Gere, 1986). In October 1987, a Supplemental Investigation Ludlow NPL Site Report was issued (Dunn Geoscience, 1987). In August 1988, a Draft Final Feasibility Study was prepared under contract to the EPA (CDM, Inc., 1988). In September 1988, EPA issued a Record of Decision (ROD) for the Ludlow site. The 1988 ROD addressed only the landfill area which was considered by EPA to be Operable Unit No. 1 "Source Control". "Subsequent operable units will deal with off-site contamination in the ground water, wetlands and gravel pit" (USEPA, 1988).

In July, 1989 an Amended Stipulation was signed which obligated a group of Potentially Responsible Parties (PRPs) for the site to gather additional information on the off-site ground water, wetlands and North Gravel Pit. Completed work included the submission of the North Gravel Pit and Off-site Ground Water Report in January 1990 and the Wetlands Investigation and Feasibility Study in March 1990 (O'Brien & Gere, 1990a; O'Brien & Gere, 1990b).

In March 1990, a Consent Judgment was signed by Chesbrough Ponds, Inc., the Ludlow defendants, New York State Department of Environmental Conservation (NYSDEC), New York State Attorney General's Office, and Special Metals Corporation. (U.S. District Court, 1990). The Judgment obligated the PRPs to implement an

Approval Remedial Plan (ARP) addended to the Judgment which was to address both of the EPA operable units at the Site. The ARP provided for excavation of contaminated soils from the adjacent wetland and of portions of the North Gravel Pit and placement of PCB contaminated soils in the landfill prior to capping. The EPA was provided copies of the ARP and time to comment prior to Court approval by the Consent Judgment.

In July 1990, construction began on the program defined in the ARP. During 1990, portions of the wetland soils and North Gravel Pit were excavated and transported to the landfill; however, heavy autumn rains prevented completion of the work. During the winter, excavation of PCB contaminated soils in the wetland was completed. Excavation of the remaining soil in the North Gravel Pit began in the Spring of 1991 at which time the extent of contamination was found to be more extensive than had been anticipated according to the data available at the time the Consent Judgment was approved.

With the approval of the NYSDEC, additional excavation and disposal of PCB contaminated soils at the landfill was undertaken. The purpose of this Focused Feasibility Study (FFS) is to identify and evaluate final remedial alternatives for the North Gravel Pit area of the site in light of the most recent analytical data which has provided a horizontal and vertical delineation of PCB contamination in this area. Implementation of remedial action at the North Gravel Pit at this time, prior to final completion of capping at the landfill has the primary advantage that soils contaminated with PCBs at levels of concern could be consolidated on-site in one location under a landfill cap with a leachate collection system. Other advantages associated with implementation at this time include a reduction in the time that PCB contaminated soils are exposed and the avoidance of roadway traffic which would result from the transport of PCB contaminated soils off-site.

1.2 Site Location and Description

The Ludlow Sanitary Landfill Site is located about six miles south of Utica in Oneida County, New York (Figure 1). The landfill is one to two miles southeast of the small community of Clayville in the Town of Paris. Immediately north of the landfill is a gravel pit operated by Ludlow Sand & Gravel. 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 encompasses approximately 60 acres. The fill area is approximately 17 acres in area. Also included within the property boundary is a designated wetland located south and east of the fill area.

The primary disposal area located between Holman City Road and Mohawk Street is presently zoned rural residential by the Town of Paris (1962 zoning ordinance; amended in 1985). The area within a 3000-foot radius of the landfill, with the exception of the wetland area, is also zoned rural residential. The designated wetland is classified as a land conservation area. The Land Development Plan for the region designates the area as open space and rural residential.

1.3 Site History

The Ludlow Sanitary Landfill began fill activities during the 1960's and continued to accept wastes until February 1988. According to facility records, the fill area is composed of municipal trash from several communities in the area. The landfill also collected bulk liquids, including septic tank pumpage, waste oils, coolants and some metals sludges. Bulk liquids were reportedly sprayed on top of the landfill (Lasher, 1984). In addition, deposition testimony from ex-employees of Ludlow Sand & Gravel reported that some bulk liquids were drained into a low lying area of approximately 0.5 acres adjacent to the sand and gravel operation access road (Deposition Transcripts, 1987). This disposal area has been defined as the North Gravel Pit Area.

During 1990, the North Gravel Pit area was surveyed, cleared of vegetation and an access road constructed. Figure 5 illustrates the topography of this area prior to excavation. In accordance with the ARP, excavation of the PCB contaminated soils began in September 1990 and continued, weather permitting, until the presence of visually stained debris was detected in April 1991. Supplemental testing of soils was conducted and excavation continued with NYSDEC oversight and concurrence (Appendix C). Debris such as cemented gravel, tree trunks, and surrounding soils were removed from the North Gravel Pit area and consolidated in the landfill with PCB contaminated materials from the wetland. The present topography, presented as Figure 6, represents the North Gravel Pit with all debris removed. The excavation continued until

June 1991, when the presence of visually stained soil beneath the debris was detected.

1.4 Environmental Setting

1.4.1 Hydrogeologic Characteristics

The geology in the vicinity of the Ludlow Site is characterized by a complex sequence of glacial deposits overlying Silurian age bedrock. The unconsolidated sediments vary in composition and increase in thickness to the west. A few hundred feet east of the site the bedrock is exposed at the land surface; whereas, 100 feet to the west of the site the bedrock is overlain by at least 150 feet of unconsolidated sediments.

1.4.1.1 Bedrock Geology

The bedrock underlying the site consists of a sedimentary sequence of Silurian age limestones, dolomites, and shales that dip to the south at one to two degrees. The limestone outcrops throughout the uplands to the east of the site along Day Hill and is characterized as massive to thinly bedded, and moderately fractured. The shale sequence underlies the limestone and forms the surficial bedrock in the Sauquoit Creek Valley. This rock type is characterized as red, green and gray, thinly bedded, friable, siltstone and mudstone.

1.4.1.2 Unconsolidated Deposits

Throughout the site, the shale bedrock is overlain by a complex sequence of unconsolidated sediments that vary in composition according to their specific mode of deposition. Three types of glacial sediments have been identified at the site: till, glaciofluvial deposits, and lacustrine deposits. These sediments are overlain by swamp deposits, silt, clay, and peat to the east and south of the fill area.

Glacial till is the most widespread, unconsolidated deposit present at the site. This deposit is a dense, unsorted mixture of rock fragments dispersed in a fine-grained matrix of silt, clay and sand. Till was deposited directly by the glacier either at its margin or beneath the ice mass. Two till deposits were identified at the site. A lower till occurs as a continuous layer just above the bedrock and consists of a gray, very dense, sandy silt with some embedded gravel. An upper till occurs as discontinuous lenses within the overlying unconsolidated deposits and consists of brown, mottled, silty, fine sand with some embedded gravel. The lower till is exposed at the land surface along Mohawk Street, but is overlain by other deposits beneath the landfill. Although the wells were not installed through the entire thickness of the lower till, the boring logs indicate this deposit is at least ten feet thick (O'Brien & Gere, 1986; O'Brien & Gere, 1990a).

Lacustrine deposits consisting of fine-grained sand, silt and clay were deposited in glacial lakes that formed due to blockage of meltwater drainage by the glacial ice mass. These lacustrine deposits were found to occur above the till in borings installed west of the North Gravel Pit Area (Appendix B), but were not present east of the North Gravel Pit (DP-1P). The deposits generally consist of gray stratified, fine sand and silt with occasional interbeds of clay. The lacustrine deposits are generally 5 to 10 feet in thickness.

The geologic materials exposed at the land surface are composed of coarse grained glaciofluvial sediments. These sediments were deposited from sediment laden meltwater streams that flowed away from the glacial ice margin and consist of well sorted sand and gravel with minor lenses of silt.

1.4.1.3 Ground Water Hydrology

Ground water elevation data have been collected from ground water wells on several occasions to evaluate the ground water flow conditions. Ground water elevation maps of the shallow and deep ground water are presented as Figures 3 and 4 for November 1989.

Ground water elevations have been taken at the three monitoring wells (MW10, MW11, MW12) in the vicinity of the North Gravel Pit on four occasions since 1989. The ground water elevation has fluctuated between approximately 1259 feet above mean sea level (AMSL) and 1262 ft. AMSL. The results, presented as Table 5, demonstrate a variable gradient and direction of flow. This is likely caused by intermittent recharge through the North Gravel Pit area. This area receives stormwater runoff from the hill immediately south as well as a portion of the sand and gravel operation. Based on water elevations, reported for MW9S, MW10, MW11, and MW12, the ground water flow beneath the North Gravel Pit travels westward toward Sauquoit Creek.

1.4.2 Climate

The climate of the site is classified as humid temperate with cold winters and moderately warm summers. The U.S. Weather Bureau Station data at Utica, approximately 8 miles north of the site, was used as a basis. The data indicate average annual precipitation of 43 inches and average temperatures of 8°C (46°F).

1.4.3 Soil

The soils in the North Gravel Pit area of the site are characterized as silt, sands, and gravels as the topsoil was removed during the development of the sand and gravel operation. On the adjacent forested hillside south of the gravel pit, approximately 0-24" of silty sand with humus was reported in three 1991 borings in this area.

1.4.4 Surface Water

The Ludlow Site lies in the Mohawk River basin, a major drainage system in central New York State. Sauquoit Creek, approximately 4,000 feet west of the site, is a tributary of the Mohawk River upstream of Utica (O'Brien & Gere, 1986). The North Gravel Pit portion of the site was a low area which periodically accumulated runoff from the gravel pit and adjacent hillside. No surface runoff from the North Gravel Pit is connected to surface water bodies due to topography.

1.5 Nature and Extent of the Problem

1.5.1 Sources of Contamination

During operation of the Ludlow Landfill, sewage and other liquids collected as bulk fluids were either sprayed on the surface of the landfill or deposited in a low lying area south of the sand and gravel operation access road (North Gravel Pit area) (Deposition Transcripts, 1987). This low lying area, illustrated on Figures 3 and 5, is identified as the North Gravel Pit portion of the site. Testing of soil and ground water samples collected since 1987 indicate the absence of volatile solvents and the presence of PCBs (Dunn, 1987; Dunn, 1989; O'Brien & Gere, 1990).

1.5.2 Toxicity Information

PCBs are present in the subsurface soils exposed during excavation of the North Gravel Pit area. In addition, PCBs are present in the soils at the water table interface at selected locations near the North Gravel Pit area. Arochlor 1260 has been identified as a possible carcinogen with a potency factor of 7.7 $(mg/kg)^{-1}$. Although testing at the North Gravel Pit identified only Arochlor 1254, the USEPA has extrapolated the conditions for Arochlor 1260 to Arochlor 1254 (USEPA, 1990).

1.5.3 Contamination Exposure Pathways

An exposure pathway consists of the following elements:

1. A source and mechanism of chemical release to the environment;
2. An environmental transport medium for the released chemical (e.g., air, surface runoff);
3. A point of potential human contact with the contaminated medium (referred to as an exposure point); and
4. A route of exposure at the exposure point (e.g., ingestion, inhalation, or dermal contact).

Because of continuing operations in and around the North Gravel Pit, a qualitative risk assessment indicates potential exposure to exposed PCBs in the North Gravel Pit area. Exposure via accidental ingestion or through dermal contact is of potential concern for site workers and trespassers on the site.

Off-site contaminant migration is also a potential exposure pathway. Hydrogeological studies have shown that on-site ground water has the potential to flow laterally in a westward direction. Since this direction is toward residential zoned areas, the potential for migration of ground water exists. PCB analyses conducted on samples collected during 1989 indicate PCBs are present in unfiltered ground water at each of the three wells at the North Gravel Pit; however, filtered samples demonstrated no detectable PCBs (MDL = 0.065 micrograms/liter). Two wells located hydraulically downgradient of the North Gravel Pit on the same side of the road (MW1M and MW1D) have consistently contained no detectable PCBs since monitoring began in 1984. Two hydraulically downgradient wells west of Holman City Road (MW9S and MW9D) demonstrated no detectable PCBs (O'Brien & Gere, 1990a).

1.5.4 Soil

An investigation in the North Gravel Pit area was performed by Dunn Geoscience Corporation during June 1987 (Dunn, 1987). The location of the borings are illustrated in Figure 5. PCBs analyses were conducted on soil samples from borings with the following results:

Sample	Depth (ft.)	PCB-1254 mg/kg
DB-1P Soil	24-30	0.320
2P	26-32	0.230
3P	12-16	<0.080
4P	30-36 & 40-46	<0.008
5P	18-26	<0.016
6P	8-10 & 15-18	0.0096

Although grade elevations were not reported, boring logs presented in Appendix B suggest samples were collected at the water table. In addition, two composite surface soil samples were collected. One identified as NP-1 contained 24 mg/kg while the other, NP-2, contained 0.78 mg/kg.

Supplemental soil samples were collected by Dunn Geoscience in September 1988 (Dunn, 1989). Samples collected represented the top foot of sediments collected with a hand auger. The results were reported as follows:

Sample	PCB 1254 mg/kg
001	18.0
002	2.4
002c	4.2
003	6.2
004	12.0
005	5.0

1.5.5 Ground Water

To further characterize the degree of contamination in the ground water, O'Brien & Gere initiated a sampling program using the monitoring wells previously installed by Dunn Geoscience (see Figure 2). Ground water samples were collected from wells 10, 11 and 12 on July 12, 1989.

Both filtered and unfiltered samples, were collected for PCB analysis. The samples were filtered in the field through a 0.45 micron filter. The filter apparatus was decontaminated between sample locations. The filtered samples were collected to determine if PCBs detected in previous samples were due to impacted ground water or due to sediment contained in the sample. Both samples were analyzed for PCBs. During sampling, it was noted that, even after development, sediment remained in the well. It was decided that the wells should be redeveloped, to minimize sample turbidity, and resampled. Redevelopment was accomplished August 30, 1989 by bailing the wells.

On September 26, 1989, monitoring wells 10 and 12 were completely evacuated and sampled using a stainless steel bailer. Monitoring well 11 was not sampled, because a bailer had become lodged in the well during a previous sampling event.

Prior to evacuation of the wells, the depth to ground water was determined and recorded on the sampling log. The volume of ground water in the well and the ground water elevation were calculated for each well. Several hours later, samples were collected from the top of the water column to minimize sediments in the samples. A relatively clear sample was obtained from MW-10; however, the sample from MW-12 did contain some sediments. Sample procedures were in accordance with those outlined in the Quality Assurance Project Plan (QAPP). Samples were placed in appropriate pre-cleaned, laboratory supplied containers. pH and specific conductivity measurements were collected and recorded on the field sampling log. Samples were analyzed for PCBs, TCL Organics and metals.

Sample containers were sealed, labeled, and placed in cooled (~4°C) sample shuttles. Table 1 provides a list of the analytical parameters, methods, container types, methods of preservation, and holding times for the combined sampling event. Analytical request form/chain-of-custody documentation was completed and included in the sample shuttle. The shuttles were sealed and hand delivered to the analytical laboratory. Copies of the sampling log are provided in Appendix A. Analytical results, chain-of-custody forms and QA/QC support is included in laboratory data packages.

Table 4 presents the results of PCB analysis for monitoring wells MW-10, MW-11 and MW-12. As indicated, filtering the samples had a pronounced effect on the analytical results. During the July 1989 sampling event, PCBs ranged from 0.09 to 10 $\mu g/\ell$ in the unfiltered samples. However, PCBs were not detected at a method detection limit of 0.065 $\mu g/\ell$ in the filtered samples.

During September 1989, the wells were redeveloped to minimize the turbidity of the ground water samples and resampled. Monitoring well 11 was not sampled because of the lodged bailer from a previous sampling event. As indicated in Table 4, no PCBs were detected in MW-10 after development; and the amount of PCB in MW-12 decreased from 10 $\mu g/\ell$ in July to 0.83 $\mu g/\ell$ in September. (It should be noted that some sediments were contained in the sample from well MW-12.) Well MW-12 was resampled for PCBs on November 21, 1989. PCBs were detected at a concentration of 0.42 $\mu g/\ell$.

Ground water samples for wells MW-10 and MW-12 were also analyzed for TCL organics and metals. No TCL organics were detected above the method detection limit and all filtered metals were below the Maximum Allowable Concentration (MAC) for New York State Class GA ground water.

1.6 Uncertainties

The procedures used to assess risks in this evaluation, as in all such assessments, are subject to a variety of uncertainties. Uncertainty in environmental sampling arises in part from the potentially uneven distribution of PCBs in the subsurface soils sampled. Uncertainties in the exposure assessment are related to estimates of how an individual would actually come in contact with the PCBs given the inaccessibility of the North Gravel Pit area from normal industrial operations on site.

SECTION 2 - JUSTIFICATION FOR EARLY REMEDIAL ACTION

Section 300.415 of the National Oil and Hazardous Substances Contingency Plan describes the factors to be used in determining whether an Early Remedial Action is appropriate. An Early Remedial Action may be performed when the following conditions apply:

1. Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby human populations, animals, or the food chain

2. Actual or potential contamination of drinking water supplies or sensitive ecosystems

3. Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release

4. High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate

5. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

6. Threat of fire or explosion

7. Other appropriate Federal or State response mechanisms to respond to the release are not available

8. Other situations or factors that may pose threats to public health or welfare or the environment

An assessment of the conditions at the Ludlow site with respect to the criteria described in Section 300.415 of the NCP yields the following conclusion:

> Contaminated on-site soil and ground water in the North Gravel Pit satisfies criteria [i] and [iv].

Undertaking an Early Remedial Action is consistent with Section 104 of CERCLA, as amended, in that it will provide an orderly transition into, and will contribute to the efficient performance of the remedial action anticipated for this site.

The development and evaluation of alternatives presented in Sections 4-6 provides justification for the selection of an Early Remedial Action. In addition, those sections present justification that completion of the Early Remedial Action will adequately address CERCLA concerns in that the selected alternative will be protective of human health and the environment.

SECTION 3 - FIELD INVESTIGATIONS FOR EARLY REMEDIAL ACTION

3.1 Objectives

The objectives of the field investigation for the Early Remedial Action were to identify and characterize the distribution of PCBs and to gather data to evaluate remedial alternatives. Soil was sampled at numerous locations and depths to determine the degree of contamination.

3.2 Soil Investigations

In June and July of 1991, O'Brien & Gere performed additional soil borings to complement the previous investigations. Seventeen soil borings were performed in and around the North Gravel Pit. In addition, surface soil samples were collected at 11 locations. The locations of these samples and the topography of the site as it now exists are presented in Figure 6. Boring Logs are presented in Appendix B.

Samples were collected from specific depths for PCB analysis to characterize the extent of PCB contamination. Table 6 presents the analytical results of the PCB analysis for each sample and the depth at which the sample was taken.

The results of the soil borings and surface soil sampling within the excavated area define the horizontal extent of PCB contaminated soils. Of the twelve borings around the perimeter of the current excavation, only three had visual contamination and detectable PCBs (SB 291, SB 1191 and SB 1391). Where contamination was suspected based on soil staining, borings were located further from the excavation. Each of these samples demonstrated less than 1 mg/kg of PCBs (SB 1491, SB 1691 and SB 1791).

The vertical distribution of PCB contaminated soil has been defined in the excavated area. Samples from the top 12 inches resulted in a geometric mean PCB concentration of 24 mg/kg. PCB concentrations on soil samples taken 1-7 feet below grade demonstrated a geometric mean PCB concentration of 2 mg/kg.

In areas not previously excavated (SB 1191, SB 1291 and SB 1391), samples were collected from the water table interface as this was considered to be the most concentrated zone due to the affinity of PCBs to oils. South of the excavated area, at SB 1191, the PCB content was 35 mg/kg at an elevation of approximately 1260 ft. AMSL, immediately above the water table. A sample of the soil at the 34-36' interval was submitted for PCB analysis with the reported result less than 1 mg/kg. Borings conducted within 30-40 feet east and south of SB 1191 identified no oil stained sand and no PCBs at the water table interface.

In a northeast direction from the existing excavation, only two borings indicated oil stained soils. The SB 291 sample collected 13-15 feet below grade at an elevation of 1262 ft. AMSL, contained 120 mg/kg PCBs. Approximately 30 feet northeast, the SB 1391 sample demonstrated a concentration of 70 mg/kg at an elevation of 1262 ft. AMSL. In both cases, the soils were saturated suggesting these samples were collected at the water table. A sample from SB 1391 collected at 1260 ft. AMSL demonstrated less than 1 mg/kg PCBs, suggesting a narrow zone of

PCB contamination in this area. A review of ground water elevation data at monitoring well 12, which is located approximately fifty feet south of these borings, indicates ground water elevation ranging from 1258.76 to 1262.12 ft. AMSL.

In summary, utilizing the grid approach presented in the USEPA field guidance, PCB concentrations were estimated at 37 projected sample locations for Table 7 (USEPA, 1986). Table 7 presents grid locations and estimated PCB concentrations. The geometric mean PCB concentration of soil collected is estimated at 8 mg/kg with a range from less than 1 mg/kg to 800 mg/kg. Shallow surface samples (0-0.2') contained higher PCBs than samples using a depth of 1 foot. At two locations, B23 and B24, shallow samples were reported as 770 and 850 mg/kg while the one foot composite concentrations were 49 and 8 mg/kg, respectively. The mean value was calculated using the highest concentration observed for each location when multiple depths have been sampled.

3.3 Remedial Action Objectives

Remedial Action Objectives must address the two potential mechanisms for exposure to the PCBs present in the soil: direct contact and ground water migration off site. The most restrictive of the calculated response objectives should be selected.

3.3.1 Direct Contact

The USEPA prepared preliminary remediation goals for Superfund Sites with PCB contamination which were issued as OSWER Directive No 9355.4-01 in August 1990 (OSWER Directive). The USEPA used two scenarios: a residential exposure and an industrial/remote exposure. The North Gravel Pit area is located adjacent to the access roadway for a sand and gravel excavation operation. Approximately 800 feet south is the Ludlow landfill's northern boundary. In addition, this surrounding area is primarily rural open land with minimal demand for residential development. Therefore, it is reasonable to utilize the exposure assumptions identified by the USEPA for industrial/remote areas.

The OSWER directive presented a range of 10-25 mg/kg of PCBs in surface soils to be protective of human health. In a publication issued under TSCA, the EPA identified a range of 25-50 mg/kg of PCBs in soils to be protective in industrial or other reduced access areas (USEPA, 1987; USEPA, 1988). Each of these publications distinguishes between surface soils and subsurface soils. Surface soils can be defined as being within 2 feet of the surface. Therefore, to provide the maximum protection from direct contact, a response objective for the site is less than 10 mg/kg of PCBs in soil within two feet of finish grade elevation.

3.3.2 <u>Ground Water Migration</u>

The USEPA recently promulgated a Maximum Concentration Limit (MCL) for PCBs in drinking water of 0.5 micrograms/liter. New York State has a ground water quality standard of 0.1 micrograms/liter of PCBs. The response objective is to meet these standards in the ground water which leaves the site.

Migration of PCBs associated with the subsurface soils with ground water has been considered by the USEPA in the OSWER directive. The OSWER directive states: "Generally, PCB soil cleanup levels based on direct contact assumptions will provide sufficient protection of ground water. However, if ground water is very shallow, oily compounds are or were present, or the unsaturated zone has a very low organic carbon content, an additional evaluation of the residual concentration that will not exceed levels found to be protective for ground water should be made." (USEPA, 1990). The ground water is shallow and two of the seventeen borings had an oily sheen, therefore, further evaluation is justified.

Ground water monitoring in the vicinity of the North Gravel Pit Area during 1989 demonstrated that filtered samples of the three monitoring wells all contained less than detectable (MDL = 0.065 micrograms/liter) PCBs. Each of the wells contained detectable PCBs during the first round of sampling, but samples collected were quite turbid. Development of each of the wells to remove fine grained materials resulted in the PCB concentration in MW12 being reduced over 95 % to 0.42 micrograms per liter and no detectable PCBs (MDL = 0.065 micrograms/liter) in MW10. MW11 was not sampled due to a bailer being lodged in the casing. These results support the premise that the PCBs are associated with the soils rather than a soluble oil phase. In the OSWER Directive, the relative immobility of PCBs in subsurface soils was presented (USEPA, 1990).

Partitioning between PCBs sorbed to soils and water has been evaluated by the USEPA in the OSWER Directive. The USEPA utilized the Hydrologic Evaluation of Landfill Performance (HELP) model, a transport module called VADOFT, and an analytical solute/heat transport module called AT123D, to estimate the PCB concentration which would allow the ground water quality to meet the MCL. Input to these models are presented in Appendix C. The output indicated that to meet NYS Ground Water Quality standard of 0.1 micrograms/liter the average PCB concentration over a five acre area ten feet deep must be approximately 5 mg/kg or less in soil. The New Jersey Department of Environmental Protection (NJDEP) recently issued draft cleanup criteria for subsurface soils based on a somewhat different set of assumptions. The NJDEP proposed value for PCBs is reported as 100 mg/kg in sandy soils. (NJDEP, 1991)

The differences between these two calculated values, both intended to be protective of ground water quality, suggests that the appropriate value lies in the range of 5 to 100 mg/kg. To address the substantial variability of PCBs in soils and this uncertainty, the proposed approach is to utilize a geometric mean PCB concentration of the soils within the 0.9 acre study area. Selecting the lower of the two values results in a response objective for the 0.9 acre area of 5 mg/kg as a geometric mean of all samples collected.

3.3.3 <u>Summary</u>

The most restrictive response objective is 5 mg/kg of PCBs as a geometric mean for the 0.9 acre area. The use of the geometric mean will result in some areas exceeding a 5 mg/kg concentration while other areas are lower. The mean value is appropriate given the assumptions used in the OSWER calculations. This geometric mean concentration will be protective for direct contact at the surface and allow ground water quality standards to be met at the property boundary.

SECTION 4 - IDENTIFICATION AND SCREENING OF TECHNOLOGIES

4.1 General Response Actions

Using the response objectives established in Section 3.4, potential response actions were identified to allow determination of appropriate remedial technology development. These actions are briefly described below:

No Action: This general response action does not contain remedial technologies but rather can be used to track site conditions in the absence of remediation. No action is typically carried through as an alternative which is used as a basis for comparing other alternatives. No action often includes access limitations such as deed restrictions and fencing.

Removal: Removal actions include technologies which prevent exposure by removing the contaminant source.

Containment: Containment actions include technologies that isolate materials from migration pathways and receptors such that exposure pathways are not complete.

Treatment: Treatment actions address waste constituents by reducing their toxicity, mobility or volume.

4.2 Identification and Screening of Remedial Technologies

The screening process was controlled by certain site-specific conditions. These conditions, which include the proximity of the North Gravel Pit site to the Ludlow Landfill, the readily available soil borrow sources, and the availability of functional on-site transportation routes, allow removal and containment technologies to be considered highly cost-effective and appropriate technologies for this site. Additionally, owing to these site conditions, removal and containment technologies are relatively less costly compared to treatment or off-site disposal technologies. The remedial technology and process option associated with the response actions in Section 4.1 are described below.

4.2.1 No Action

No action is a general response and does not include any remedial technologies, however, it will include monitoring as well as filling and regrading of the area. The no action response is intended to provide a basis for confirming the absence of risks associated with the site if no remedial actions are implemented.

4.2.2 Removal Technologies

Implementation of remedial alternatives involving removal would require handling bulk materials. Equipment is readily available to provide the bulk material handling. In addition, the Ludlow Landfill is immediately adjacent to the area and would provide disposal for excavated material with only limited transportation requirements.

Excavation, Grading and Backfilling: Earthwork would be required for all removal options. Excavation would be accomplished utilizing conventional equipment. Soil for backfilling is available on-site and grading equipment is also available. Compaction of backfill is not necessary since no construction related activities requiring compaction will occur.

Transportation: Transportation equipment is readily available. The transportation route would consist of an existing on-site access road constructed as part of the Ludlow Landfill project. Traffic burden and noise would not be expected to impact the local community. This technology will be retained for further evaluation.

4.2.3 <u>Containment Technologies</u>

The objective of containment technologies is to limit mobility of the constituents of concern as well as to prevent inadvertent direct contact with the material. Several remedial technologies and process options are available to implement this response.

<u>Capping</u>: Capping can be highly effective in limiting the spread of waste materials and preventing inadvertent contact with the material. Capping consists of placing various materials in layers, each with a specific function, so that the combination of these layers limits infiltration of precipitation through waste material. Vegetation would also be established on the surface of the cap to provide erosion protection. The availability and proximity of materials to create a cap on this site is excellent, thus this option will be retained for further evaluation.

<u>Landfill</u>: Landfilling can provide a greater degree of waste isolation than capping. Landfills typically consist of a primary and secondary liner which completely underlie the waste material, a primary and secondary leachate collection system and a cap. A wide variety of natural and synthetic materials may be used for one or both of the liners. Two basic options are available:

<u>On-Site Landfill</u>: On-site landfills are utilized when site locations and conditions, and the nature of the waste

materials are appropriate. The option is also feasible when an established on-site landfill is available. This will be retained for further evaluation.

Off-Site Landfill: Containment in an established off-site landfill could be a feasible remedial alternative. The costs and risks associated with off-site transportation, however, could be significant when compared to utilizing the on-site landfill and thus, this option will not be retained for further evaluation.

4.2.4 Treatment Technologies

Though there are various additional technologies available for remediation of PCB contamination, given the site resources and the effectiveness of the above technologies due to site characteristics, any treatment technology, even if deemed effective, would have orders of magnitude higher implementation costs, and would be considered inappropriate.

SECTION 5 - DEVELOPMENT AND SCREENING OF ALTERNATIVES

5.1 General

To develop alternatives to achieve the established remedial actions, a three step process is applied. The initial step creates performance requirements and potential human health risks associated with each alternative by establishing Applicable or Relevant and Appropriate Requirements (ARARs) or ability to attain a waiver. The second step evaluates the alternatives on the basis of the operation and performance compatibility as well as the availability of acceptable engineering practices. Third, the alternatives are evaluated for general effectiveness, implementability and cost.

5.1.1 Alternative Evaluation by ARARs

This criterion evaluates the compliance of alternatives against ARARs or evaluates the alternatives against requirements for and justification of a waiver. Specific compliance factors of ARARs are chemical-specific, location-specific, and action-specific as well as other criteria, advisories and guidance. ARARs are discussed relative to specific alternatives in the following sections.

5.2 Development of Remedial Alternatives

5.2.1 Alternative A - No Action

The present topography illustrated in Figure 6, includes an excavation approximately 20 feet below grade elevation which would result in ponding of stormwater runoff. Therefore, the no action alternative does include regrading the North Gravel Pit area to prevent ponding. Figure 9 illustrates projected finish grade elevations. Incorporated in the deed would be restrictions on excavation in this area, as subsurface PCB concentrations would be above the response objective for surface PCB concentrations.

In addition, Alternative A would include a ground water monitoring program which would include the installation of an additional shallow monitoring well approximately 400 feet west of MW11 and repair of MW11. The program would consist of quarterly sampling and analysis of the subsurface water for PCB and recording of subsurface water elevations. The data from the monitoring program would be evaluated and summarized in a report. The report would include site condition changes which could impact human health and the environment.

5.2.2 Alternative B - Partial Excavation (5 mg/kg mean)

Alternative B would consist of exposing areas where the present PCB concentrations exceed 50 mg/kg. Removal of the soils in excess of 50 mg/kg PCBs to achieve a geometric mean PCB concentration of 5 mg/kg would be implemented. Soil from two localized areas where soil PCB concentrations exceed 500 mg/kg will be managed off-site at a permitted facility. The remaining soil will be managed in the on-site landfill which includes a RCRA cover and leachate collection. Figure 7 illustrates the excavation configuration after the contaminated soil is removed. The depth of excavation is to elevation 1258 AMSL, slightly below the existing water table. The soil to be removed would be loaded into trucks and hauled via an on-site access road to the Ludlow Landfill. The excavation would be backfilled to meet finish grades identified in Figure 9. Topsoil would be placed on the backfill and graded to provide positive drainage patterns toward the west followed by the establishment of vegetation. Deed restrictions would be included to prevent excavation in the North Gravel Pit area. Quarterly monitoring for two years is assumed with semiannual ground water monitoring after that. Monitoring would include the additional monitoring well, would be included in this alternative.

5.2.3 Alternative C - Partial Excavation (3 mg/kg mean)

Alternative C is identical to Alternative B with the exception that the soils removed for disposal will be that volume of soil containing PCB levels in excess of 10 mg/kg to achieve a 3 mg/kg mean PCB concentration. Figure 8 illustrates the excavation area. The depth of excavation would be the same as for Alternative B. Quarterly monitoring for two years is assumed with semiannual monitoring after that.

5.2.4 Alternative D - Full Cap

Engineered soil covers enhance critical engineering characteristics of existing soils such as permeability, structural integrity and runoff. Alternative D would consist of a multimedia cap designed to reduce the PCB migration potential. The multimedia cap would consist of 24 inches of clay and 30 inches of protective cover and root zone. Six inches of topsoil is added to allow the establishment of vegetation for cap surface stabilization. In addition to the installation of the cap, a periodic cap maintenance program as well as quarterly monitoring program would be established as part of Alternative D. Deed restrictions would be included to prevent excavation in the North Gravel Pit area.

5.3 Screening of Alternatives

The intent of the screening of alternatives step is to eliminate alternatives that are significantly less implementable or more costly than comparably effective alternatives. The screening is conducted on the basis of compliance with ARARs, effectiveness, implementability and cost.

The factors included in effectiveness include overall reduction in toxicity, mobility or volume of waste, permanence, impacts of implementation, and time to achieve protection.

Implementability considers the technical and administrative feasibility of constructing, operating and maintaining a particular alternative relative to the other alternatives.

Cost screening includes the costs necessary to perform a remedial action and operation and maintenance. Similar protectiveness at significantly greater costs will be evaluated.

5.3.1 Effectiveness

Alternative A - No Action: Alternative A would result in a residual mean PCB concentration in the soil of approximately 8 mg/kg over the 0.9 acre site. Using the worst case assumptions, this may result in ground water not meeting the 0.1 microgram/liter standard. However, the distance to off-site users, a minimum of 500 feet suggests that this may not be a human health risk as the MCL is 0.5 micrograms/liter. Testing at MW9S and MW9D indicate no detectable PCBs west of the site. If ground water did not meet the standard, then ARARs would not be met. This alternative could be implemented immediately with no impact to the community.

Alternative B - Partial Excavation (5 mg/kg): Excavation of PCB contaminated soil above 50 mg/kg and transporting on-site to the spoil area within the landfill is consistent with USEPA's OSWER Directive. Federal ARARs for PCBs derive from Toxic Substance Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA). Under TSCA, PCBs deposited in the environment after February 17, 1978 are managed as if they were at the concentration of the original material discarded (USEPA, 1990). However, in light of the fact that there was no indication in the deposition testimony that depositional use of the North Gravel Pit continued beyond 1975, it is assumed that PCB disposal predated the 1978 effective date of the regulations and under these circumstances, USEPA specifies evaluation on a basis of the form and concentration "as found" at the site (USEPA, 1990).

TSCA specifies that soils and sludges contaminated with PCBs at concentrations greater than or equal to 50 mg/kg can be incinerated, treated by an equivalent method, or disposed in a chemical waste landfill. TSCA provides USEPA with the flexibility to grant a waiver of the technical requirement and 40 CFR 765.75(b) when it can be demonstrated that the landfill will not present an unreasonable risk to human health and the environment (CDM, 1988). The EPA in the 1988 ROD, utilized this waiver to allow consolidation of PCBs from the wetland at concentrations as high as 482 mg/kg into the on-site landfill. That logic was maintained in

1990 and 1991 when soils from the North Gravel Pit had PCB concentrations ranging up to 480 mg/kg were also consolidated within the on-site landfill. It should be noted that the EPA included the 6100 mg/kg PCB content at one location in the landfill in its calculations for protection to human health and the environment (CDM, 1988).

Alternative B would be considered protective of human health and the environment as it meets the calculated response objectives. Alternative B would reduce the mobility of the PCBs because the disposal of waste would be at the Ludlow Landfill which will have a cap and leachate collection system. The existing on-site access road linking the gravel pit with the landfill minimizes the transportation impact on the surrounding communities. Protection would be achieved immediately upon implementation.

<u>Alternative C - Partial Excavation (3 mg/kg mean)</u>: The effectiveness of Alternative C would be similar to Alternative B.

<u>Alternative D - Full Cap</u>: Containment on-site would be similar to actions prescribed in the 1988 ROD. Based on the designed function Alternative D, some reduction in mobility would be realized. A clay cover would substantially reduce infiltration because the area would no longer be a recharge due to topography. In addition, the clay barrier would substantially reduce infiltration. This would limit migration through the most contaminated soils located above the water table, however, soil containing PCBs will be at the water table and migration is a possibility. Short-term impacts resulting from this alternative

are minimal since the available on-site resources limit the need for an off-site borrow source to clay and topsoil.

5.3.2 Implementability

Alternative A: Implementation would be straight forward with standard equipment and procedures.

Alternative B: Standard construction practices would be used for implementation of this alternative and readily available resources on-site allow this alternative to easily be implemented. Operation and maintenance would be a minor issue.

Alternative C: Implementation would be identical to Alternative B.

Alternative D: Implementation would be considered not difficult due to the on-site availability of fill materials for cap construction. Clay and topsoil would have to be obtained from off-site sources. Annual maintenance would be required to maintain the integrity of the cap and vegetative cover.

5.3.3 Cost

Projected completion costs for the four alternatives are presented as Tables 8-11. Alternative A has a present worth cost of $293,000; Alternative B $396,000; Alternative C $471,000; and Alternative D $346,000.

SECTION 6 - DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

This section presents a detailed description and evaluation of each remedial alternative that passed the initial screening in Section 5.0. The remedial alternatives are examined with respect to the requirements stipulated in CERCLA as amended, "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (April 1989). Section 6.1 discusses the evaluation processes used and the nine criteria against which the remedial actions are analyzed. Section 6.2 describes the alternatives in detail and evaluates each with respect to the evaluation criteria. Section 6.5 presents a comparison of the remedial alternatives. Section 6.4 recommends selection of one of the remedial alternatives based on the comparison in Section 6.3.

6.1 Evaluation Processes

A detailed analysis of the remedial alternatives consists of the following components and processes:

Further definitions of each alternative, if appropriate, with respect to the volumes and areas of contaminated media to be addressed, the technologies to be used, and any performance requirements associated with those technologies.

Assessment and summary of each alternative against the nine criteria as defined by the RI/FS Guidance document.

Comparative analysis among the remedial alternatives to assess the relative performance of each alternative with respect to each evaluation criterion.

Based on the statutory preferences and the response objectives developed in Section 5.0, remedial alternatives shall meet the following requirements during evaluation and selection:

Protection of human health and the environment (CERCLA Section 121(b)).

Attainment of the applicable or relevant and appropriate requirements (ARARs) of Federal and State law (CERCLA Section 121(d)(2)(a)) or warranting a waiver under CERCLA Section 121(d)(4).

Reflection of a cost-effective solution, taking into consideration short- and long-term costs (CERCLA Section 121(a)).

Use of permanent solutions and treatment technologies or resource recovery technologies to the maximum extent practical (CERCLA Section 121(b)).

Satisfaction of the preference for remedies that employ treatments that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances as a principal element, or explanation of reasons why such remedies were not selected (CERCLA Section 121(b)).

In order to address the CERCLA requirements adequately, nine evaluation criteria have been developed. These criteria are discussed and defined in the EPA Guidance for Conducting RI/FS under CERCLA (April 1989).

The first two criteria are the "threshold" factors. Any alternative that does not satisfy both of these criteria is dropped from further consideration in the detailed analysis. These are:

1. Overall protection of human health and the environment.

2. Compliance with applicable or relevant and appropriate requirements (ARARs).

Five "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between the remedial alternatives. Alternatives that satisfy the threshold criteria are evaluated further using the following balancing criteria:

3. Long-term effectiveness.

4. Reduction of toxicity, mobility or volume through treatment.

5. Short-term effectiveness.

6. Implementability.

7. Cost.

The remaining two criteria, State acceptance and community acceptance, are "modifying" factors. State acceptance will be evaluated in the Proposed Plan after receiving State comments on this Focused Feasibility Study report. The final evaluation criterion, community acceptance, will be evaluated in the Record of Decision (ROD) after the public comment period is completed.

A discussion of the nine evaluation criteria is presented below. Then, each remedial alternative is evaluated with respect to the first seven criteria. At the completion of all detailed analyses, a summary section is included, wherein the statutory factors and criteria are compared for each remedial alternative to facilitate the remedy selection process.

Overall Protection of Human Health and the Environment

This evaluation criterion provides an overall assessment of protection based on a composite of factors such as long-term and short-term effectiveness and compliance with ARARs. Evaluations of the overall protectiveness address:

How a specific site remedial action achieves protection over time;

How site risks are reduced; and

How each source of contamination is to be eliminated, reduced, or controlled for each remedial alternative.

Compliance with ARARs

This evaluation criterion is used to determine how each remedial alternative complies with applicable or relevant and appropriate Federal and State requirements as defined in CERCLA Section 121. Each alternative is evaluated in detail for:

- Compliance with contaminant-specific ARARs (e.g., RCRA Standards);
- Compliance with action-specific ARARs (e.g., RCRA minimum technology standards);
- Compliance with location-specific ARARs (e.g., preservation of historic sites); and
- Compliance with appropriate criteria, advisories, and guidances (i.e., "To Be Considered" material).

Section 5.0 presents an overall list of ARARs and "To Be Considered" (TBC) material that were used to evaluate the remedial alternatives. Specific statutory or regulatory citations and their applications to the remedial alternative evaluations are contained in Section 6.2

Long-Term Effectiveness

This evaluation criterion addresses the results of the remedial action in terms of the risk remaining at the site after the response objectives have been met. The components of this criterion include the magnitude of the remaining risks measured by numerical standards such as cancer risk levels; the adequacy and suitability of controls used to manage treatment residuals or untreated wastes; and the long-term reliability of management controls for providing continued protection from residuals (i.e., the assessment of potential failure of the technical components).

Reduction of Toxicity, Mobility or Volume Through Treatment

This evaluation criterion addresses the statutory preference that treatment results in the reduction of principal threats of the total mass of toxic contaminants, the irreversible reduction in contaminant mobility, or the reduction of the total volume of contaminated media. Factors to be evaluated in this criterion include the treatment process employed; the amount of hazardous material destroyed or treated; the degree of reduction in toxicity, mobility, or volume expected; and the type and quantity of treatment residuals.

Short-Term Effectiveness

This evaluation criterion addresses the impacts of the remedial action during the construction and implementation phases preceding the attainment of the remedial response objectives. Factors to be evaluated include protection of the community during the remedial actions, protection of workers during the remedial actions, environmental impacts resulting from the implementation of the remedial actions, and the time required to achieve protection.

Implementability

This criterion addresses the technical and administrative feasibility of implementing a remedial action and the availability of various services and materials required during its implementation. Technical feasibility factors include construction and operation difficulties, reliability of technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy. The administrative feasibility includes the ability and time required for permit approval and for activities needed to coordinate with other agencies. Factors employed in evaluating the availability of services and materials include availability of treatment, storage and disposal services with required capacities; availability of equipment and specialists; and availability of prospective technologies for competitive bidding.

Cost

The types of costs that would be addressed include: capital costs, operation and maintenance (O&M) costs, costs of five-year reviews where required, present value of capital and O&M costs, and potential future remedial action costs. Capital costs consist of direct and indirect costs. Direct costs include expenditures for the equipment, labor and materials necessary to install remedial actions. Indirect costs include expenditures for engineering, financial, and other services required to complete the installation of remedial alternatives. Other annual O&M costs include auxiliary materials and energy, disposal of residues, purchased services, administrative costs, insurance, taxes, license costs, maintenance reserve and contingency funds, rehabilitation costs, and costs for periodic site review.

This assessment evaluates the costs of the remedial actions on the basis of present worth. Present worth analysis allows remedial alternatives to be compared on the basis of a single cost representing an amount that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial alternative over its planned life. A required operating performance period is assumed for present worth and is a function of the discount rate and time. A discount rate of five percent is assumed for a base calculation. The "study estimate" costs provided for the remedial actions are intended to reflect actual costs with an accuracy of -30 to +50 percent.

State Acceptance

This assessment evaluates the technical and administrative issues and concerns the State may have regarding each of the remedial alternatives. The factors to be evaluated include features of the actions that the State supports, has reservations about, or opposes.

Community Acceptance

This assessment incorporates public input into the analysis of the remedial alternatives. Factors of community acceptance to be discussed include features of the supportiveness, reservations, and opposition of the community.

The breakdown of major facilities and construction components for the remedial alternatives and the detailed breakdown of capital and annual operation and maintenance cost estimates are presented in Tables 8 through 11.

6.2 Alternative Analysis

The remedial alternatives that passed the initial screening process in Section 5.0 and that will be evaluated in further detail against the seven evaluation criteria are as follows:

Alternative A: No Action
Alternative B: Partial Excavation (5 mg/kg mean)

Alternative C: Partial Excavation (3 mg/kg mean)
Alternative D: Containment (Multimedia Cap)

A detailed description and discussion of the above remedial alternatives is presented in the following subsections. A concise summary is provided as Table 12.

6.2.1 Alternative A: No Action

6.2.1.1 Description

The No Action alternative for the North Gravel Pit would consist of filling in the excavated area and grading for drainage. A long-term monitoring program of the ground water would be established using the existing on-site wells and an additional well that would be installed. This program would consist of quarterly sampling and analysis of the wells and the submission of reports on the results of the analyses. A fence would also be established around the perimeter of the site as an institutional control as would deed restrictions on excavation in the area.

6.2.1.2 Assessment

Overall Protection of Human Health and the Environment

The placement of clean fill above the PCB contaminated soils would result in no direct contact with PCBs. There, the No Action alternative would not remove or contain the PCBs found in the soil.

The migration of PCBs to ground water is expected, however, mobility is limited. Ground water monitoring next to the North Gravel Pit indicated PCB concentration less than 0.5 microgram/liter MCL on the most recent testing. This suggests that at the property boundary, the MCL would be met with no action

Compliance with ARARs

This alternative complies with ARARs excepting those for TSCA landfills and possibility NYS Ground Water standards for PCBs.

Long-Term Effectiveness

The quantitative risk assessment indicates that there is a current and future risk due to a moderate potential for on-site ground water contamination. Because PCBs would be left at the site, this alternative may not meet the remedial objective for protection of ground water. Filling in the excavation and establishing a fence around the site perimeter, however, would meet the remedial response objective for prevention of direct contact.

The No Action alternative would slowly reduce the level of contaminants by natural leaching, migration and biodegradation. However, natural attenuation is a very slow process and it would take an unpredictably long period of time to achieve the remedial objectives for the site.

The implementation of this alternative would not have any additional beneficial effects on the environment. Potential long-term adverse environmental impacts do exist because the PCBs would remain in the soil. The possibility that the PCBs would eventually migrate off-site into drinking water supplies existing, however, the probability is low due to the affinity of PCBs like Arochlor 1254 to solids. The long-term monitoring program would be an adequate and reliable control for monitoring the trend of PCB migration, however.

Reduction of Toxicity, Mobility, or Volume Through Treatment

The No Action alternative does not involve any containment, removal, treatment, or disposal actions for the contaminated soil and ground water. There is a slow and gradual reduction of the toxicity and volume of the PCBs due to natural leaching, migration and biodegradation. However, the time needed to reach the acceptable risk levels is unknown. In addition, the mobility of the PCBs would remain unchanged and, therefore, the potential to migrate off-site would remain unchanged.

Short-Term Effectiveness

Implementability

> Technical Feasibility: The monitoring program designed for this site would use existing wells and one new well, to monitor contaminant migration from the North Gravel Pit. In addition, common fill and earthmoving equipment are available on-site. If monitoring were to indicate that future action is necessary, supplemental action would not be difficult. Long-term monitoring of the ground water at the site would also be required. This alternative would be relatively easy to implement.
>
> Administrative Feasibility: Considerable long-term institutional management would be associated with this alternative for the ground water monitoring program and the five-year reviews. In addition, the development and performance of the monitoring program would necessitate the involvement of environmental and public health agencies, including EPA and New York State Department of Environmental Conservation (NYSDEC).
>
> Availability of Services and Materials: This alternative does not involve any treatment, storage, or disposal services. Equipment and specialists for sampling, monitoring and analyses are locally available.

Cost

The total capital cost for this alternative for the required site work is estimated to be $185,000. The annual operation and maintenance cost is estimated to be $7,000. The total present worth, calculated on the basis of a discount rate of 5 percent and a 30 year period, is $293,000. Table 8 presents the line items used in the tabulation of the cost estimate for the No Action alternative.

6.2.2 Alternative B: Partial Excavation (5 mg/kg mean)

6.2.2.1 Description

This alternative would consist of the excavation of soil at the North Gravel Pit to achieve a mean PCB concentration of 5 mg/kg. This excavation would result in approximately 900 cubic yards of contaminated soil being removed. The contaminated soil would then be transported to and disposed of in the Ludlow Landfill located on-site. Non-contaminated soil removed to access the PCB contaminated soil would be filled back into the gravel pit (approximately 12,000 cubic yards). The gravel pit would then be backfilled to match existing grades and to eliminate ponding. Approximately 31,000 cubic yards of soil would be required to achieve the proposed drainage slope of 0.3 percent. A long-term monitoring program would also be implemented using both the existing on-site wells and a well which would be installed and would involve semiannual sampling and analysis. A fence would be established around the perimeter of the site as an institutional control as would deed restrictions to prevent further excavation.

6.2.2.2 Assessment

Overall Protection of Human Health and the Environment

The clean soil cover coupled with access limitations would prevent direct contact with PCB contaminated soils and this would be protective. The removal of soil contaminated with PCBs to a mean concentration of 5 mg/kg would significantly reduce the potential of PCBs from the soil into the ground water. Backfilling the pit to match existing grades and providing for a drainage slope will prevent ponding on the site. In addition, site access would be restricted with the installation of a perimeter security fence and deed restrictions prohibiting excavation in the North Gravel Pit area.

Compliance with ARARs

This alternative would comply with the applicable ARARs with the exception of those concerning TSCA landfills. The same waiver that is presently used for the landfill area is applicable here because the contaminated soils are disposed at the landfill area.

Long-Term Effectiveness

Filling the North Gravel Pit and providing for drainage would serve to eliminate health risks associated with direct contact with PCBs in ground water. Following remediation, there would be a minimal residual risk due to ground water contamination on-site. The long-term monitoring program would serve as an adequate and a reliable control for assessing the migration of remaining contaminants.

Reduction of Toxicity, Mobility, or Volume Through Treatment

The contaminated soil and ground water would not be treated under this alternative, therefore, there would be no reduction in toxicity, mobility, or volume.

Short-Term Effectiveness

The potential risk to public health and the environment in the short term is minimal. The risk to workers would be minimized in accordance with a site-specific Health and Safety Plan denoting adequate protection measures and proper personal protective equipment. Since all excavation and disposal practices would be kept on-site, there would be no risks to public health and the environment in the short term. Response objectives would be met within one month of the construction start date.

Implementability

> Technical Feasibility: Excavation and disposal is a reliable remediation technique requiring no new or untested technologies. There would be no future operational requirements since waste would be removed. Limited long-term monitoring of on-site ground water would be required. Remediation efforts would be easily expandable during implementation, if required. If long-term monitoring were to indicate that future action is necessary, additional remediation efforts would be moderately difficult to implement.
>
> Administrative Feasibility: Implementation of this alternative would require restriction of access to the site during the excavation process. No permits would be needed since all excavation and disposal would be done on-site. Minimal coordination with other agencies would be required since agency oversight is available on-site at the present time.
>
> Availability of Services and Materials: All necessary equipment is already located on-site due to ongoing work at the Ludlow Sand and Gravel operation. No treatment or storage would be required. All disposal would be on-site using established access routes. Other necessary

equipment, specialists and technologies are all readily available locally.

Cost

The capital cost for this alternative is estimated at $319,000 which includes a 25% (+/-) contingency. Annual operation and maintenance costs are estimated to be $5,000. The total present worth, calculated on the basis of a discount rate of 5% and a 30 year period, is $396,000. Table 9 presents the line items used in the tabulation of the cost estimate for this alternative.

6.2.3 Alternative C: Partial Excavation (3 mg/kg)

6.2.3.1 Description

This alternative consists of the excavation of soil at the North Gravel Pit to remove PCBs to a mean area concentration of 3 mg/kg. This excavation would result in approximately 2,000 cubic yards of contaminated soil being removed. To excavate this contaminated soil, the existing forest and overburden of 10-20 feet of soil will have to be removed. The contaminated soil would then be transported to and disposed of in the Ludlow Landfill located on-site. Non-contaminated soil would be filled back into the gravel pit (approximately 15,000 cubic yards). The gravel pit would then be backfilled to match existing grades and to eliminate ponding. Approximately 36,000 cubic yards of soil would be required to achieve the proposed drainage slope of 0.3 percent. A long-term monitoring program would also be implemented using both the existing on-site wells and a well that would be installed and would involve semiannual sampling and analysis. A fence would be established around the perimeter of the site as an institutional control.

6.2.3.2 Assessment

Overall Protection of Human Health and the Environment

Backfilling the pit to match existing grades and providing for a drainage slope will prevent ponding on the site and direct contact with PCB contaminated soil. The removal of soil contaminated with PCBs to a mean area concentration of 3 mg/kg would significantly reduce the potential migration. Predicted concentrations are less than 0.1 microgram/liter at the property boundary, therefore, human health would be protected given an MCL of 0.5 micrograms/liter. Reducing ponding and providing for drainage would reduce leaching of PCBs into the ground water. In addition, site access would be restricted with the installation of a perimeter security fence.

Compliance with ARARs

This alternative would comply with the applicable ARARs with the exception of those concerning TSCA landfills. The same waiver that is presently used for the rest of landfill area is applicable here because contaminated soils are disposed at the landfill area.

Long-Term Effectiveness

Filling the North Gravel Pit and providing for drainage would serve to reduce health risks associated with direct contact as well as reduce leaching of PCBs into the ground water. The installation of a perimeter security fence would reduce the potential for unintentional direct contact. Following remediation, there would be a minimal residual risk due to ground water contamination on-site. The long-term monitoring program would serve as both an adequate and a reliable control for assessing the migration of remaining contaminants.

Reduction of Toxicity, Mobility, or Volume Through Treatment

The contaminated soil and ground water would not be treated under this alternative; therefore, there would be no reduction in toxicity, mobility, or volume.

Short-Term Effectiveness

The potential risk to public health and the environment in the short term is minimal. The risk to workers would be minimized in accordance with a site-specific Health and Safety Plan denoting adequate protection measures and proper personal protection equipment. Since all excavation and disposal practices would be kept on-site, there would be no risks to public health. Short-term environmental impacts would include the clearing and grubbing of approximately 0.5 acres of forested hillside. Response objectives would be met within three months of the construction start date.

Implementability

Technical Feasibility: Excavation and disposal is a reliable remediation technique requiring no new or untested technologies. There would be no future operational requirements since waste would be removed. Limited long-term monitoring of on-site ground water would be required. Remediation efforts would be easy to expand during implementation, if required. If long-term monitoring were to indicate that future action is necessary, additional remediation efforts would be moderately difficult to implement.

Administrative Feasibility: Implementation of this alternative would require restriction of access to the site during the excavation process. No permits would be needed since all excavation and disposal would be done on-site. Minimal coordination with other agencies would be required since agency oversight is presently available on-site.

Availability of Services and Materials: All necessary equipment is already located on-site due to ongoing work at the Ludlow Sand and Gravel operation. No treatment or storage would be required. All disposal would be on-site using established access routes. Other necessary equipment, materials, specialists, and technologies are all readily available locally.

Cost

The capital cost for this alternative is estimated at $394,000 which includes a 25% (+/-) contingency. Annual operation and maintenance costs are estimated to be $5,000. The total present worth, calculated on the basis of a discount of 5% and a 30 year period, is $471,000. Table 10 presents the line items used in the tabulation of the cost estimate for this alternative.

6.2.4 Alternative D: Containment (Multimedia Cap)

6.2.4.1 Description

This alternative consists of the filling of the excavation of the North Gravel Pit and the applying of a five foot thick multimedia cap. The cap would consist of a two foot thick clay barrier placed on top of the fill material and in turn covered by two and one half feet of protective soil and six inches of topsoil. The cap would be graded to match existing grades and to provide a drainage slope of 0.3 percent so as to prevent ponding. For all layers of the cap, including the common fill material, approximately 19,000 cubic yards of material would be required. A long-term monitoring program would also be implemented using both the existing on-site wells and a well that would be installed and would involve quarterly sampling and analysis. A fence would be established around the perimeter of the site as an institutional control.

6.2.4.2 Assessment

Overall protection of Human Health and the Environment

This alternative would be protective of direct contact with the PCBs as a result of the capping process and the installation of the perimeter security fence. The mobility of the PCBs would remain unchanged. Migration of the PCBs into the ground water due to the effects of leaching from storm events would be reduced due to the low hydraulic permeability of the clay barrier ($1x10^{-7}$ cm/sec). However, PCBs in soil at the water table would potentially migrate. The present concentration of PCBs in the ground water is less than 0.5 micrograms/liter next to the North Gravel Pit so it is anticipated that with a cap, the concentration would also be below the MCL and thus be protective. This alternative meets the remedial response objective for the prevention of direct contact, meet the objective for protection of ground water.

Compliance with ARARs

This alternative complies with ARARs except for those pertaining to TSCA landfills and potentially NYS Ground Water Standards. A waiver for compliance with the TSCA ARARs would be necessary.

Long-Term Effectiveness

The qualitative risk assessment indicates that there is a current and future risk due to a moderate potential for on-site ground water contamination with PCBs. Filling in the excavation, providing a low permeability cap, and establishing a fence around the site perimeter, however, would meet the remedial response objective for prevention of direct contact.

The multimedia cap alternative would reduce the level of contaminants in the ground water due to natural leaching and migration. Clay has a low hydraulic permeability thereby reducing the amount of infiltration into the contaminated soil area. Capping as a containment option is an adequate and reliable control.

The implementation of this alternative would not have any additional impacts on the environment. Potential long-term adverse environmental impacts do exist because PCBs would remain in the soil. The possibility that the PCBs would eventually migrate off-site into drinking water supplies would be reduced. The long-term monitoring program would be an adequate and reliable control for monitoring the trend of PCB migration.

Reduction of Toxicity, Mobility, or Volume Through Treatment

The contaminated soil and ground water would not be treated under this alternative; therefore, there would be no reduction in toxicity, mobility, or volume.

Short-Term Effectiveness

The potential risk to public health and the environment in the short term is minimal. The risk to workers would be minimized in accordance with a site-specific Health and Safety Plan denoting adequate protection measures and proper personal protection equipment. There would be an increase in truck traffic on the off-site roads leading to the site due to the necessity of obtaining clay for the cap from an off-site source. This traffic would have minimal impact on the surrounding community, however.

No environmental impacts are expected. All earthmoving and capping operations would occur on-site. Remedial response objectives would be met within three months of the construction start date.

Implementability

Technical Feasibility: Capping is a reliable technology that has been widely proven. Standard construction techniques would be used in the cap placement. No further operational requirements would be expected. Long-term monitoring of on-site ground water would be required. Remediation efforts would be easy to expand during implementation, if required. If long-term monitoring were to indicate that additional remediation would be necessary, implementation would not be difficult.

Administrative Feasibility: Considerable long-term institutional management would be associated with this alternative for the ground water monitoring program and the five-year reviews. In addition, the development and performance of the monitoring program would necessitate the involvement of environmental and public health agencies, including EPA and New York State Department of Environmental Conservation (NYSDEC).

Availability of Services and Materials: This alternative does not involve any treatment, storage, or disposal services. Equipment for earthmoving and capping operations are locally available as are specialists for sampling, monitoring, and analysis of the monitoring wells.

Cost

The total capital cost for this alternative for the required site work is estimated to be $208,800, including a 25% (+/-) contingency. The annual operation and maintenance cost is estimated to be $9,000. The total present worth, calculated on the basis of a discount rate of 5% and a 30 year period, is $346,800. Table 11 presents the line items used in the tabulation of the cost estimate for this alternative.

6.3 Comparison Among Remedial Alternatives

The following subsection compares the relative performance of each remedial alternative using the specific criteria presented in Section 6.1. Comparisons are presented in a qualitative manner, and will attempt to identify substantive differences between the alternatives. As with the detailed evaluation, the following criteria are used for the comparative analysis.

- Overall protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

A summary of the detailed analysis of remedial alternatives is presented in Table 12.

Overall Protection of Human Health and the Environment

All four alternatives are protective of human health by preventing direct contact with the PCBs. In addition, each alternative is expected to meet MCL's at the property boundary. Alternatives "B" and "C" would be more protective for ground water users because contaminated soil would be excavated to mean area concentrations of 5 mg/kg and 3 mg/kg, respectively with projected PCB in ground water of less than 0.1 micrograms/liter. Alternatives "B" and "C" would be more protective for ground water users because contaminated soil would be excavated to mean area concentrations of 5 mg/kg and 3 mg/kg, respectively. Both of these excavation alternatives would place excavated soil on-site in the existing landfill which includes cover and leachate collection. Alternative "D" would reduce infiltration of stormwater into the contaminated areas. Long-term monitoring would be required for all four alternatives.

Compliance with ARARs

Each alternative would not meet TSCA ARARs for landfills, however, waivers for these types of actions are identified in the OSWER directive. For alternatives "B" and "C", the same waiver presently used for the landfill area would be applied here. Alternatives "A" and "D" may not meet ARARs for NYS ground water standards.

Long-Term Effectiveness

Alternative "A" would prevent direct contact with PCBs, but would only monitor their migration and does not provide for removal and/or treatment. Therefore, there is a moderate potential for on-site ground water contamination.

Alternatives "B" and "C" would significantly reduce the hazards both by preventing direct contact with the PCBs and by providing for excavation to mean area concentrations of 5 mg/kg and 3 mg/kg, respectively. There would be a minimal residual risk due to existing on-site ground water contamination.

Alternative "D" would also be protective of direct contact with PCBs. However, it does not provide for removal and/or treatment. There would be a moderate potential for ground water contamination with PCBs. Leaching of PCBs out of the soil as a result of stormwater infiltration would be reduced by the application of the relatively impermeable multimedia cap.

All four alternatives would require long-term monitoring of the ground water around the gravel pit.

Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the alternatives would require treatment of the PCBs. All contaminants would remain on-site, therefore, there would be no reduction in toxicity, mobility, or volume.

Short-Term Effectiveness

Alternative "A" should not result in any additional risk to the workers and the community. Alternatives "B" and "C" include activities such as contaminated soil removal, handling, and/or transportation that could result in potential exposure of workers to the contaminated soil. Alternative "D" would result in a slight increase in off-site truck traffic, but this impact should be minimal.

Alternatives "C" and "D" would require clearing and grubbing of approximately 0.5 acres of forested hillside. The earthwork required in Alternatives "A" and "B" would have no impact since the land has already been cleared and grubbed.

Alternative "A" would take more than thirty years to achieve complete protection. Alternative "B" would meet remedial objectives within one month of the construction start date. Alternative "C" would require approximately two months because of time required to clear hillside and remove over twenty feet of overburden. Alternative "D" would require three months from the construction start date to achieve remedial objectives.

Implementability

All of the alternatives would require long-term monitoring and sampling as well as some form of earthwork. Alternatives "B" and "C" would involve some removal of contaminated soil. All of these measures can be easily implemented using standard construction techniques. Equipment and materials are all available on-site or locally. Alternative "D" can be implemented because containment is a proven technology that has been widely used.

Cost

The total capital, annual operation and maintenance, and present worth costs are all presented in Table 12. Alternative "C" is the most expensive alternative.

6.4 Selection of a Remedial Alternative

On the basis of the above comparison of remedial alternatives with respect to the seven evaluation criteria, it is recommended that Alternative "B" be implemented. This alternative would provide for protection of human health and the environment by preventing direct contact with the remaining PCBs. In addition, excavating on-site PCBs to a mean area concentration of 5 mg/kg will meet ARARs and be protective of ground water quality. The approach is also consistent with actions at other portions of the site which were acceptable to the USEPA and public during issuance of the ROD for operable unit #1 in 1988. The present worth cost for this alternative is estimated to be $396,000.

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Tables

O'BRIEN & GERE

TABLE 1

Analytical Methods, Containers, Preservatives, Holding Times

Parameter	Analytical Method	Container Type	Method of Preservation	Holding Time
Volatile Halocarbons	CLP (601)	40 ml glass VOA	4°C	14 days
Volatile Aromatics	CLP (602)	40 ml glass VOA	4°C	7 days (14 days if pH adjusted)
Phenols	CLP (604)	1ℓ glass	4°C	7 day extraction 40 days analysis
Phthalate Esters	CLP (606)	1ℓ glass	4°C	7 day extraction 40 days analysis
OC Pesticides/ PCBs	CLP (608)	1ℓ glass	4°C	7 day (w/pH 5-9) extraction 40 days analysis
Polyaromatic Hydrocarbons	CLP (610)	1ℓ glass Amber or foiled	4°C	7 day extraction 40 days analysis
Volatiles	CL (624)	49 ml glass VOA	4°C (1:1 HCL)	14 days
Semi-Volatiles	CLP (625)	1ℓ glass	4°C	7 day extraction 40 days analysis
Metals (ICP)	CLP (2007)	Poly	HNO_3 to pH <2; 4°C	6 months
Arsenic (GF/AA)	CLP (206.2)	Poly	HNO_3 to pH <2; 4°C	6 months
Mercury (CV/AA)	CLP (245.1)	Poly	HNO_3 to pH <2; 4°C	28 days
Selenium (GF/AA)	CLP (270.2)	Poly	HNO_3 to pH <2; 4°C	6 months
Thallium (GF/AA)	CLP (279.2)	Poly	HNO_3 to pH <2; 4°C	6 months
Lead (GF/AA)	CLP (239.2)	Poly	HNO_3 to pH <2; 4°C	6 months
Chromium (VI)	CLP (312B)	Poly	4°C	24 hours

Note: Potable water well samples were analyzed according to Safe Drinking Water Act Protocol - EPA Methods 502.1 and 503.1

TABLE 2
Well Completion Data

Well Number	Date of Completion	Diameter (in.)	Top of PVC Casing Elevation	Screen Length (ft.)	Screen Interval (ft. below surface)	Total Depth (ft. below surface)
1S	10/12/84	2	1280.8	5	5-10	10
1M	10/13/84	2	1280.9	10	20-30	30
1D	10/15/84	2	1280.3	20	77-97	97
2	10/18/84	2	1333.7	20	27.5-47.5	47.5
3S	10/2/84	2	1295.8	15	6.5-21.5	22
3D	10/2/84	2	1295.4	10	24-34	35
4S	10/17/84	2	1285.8	7	13-20	20
4D	10/18/84	2	1285.8	10	20-30	31
5S	10/6/84	2	1290.2	20	3-23	23
5D	10/8/84	2	1290.0	21	57-78	79
6S	1/14/85	2	1326.5	40.5	49.5-90	90
6D	1/15/85	2	1327.1	10	110-130	130
7S	7/8/85	2	1297.0	20	64-84	84
7D	7/17/85	2	1297.0	20	120-140	140
8S	7/19/85	2	1284.2	15	40-55	55
8D	7/29/85	2	1284.2	25	100-125	125
9S	7/19/85	2	1264.2	11	1-12	12
9M	7/85	2	1264.7	15	22-37	37
10	9/1/88	2	1277.9	10	10-20	20
11	8/30/88	2	1283.5	10	17-27	27
12	8/31/88	2	1283.5	10	30-40	40
13S	8/30/89	2	1284.48	15	22-37	37
13D	8/29/89	2	1284.76	10	53-63	63
14S	8/24/89	2	1319.36	15	47-62	62
14D	8/24/89	2	1319.97	10	96-106	106
15S	8/21/89	2	1312.43	15	29-44	44
15D	8/18/89	2	--	10	96-106	106
16S	8/16/89	2	1298.23	15	15-30	30
16D	8/15/89	2	1297.80	10	68-78	78

TABLE 3

Hydrogeologic Characteristics
Ludlow Landfill

	Hydraulic Conductivity		cm/sec gpd/ft^2	Porosity	Transmissivity (gpd/ft)			Avg. Linear Velocity (ft/day)		
	High	Low	Avg.		High	Low	Avg.	High	Low	Avg.
Upper Till	$9.8x10^{-4}$ 20.8	$4.3x10^{-5}$ 0.91	$4.0x10^{-4}$ 8.48	0.34	458	2.0	90	0.24	0.007	0.08
Glaciofluvial Sand/Gravel	$3.4x10^{-1}$ 7211	$3.6x10^{-3}$ 76.4	$6x10^{-2}$ 1273	0.40	288,440	760	33,990	72.1	0.51	10.6
Glaciolacustrine Sand/Silt	$2.1x10^{-3}$ 44.5	$3.1x10^{-5}$ 0.66	$4.4x10^{-4}$ 9.33	0.44	2,136	21	373	0.40	0.004	0.07

TABLE 4

NORTH GRAVEL PIT MONITORING WELLS
PCB ANALYTICAL RESULTS

Sample Description	Date	PCB ($\mu g/\ell$)		PCB (Filtered) ($\mu g/\ell$)
MW-10	9/13/88	ND		--
	7/12/89	0.09		<0.065
	9/26/89	<0.065		--
MW-11	9/13/88	ND		--
	7/12/89	0.17	*	<0.065
	9/26/89	--		--
MW-12	9/13/88	5.5	**	--
	7/12/89	10		<0.065
	9/26/89	0.83		--
	11/21/89	0.42		--

* Duplicate sample analyzed for well MW-11. Result = 0.6 $\mu g/\ell$

** Analysis for Aroclor 1254 only.

ND = Not detected at the method detection limit.

-- = Not analyzed.

September 1989 amples analyzed using USEPA 608 methodology to achieve a detection limit below 0.1 ppb.

TABLE 5

GROUND WATER ELEVATIONS

Well Number	Casing Cover Elevation	PVC Elevation	Ground Water Elevation 7/12/89	9/26/89	5/91	7/31/91
10	1277.94	1277.71	1761.65	1259.88	1261.44	1259.18
11	1283.47	1283.21	1260.26	--	1261.27	1259.11 *
12	1282.92	1282.75	1259.64	1258.76	1262.35	1259.35

* Well dry at this elevation.

TABLE 6

NORTH GRAVEL PIT
1991 SOIL BORINGS
PCB ANALYTICAL RESULTS

Boring #	Grade Elevation (ft.)	Sample Depth (Ft.)	Sample Elevation Ft. AMSL	PCB (mg/kg)
SB-191	1284.4	21-23	1262	<1
SB-291	1277.4	13-15	1263	120
SB-391	1280.4	17-19	1262	<1
SB-491	1284.9	21-23	1263	<1
SB-591	1284.4	21-23	1262	<1
SB-691	1283.1	23-25	1259	<1
SB-791	1258.0	1-3	1256	2
SB-891	1258.4	3-5	1254	1
SB-991	1260.8	5-7	1255	2
SB-1091	1258.2	5-7	1252	5
SB-1191	1281.3	20-22	1260	35
SB-1191	1281.3	34-36	1246	<1
SB-1291	1283.9	21-23	1261	<1
SB-1391	1283.4	19-21	1263	<1
SB-1391	1283.4	22-24	1260	<1
SB-1491	1289.2	23-25	1265	<1
SB-1491	1289.2	27-29	1261	<1
SB-1591	1266.9	5-7	1261	1
SB-1691	1284.0	21-23	1262	<1
SB-1791	1286.8	23-25	1263	1
B-21	NR	0-0.5	NR	2
B-22	NR	0-0.5	NR	200
B-23	NR	0-0.5	NR	770
B-23	NR	0-1	NR	49
B-24	NR	0-0.5	NR	850
B-24	NR	0-1	NR	8
B-25	NR	0-1	NR	110
B-26	NR	0-1	NR	44
B-27	NR	0-1	NR	74
B-28	NR	0-1	NR	2

NR Not Recorded

TABLE 7

NORTH GRAVEL PIT
ESTIMATED PCB CONCENTRATIONS

Location[1] Coordinates N	E	Alt. A Estimated PCBs (mg/kg)	Alt. B Estimated PCBs (mg/kg)	Alt. C Estimated PCBs (mg/kg)	Alt. D Estimated PCBs (mg/kg)
13053	9310	<1	<1	<1	<1
13053	9343	20	20	10	20
13053	9376	10	10	10	10
13053	9409	<1	<1	<1	<1
13082	9294	<1	<1	<1	<1
13082	9327	50	50	10	50
13082	9360	90	50	10	50
13082	9393	60	50	10	60
13082	9426	800	50	10	800
13111	9277	<1	<1	<1	<1
13111	9310	<1	<1	<1	<1
13111	9343	20	20	10	20
13111	9376	100	50	10	100
13111	9409	800	50	10	800
13111	9442	200	50	10	200
13140	9261	<1	<1	<1	<1
13140	9294	<1	<1	<1	<1
13140	9327	1	1	1	1
13140	9360	40	40	10	40
13140	9393	30	30	10	30
13140	9426	2	2	2	2
1310	9459	<1	<1	<1	<1
13169	9277	<1	<1	<1	<1
13169	9310	<1	<1	<1	<1
13169	9343	2	2	2	2
13169	9326	30	10	10	30
13169	9409	60	10	10	60
13169	9442	120	10	10	120
13198	9294	<1	<1	<1	<1
13198	9327	<1	<1	<1	<1
13198	9360	<1	<1	<1	<1
13198	9393	<1	<1	<1	<1
13198	9426	50	10	10	50
13227	9310	<1	<1	<1	<1
13227	9343	<1	<1	<1	<1
13227	9376	<1	<1	<1	<1
13227	9409	<1	<2	<1	<1
Geometric Mean		8	5	3	8

[1] See Figure 6

TABLE 8 (1)
PRELIMINARY COST ESTIMATE
NO ACTION

ITEM	QUANTITY	UNITS	UNIT COST	EXTENDED COST	TOTAL COST
DIRECT CAPITAL COSTS					
Water Treatment	60,000.00	GAL	$0.10	$6,000.00	
Restoration					
Common Fill (purchase)	19,000.00	CY	$2.50	$47,500.00	
Common Fill (placement)	19,000.00	CY	$3.00	$57,000.00	
Topsoil (6" depth)	700.00	CY	$15.00	$10,500.00	
Regrading	0.90	ACRE	$3,000.00	$2,700.00	
Seeding	1.00	LS	$2,500.00	$2,500.00	
Site Work					
Fence	700.00	LF	$10.00	$7,000.00	
Inspection	15.00	DAYS	$600.00	$9,000.00	
Administration	3.00	DAYS	$1,000.00	$3,000.00	
Wells	1.00	EA	$3,000.00	$3,000.00	
Subtotal					$148,200.00
Contingency (25% +/-)				$37,050.00	
TOTAL CONSTRUCTION COSTS					$185,000.00
ANNUAL OPERATING AND MAINTENANCE COSTS					
Quarterly Monitoring Program					
Mobilization/Site Prep.	1.00	LS	$100.00	$100.00	
Sampler	8.00	Manhours	$30.00	$240.00	
Sampling Equipment	1.00	LS	$100.00	$100.00	
Subsurface Water Analysis	5.00	Wells	$150.00	$750.00	
Report	16.00	Manhours	$40.00	$640.00	
Subtotal (Quarterly Cost)					$1,830.00
TOTAL ANNUAL O&M					$7,000.00
PRESENT WORTH (30 YR @ 5%)					$108,000.00
TOTAL ESTIMATED REMEDIAL COST					$293,000.00

(1) Revised 8/8/91

TABLE 9 (1)
PRELIMINARY COST ESTIMATE
PARTIAL EXCAVATION - 5 MG/KG MEAN

ITEM	QUANTITY	UNITS	UNIT COST	EXTENDED COST	TOTAL COST
DIRECT CAPITAL COSTS					
Site Preparation					
Mobilization/Site Prep.	1.00	LS	$5,000.00	$5,000.00	
Water Treatment	60,000.00	GAL	$0.10	$6,000.00	
Site Work					
Overburden Removal	11,100.00	CY	$3.00	$33,300.00	
Soil Excavation	900.00	CY	$5.00	$4,500.00	
Soil Transport/Disposal	900.00	CY	$9.00	$8,100.00	
Fence	700.00	LF	$10.00	$7,000.00	
Restoration					
Common Fill (purchase)	19,000.00	CY	$2.50	$47,500.00	
Common Fill (placement)	31,000.00	CY	$3.00	$93,000.00	
Topsoil (6" depth)	700.00	CY	$15.00	$10,500.00	
Regrading	1.00	LS	$6,000.00	$6,000.00	
Seeding	1.00	LS	$5,000.00	$5,000.00	
Inspection	25.00	DAYS	$600.00	$15,000.00	
Administration	5.00	DAYS	$1,000.00	$5,000.00	
Wells	1.00	EA	$3,000.00	$3,000.00	
Sampling	40.00	EA	$150.00	$6,000.00	
Subtotal					$255,000.00
Contingency (25% +/-)				$64,000.00	
TOTAL CONSTRUCTION COSTS					$319,000.00
ANNUAL OPERATING AND MAINTENANCE COSTS					
Maintenance					
Miscellaneous site work	1.00	LS	$1,000.00	$1,000.00	
Monitoring Program	2.00	EA	$2,000.00	$4,000.00	
TOTAL ANNUAL O&M					$5,000.00
PRESENT WORTH (30 YR @ 5%)					$77,000.00
TOTAL ESTIMATED REMEDIAL COST					$396,000.00

(1) Revised 8/8/91

TABLE 10 (1)
PRELIMINARY COST ESTIMATE
PARTIAL EXCAVATION - 3 MG/KG MEAN

ITEM	QUANTITY	UNITS	UNIT COST	EXTENDED COST	TOTAL COST
DIRECT CAPITAL COSTS					
Site Preparation					
Mobilization/Site Prep.	1.00	LS	$5,000.00	$5,000.00	
Clear and Grub	1.00	LS	$5,000.00	$5,000.00	
Water Treatment	90,000.00	GAL	$0.10	$9,000.00	
Site Work					
Overburden Removal	15,000.00	CY	$3.00	$45,000.00	
Soil Excavation	2,000.00	CY	$5.00	$10,000.00	
Soil Transport/Disposal	2,000.00	CY	$9.00	$18,000.00	
Fence	700.00	LF	$10.00	$7,000.00	
Restoration					
Common Fill (purchase)	20,000.00	CY	$2.50	$50,000.00	
Common Fill (placement)	35,000.00	CY	$3.00	$105,000.00	
Topsoil (6" depth)	700.00	CY	$15.00	$10,500.00	
Regrading	1.00	LS	$9,000.00	$9,000.00	
Seeding	1.00	LS	$7,500.00	$7,500.00	
Inspection	30.00	DAYS	$600.00	$18,000.00	
Administration	7.00	DAYS	$1,000.00	$7,000.00	
Wells	1.00	EA	$3,000.00	$3,000.00	
Sampling	40.00	EA	$150.00	$6,000.00	
Subtotal					$315,000.00
Contingency (25% +/-)				$79,000.00	
TOTAL CONSTRUCTION COSTS					$394,000.00
ANNUAL OPERATING AND MAINTENANCE COSTS					
Maintenance					
Miscellaneous site work	1.00	LS	$1,000.00	$1,000.00	
Monitoring Program	2.00	EA	$2,000.00	$4,000.00	
TOTAL ANNUAL O&M					$5,000.00
PRESENT WORTH (30 YR @ 5%)					$77,000.00
TOTAL ESTIMATED REMEDIAL COST					$471,000.00

(1) Revised 8/8/91

TABLE 11 (1)
PRELIMINARY COST ESTIMATE
MULTIMEDIA CAP

ITEM	QUANTITY	UNITS	UNIT COST	EXTENDED COST	TOTAL COST
DIRECT CAPITAL COSTS					
Site Preparation					
Mobilization/Site Prep.	1.00	LS	$5,000.00	$5,000.00	
Clear and Grub	0.50	ACRE	$5,000.00	$2,500.00	
Water Treatment	60,000.00	GAL	$0.10	$6,000.00	
Site Work					
Fence	700.00	LF	$10.00	$7,000.00	
Capping					
Common Fill (purchase)	14,600.00	CY	$2.50	$36,500.00	
Common Fill (placement)	12,000.00	CY	$3.00	$36,000.00	
Clay (24" depth)	3,700.00	CY	$10.00	$37,000.00	
Onsite Prot. Soil(30"depth)	2,600.00	CY	$3.00	$7,800.00	
Topsoil (6" depth)	700.00	CY	$15.00	$10,500.00	
Seeding	1.00	LS	$2,500.00	$2,500.00	
Inspection	15.00	DAYS	$600.00	$9,000.00	
Administration	4.00	DAYS	$1,000.00	$4,000.00	
Wells	1.00	EA	$3,000.00	$3,000.00	
Subtotal					$166,800.00
Contingency (25% +/-)				$42,000.00	
TOTAL CONSTRUCTION COSTS					$208,800.00
ANNUAL OPERATING AND MAINTENANCE COSTS					
Maintenance					
Miscellaneous site work	1.00	LS	$1,000.00	$1,000.00	
Monitoring Program	4.00	EA	$2,000.00	$8,000.00	
TOTAL ANNUAL O&M					$9,000.00
PRESENT WORTH (30 YR @ 5%)					$138,000.00
TOTAL ESTIMATED REMEDIAL COST					$346,800.00

(1) Revised 8/8/91

TABLE 12

SUMMARY OF REMEDIAL ALTERNATIVES

Criteria	Alternative A	Alternative B	Alternative C	Alternative D
Key Components	Fill excavation and regrade for drainage. Fence & monitor. Deed restrictions.	Excavate to achieve area mean PCB concentration of 5 mg/kg. Fill excavation and regrade for for drainage. Fence & monitor. Deed restrictions.	Excavate to achieve area mean PCB concentration of 3 mg/kg. Fill excavation and regrade for drainage. Fence & monitor. Deed restrictions.	Fill excavation, apply five foot thick cap including 2 feet of clay barrier. Fence & monitor. Deed restrictions.
1. Overall Protection Human Health and the Environment	Protective for direct contact and ground water users.	Protective for direct contact and ground water users.	Protective for direct contact and ground water users.	Protective for direct contact and ground water users.
2. Compliance with ARARs	Complies with ARARs excepting TSCA landfill and possibly NYS Ground Water Standards.	Complies with ARARs excepting TSCA landfill. Use same waiver as for rest of site. Expected to meet NYS Ground Water Standards.	Complies with ARARs excepting TSCA landfill. Use same waiver as for rest of site. Expected to meet NYS Ground Water Standards.	Complies with ARARs except for TSCA landfill. Could apply for waiver. May not meet NYS Ground Water Standards.
3. Long-Term Effectiveness				
• Magnitude of Residual Risks	Moderate potential for on-site ground water contamination with PCBs.	Minimal residual risk due to ground water contamination on-site.	Minimal residual risk due to ground water contamination on-site.	Moderate potential for on-site ground watern contamination with PCBs.
• Adequacy of Controls	Adequate	Adequate	Adequate	Adequate
• Reliability of Controls	Reliable	Reliable	Reliable	Reliable
4. Reduction of Toxicity, Mobility and Volume through Treatment				
• Treatment Process and Remedy	No Treatment Involved	No Treatment Involved	No Treatment Involved	No Treatment Involved

Revised 10 August 1991

TABLE 12

SUMMARY OF REMEDIAL ALTERNATIVES

Criteria	Alternative A	Alternative B	Alternative C	Alternative D
• Amount of Hazardous Material Destroyed or Treated	None since no treatment process involved	None since no treatment process involved	None since no treatment process involved	None since no treatment process involved
• Irreversibility of Treatment	No Treatment Involved	No Treatment Involved	No Treatment Involved	No Treatment Involved
• Type and Quantity of Treatment Residues	None	None	None	None
5. Short-Term Effectiveness • Protection of Community During Remedial Action	Not applicable: no remedial action involved.	All on-site activities, no effect anticipated.	All on-site activities, no effect anticipated.	Increase in truck traffic to bring clay to site (70 loads). Minimal impact.
• Protection of Workers During Remedial Action	No short-term risk	Health and Safety Plan protection for workers.	Health and Safety Plan protection for workers.	Health and Safety Plan protection for workers.
• Environmental Impacts	No impact expected.	No impact expected.	Will require clearing and grubbing forested hillside (0.5 acres)	Will require clearing and grubbing forested hillside (0.5 acres)
• Time to Meet Response Objectives	More than 30 years due to long halflife of PCBs.	Within one month of construction start.	Within two months of construction start.	Within three months of construction start.
6. Implementability Technical Feasibility • Ability to Contract and Operate	Easy since monitoring wells already exist, and common fill and earthmoving equipment are available on-site.	Standard construction techniques used. No future operational requirements.	Standard construction techniques used. No future operational requirements.	Standard construction techniques used. Minimal maintenance.
• Reliability of Technology	Monitoring is reliable.	Reliable since waste will be removed.	Reliable since waste will be removed.	Reliable, has been widely used and proven.

Revised 10 August 1991

TABLE 12

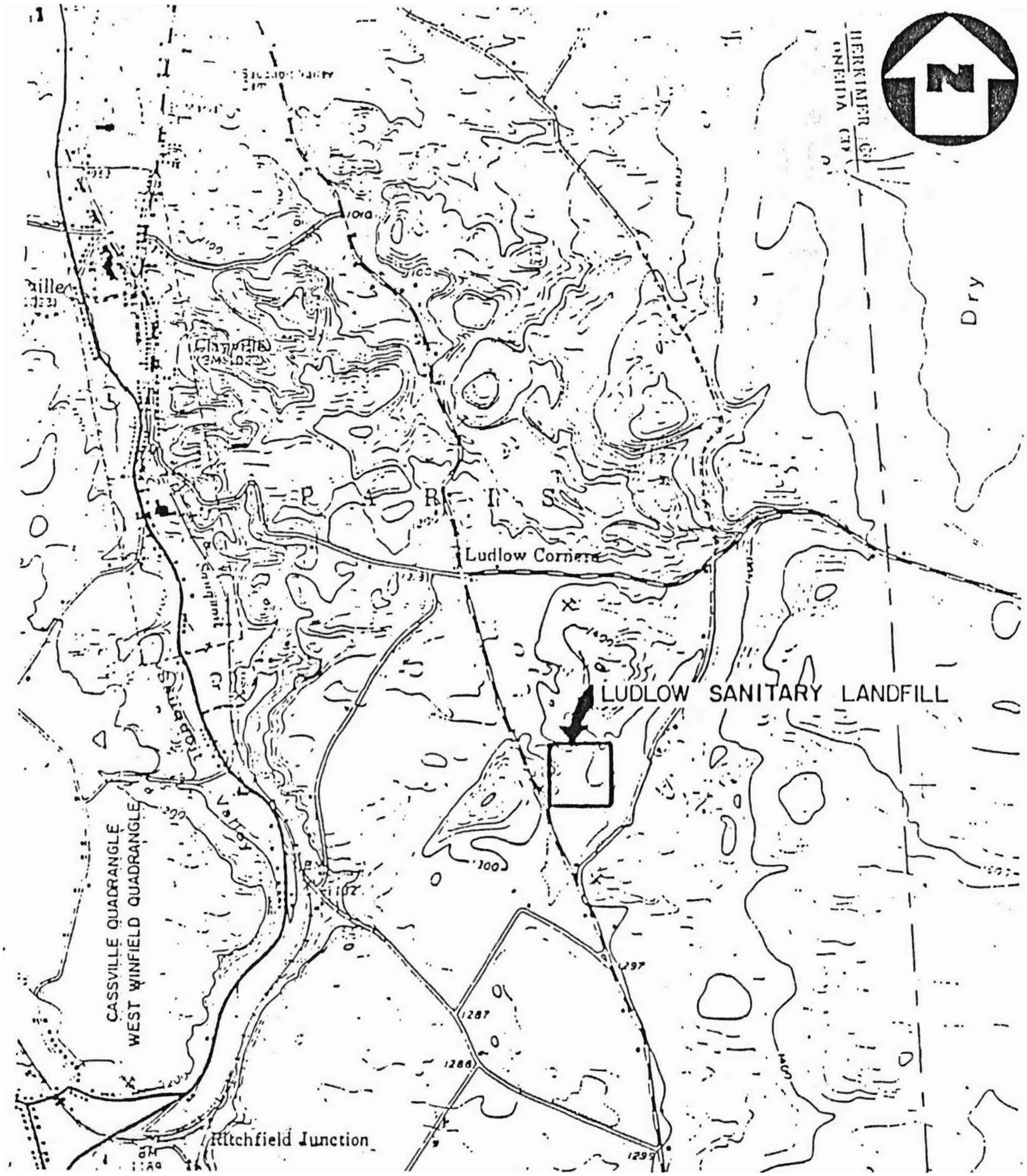
SUMMARY OF REMEDIAL ALTERNATIVES

Criteria	Alternative A No Action	Alternative B (5 mg/kg mean)	Alternative C (3 mg/kg mean)	Alternative D Multimedia Cap
• Ease of Undertaking Additional Remedial Action if Necessary	If monitoring indicates future action necessary, supplemental action not difficult.	Efforts would be easily expanded if necessary during implementation and not difficult afterwards.	Efforts would be easily expanded if necessary during implementation and not difficult afterwards.	Efforts would be easily expanded if necessary during implementation and not difficult afterwards.
• Monitoring Considerations	Long-term monitoring required.	Limited long-term monitoring required.	Limited long-term monitoring required.	Long-term monitoring required.
Administrative Feasibility • Coordination with Other Agencies	Minimal coordination as agency oversight availabe on-site now.	Minimal coordination as agency oversight available on-site now.	Minimal coordination as agency oversight available on-site now.	Minimal coordination as agency oversight available. now.
Availability of Services and Materials • Availability of Treatment, Storage Capacity, and Disposal Services	No treatment, storage or disposal required.	No treatment or storage required. Transportation and disposal available on-site with direct on-site access routes for most material, off-site management of less than 10 CY available.	No treatment or storage required. Transportation and disposal available on-site with direct on-site access routes for most material, off-site management of less than 10 CY available.	No treatment, storage, or disposal required.
• Availability of Necessary Equipment, Specialists, and Material	Readily available locally	Readily available locally	Readily available locally	Readily available locally
• Availability of Technologies	None required	Readily available locally	Readily available locally	Readily available locally
Costs • Total Capital Cost	$185,000	$319,000	$394,000	$208,800
• Annual O&M $/year	$7,000	$5,000	$5,000	$9,000
• Present Worth 5.0% Discount and and 30 Years	$293,000	$396,000	$471,000	$346,800

Revised 10 August 1991

Figures

O'BRIEN & GERE



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').

GEOGRAPHIC LOCATION PLAN

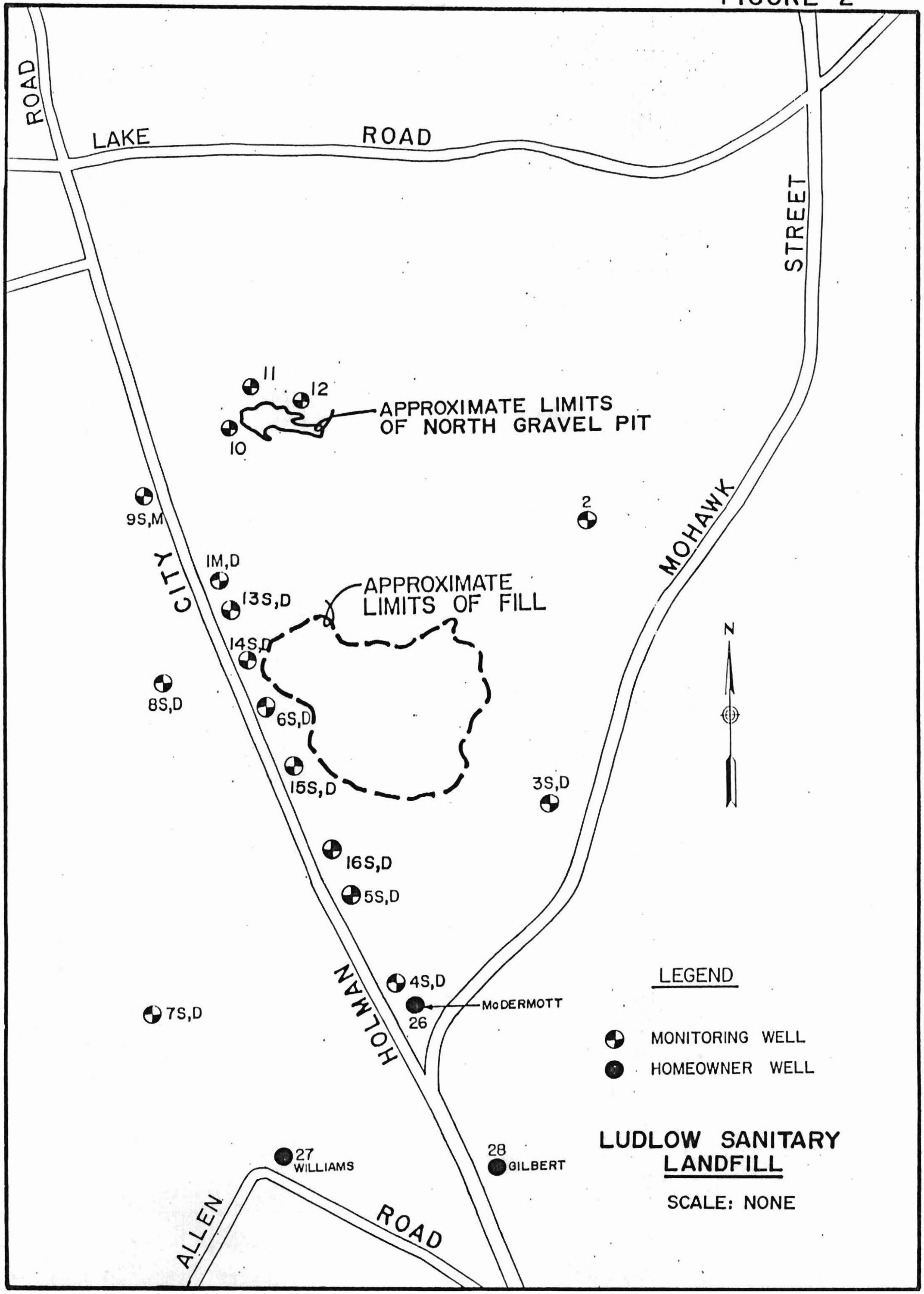
SOURCE :
INUS Corp.
Remedial Action Master Plan
Ludlow Sand & Gravel

LUDLOW SANITARY LANDFILL

SCALE : 1" = 2000'

O'BRIEN & GERE ENGINEERS, INC.

FIGURE 2

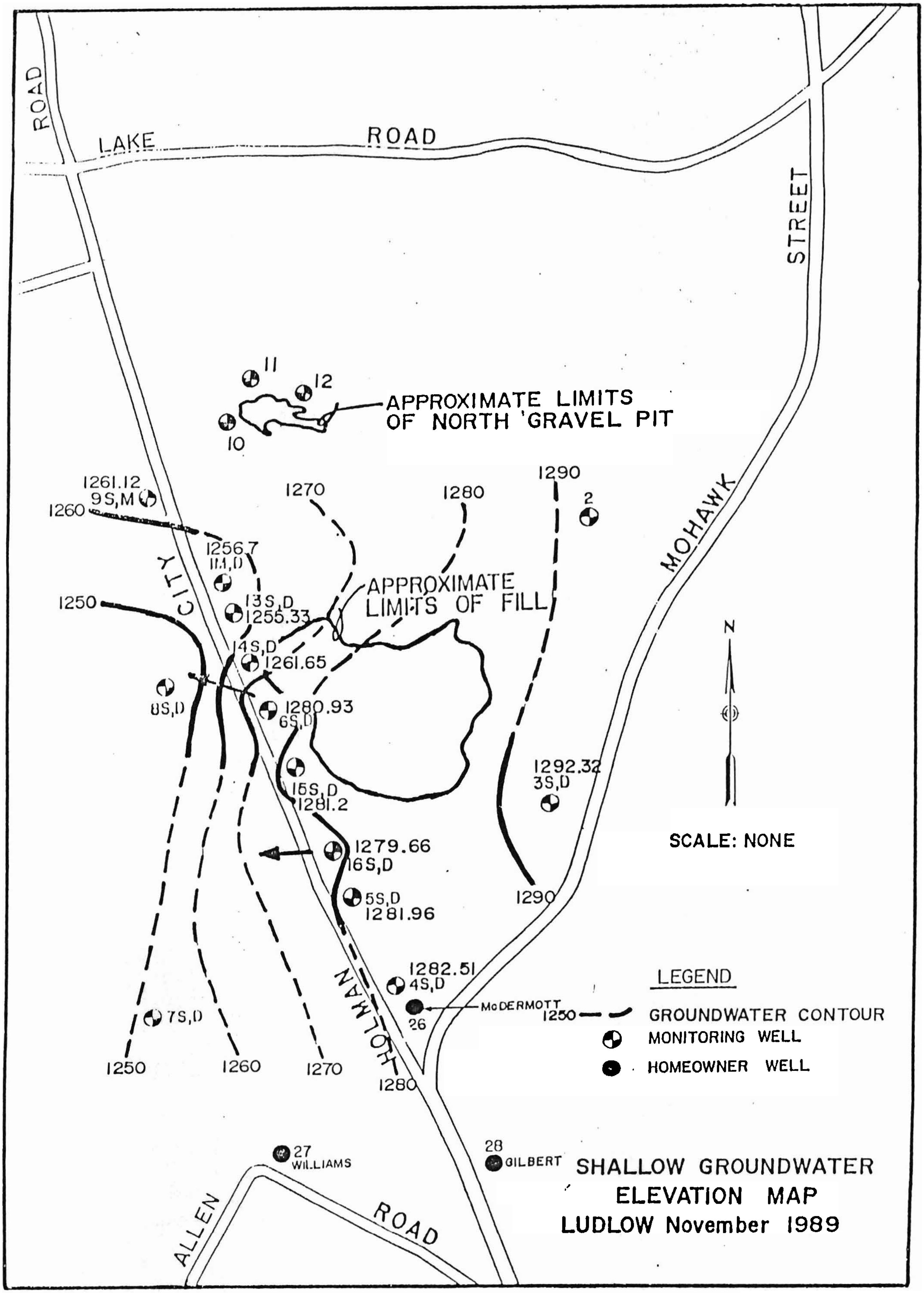


LUDLOW SANITARY LANDFILL

SCALE: NONE

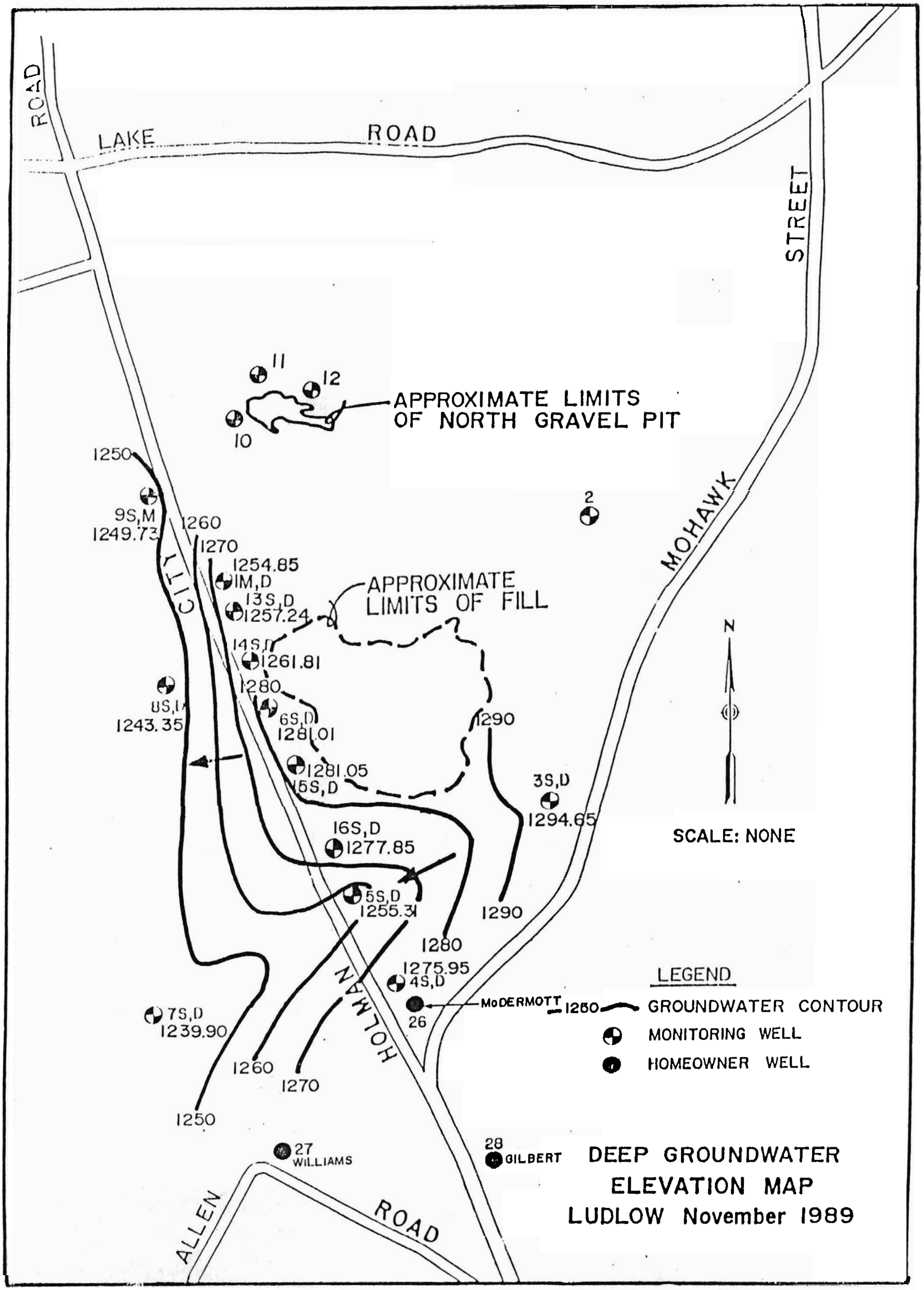
O'BRIEN & GERE ENGINEERS, INC.

FIGURE 3



O'BRIEN & GERE ENGINEERS, INC.

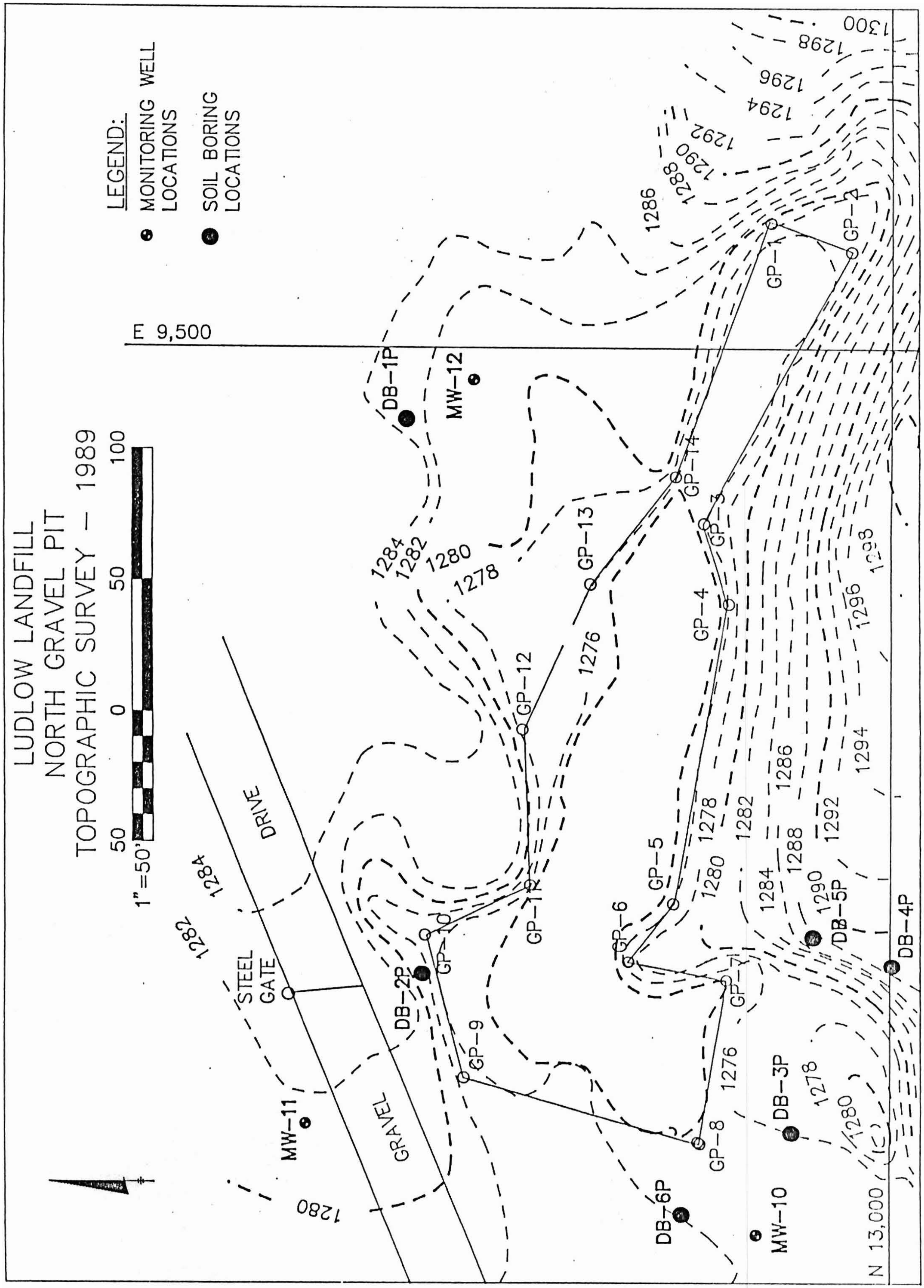
FIGURE 4



DEEP GROUNDWATER ELEVATION MAP
LUDLOW November 1989

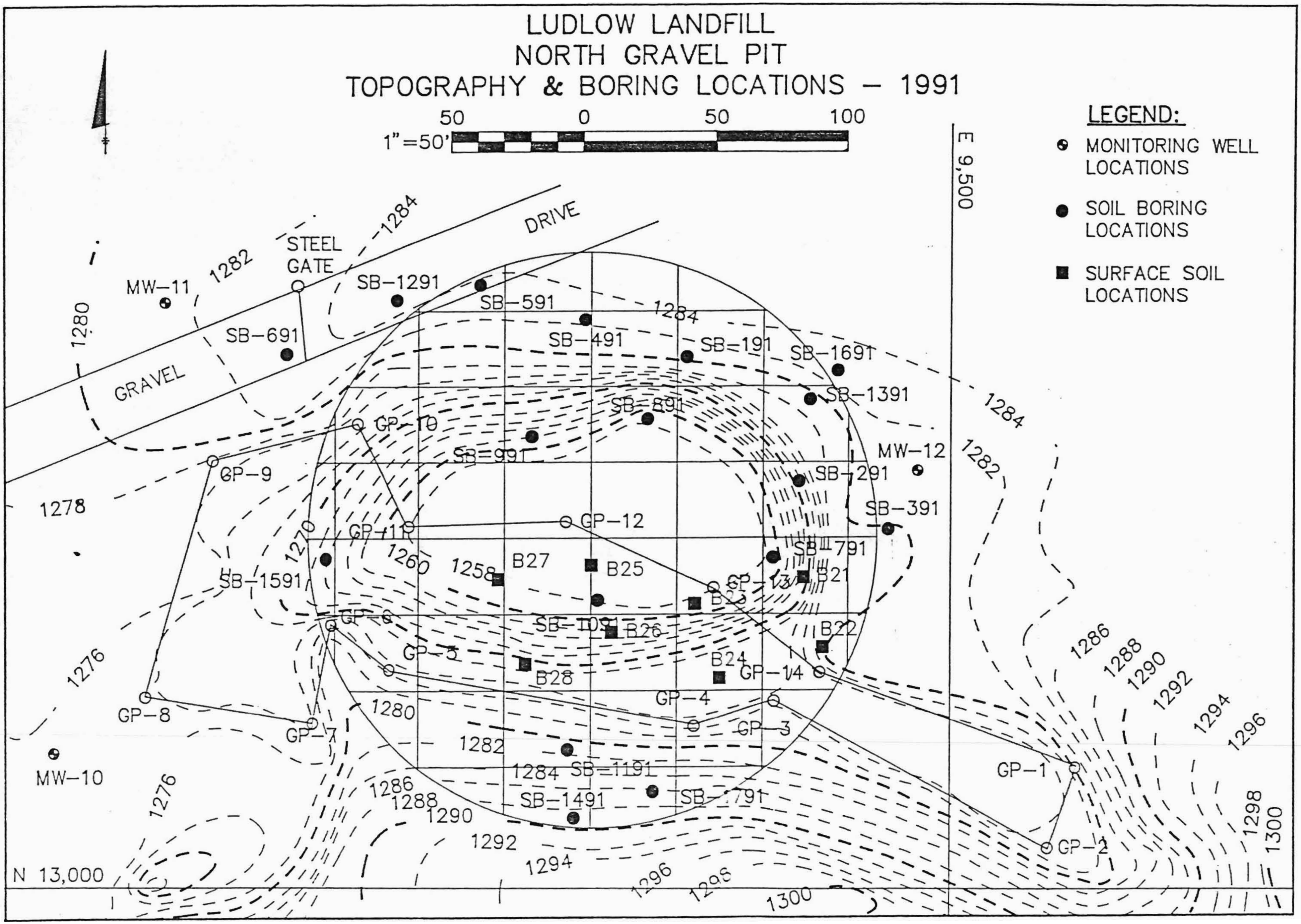
O'BRIEN & GERE ENGINEERS, INC.

FIGURE 5



O'BRIEN & GERE ENGINEERS, INC.

FIGURE 6



O'BRIEN & GERE ENGINEERS, INC.

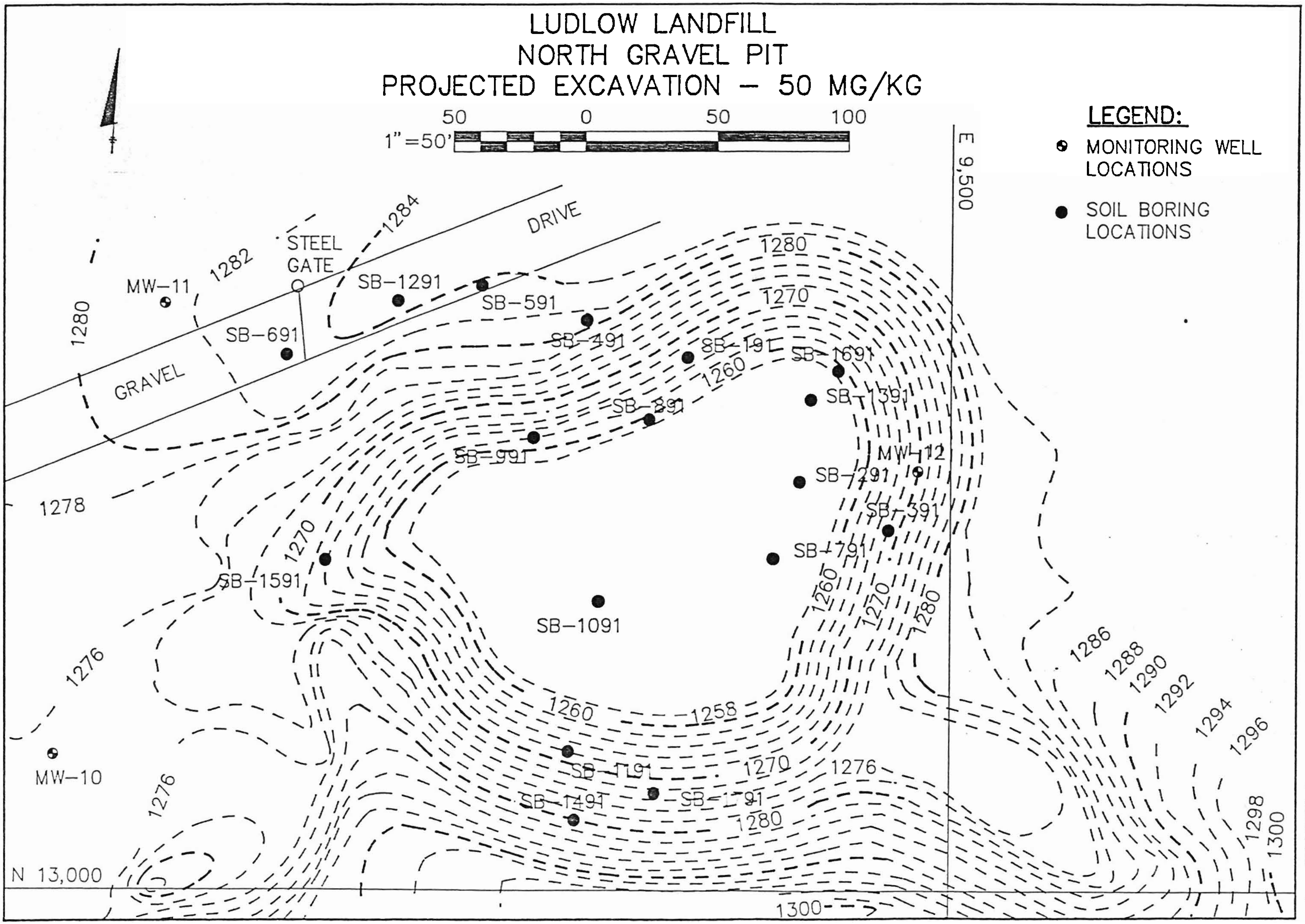


FIGURE 7

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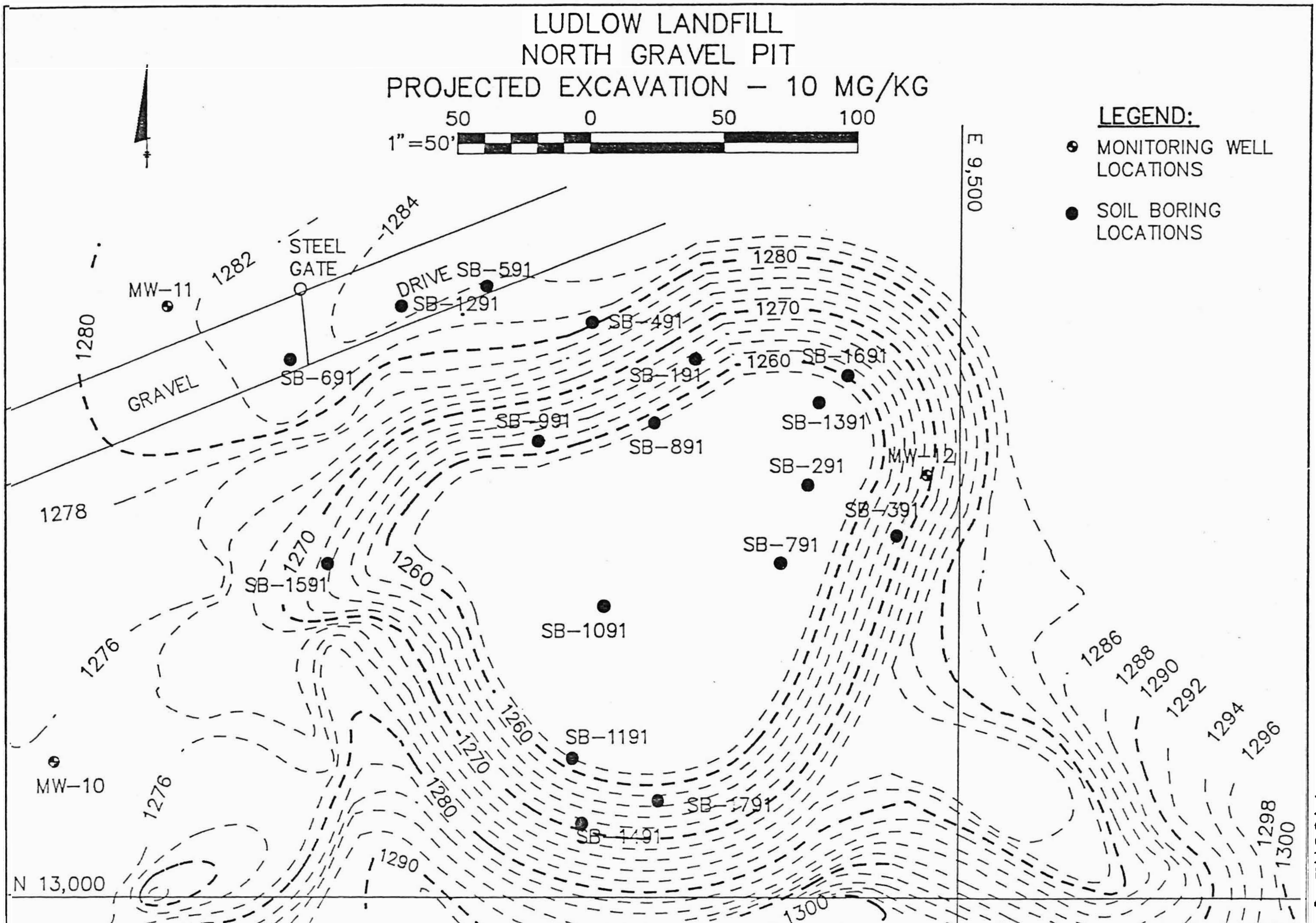
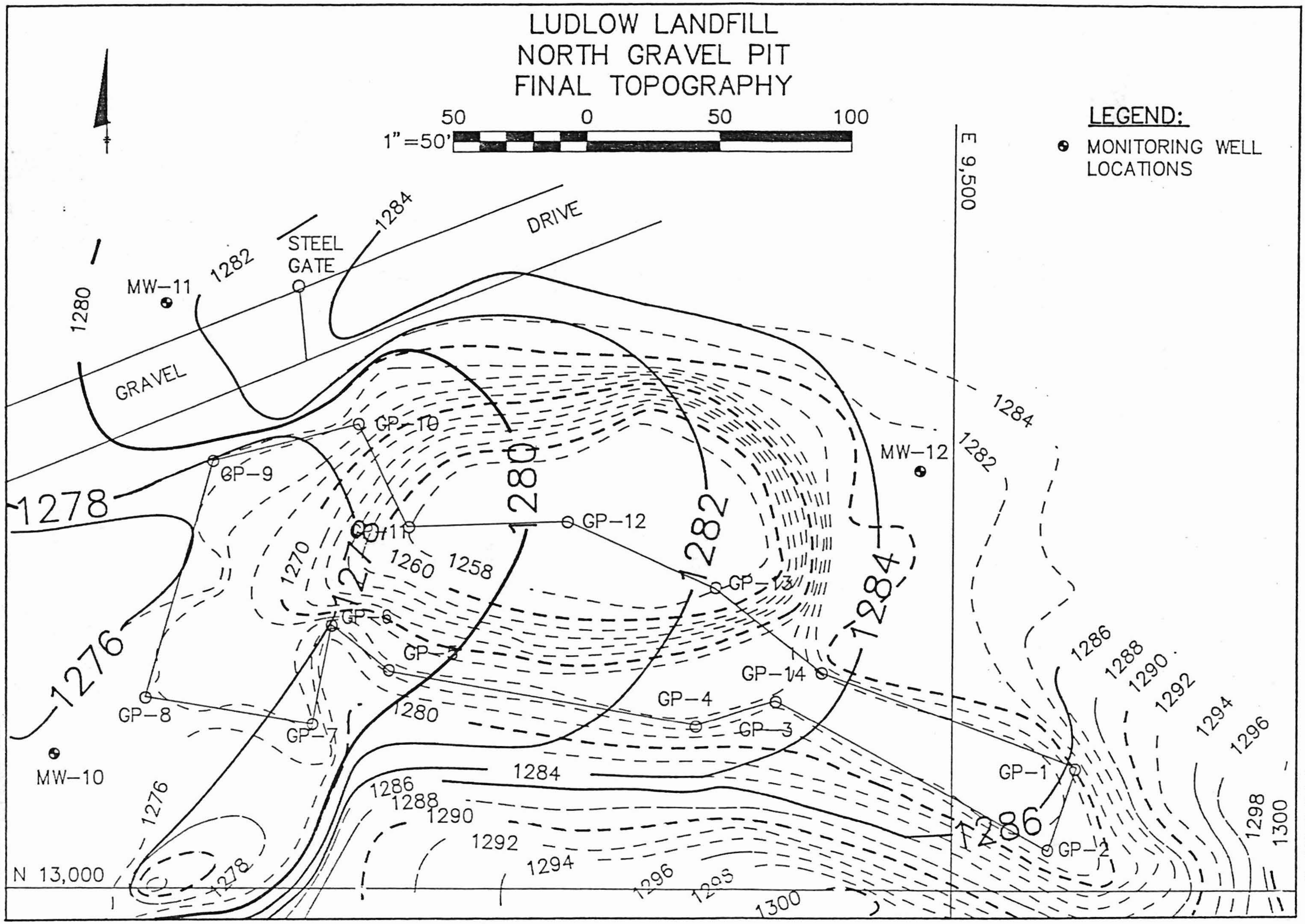
FIGURE 8



O'BRIEN & GERE ENGINEERS, INC.

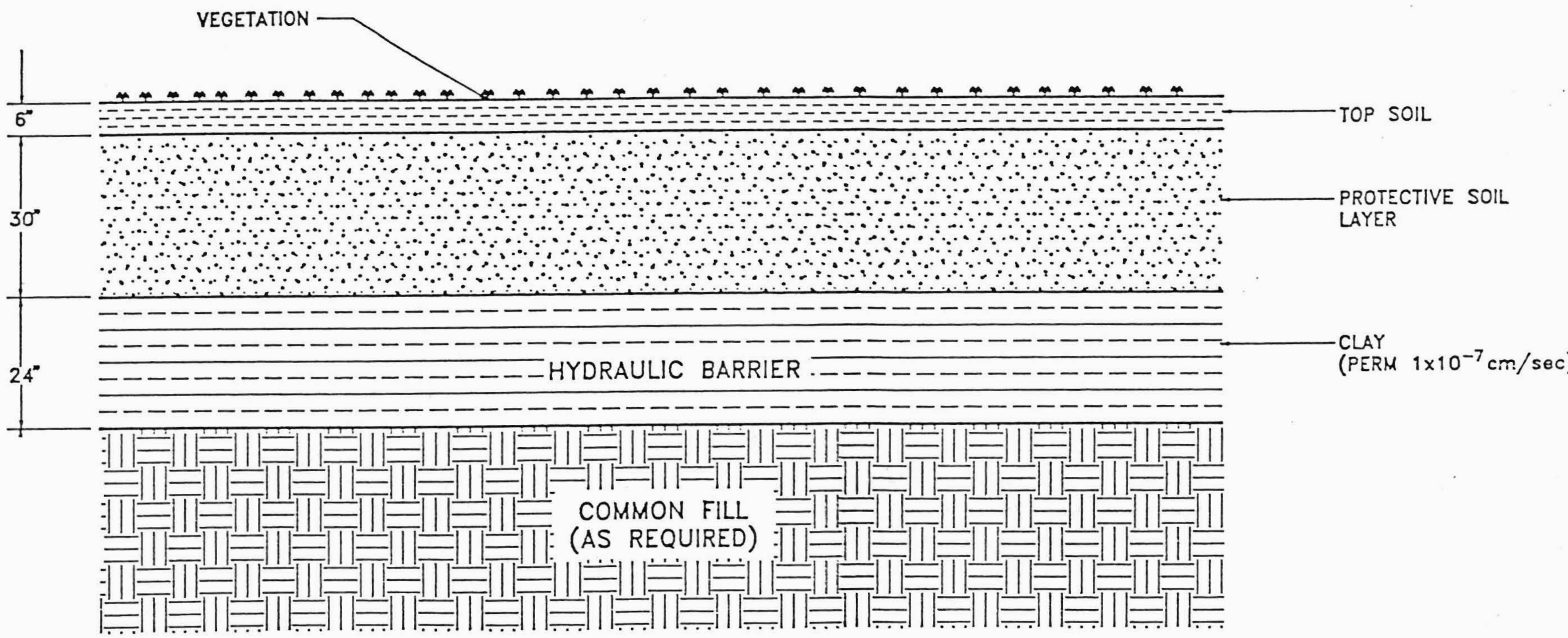


LUDLOW LANDFILL
NORTH GRAVEL PIT
FINAL TOPOGRAPHY
50 0 50 100
1"=50'
LEGEND:
MONITORING WELL LOCATIONS
E 9,500
N 13,000
GRAVEL DRIVE
STEEL GATE
MW-10
MW-11
MW-12
GP-1
GP-2
GP-3
GP-4
GP-5
GP-6
GP-7
GP-8
GP-9
GP-10
GP-11
GP-12
GP-13
GP-14
1276
1278
1280
1282
1284
1286
1288
1290
1292
1294
1296
1298
1300
1258
1260
1270
O'BRIEN&GERE ENGINEERS, INC.

FIGURE 9

063397

FIGURE 10



FULL CAP DETAIL

O'BRIEN & GERE ENGINEERS, INC.

Appendices

O'BRIEN & GERE

Appendix A

Sampling Log

O'BRIEN & GERE

SAMPLING LOG

Client : B.S+K - LUDLOW

Weather : FAIR ~85°F

Sampled by : GLL, MDL

I.D.	Date	Time	Type & Volume of Sample	pH	SPCOND	Temp.	Comments	
6S	7/11/89		TCL ORGANICS (SOL. + TOTAL) " METALS	6.6	1250		ELEV. = -45.15 VOL Removed = 22 gal	90
6D	"		"	6.7	1400		ELEV. = -45.78 Vol Removed = 52 gal	150
5S	"		"	6.9	360		ELEV. = -8.38 Volume Removed - 6 gal	21'
5D	"		"	7.1	360		ELEV. = -32.18 Vol Removed = 23 gal	
1D	7/12/89		"	7.5	32		ELEV. = -24.35 Vol Removed = 30 gal	85
1M	"		" MS + MSD (QC) ALSO	6.9	650		ELEV. = -23.0 Vol Removed = 16 gal	31'
1S	"		NOT SAMPLED				ELEV. = -9.23 Vol Removed = 5 gal	11.5
BAILER BLANK	"		TCL ORGANICS " METALS ([redacted] TOT)					
12	"		PCB's (SOL. + TOT)	7.0	700		ELEV. = -23.11 BAILED DRY/ Volume Removed = 3 gal	40
11	"		" DUP. FOR QC (TOT)	7.1	700		ELEV. = -22.95 Vol Removed = 12 gal OBSTRUCTION IN WELL LOST BAILER 3 VOL. REM.	29
10	"		PCBs (SOL. + TOT.)	7.2	380		ELEV. = -15.97 Vol Removed - 6 gal 5 VOL. REMOVED	23

O'BRIEN & GERE

SAMPLING LOG

Client: SMC - LUDLOW LANDFILL

Weather: PARTLY SUNNY, 60° F

Sampled by: GLL, MDL

I.D.	Date	Time	Type & Volume of Sample	pH	SPCOND	Temp.	Comments
MW-12	9/26/89		BAILED DRY - RETURNED AFTER 4 HRS. & COLLECTED SAMPLES	7.1	650		ELEV. = -23.99' Vol. Removed = Bailed Dry
MW-11	"		↓				BAILER CAUGHT IN WELL @ 19' - UNABLE TO SAMPLE.
MW-10	"		↓	7.3	350		ELEV. = -18.06' Bailed dry
MW-16S	"		BAILED 3 VOL. & SAMPLED	7.2	600		ELEV. = -19.48 Vol Removed = 5 gal
MW-16D	"		"	7.6	500		ELEV. = -21.38 Vol. Removed = 28.5 gal
MW-15S	"		"	7.0	800		ELEV. = -34.54 Vol Removed = 5 gal
MW-15D	"		"	6.7	1100		ELEV. = -35.41 Vol. Removed = 35 gal
MW-14S	9/27/89		"	~~7.1~~ 6.8	~~650~~ 850		ELEV. = -60.07 Vol Removed = 1 gal
MW-14D	"		"	7.1	1650		ELEV. = -60.81 Vol Removed = 24 gal
MW-13S	"		"	7.3	600		ELEV. = -27.92 Vol. Removed = 4.5 gal
MW-13D	"		BAILED DRY, 8 GAL. REMOVED	8.0	700		ELEV. = -29.18 Vol. Removed = 18 gal
MW-8S	"		BAILED 3 VOL. & SAMPLED	7.5	500		ELEV. = -40.30 Vol. Removed = 9 gal
MW-8D	"		"	7.4	450		ELEV. = -40.59 Vol. Removed = 42 gal
MW-7S	9/28/89		"	7.3	600		ELEV. = -65.17 Vol Removed = 10.5 gal
MW-7D			"	7.6	300		ELEV. = -55.83 Vol. Removed = 42.5 gal

Appendix B

Boring Logs

Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DB-1P

PROJECT Ludlow Landfill

SHEET 2 OF 2

CLIENT Whiteman, Osterman & Hanna

JOB No. 348-8-4789

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-11	6 10 11 11	GP		BrmfG s(-), cmfS, t(+)Cy$	Rec=1.0' WET
22	S-12	6 11 14 13	GW		BrcmfG l(+), cmfS, tCy$; mtld	Rec=1.0' WET
24	S-13	10 14 15 15	GW	Lab Composite Sample	BrcmfG l(+), cmfS, t(-)Cy$; mtld (GLACIO-FLUVIAL) 26.0'	Rec=.9' WET
26	S-14	7 11 10 12	GM		BrcmfG l, cmfS, lCy$; mtld	Rec=.6' WET/Moist
28	S-15	7 10 9 12	GW		Brc(-)mfG l, cmfS, tCy$; mtld	Rec=.9' WET
30	S-16	11 10 12 20	GM		Brc(-)mfG l(+), cmfS, l(+)Cy$; mtld	Rec=.8' Damp/Moist
32	S-17	9 18 18 21	GW		BrcmfG l, cmfS, tCy$; mtld	Rec=.9' WET
34	S-18	19 25 29 26	GM		BrcmfG l(+), cmfS, lCy$; mtld	Rec=1.0' Damp/Moist
36	S-19	25 37 28 26	GM		BrcmfG l(+), cmfS, l(+)Cy$; mtld	Rec=.9' Damp/Moist
38	S-20	25 27 30 31	GM		DO (TILL) 40.0'	Rec=.8' WET/Moist
40					End of Boring	

Dunn Geoscience Corp. Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. DB-1P

PROJECT	Ludlow Landfill				SHEET 1 OF 2
CLIENT	Whiteman, Osterman & Hanna				JOB No. 348-8-4789
DRILLING CONTRACTOR	Parratt-Wolff, Inc.				MEAS. PT. ELEV.
PURPOSE					GROUND ELEV.
DRILLING METHOD	4¼" ID HSA	SAMPLE	CORE	CASING	DATUM MSL
DRILL RIG TYPE Mobile B-52	TYPE	SS			DATE STARTED 6/3/87
GROUNDWATER DEPTH	DIA.	2"			DATE FINISHED 6/3/87
MEASURING POINT	WEIGHT	140#			DRILLER Neil Thurston
DATE OF MEASUREMENT	FALL	30"			INSPECTOR Michael Palleschi

DEPTH FT.	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-1	11 15 12 13	GW		Br cmfG s(-), cmfS, tCy$; mtld	Rec=.9' Moist
	S-2	10 18 17 19	GW		DO	Rec=.8' Moist
	S-3	14 16 10 7	GW		DO; not mottled.	Rec=.6' Moist
	S-4	7 9 5 5	GW		DO	Rec=.6' Moist
	S-5	11 7 4 7	GW		Brc(+)mfG l(+), cmfS, t(-)Cy$	Rec=.65' Moist
	S-6	6 6 4 4	GW		DO; mottled.	Rec=.5' Moist
	S-7	5 4 5 5	GW		DO	Rec=.7' Moist
15	S-8	5 7 5 6	GW		DO (GLACIO-FLUVIAL)	Rec=.8' Moist
	S-9	5 9 7 11	GW		Brc(+)mfG s(-), cmfS, t(-)Cy$; mtld	Rec=.9' Moist
	S-10	8 12 12 10	GW		Brcm(+)fG l, cmfS, t(-)Cy$	Rec=.8' Moist
20						

Dunn Geoscience Corp. Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. DB-2P

PROJECT Ludlow Landfill					SHEET 1 OF 2
CLIENT Whiteman, Osterman & Hanna					JOB No. 348-8-4789
DRILLING CONTRACTOR Parratt-Wolff, Inc.					MEAS. PT. ELEV
PURPOSE					GROUND ELEV.
DRILLING METHOD 4¼" ID HSA		SAMPLE	CORE	CASING	DATUM MSL
DRILL RIG TYPE Mobile B-52	TYPE	SS			DATE STARTED 6/4/87
GROUNDWATER DEPTH	DIA.	2"			DATE FINISHED 6/4/87
MEASURING POINT	WEIGHT	140#			DRILLER Neil Thurston
DATE OF MEASUREMENT	FALL	30"			INSPECTOR Michael Palleschi

DEPTH FT.	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-1	2, 4, 8, 7	SM		Organic; Rts .6 BrfS, s(+)Cy$, lmfG	Rec=1.0' Dry
	S-2	6, 6, 7, 7	SM		BrfS, s(+)Cy$, tmfG; mtld (FLUVIAL)	Rec=.7' Moist
5	S-3	3, 3, 3, 3	ML		BrCy$ s(+), fS, t(-)mfG; mtld, pt	Rec=.8' Moist
	S-4	3, 2, 1, 3	ML		BrCy$ s, fS, t(-)fG; mtld (LACUSTRINE)	Rec=1.0' Damp
	S-5	3, 5, 3, 7	ML GM		BrCy$ a(-), fS 8.9' BrmfGl, cmfS, l Cy$	Rec=1.0' Damp
10	S-6	5, 7, 11, 10	GM		Brc(+)mfG l(+), cmfS, lCy$; mtld (TILL)	Rec=1.0' Moist
	S-7	12, 13, 10, 14	GM SW		Brc(+)mfG s(-), cmfS, lCy$; mtld 12.8' Br cmfS, tCy$, t(-)fG	Rec=1.2' Moist
15	S-8	12, 18, 13, 34	SW CW		BrcmfS, tCy$, smfG, 14.6' - cmfGs, cmfS, tCy$; mtld	Rec=1.4' Moist
	S-9	19, 13, 21, 52	SW		BrcmfS, t(+)Cy$, s(+)mfG; mtld (GLACIO-FLUVIAL)	Rec=1.0' Moist
20	S-10	12, 25, 26, 28	SW GW		Brcmf(+)S, t(+)Cy$, t(-)fG; 18.5' - Brcm(+)fGs, cmfS, tCy$	Rec=1.0' Moist

Dunn Geoscience Corp. Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. DB-2P
PROJECT Ludlow Landfill		SHEET 2 OF 2
CLIENT Whiteman, Osterman & Hanna		JOB No. 348-8-4789

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-11	24	GW		BrmfG s, cmfS, tCy$	Rec=1.7'
		16			.6' BrCy$ s(+), fS, l(+)mfG	Moist
		14	ML			
22		14				
	S-12	13	SM		BrfS, l(+)Cy$, t(+)fG	Rec=1.6'
		16				Moist
		19				
24		23				
	S-13	8	SM		BrfS, l(+)Cy$, l(+)mfG	Rec=1.2'
		13				Damp
		20				
26		32				
	S-14	18	SM	Lab Composite Sample	BrfS, l(+)Cy$, l(+)m(+)fG	Rec=1.4'
		23				Damp
		34				
28		36				
	S-15	13	GP		Brcm(-)fG l, cmfS, tCy$	Rec=.4'
		25				WET
		29				
30		35				
	S-16	20	GP		Brm(+)fG a, cmfS, tCy$	Rec=1.1'
		21				WET
		23				
32		26			32.0'	
	S-17	17	GM		Br mfG l(+), cmfS, lCy$	Rec=.7'
		26				Moist
		24				
34		28				
	S-18	24	GM		Brcm(+)fG s(-), cmfS, lCy$	Rec=.6'
		28				WET
		13			(TILL)	
36		50/1.1			36.0'	
					End of Boring	

Dunn Geoscience Corp. Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. DB-3P

PROJECT	Ludlow Landfill				SHEET 1 OF 1
CLIENT	Whiteman, Osterman & Hanna				JOB No. 348-8-4789
DRILLING CONTRACTOR	Parratt-Wolff				MEAS. PT. ELEV.
PURPOSE					GROUND ELEV.
DRILLING METHOD	4¼" ID HSA	SAMPLE	CORE	CASING	DATUM MSL
DRILL RIG TYPE	Mobile B-52 TYPE	SS			DATE STARTED 6/5/87
GROUNDWATER DEPTH	DIA.	2"			DATE FINISHED 6/5/87
MEASURING POINT	WEIGHT	140#			DRILLER Neil Thurston
DATE OF MEASUREMENT	FALL	30"			INSPECTOR Michael Palleschi

DEPTH FT.	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-1	W.H., 2, 5, 7	SM		Bio, .6 - BrfS, s(-)Cy$, t(-)fG	Rec=1.4' Damp
	S-2	5, 13, 9, 12	SM SW		BrfS, s(-)Cy$, tmfG 2.8' - BrcmfS, tCy$, smfG BrcmfG l(+), cmfS, tCy$	Rec=2.0' Damp
5	S-3	10, 12, 18, 21			BrcmfG l(+), cmfS, tCy$	Rec=.65' Moist
	S-4	20, 25, 31, 31			Brc(-)mfG s(+), cmfS, tCy$; mtld	Rec=1.1' Moist Till
	S-5	17, 16, 9, 9			Brc(+)mfG l(+), cmfS, tCy$ 8.5' - BrcmfS, tCy$, t(-)fG	Rec=1.0' Moist
10	S-6	9, 15, 14, 18			BrmfG l(+), cmfS, tCy$	Rec=1.0' Moist Till
	S-7	15, 9, 15, 17		Lab Composite Sample	BrcmfS, tCy$, tmfG 12.8' - BrmfG l, cmfS, tCy$; mtld	Rec=1.3' Damp
15	S-8	8, 13, 15, 12			BrmfG l(+), cmfS, tCy$; mtld 16.0'	Rec=.8' WET
	S-9	6, 9, 13, 16	ML		BrCy$ l, fS; lns cmfS (LACUSTRINE)	Rec=1.4' Damp
20	S-10	5, 6, 10, 10	ML		DkgrCy$ t, fS End of Boring 20.0'	Rec=1.9' Damp

Dunn Geoscience Corp.
Albany, NY 12205 (518)458--1313

TEST BORING LOG

BORING No. DB-4P

PROJECT Ludlow Landfill					SHEET 1 OF 3
CLIENT Whiteman, Osterman & Hanna					JOB No. 348-8-4789
DRILLING CONTRACTOR Parratt-Wolff, Inc.					MEAS. PT. ELEV.
PURPOSE					GROUND ELEV.
DRILLING METHOD 4¼" ID HSA		SAMPLE	CORE	CASING	DATUM MSL
DRILL RIG TYPE Mobile B-52	TYPE	SS			DATE STARTED 6/8/87
GROUNDWATER DEPTH	DIA.	2"			DATE FINISHED 6/8/87
MEASURING POINT	WEIGHT	140#			DRILLER Neil Thurston
DATE OF MEASUREMENT	FALL	30"			INSPECTOR Michael Palleschi

D FT.	SAM NUMBER	BLOWS ON SAMPLE SPOON PER 6	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-1	2 3 4 3	SM		Bio; .2' - BrfS, 1(+)Cy$, lmfG	Rec=.8' Moist
	S-2	3 4 4 4	SM		BrfS, 1(+)Cy$, tfG; mtld	Rec=2.0' Moist
5	S-3	3 2 1 2	SM		BrfS, 1(+)Cy$, tmfG; mtld	Rec=.8' Damp
	S-4	2 5 5 2	SM		BrfS, 1(+)Cy$, t(-)fG; (LACUSTRINE) 8.0'	Rec=.5' Damp
	S-5	2 2 15 25	GM GM		BrmfGS(+), cmf(+)S, 1Cy$ BrcmfG s, cmf(+) S, 1(+)Cy$	Rec=.7' Damp Till like
10	S-6	4 20 23 33	GM		BrmfG s, cmfS, 1Cy$; mtld	Rec=1.2' Moist Till like
	S-7	10 50/.3	GM GM		Brmf(+)G s, cmfS, 1Cy$ 12.3' - BrfS, 1(+)Cy$, tfG	Rec=.8' Damp Cobble
15	S-8	7 13 23 22	SM GM		BrfS, t(+)Cy$, am(+)fG; 14.8' - mfG s, cmfs, 1Cy$; mtld	Rec=1.3' Damp Till
	S-9	18 20 31 24	GM		BrcmfG s, cmfS, 1Cy$; mtld.	Rec=1.0' Moist Till
20	S-10	17 23 25 21	GM		BrmfG s, cmfS, 1Cy$; mtld (TILL)	Rec=1.2' Dry Till

FORM 001

Dunn Geoscience Corp. Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. DB-4P
PROJECT Ludlow Landfill		SHEET 2 OF 3
CLIENT Whiteman, Osterman & Hanna		JOB No. 348-8-4789

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-11	13 20 17 18	GM		BrmfG l(+), cmfS, tCy$; mtld	Rec=1.0' Dry Till
	S-12	14 18 30 25	GM		DO	Rec=1.3' Dry Till
25	S-13	19 28 17 16	GM		DO	Rec=1.0' Dry Till
	S-14	30 22 22 18	GM		BrcmfG s(+), cmfS, lCy$; mtld	Rec=1.5' Dry Till
30	S-15	4 7 19 28	GM		BrmfG s, cmfS, lCy$; mtld	Rec=1.2' WET Till
	S-16	17 33 37 21	GM	Lab Compo-site Sample	DO	Rec=1.3' WET Till
	S-17	33 34 33 23	GM		DO (TILL)	Rec=1.7' WET Till
35	S-18	3 7 19 21	GM		DO	Rec=.7' WET
	S-19	16 23 26 21	GM		Brm(+)fG s(+), cmfS, lCy$; mtld	Rec=.9' Damp
40	S-20	22 22 28 22	GM		BrmfG s, cmfS, lCy$ .65 - Br cm(+) fS, lCy$	Rec=1.3' Damp
	S-21	5 11 10 13	SW	Lab Compo-site Sample	Brcm(+)fS, tCy$	Rec=.9' WET
	S-22	7 21 21 30	SW		DO (GLACIO-FLUVIAL)	Rec=1.0' WET
44						

FORM002

Dunn Geoscience Corp. Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. DB-4P
PROJECT Ludlow Landfill		SHEET 3 OF 3
CLIENT Whiteman, Osterman & Hanna		JOB No. 348-8-4789

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSI-FICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
		16	SW	Lab	Brcm(+)fS, tCy$, tfG 45.0'	Rec=1.6'
	S-23	22		Compo-	Br mf(+)G a, cmfs, lCy$	WET/Moist
		29	GM	site		
46		33		Sample		
		24			No Recovery	Rec=0
	S-24	40				
		44				
		48			(TILL) 48.0'	
48					End of Boring	

FORM002

Dunn Geoscience Corp. Albany, NY 12205 (518)458-1313	TEST BORING LOG	BORING No. DB-5P

PROJECT Ludlow Landfill					SHEET 1 OF 2
CLIENT Whiteman, Osterman & Hanna					JOB No. 348-8-4789
DRILLING CONTRACTOR Parratt-Wolff					MEAS. PT. ELEV.
PURPOSE					GROUND ELEV.
DRILLING METHOD 4¼" ID HSA		SAMPLE	CORE	CASING	DATUM MSL
DRILL RIG TYPE Mobile B-52	TYPE	SS			DATE STARTED 6/9/87
GROUNDWATER DEPTH	DIA.	2"			DATE FINISHED 6/9/87
MEASURING POINT	WEIGHT	140#			DRILLER Neil Thurston
DATE OF MEASUREMENT	FALL	30"			INSPECTOR Michael Palleschi

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-1	1, 2, 3, 2	SM		Bio, .2' - BrfS, 1(+)Cy$, s(+)m(+)fG	Rec=.9' Damp
	S-2	5, 4, 3, 3	GW		Brm(+)fG s, cmfS, tCy$	Rec=.5' Moist
5	S-3	2, 2, 2, 2	SM		BrfS, 1(+)Cy$, sm(+)fG; mtld	Rec=5.5' Damp
	S-4	1, 1, 2	SW/SP		Brc(-)mfS, t(+)Cy$, lmf(-)G; mtld (GLACIO-FLUVIAL)	Rec=1.3' Damp
	S-5	1, 3, 5, 12	SW GM		Brcm(+)fS, tCy$, t(-)fG; mtld 8.5' Brm(+)fG 1(+), cmfS, 1Cy$; mtld	Rec=1.1' Damp Till
10	S-6	10, 17, 15, 14	GM		Brm(+)fG 1(+), cmfS, 1Cy$; mtld	Rec=1.0' Moist Till
	S-7	18, 20, 20, 21	GM		Brmf(+)G s, cmfS, 1Cy$	Rec=1.3' Dry Till
15	S-8	10, 14, 17, 14	GM		Brmf(+)G a, cmfS, 1Cy$	Rec=1.3' Dry
	S-9	10, 10	GM SM		Brm(-)fG a, cmfS, 1Cy$ 15.6' - Brcm(+)fS, 1Cy$, t(-)fG	Rec=1.9' Dry
20	S-10	27, 30, 30, 25	GM	Lab Composite Sample	Brc(-)mfG s, cmfS, 1Cy$ (TILL)	Rec=1.3' Moist

Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DB-5P

PROJECT Ludlow Landfill

SHEET 2 OF 2

CLIENT Whiteman, Osterman & Hanna

JOB No. 348-8-4789

DEPTH FT	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-11	20, 22, 30, 34	GM	Lab Composite	Brm(+)fG s(-), cmfS lCy$	Rec=1.7' WET
	S-12	40, 35, 24, 23	GM		BrmfG s(+), cmfS, l(+)Cy$	Rec=1.3' Damp Till
25	S-13	18, 24, 32, 38	GM	Sample	Brm(+)fG s(+), cmf(+)S, l(+)Cy$ (TILL) 26.0'	Rec=1.3' Moist Till
					End of Boring	

FORM 1002

Dunn Geoscience Corp.
Albany, NY 12205 (518)458-1313

TEST BORING LOG

BORING No. DB-6P

PROJECT	Ludlow Landfill
CLIENT	Whiteman, Osterman & Hanna
DRILLING CONTRACTOR	Parratt-Wolff, Inc.
PURPOSE	
DRILLING METHOD	4¼" ID HSA
DRILL RIG TYPE	Mobile B-52
GROUNDWATER DEPTH	
MEASURING POINT	
DATE OF MEASUREMENT	

	SAMPLE	CORE	CASING
TYPE	SS		
DIA.	2"		
WEIGHT	140#		
FALL	30"		

SHEET 1 OF 1	
JOB No.	348-8-4789
MEAS. PT. ELEV.	
GROUND ELEV.	
DATUM	MSL
DATE STARTED	6/9/87
DATE FINISHED	6/9/87
DRILLER	Neil Thurston
INSPECTOR	Michael Palleschi

DEPTH	SAMPLE NUMBER	BLOWS ON SAMPLE SPOON PER 6"	UNIFIED CLASSIFICATION	GRAPHIC LOG	GEOLOGIC DESCRIPTION	REMARKS
	S-1	2, 5, 7	SM		BrfS, l(+)Cy$, lm(+)fG; o, rts	Rec=1.6' Moist
	S-2	2, 7, 28, 12	SM, GP		BrfS, l(+)Cy$, tfG; 2.8' - BrmfG a, cmfS, tCy$	Rec=1.3' Damp
5	S-3	7, 14, 21, 35	GP		BrmfG s(+), cmfS, tCy$	Rec=1.3' Moist
	S-4	45, 28, 25, 20	GP		Brm(+)fG l(+), cmfS, tCy$ (GLACIO-FLUVIAL)	Rec=1.3' Damp
	S-5	13, 22, 27, 33	GP, GM	Lab Composite Sample	BrmfG s(-), cmfS, tCy$ 8.8' BrmfG s, cmfS, lCy$; mtld	Rec=1.7' WET Till
10	S-6	20, 13, 12, 35	GM		BrmfG s(+), cmfS, lCy$; mtld (TILL)	Rec=1.5' Moist Till
	S-7	17, 25, 20, 14	GM, GM		BrmfG s(+), cmfS, lCy$ 13.0' - BrmfG s(+), cmfS, lCy$; mtld 14.0'	Rec=1.4' Dry
15	S-8	5, 6, 6, 9	SW, ML	Lab Composite Sample	BrcmfS, tCy$ 15.2' - BrCy$ l(+), fS	Rec=1.7' WET
	S-9	7, 12, 18, 14	ML, GP, ML		Br Cy$l(+), fS 16.2' - Brmf(+)G s, cmfS, tCy$ 16.8' - Br Cy$t(+), fS	Rec=1.0' Damp
20	S-10	14, 13, 17, 21	ML, ML		BrCy$ t(+), fS 18.4' - DkgrCy$ t, fs (LACUSTRINE) End of Boring at 20.0'	Rec=1.4' Damp

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-191 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill, Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 101 ft. North, 59 degrees West of MW-12 START DATE: 6/27/91 1110 END DATE: 6/27/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH - 22-24 ft. ANALYSIS - PCB's	ELEVATION - 1284.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	8-6-6-7	1.0	12	Dry, light brown/brown fine to coarse SAND and round to subround GRAVEL (matrix-supported), trace silt and clay, massive				0
1										
2	2	2-4'	5-5-4-5	0.8	9	Damp, brown/gray silty CLAY, little fine, gravel and fine to coarse sand, massive				0
3										
4	3	4-6'	2-2-1-2	1.2	3	Damp, brown/light brown SAND and fine to medium GRAVEL, little silt, trace clay, massive				0
5										
6	4	6-8'	3-7-7-11	0.7	14	As above, damp, round to subround, faceted and striated gravel				0
7										
8	5	8-10'	10-11-10-17	0.9	21	Damp, brown to gray GRAVEL with sand, silt and green to red, faintly laminated clay				0
9										
10	6	10-12'	18-21-11-10	0.6	32	As above, damp gravel, saturated in some fractures				0
11										
12	7	12-14'	14-16-14-15	0.8	30	Damp, brown to gray, sandy GRAVEL with little silt and clay, massive				0
13										
14	8	14-16'	8-22-12-8	1.3	34	As above, dry with tan clay horizontal laminations (flow till ?)				0
15										
16	9	16-18'	18-12-10-13	1.2	22	As above, damp silt and clay, massive				0
17										
18	10	18-20'	5-15-10-12	1.0	25	Damp, brown to gray SILT and rust-colored to greenish/brown to gray CLAY, massive				1
19										
20	11	20-22'	12-9-19-8	1.6	28	As above, damp with saturated fractures				0

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-191 PAGE 2 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 101 ft. North, 59 degrees West of MW-12 START DATE: 6/27/91 1110 END DATE: 6/27/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH - 22-24 ft. ANALYSIS - PCB's	ELEVATION - 1284.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
21										
22	12	22-24'	11-12-	1.4	33	As above, damp		Submitted		1
			21-22					to lab for		
23								PCB's		
								Analyses		
24	13	24-26'	12-12-	1.8	22	Saturated brown to gray GRAVEL with sand,				0
			10-12			silt and clay (no odor or sheen)				
25										
26										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-291 PAGE 1 OF 1
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill, Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 43 ft. North, 75 degrees West of MW-12 START DATE: 6/27/91 1400 END DATE: 6/27/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH - 14-16 ft. ANALYSIS - PCB's	ELEVATION - 1277.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	1-2-3-4	1.0	5	Dry to damp, brown to gray GRAVEL and SAND with little silt and clay, matrix-supported, massive				0
1										
2	2	2-4'	7-5-7-4	0.9	12	As above, damp fine sand, dry gravel				0
3										
4	3	4-6'	6-5-6-5	1.6	11	(4-4.7') As above, damp (4.7-5.2') Damp, brown, fine well-sorted SAND (5.2-5.8') Saturated, brown to white medium, well-sorted SAND				2
5										
6	4	6-8'	6-5-5-7	1.6	10	(5.8-6') Damp, brown SAND and GRAVEL with clay and silt (6-8') As above, damp, brown GRAVEL with less sand, silt and clay, massive				10
7										
8	5	8-10'	9-8-4-4	1.1	12	As above, dry brown/gray GRAVEL and SAND				0
9										
10	6	10-12'	3-5-8-10	1.0	13	As above, damp				0
11										
12	7	12-14'	8-6-8-7	—	14	No recovery				—
13										
14	8	14-16'	6-6-11-7	0.9	17	Saturated, brown/light brown GRAVEL and SAND with silt and brown clay, massive		Submitted to lab for PCB's Analyses		0
15										
16	9	16-18'	8-8-9-13	1.1	17	As above, saturated				0
17										
18										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-391 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 26 ft. South, 36 degrees West of MW-12 START DATE: 6/28/91 0630 END DATE: 6/28/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH - 18-20 ft. ANALYSIS - PCB's	ELEVATION - 1280.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	2-4-7-11	0.4	11	(0-0.4') Dry, brown/black to white medium SAND				0
1						(0.4-3.4') Saturated, brown, medium to coarse SAND with angular to round, fine gravel, massive				
2	2	2-4'	10-10-6-13	1.1	16	(3.4-4') Damp to saturated, gray to brown SILT and CLAY with fine to medium gravel and coarse to very coarse sand				0
3										
4	3	4-6'	21-19-13-11	0.6	32	(4-5') As above, damp black to white SAND (5-6') Damp SILT and CLAY with gravel, trace sand, massive				0
5										
6	4	6-8'	11-10-10-8	1.1	20	As above, damp with zones of pure SILT and red/brown CLAY, some gray/yellow to red clay spots				0
7										
8	5	8-10'	5-9-10-15	1.0	19	Damp, brown GRAVEL in clay matrix, some sand, deformed clay lamination, peat zone				0
9										
10	6	10-12'	21-10-10-10	0.7	20	As above, dry, mostly green to white marbled, GRAVEL, matrix-supported				0
11										
12	7	12-14'	12-9-15-14	0.8	24	As above, dry with red sandstone pebbles, A-axis random, facets common, subrounded gravel				0
13										
14	8	14-16'	15-16-18-18	0.4	34	Damp, brown sandy SILT with clay, trace fine gravel and fine to medium sand, massive				1
15										
16	9	16-18'	16-9-9-13	1.2	18	Damp with wet zone at 17.5', brown to rust-colored GRAVEL with silt and clay matrix, some sand				0
17										
18	10	18-20'	12-10-11-15	2.0	21	As above, damp with no wet zone, 55% GRAVEL, 20% sand, 15% silt, 10% clay		Submitted to lab for PCB's Analyses		0
19										
20	11	20-22'	16-15-21-36	1.1	36	As above, saturated at 20.1'				0

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

CLIENT: Special Metals

PROJECT LOCATION: Ludlow Landfill
Paris, New York

FILE NO.: 2290.039.760

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Doug Richmond
OBG GEOLOGIST: Paul Gottler

SAMPLER Split Spoon
HAMMER: 140 lbs.
FALL: 30"

ANALYTICAL SAMPLES

DEPTH - 18-20 ft.

ANALYSIS - PCB's

LOCATION: 26 ft South, 36 degrees West of MW-12
START DATE: 6/28/91 0630
END DATE: 6/28/91

ELEVATION - 1280.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
21										
22	12	22-24'	16-16-15-14	1.8	31	As above, saturated (no odor or sheen)				0
23										
24										

NOTES: Split sample with DEC Representative
Mostly fine gravel up auger
Completed boring 0845 to 24'

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-491 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 143 ft. North, 78 degrees West of MW-12 START DATE: 6/28/91 1000 END DATE: 6/28/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH - 22-24 ft. ANALYSIS - PCB's	ELEVATION - 1284.9 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	FIELD TESTING HNU
0	1	0-2'	10-34- 23-46	1.0	57	Dry, gray/brown, fine to medium, subround and faceted GRAVEL and very fine to coarse SAND, little silt, trace clay, massive				0
1										
2	2	2-4'	49-65/.4	0.3	—	As above, damp, browner, more silt and clay				0
3										
4	3	4-6'	8-7-7-8	1.1	14	As above, dry				0
5										
6	4	6-8'	9-8-7-6	0.6	15	As above, damp with 60% GRAVEL, 20% sand, 15% silt, 5% clay, sandier than above				0
7										
8	5	8-10'	15-16- 16-18	0.7	32	As above, damp with more silt and clay				0
9										
10	6	10-12'	4-13- 14-11	2.0	27	As above, damp with more sand				0
11										
12	7	12-14'	18-16- 16-15	0.4	32	As above, dry, 70-80% GRAVEL, fossiliferous limestone pebbles				0
13										
14	8	14-16'	11-7- 10-11	1.1	17	(14-14.6') Damp, brown GRAVEL with silt and clay, trace sand				0
15						(14.6-16') Dry, brown/gray GRAVEL with sand, trace silt and clay				
16	9	16-18'	11-18- 18-10	0.4	36	As above, dry with large sandstone pebble				1
17										
18	10	18-20'	11-11- 10-8	1.6	21	(18-18.4') Dry, light brown/brown GRAVEL and SAND				0
19						(18.4-20') Dry, gray to white medium SAND, well-sorted, grades to brown, fine SAND, well-sorted				

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

CLIENT: Special Metals

PROJECT LOCATION: Ludlow Landfill
Paris, New York

FILE NO.: 2290.039.760

SAMPLER Split Spoon
HAMMER: 140 lbs.
FALL: 30"

LOCATION: 143 ft. North, 78 degrees West of MW-12
START DATE: 6/28/91 1000
END DATE: 6/28/91

ANALYTICAL SAMPLES

DEPTH - 22-24 ft.

ANALYSIS - PCB's

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Doug Richmond
OBG GEOLOGIST: Paul Gottler

ELEVATION - 1284.9 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
20	11	20-22'	6-5-7-8	1.9	12	Damp, brown/white to black, medium, very well sorted SAND, trace gravel				0
21										
22	12	22-24'	11-10-8-8	1.9	18	As above, damp, trace silt and clay		Submitted to lab for PCB's Analyses		0
23										
24	13	24-26'	8-6-6-11	2.0	12	(24-24.4') As above, damp (24.4-25.8') As above, saturated				0
25						(25.8-26') Saturated GRAVEL, with sand, trace silt and clay (no odor or sheen)				
26										

NOTES: Split sample with DEC Representative
Completed boring 1145 to 26'

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-591 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 186 ft. North, 79 degrees West of MW-12 START DATE: 6/28/91 1300 END DATE: 6/28/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH - 22-24 ft. ANALYSIS - PCB's	ELEVATION - 1284.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'				Dry GRAVEL and SAND (road surface)				
1										
2	2	2-4'	5-5-6-5	1.1	11	Dry, brown/light brown fine to medium, round				0
						to subround GRAVEL and fine to coarse SAND,				
3						little brown to red to green clay, little				
						silt				
4	3	4-6'	6-7-7-12	1.3	14	As above, dry, brown, subangular to round				0
						GRAVEL and SAND				
5										
6	4	6-8'	15-9-8-8	1.0	17	(6-6.7') As above, dry				0
						(6.7-8') Dry, brown, fine well-sorted SAND				
7						with gravel, appears massive				
8	5	8-10'	6-6-7-3	1.4	13	As above, dry with trace fine gravel only,				0
						massive				
9										
10	6	10-12'	4-7-4-5	1.1	11	As above, damp with very fine SAND and SILT,				1
						1 large sandstone pebble				
11										
12	7	12-14'	2-2-3-4	0.9	5	Damp with saturated zones, brown/light brown,				0
						very fine to medium, laminated SAND, some				
13						coarse sand horizontal, trace fine gravel,				
						saturated at 13.3'				
14	8	14-16'	8-10-	1.1	20	(14-15.6') As above, with A-axis horizontal				0
			10-8			(15.6-16') Damp, brown/red brown SILT and				
15						GRAVEL with sand and clay				
16	9	16-18'	13-14-	0.8	28	(16-16.9') As above, damp with fine gravel, flow				0
			14-12			till				
17						(16.9-17.1') Damp, tan SILT, horizontal				
						(17.1-18') Damp SILT, fine sand and gravel,				
18	10	18-20'	9-6-	2.0	19	trace sand and clay				0
			13-10			(18-19.6') As above, damp with saturated silt,				
19						saturated coarse sand horizons				
						(19.6-20') Sharp contact with gray SILT				
						and GRAVEL				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-591 PAGE 2 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill, Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 186 ft. North, 79 degrees West of MW-12 START DATE: 6/28/91 1300 END DATE: 6/28/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH – 22-24 ft. ANALYSIS – PCB's	ELEVATION – 1284.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
20	11	20-22'	7-7-8-11	0.6	15	Round to angular PEBBLES, A-axis random, trace sand				0
21										
22	12	22-24'	54/.4	0.4	—	As above, damp to saturated gray SILT and GRAVEL		Submitted to lab for PCB's Analyses		0
23										
24	13	24-26'		2.0		(24-25') As above, damp (25-26') Damp to saturated, brown SILT and GRAVEL with sand and brown clay, saturated at 25.2' (no odor or sheen)				— 0
25										
26										

NOTES: Split sample with DEC Representative
Completed boring 1440 to 26'

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-691

CLIENT: Special Metals

PROJECT LOCATION: Ludlow Landfill
Paris, New York

FILE NO.: 2290.039.760

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Doug Richmond
OBG GEOLOGIST: Paul Gottler

SAMPLER Split Spoon
HAMMER: 140 lbs.
FALL: 30"

ANALYTICAL SAMPLES

DEPTH - 24-26 ft.

ANALYSIS - PCB's

LOCATION: 45 ft. South, 57 degrees East of MW-11

START DATE: 7/1/91 0845
END DATE: 7/1/91

ELEVATION - 1283.1 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'				Dry SAND and GRAVEL (road)				
1										
2	2	2-4'	6-8-7-6	0.6	15	Dry, brown, fine SAND and GRAVEL, with trace silt and clay, massive				0
3										
4	3	4-6'	4-3-3-3	0.8	6	As above, damp, brown, fine SAND with gravel, clay laminations				0
5										
6	4	6-8'	4-4-4-4	1.1	8	As above, damp				0
7										
8	5	8-10'	2-2-2-3	1.8	4	Damp, brown, fine SAND, little clay and silt, trace gravel, laminated				0
9										
10	6	10-12'	2-1-2-4	1.7	3	(10-10.4') As above, damp (10.4-10.8') Saturated, brown SILT, trace clay				0
11						(10.8-11.6') Damp, brown, fine SAND and CLAY				
12	7	12-14'	7-15-12-14	1.3	27	(11.6-12.8') Damp, well-sorted, medium SAND (12.8-14') Dry, gray to brown GRAVEL, trace silt, sand and clay				0
13										
14	8	14-16'	4-9-9-8	1.5	18	As above, dry, clast-supported				0
15										
16	9	16-18'	11-15-12-11	1.1	27	As above, dry with sand matrix				0
17										
18	10	18-20'	10-10-8-11		18	(18-18.7') As above, damp (18.7-20') Damp, brown, fine GRAVEL with sand, silt and clay, matrix-supported (flow till ?)				0
19										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-691 PAGE 2 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 45 ft. South, 57 degrees East of MW-11 START DATE: 7/1/91 0845 END DATE: 7/1/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH - 24-26 ft. ANALYSIS - PCB's	ELEVATION - 1283.1 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
20	11	20-22'	15-12-		59	(20-21.7') As above, damp				0
			47-30			(21.7-22') Damp, gray GRAVEL, trace sand,				
21						clast-supported				
22	12	22-24'	15-30-		61	Damp, brown/gold brown SAND and GRAVEL				0
			31-29			with trace red/brown clay, trace silt,				
23						laminated (lodgement till ?)				
24	13	24-26'	27-30-		61	(24-26') As above, damp		Submitted		0
			31-27			As above, saturated (no odor or sheen)		to lab for		
25								PCB's		
								Analyses		
26	14	26-28'	19-27-		56	As above with purple CLAY				0
			29-28							
27										
28										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-791 PAGE 1 OF 1
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 73 ft. North, 25 degrees East of GP-4 START DATE: 7/1/91 1300 END DATE: 7/1/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH - 2-4 ft. ANALYSIS - PCB's	ELEVATION - 1258.0 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	2-4-4-5	0.6	8	Saturated, gray SILT and CLAY, trace gravel, parallel laminations (~18/.1')				
1										
2	2	2-4'	5-5-4-3	0.6	9	As above, saturated gold to brown CLAY and SILT (HNU did not deflect down hole) (no sheen)		Submitted to lab for PCB's Analyses		
3										
4										

NOTES: Immediately east of boring was orange/brown seep

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-891 PAGE 1 OF 1
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill, Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 125 ft. North, 10 degrees West of GP-4 START DATE: 7/1/91 1430 END DATE: 7/1/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH - 4-6 ft. ANALYSIS - PCB's	ELEVATION - 1258.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	2-2-6-6	0.9	8	Saturated, brown/gold brown, fine, well-sorted SAND and SILT, sharp contact with gold silt, trace clay, laminated				
1										
2	2	2-4'	6-4-3-4	1.3	7	Saturated, black to brown, medium SAND, trace gravel				
3										
4	3	4-6'	9-10-9-9		19	Saturated, brown/gold brown, fine, well-sorted SAND and SILT, trace gravel and clay, parallel laminations (no sheen)		Submitted to lab for PCB's Analyses		
5										
6										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-991
PAGE 1 OF 1

CLIENT: Special Metals

PROJECT LOCATION: Ludlow Landfill
Paris, New York

FILE NO.: 2290.039.760

SAMPLER Split Spoon
HAMMER: 140 lbs.
FALL: 30"

LOCATION: 135 ft. North, 28 degrees West of GP-4
START DATE: 7/2/91 0800
END DATE: 7/2/91

ANALYTICAL SAMPLES

DEPTH - 6-8 ft.

ANALYSIS - PCB's

ELEVATION - 1260.8 ft.

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Doug Richmond
OBG GEOLOGIST: Paul Gottler

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	2-2-3-3	1.4	5	Saturated, black to gray to green to brown CLAY and SILT with peat, parallel laminations present				6
1										
2	2	2-4'	5-3-4-4	0.9	7	Saturated, brown to black SAND and well-rounded GRAVEL, matrix-supported, visible sheen				4
3										
4	3	4-6'	9-5-6-10		11	(4-5') Saturated, gray/brown SAND and GRAVEL with silt and clay				1
5						(5-6') Saturated, gold brown/light brown, very fine SAND and SILT, trace clay, trace fine, well-rounded gravel				
6	4	6-8'	9-10-7-9		17	As above, saturated (no sheen)		Submitted to lab for PCB's Analyses		1
7										
8										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-1091
PAGE 1 OF 1

CLIENT: Special Metals
PROJECT LOCATION: Ludlow Landfill, Paris, New York
FILE NO.: 2290.039.760

SAMPLER: Split Spoon
HAMMER: 140 lbs.
FALL: 30"

LOCATION: 61 ft. North, 34 degrees West of GP-4
START DATE: 7/1/91 1645
END DATE: 7/1/91

ANALYTICAL SAMPLES
DEPTH - 6-8 ft.
ANALYSIS - PCB's

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Doug Richmond
OBG GEOLOGIST: Paul Gottler

ELEVATION - 1258.2 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	WOH-3-3	1.3	—	Saturated, brown to gray SAND and GRAVEL, trace silt and clay				20
1										
2	2	2-4'	WOH-2-3-3	1.6	5	As above, saturated				10
3										
4	3	4-6'	6-5-6-6	1.1	11	(4-4.5') As above, saturated (4.5-6') Saturated, light brown to gold/brown SILT and fine SAND, some clay, trace gravel, laminated				1
5										
6	4	6-8'	9-9-12-9	1.3	21	As above, saturated (no sheen)		Submitted to lab for PCB's Analyses		1
7										
8										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1191 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 51 ft. West of GP-4 START DATE: 7/2/91 1520 END DATE: 7/3/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH – NA ANALYSIS – NA	ELEVATION – 1281.3 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	5-4-9-13	0.7	13	Dry, brown/dark brown SAND and SILT and round to subround GRAVEL, very humus, matrix-supported				0
1										
2										
3										
4										
5	2	5-7'	6-5-3-3	0.6	8	Dry, brown/light brown SILT with sand and subrounded gravel, matrix-supported, some clay, faintly laminated within silt unit, appears massive				0
6										
7										
8										
9										
10	3	10-12'	7-7-9-10	1.1	16	(10-11.5') As above, dry (11.5-12') Dry, gray, fine GRAVEL and fine to coarse SAND with silt and clay, faintly laminated, fine to medium gravel up auger				1
11										
12										
13										
14										
15	4	15-17'	10-10-9-7	1.0	19	Damp, gray/brownish red to green SILT and CLAY with sand, trace gravel, faintly laminated, fine gravel up auger				0
16										
17										
18										
19										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1191 PAGE 2 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 51 ft. West of GP-4 START DATE: 7/2/91 1520 END DATE: 7/3/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH - NA ANALYSIS - NA	ELEVATION – 1281.3 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
20	5	20-22'	17-19-	0.6	38	Damp, gray to brown SILT and GRAVEL, some				1
			19-11			clay and sand, faint laminations				
21										
22	6	22-24'	9-9-	0.9	20	Saturated, gray to brown GRAVEL with sand				3
			11-12			and silt, some clay, oily odor, visible				
23						sheen				
24	7	24-26'	10-11-	0.7	22	(24-25.7') As above, saturated (oily and				6
			11-11			odiferous)				
25						(25.7-26') Damp, gray to green CLAY and SILT				
						with well-rounded gravel, faint laminations				
26	8	26-28'	22-14-	0.7	24	Saturated, gray to brown, fine GRAVEL with				5
			10-10			sand, silt and gray to red to tan to rust-				
27						colored clay, faintly laminated, oily and				
						odiferous				
28	9	28-30'	13-15-	0.5	32	As above, saturated with coarse sand layer,				6
			17-13			~0.2' thick, oily and odiferous				
29										
30	10	30-32'	7-8-8-10	—	16	No recovery				
31										
32	11	32-34'	9-12-	1.1	26	As above, saturated, also some coarse sand				4
			14-11			layer, oily and odiferous				
33										
34	12	34-36'	27-25-	0.3	44	As above, saturated, oily and odiferous				
			19-9							
35										
36										

NOTES: Standard sampling, OK'd by DEC Representative @ 1430 on 7/2/91.
Sands ran 4' up auger, halted drilling, no sample to be submitted.

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1291 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 92.8 ft. South, 75 degrees East of MW-11 (48 ft. from SB-691) START DATE: 7/3/91 1330 END DATE: 7/3/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH - 22-24 ft. ANALYSIS - PCB's	ELEVATION - 1283.9 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'				GRAVEL, road, no sample				
1										
2	2	2-4'	9-10-9-6	1.2	19	Dry, brown to gray, matrix-supported, A-axis horizontal, round to subround GRAVEL and fine to coarse SAND with silt and clay, faintly laminated				0
3										
4										
5	3	5-7'	9-11-6-8	0.9	17	As above, damp with increased amount of sand, green to red to gray to brown clay				0
6										
7										
8										
9										
10	4	10-12'	4-5-6-6	1.3	11	(10-11.3') As above, damp (11.3-12') Damp, brown to orange/brown, fine SAND with trace silt and clay, laminated				0
11										
12										
13										
14										
15	5	15-17'	6-9-14-16	1.9	23	As above, damp, fine GRAVEL A-axis horizontal, coarse GRAVEL A-axis vertical				0
16										
17										
18										
19										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1291 PAGE 2 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 92.8 ft. South, 75 degrees East of MW-11 (48 ft. from SB-691) START DATE: 7/3/91 1330 END DATE: 7/3/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	DEPTH - 22-24 ft. ANALYSIS - PCB's	ELEVATION - 1283.9 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
20	6	20-22'	4-10-	1.9	21	(20-21.1') As above, damp				1
			11-15			(21.1-22') Dry, gray to green to red GRAVEL				
21						with sand, silt and clay (calcite cement ?)				
22	7	22-24'	12-15-	1.8	30	(22-22.2') As above, dry		Submitted		0
			15-17			(22.2-22.8') Dry, brown to gray, well-sorted,		to lab for		
23						fine to medium SAND		PCB's		
						(22.8-24') As above, dry, gray/green to red		Analyses		
24	8	24-26'	6-5-5-4	0.7	10	GRAVEL				0
						As above, saturated, brown GRAVEL (no odor				
25						or sheen)				
26										

NOTES: Saturated at 24'

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1391 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 46 ft. North, 47 degrees West of MW-12 (32 ft. from SB-2) START DATE: 7/8/91 1415 END DATE: 7/8/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH - 20-22 ft. ANALYSIS - PCB's	ELEVATION - 1283.4 ft

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	8-7-7-6		14	Dry to damp, brown/light brown to gray, very fine to coarse, well-rounded GRAVEL with fine to coarse SAND, little silt, trace clay				0
1										
2										
3										
4										
5	2	5-7'	4-3-2-3	0.4	5	Damp, brown to gray GRAVEL as above, finer, with sand, trace silt and clay				1
6										
7										
8										
9										
10	3	10-12'	5-5-5-5	1.0	10	(10-11.7') Damp, gray to dark gray, fine to medium, well-rounded GRAVEL and silt and clay, little sand, a-axis horizontal (flow till ?) (11.7-12') Sharp contact with damp, gray and brown SILT and brown CLAY, parallel laminations, ~18/.2' very regular				1
11										
12										
13										
14										
15	4	15-17'	11-12-16-10	0.9	28	(15-15.5') As above, damp (15.5-17') Damp, gray to red to brown, calcite-cemented SAND and GRAVEL, little silt, trace clay				2
16										
17										
18										
19										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1391 PAGE 2 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill, Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 46 ft. North, 47 degrees West of MW-12 (32 ft. from SB-2) START DATE: 7/8/91 1415 END DATE: 7/8/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Doug Richmond OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH - 20-22 ft. ANALYSIS - PCB's	ELEVATION - 1283.4 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	FIELD TESTING HNU
20	5	20-22'	16-18-	1.7	30	Damp to saturated, gray to brown GRAVEL and		Submitted		5
			12-17			SAND, little silt and clay, matrix-supported		to lab for		
21						(oily odor, visible sheen)		PCB's		
								Analyses		
22	6	22-24'	20-24-	0.8	48	As above, saturated, gray/dark brown				7
			24-19			GRAVEL and SAND				
23										
24										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1491 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill, Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 28.7 ft. South of SB-1191 START DATE: 7/10/91 1030 END DATE: 7/11/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Barney Waters OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH – 24–26 ft., 28–30 ft. ANALYSIS – PCB's	ELEVATION – 1289.2 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0–2'	NO SAMPLE TAKEN			Dry, brown/dark brown GRAVEL and SAND with high root/organic content				
1										
2										
3										
4										
5	2	5–7'	8–12–10–8	1.7	22	Dry, brown/light brown SAND and SILT with clay, trace fine, well-rounded gravel, faintly laminated				0
6										
7										
8										
9										
10	3	10–12'	11–7–8–8	1.8	15	As above, dry, brown/light brown SAND and SILT, with well-sorted sand horizons, increased clay and gravel				0
11										
12										
13										
14										
15	4	15–17'	12–14–12–10	1.5	26	(15–16.2') As above, dry with deformed laminations of medium to very fine sand (16.2–17') Dry, brown to gray GRAVEL and SAND				0
16										
17										
18										
19										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-1491
PAGE 2 OF 2

CLIENT: Special Metals

PROJECT LOCATION: Ludlow Landfill
Paris, New York

FILE NO.: 2290.039.760

SAMPLER Split Spoon
HAMMER: 140 lbs.
FALL: 30"

LOCATION: 28.7 ft. South of SB-1191

START DATE: 7/10/91 1030
END DATE: 7/11/91

ANALYTICAL SAMPLES

DEPTH - 24-26 ft.
28-30 ft.
ANALYSIS - PCB's

ELEVATION - 1289.2 ft.

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Barney Waters
OBG GEOLOGIST: Paul Gottler

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
20	5	20-22'	11-13-	1.8	33	(20-20.7') As above, dry, fine gravel				0
			20-19			up augers				
21						(20.7-22') Damp, brown, well-sorted medium				
						SAND, fine sand laminations				
22										
23										
24	6	24-26'	12-50/.2	0.7	—	As above, damp with red/brown clay		Submitted to lab for PCB's Analyses		0
25										
26	7	26-28'	34-14-	1.1	32	Damp to moist, brown GRAVEL and SAND				0
			18-33			with brown, well-sorted, medium sand				
27						horizons which contain trace silt and clay				
28	8	28-30'	48-41-	1.2	74	(28-28.9') As above, dry to damp, gray/		Submitted to lab for PCB's Analyses		0
			33-22			brown GRAVEL and SAND				
29						(28.9-29.7') Damp, green SAPROLITE				
						(29.7-30') As above, saturated, green				
30						SAPROLITE with brown gravel and sand (no				
						odor or sheen)				

NOTES: 28-30' sample split with DEC Representative

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-1591

PAGE 1 OF 1

CLIENT: Special Metals

PROJECT LOCATION: Ludlow Landfill
Paris, New York

FILE NO.: 2290.039.760

SAMPLER: Split Spoon
HAMMER: 140 lbs.
FALL: 30"

LOCATION: 132.5 ft. North, 70 degrees East of MW-10
START DATE: 7/10/91 1345
END DATE: 7/10/91

ANALYTICAL SAMPLES

DEPTH - 6-8 ft.

ANALYSIS - PCB's

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Barney Waters
OBG GEOLOGIST: Paul Gottler

ELEVATION - 1266.9 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0										
1										
2										
3										
4	1	4-6'	12-12-21-19	1.9	33	Damp, light brown/gold brown, fine, well-sorted SAND and GRAVEL with silt and trace clay, faintly laminated, matrix-supported				0
5										
6	2	6-8'	19-28-23-19	1.7	51	As above, moist with less well-rounded gravel and more clay		Submitted to lab for PCB's Analyses		0
7										
8	3	8-10'	7-8-13-9	1.0	21	(8-8.4') As above, saturated				0
						(8.4-10') Saturated, gray/gray black angular to more round GRAVEL and SAND, trace silt and clay, organic swampy odor				0
9										
10	4	10-12'		1.9		(10-11.2') As above, saturated				
						(11.2-12') Damp, light brown/brown, very fine SAND and SILT with very fine gravel, trace clay, A-axis horizontal				
11										
12										

NOTES: DEC Representative sampled entire 10-12' spoon for PCB's, volatiles and semi-volatiles

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1691 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill, Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30"	LOCATION: 13 ft. North, 51 degrees East of SB-1391 START DATE: 7/10/91 1515 END DATE: 7/10/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Barney Waters OBG GEOLOGIST: Paul Gottler	ANALYTICAL SAMPLES DEPTH - 22-24 ft. ANALYSIS - PCB's	ELEVATION - 1284.0 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0										
1										
2										
3										
4										
5	1	5-7'	3-4-3-3	1.6	7	Damp, brown/dark brown 70% SAND, 25% gravel, trace silt and clay, laminated, wet, very fine sand and silt up auger				0
6										
7										
8										
9										
10	2	10-12'	3-3-17-5	1.7	20	Damp to saturated, gray to brown SILT and CLAY with gravel, laminated, some sandstone pebbles, roots and branches present				0
11										
12										
13										
14										
15	3	15-17'	7-6-6-8	1.2	12	Damp, brown to white to gray to red, coarse SAND, some gravel, trace silt and clay, calcite cement				0
16										
17										
18	4	18-20'	8-8-10-11	1.6	18	As above, damp with red, fine GRAVEL				0
19										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-1691

CLIENT: Special Metals

PROJECT LOCATION: Ludlow Landfill
Paris, New York

FILE NO.: 2290.039.760

SAMPLER: Split Spoon
HAMMER: 140 lbs.
FALL: 30"

LOCATION: 13 ft. North, 51 degrees East of SB-1391
START DATE: 7/10/91 1515
END DATE: 7/10/91

ANALYTICAL SAMPLES
DEPTH – 22-24 ft.
ANALYSIS – PCB's

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Barney Waters
OBG GEOLOGIST: Paul Gottler

ELEVATION – 1284.0 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
20	5	20-22'	7-8-9-17	1.8	17	(20-21.8') As above, damp to moist CLAY				0
						(21.8-22') Dry, gray/brown GRAVEL with sand				
21										
22	6	22-24'	24-22-	1.0	41	As above, dry, clast-supported		Submitted		0
			19-17					to lab for		
23								PCB's		
								Analyses		
24	7	24-26'	14-18-	1.7	45	As above, saturated, brown/brown gray, clast-				0
			27-17			supported GRAVEL, little sand, trace silt				
25						and brown clay				
26										

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1791 PAGE 1 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES	LOCATION: 32 ft. South, 40 degrees West of GP-4 START DATE: 7/11/91 1130 END DATE: 7/11/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Barney Waters OBG GEOLOGIST: Paul Gottler	DEPTH - 24-26 ft. ANALYSIS - PCB's	ELEVATION - 1286.8 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
0	1	0-2'	NO			Dry, brown/orange brown SAND and GRAVEL,				
			SAMPLE			trace silt and clay, highly organic				
1			TAKEN							
2										
3										
4										
5	2	5-7'	5-6-5-4	1.8	11	(5-6') As above, dry				0
						(6-7') Dry, brown/dark brown SAND and fine,				
6						well-rounded GRAVEL, trace silt and clay,				
						faintly laminated, A-axis horizontal				
7										
8										
9										
10	3	10-12'	12-15-	1.9	27	Damp, gray/gray brown SILT, fine SAND and				0
			12-13			fine, well-rounded GRAVEL, trace clay,				
11						matrix-supported				
12										
13										
						Boulder at 13-14'				
14										
15	4	15-17'	24-22-	1.7	40	(15-16.6') As above, damp				0
			18-15			(16.6-17') Dry, gray to brown GRAVEL with				
16						some sand, clast-supported, trace silt and clay				
17										
18										
19						Augering through gravel to 19',				
						medium gravel up auger to 19.5'				

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING SB-1791 PAGE 2 OF 2
CLIENT: Special Metals PROJECT LOCATION: Ludlow Landfill, Paris, New York FILE NO.: 2290.039.760	SAMPLER Split Spoon HAMMER: 140 lbs. FALL: 30" ANALYTICAL SAMPLES DEPTH – 24–26 ft. ANALYSIS – PCB's	LOCATION: 32 ft. South, 40 degrees West of GP-4 START DATE: 7/11/91 1130 END DATE: 7/11/91
BORING COMPANY: Parratt-Wolff, Inc. FOREMAN: Barney Waters OBG GEOLOGIST: Paul Gottler		ELEVATION – 1286.8 ft.

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNU
20	5	20–22'	9-9-8-10	1.9	17	Dry, brown/red/gray, calcite-cemented SAND and GRAVEL, trace silt and clay				0
21										
22	6	22–24'	10–11–10–9	1.5	21	As above, dry with some green sand and medium, well-rounded gravel				0
23										
24	7	24–26'	28–20–15–22	1.6	35	As above, dry with 1 zone of clast-supported gravel and sand at 25'		Submitted to lab for PCB's Analyses		0
25										
26	8	26–28'	25–17–19–20	1.7	36	(26–27') As above, damp				0
						(27–28') Saturated, brown, coarse SAND, some well-rounded gravel, trace silt and clay, faintly laminated, well-sorted sands (no odor or sheen)				0
27										
28										

APPENDIX C

NYSDEC North Gravel Pit Letter

File 2290.039

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

FAX

May 31, 1991

Mr. Richard Thurston
Special Metals Corporation
Middle Settlement Road
New Hartford, NY 13413

Dear Mr. Thurston:

Re: Site #6-33-014
Ludlow Sand & Gravel
Oneida County

This letter is in regards to your telephone conversation of May 31, 1991 with Jim Drumm of my staff in regards to the north gravel pit. Any visible increase in the oily substance in the north gravel pit soil requires additional sampling. Should you feel that the sampling is not warranted, the Department's representative may take samples. We recommend that you segregate any soil excavated that appears to have an increased quantity of oily substance. Should the soil be shown to contain greater than 500 parts per million (ppm) PCBs it must be disposed in a TSCA approved facility. If the aforementioned soil has been placed with other soils, all the soil would then be contaminated with soil containing PCBs at a level greater than 500 ppm, and therefore must be disposed in a TSCA approved facility.

If you have any questions, please call Jim Drumm at (518) 457-9279.

Sincerely,

James G. Van Hoesen

James G. Van Hoesen, P.E.
Chief, Western Field Services Section
Bureau of Construction Services
Division of Hazardous Waste Remediation

cc: A. Bolensz - NYSDOL
D. Sommer - NYSDOL
M. Hudson - Rizzo Associates
R. Montione - NYSDOH
F. Hale - OBG
R. Slizy - USEPA Region II

RECEIVED
JUN - 6 1991
O'Brien & Gere Engineers, Inc.
Virginia Beach, VA