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SITE INVESTIGATION

PASS & SEYMOUR FACILITY
Solvay, New York

PASS & SEYMOUR/legrand
Syracuse, New York 13221

OCTOBER 1993

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N5005

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SECTION 1. INTRODUCTION

1.01. Site History

Unless otherwise noted, information regarding the following site history was presented by current Pass & Seymour employees. The facility currently owned and operated by Pass & Seymour was reportedly originally constructed in the 1800s for use as a steel mill. Operation as a steel mill apparently ceased in the 1920s, and the property was unused for several years until being acquired by Pass & Seymour. Figure 1 is a site plan of the current facility.

Original operations by Pass & Seymour included the manufacture of ceramic dinnerware. As part of this operation, a large kiln was operated on-site and had a rejection rate, due to quality control reasons, of approximately 20%. The rejected materials were disposed on site in a landfill that had begun operations when the facility was used as a steel mill. Total operating life of this landfill was reported as being from the early 1900s through the early 1980s. While the extent of the fill area has not been defined, the western half of the facility buildings are reportedly constructed on the fill. Visual observation of broken ceramic pieces between the buildings in this area and the adjacent Conrail railroad tracks support this report.

Trichloroethylene (TCE) was used in plant operations in the past. While the on-site kiln was operating, TCE was used to clean the finished porcelain prior to firing, and was also later used as a cleaning agent in other electromechanical operations. TCE was stored in a bulk storage tank located to the west of Building 11 (see Figure 1) and was hard-piped to locations throughout the facility where it was used. The bulk storage system is discussed in further detail in Section 3 of this report.

Two ground water production wells were formerly operated at the facility: one to supply water for a former electroplating line, and one to supply water for an injection molding process. While no documentation was available for these wells, they reportedly drew water from a depth of approximately 180 ft, and were discontinued in the 1970s when the facility began to utilize public water for use in its electroplating and injection molding processes. While in use, well water was reportedly routinely monitored for brine content, but no records were retained for these analyses.

As part of the background review of the Pass & Seymour property, O'Brien & Gere Engineers submitted a Freedom of Information (FOI) request to the New York State Department of Environmental Conservation (NYSDEC) for information pertaining to ground water conditions at five sites located in Solvay, New York. These sites consist of the following:

Village of Solvay Landfill
Town of Geddes Landfill
Allied Industrial Laundry
Frazer & Jones Laundry
Stanton Foundry.

This review of NYSDEC records did not provide an indication of ground water quality, depth, gradient, or flow direction in the area of the Pass & Seymour facility.

1.02. Objective and Site Investigation Activities

In August 1992, O'Brien & Gere was retained to prepare a field investigation of nine areas of the Pass & Seymour facility. The objective of the field investigation was to provide a reasonable approach in assessing potential impacts to the site soils from past uses of the areas identified by the facility for evaluation. The field investigation was initiated by Pass & Seymour and was not a regulatory agency program. Data validation and other intensive QA/QC procedures were not included in this program. The areas of concern consisted of the following:

1. Concrete pad used for temporary storage of transformers
2. Location of former TCE storage tank
3. Empty oil drum storage area
4. Former electroplating area
5. Former landfill area
6. Two chemical storage areas
7. Location of two closed underground fuel oil storage tanks
8. Location of one closed underground fuel oil storage tank
9. Location of three former above-ground fuel oil storage tanks.

Following the initial field investigation, a second phase was conducted in selected areas. Both phases of this investigation were limited to potential impacts to soils. More detailed descriptions of the study areas and the associated field investigations are included in the following sections of this report. Analytical results from the first and second phases are included in this report as Attachments 1 and 2, respectively.

SECTION 2. TRANSFORMER STORAGE PAD

2.01. Site Description

This site consists of an existing concrete pad approximately 4 ft wide by 50 ft long, located to the west of Building 11 (see Figure 1). Plant personnel indicated that this pad was used for the temporary storage of transformers that had been removed from active use, but had not yet been removed from the site. The pad was not used as a permanent or active transformer installation. The pad is not currently used, and other former uses of the area were not identified as part of this investigation.

2.02. Field Investigation

The objective of the field investigation was to assess the potential for PCB contamination of this pad. To address this objective, three holes were drilled in the concrete pad with an electric drill fitted with a one-half inch masonry bit. These holes were spaced at approximately equal intervals along the length of the pad, with the first hole located closest to Building 11, the second hole located midway along the pad, and the third hole located the furthest from Building 11. Concrete dust from each hole was collected by a metal laboratory spatula and placed in separate glass containers. Sampling equipment was decontaminated before being used at each location. Following collection, samples were cooled to 4°C and submitted to OBG Laboratories for analysis for PCBs.

2.03. Analytical Results

Analytical results indicated no detectable levels of PCBs (detection level of 0.5 ppm) in the first sample location. The second sample location resulted in a total PCB level of 2.3 ppm, with the PCB compounds being identified as Aroclors 1248 and 1260. The third sampling location had a total PCB result of 3.9 ppm, with the same identified Aroclors as the second sample location.

2.04. Conclusions and Recommendations

The United States Environmental Protection Agency's (USEPA) PCB Spill Cleanup Policy is set forth in 40 CFR Part 761, Subpart G. While no cleanup policy is presented for concrete samples, USEPA policy for soils associated with spill cleanups in restricted areas states that soils should be cleaned to 25 ppm PCBs by weight (40 CFR § 761.125[c][3][v]) Since the highest result from the first field investigation was 3.9 ppm, it was concluded that no further action was required, and no additional investigation of this area was performed in the second phase.

SECTION 3. FORMER TRICHLOROETHYLENE STORAGE TANK

3.01. Site Description

In the past, TCE was used as a solvent throughout the facility. An above-ground storage tank was located west of Building 11 (see Figure 1). Bulk deliveries were unloaded to this tank and then hard-piped as needed to various areas of the plant. TCE was used as a solvent and/or cleaner in various electro-mechanical operations, and also to clean finished porcelain prior to firing when the on-site kiln was in operation. Use of TCE was discontinued in 1979 or 1980, and the bulk storage tank was removed at that time. While disposal records could not be located for this material, Mr. Baumgras reported that litigation associated with a vendor occurred in the past regarding an off-site disposal site, indicating that the material was shipped off-site for disposal. The widespread use of TCE ceased at this site prior to the implementation of the hazardous waste manifest system; therefore this type of documentation is not likely to exist.

3.02. Field Investigation

The objective of the field investigation was to assess the potential for TCE soil contamination in the vicinity of the former above-ground storage tank. To address this objective, the location of this former tank was identified by Mr. Baumgras, and a soil vapor survey was conducted in the vicinity of the former tank. In addition, two surface soil samples and one soil boring sample were collected and submitted to OBG Laboratories to be analyzed for volatile organic compounds (VOCs). Continuous soil samples were collected from the soil boring with a split-spoon sampler. Collected samples were screened with a photoionization detector (PID) for the field detection of VOCs, and observed for stained soil or odors. Based on the field screening, one sample was selected for laboratory analysis. Sampling equipment was decontaminated before being used at each location. Following collection, samples were cooled to 4°C until delivered to the laboratory.

3.03. Analytical Results

Analytical results indicated that the two surface soil samples contained concentrations of TCE at 7 ppb and 8 ppb, respectively. The former storage tank appears to have been the source of the TCE. Similarly, the soil sample collected from the deeper boring (Sample B-1, collected at a depth of 2-4 ft) contained a TCE concentration of 22 ppb, and the soil vapor survey indicated detectable levels of TCE. The soil vapor survey, however, indicated the highest concentrations of TCE in an area west of the former storage tank.

3.04. Conclusions and Recommendations

The detection of higher concentrations of TCE in the area located to the west of the former storage tank may be a result of leakage from the underground pipes that connected the tank to the process areas. The highest concentration of TCE found in the soil was 22 ppb, which is below the recommended soil cleanup objective (700 ppb) established by NYSDEC in its November 16, 1992 Technical and Administrative Guidance Memorandum (TAGM): "Determination of Soil Cleanup Objectives and Cleanup Levels." Therefore, based on the laboratory results and NYSDEC guidance values, no further action is recommended for this area.

SECTION 4. FORMER EMPTY OIL DRUM STORAGE AREA

4.01. Site Description

The former empty oil drum storage area is located to the north of Building 15, and west of the former TCE storage tank site (see Figure 1). This area is presently paved with asphalt at the same approximate grade as the surrounding parking lot, but was previously used to store empty drums which had formerly contained virgin or used cutting oils. When used for empty drum storage, an earthen mound, estimated at 4 to 5 ft high and approximately 30 ft square, was located here with the empty drums being stored on the mounded dirt. The dirt has since been removed, but the date of the removal or the final disposal site could not be identified. Based on visual observation of the topography of the site, runoff from the former mound would appear to have flowed to the grassed area located to the north.

4.02. Field Investigation

The objective of the field investigation was to assess the potential for soil contamination from the former storage of empty cutting oil drums in this area. To address this objective, one composite surface soil sample was initially collected, as well as one deeper soil sample collected from a boring. The surface soil sample was obtained by compositing two grab samples: one collected from a mound of dirt located adjacent to Building 15, and one collected from a grassed area north of the paved parking area now covering the site. The deeper soil sample was collected from a depth of 6.0 to 6.8 ft. Continuous soil samples were collected from the soil boring with a split-spoon sampler. Collected samples were screened in the field with a PID and observed for stained soil or odors. Based on the soil vapor survey results discussed in Section 3.03 and the field screening procedures, a shallow soil sample (4.0 to 6.0 ft) was also submitted for VOC analysis. No detectable levels of VOCs were found in this sample. Sampling equipment was decontaminated before being used at each location, and following collection, samples were cooled to 4°C and submitted to OBG Laboratories for analysis.

4.03. Analytical Results

Analytical results from the two subsurface soil samples indicated no detectable concentrations of volatile or semi-volatile organic compounds. The composite surface soil sample indicated concentrations of the following semi-volatile compounds:

Compound	Sample Results	NYSDEC Guidance*
Acenaphthene	39,000 ppb	50,000 ppb
Phenanthrene	280,000 ppb	50,000 ppb
Anthracene	55,000 ppb	50,000 ppb
Fluoranthene	320,000 ppb	50,000 ppb
Pyrene	260,000 ppb	50,000 ppb
Benzo (a) anthracene	150,000 ppb	220 ppb
Chrysene	130,000 ppb	400 ppb
Benzo (b) fluoranthene	190,000 ppb	1,100 ppb
Benzo (k) fluoranthene	71,000 ppb	1,100 pbb
Benzo (a) pyrene	120,000 ppb	61 ppb or MDL**
Indeno (1,2,3,-cd) pyrene	68,000 ppb	3,200 ppb
Benzo (g,h,i) perylene	57,000 ppb	50,000 ppb

* November 16, 1992 NYSDEC TAGM: "Determination of Soil Cleanup Objectives and Cleanup Levels

** MDL = Method Detection Limit

In addition, several other semi-volatile organic compounds were detected, but at levels below the analytical detection limits. These compounds were therefore noted as tentatively identified compounds (TICs). Full analytical data for these samples are included in Attachment 1.

Following receipt of the first round of sampling, a second round of surface soil samples was collected to better define the area of apparent surface contamination. Two grab samples were collected as in the first phase, but were not composited. The grab sample collected from the area adjacent to Building 15 was submitted for laboratory analysis of semi-volatile organic compounds. Analytical results from this sample showed many of the compounds detected in the Phase 1 sampling, but at concentrations that were greater than twice the Phase 1 levels or higher. Full analytical results from the Phase 2 sampling are included in Attachment 2.

4.04. Conclusions and Recommendations

The detected semi-volatile compounds are not typically associated with cutting oils. A typical source of these compounds is coal tar or coal piles. This indicates the possibility that the source of contamination may not have been the empty oil drums formerly stored in this area, but the fill material itself if it was associated with a coal pile or similar use.

The analytical results of the subsurface soil samples indicate that no residual contamination was detected from the previous use of this area for the storage of empty oil drums. Surface soil samples indicate that some contamination is located in the mound of dirt located adjacent to Building 15. This area is located behind a concrete retaining wall which extends east from the north end of Building 15. The area of concern is further defined as being located between the east side of the building and an existing driveway which is located parallel to the east side of the building (see Figure 1). Since the elevation of this area is close to the elevation of the former mound of dirt used to store the drums, it may be possible that this pile is what remains of the original mound. While the two surface samples collected in this area do not define the areal or vertical extent of contamination, the volume of potentially contaminated material appears to be limited to 20 cubic yards or less (estimated at 10 ft by 10 ft by 5 ft deep), assuming that the contamination does not extend below the surrounding grade.

The following compounds exceed New York State soil cleanup guidance values (see Section 4.03), as defined in the November 16, 1992 NYSDEC TAGM entitled "Determination of Soil Cleanup Objectives and Cleanup Levels."

Anthracene
Benzo (a) anthracene
Benzo (b) flouranthene
Benzo (k) flouranthene
Benzo (a) pyrene
Benzo (g,h,i) perylene
Chrysene
Fluoranthene
Indeno (1,2,3-cd) pyrene
Phenanthrene
Pyrene

Due to the small volume of suspected contamination (approximately 20 cubic yards), and the high analytical cost for semi-volatile organic analyses, it is recommended that the suspected area of contamination be excavated and characterized for off-site disposal. A composite confirmation sample should be collected of the bottom and sides of the excavation for analysis of semi-volatile organic compounds. If the confirmation sample is below New York State guidance levels, remediation of this area would be considered to be complete.

SECTION 5. ELECTROPLATING AREA

5.01. Site Description

The area which was formerly used for electroplating is located near the middle of Building 15 (see Figure 1). This area is currently used for an injection molding process. Prior to being used for electroplating, the area was also reported to have been used for the manufacture of hand grenade fuses during World War II, and was separately identified by plant personnel for investigation. Since the two former uses (electroplating and hand grenade fuses) were conducted in the same area, the two areas of concern were combined into one. Direct access to this area from the outside is via an alley which bisects the Pass & Seymour facility.

Plant personnel identified several metals that were associated with the former electroplating operation; these were incorporated into the analytical schedule discussed in Section 5.02. Information was not available regarding the process used for manufacturing hand grenade fuses, although plant personnel thought that the process was limited to metal working and did not involve the use or installation of explosive materials.

5.02. Field Investigation

The objective of the field investigation was to assess the potential for soil contamination from the former electroplating and hand grenade fuse manufacturing operations. In the Phase I investigation, four borings were advanced through the existing concrete floor and into the underlying soils. These borings were advanced using a tripod-mounted drilling rig due to limited vertical height available in the building. One sample of the underlying soil was collected from each boring at an approximate depth of 1 ft to 3 ft below grade. These samples were submitted to OBG Laboratories for analysis of the following parameters:

- Total Arsenic
- Total Cadmium
- Total Chromium
- Hexavalent Chromium
- Total Copper
- Total Cyanide
- Total Lead
- Total Mercury
- Total Nickel
- Total Zinc

Sampling equipment was decontaminated before being used at each location. Following collection, samples were cooled to 4°C before being submitted to the laboratory.

After receipt of the Phase I results (see Section 5.03), two additional soil borings were placed outside of Building 15 to investigate potential contamination that may have occurred from ancillary spillage of materials in the adjacent alley, possibly due to loading or unloading activities. Boring locations were originally proposed in the alley itself; however, the location of several underground utilities within this restricted space prohibited the investigation of the initially identified locations. Two borings were eventually located: one near the north end of Building 14, and one near the south end of Building 12, where the south end of the alley is located. Subsurface soil samples were collected from each of these locations and submitted to OBG Laboratories for the same parameters used in the Phase I investigation. The same field sampling procedures were followed as in the Phase I investigation, with the exception that a truck-mounted drilling rig was used for the boring located at the south end of the alley.

5.03. Analytical Results

Phase 1 borings through the floor of the area of concern indicated that three concrete floors had been poured in this area, with a combined thickness of approximately 18 inches. While it could not be assessed which layer of concrete had been used to support the former electroplating or hand grenade fuse operations, analytical data from the underlying soil samples showed the following concentrations:

	Phase 1	Phase 2	NYSDEC Guidance	Typical Soil Background**
Total Lead	23 - 59 ppm	120 ppm	30 ppm or SB*	4 - 61 ppm
Total Cyanide	ND - 0.7 ppm	ND	---	---
Total Nickel	23 - 110 ppm	100 ppm	13 ppm or SB	0.5 - 25 ppm
Total Arsenic	29 ppm	7.6 - 41 ppm	7.5 ppm or SB	3 - 12 ppm
Total Cadmium	ND	2 ppm	1 ppm or SB	0.01 - 0.88 ppm
Total Chromium	10 - 22 ppm	14 - 20 ppm	10 ppm or SB	1.5 - 40 ppm
Hexavalent Chrom.	ND - 1.1 ppm	ND	---	---
Total Mercury	ND - 0.7 ppm	ND	0.1 ppm	0.042 - 0.066 ppm
Total Zinc	40 - 160 ppm	610 - 760 ppm	20 ppm or SB	9 - 50 ppm
Total Copper	29 - 85 ppm	120 - 3000 ppm	25 ppm or SB	2 - 250 ppm

*SB = Site Background

**"Background Concentrations of 20 Elements in Soils with Special Regard for New York State," NYSDEC (When more than one range of background concentrations was cited, the range most specific to central New York State is quoted in this report. - See Attachment 4.)

5.04. Conclusions and Recommendations

The NYSDEC November 16, 1992 TAGM, titled "Determination of Soil Cleanup Objectives and Cleanup Levels," provides recommended cleanup levels for eight of the ten parameters which were analyzed in the Phase 1 and 2 samples (see Section 5.03). Where cleanup goals are stated for these parameters, either the goal is presented as a specific number, or the cleanup goal is the "site background" level.

Establishing background levels of metal concentrations in soils is difficult for older industrial sites due to the wide variation of concentrations that may be present from the placement of fill materials or the deposition of coal ash from previous years. A NYSDEC document entitled "Background Concentrations of 20 Elements in Soils with Special Regard for New York State" details a literature review of metal concentrations in natural soils (see Attachment 4). These background concentrations, however, do not appear to include soils from industrial areas, and may therefore not be applicable to the Pass & Seymour site. While background levels have not been established specific to the Pass & Seymour site, the concentrations resulting from the Phase 1 samples are typical of concentrations O'Brien & Gere has seen on similar industrial sites of the same age, for which no additional work was required. The Phase 2 samples, however, appear to indicate elevated levels of total zinc and copper in comparison to the Phase 1 results. The source of these higher concentrations in the samples collected from outside the building may be from the outdoor storage of scrap metals and cable. Zinc and copper concentrations at these levels are not typically of concern in terms of impacts to the environment. Therefore, based on the Phase 1 and 2 sampling results, no further action is recommended for the former electroplating and hand grenade manufacturing area.

SECTION 6. FORMER LANDFILL AREA

6.01. Site Description

Approximately the western one-half of the property is believed to have received landfilled materials, beginning around the early 1900s when the property was used as a steel mill. Waste materials such as mill scale (iron oxide which forms on the sides of ingots), scrap steel, and grinding dust appear to have been used to fill low-lying areas of the site. In addition, foundry sand from the nearby Frazer & Jones, and Stanton Foundries was landfilled on the Pass & Seymour property. Steel mill debris and foundry sand were observed on the surface of this area, and in soil borings placed as part of this operation.

Following acquisition by Pass & Seymour in the 1930s, the landfill operation was continued until the early 1980s, with a significant portion of the landfilled materials involving broken or rejected porcelain product from the former kiln that was operated on site. The kiln reportedly had a rejection rate of 20%, and was operated until 1972. Other materials that were landfilled included construction and demolition debris such as masonry debris and scrap wood.

As described by plant personnel, the landfill was operated informally, with wastes being placed in unused areas of the site as they were generated. During several plant expansions, areas which had previously received wastes were graded and the new construction was placed on top of the fill materials. With the removal of the kiln, the need for the landfill diminished. During the early 1980s, the landfill operation was discontinued after uncontrolled dumping of appliances and other materials was observed. Access to the undeveloped areas of the property located to the west of the rear parking lot was blocked by placing piles of dirt at the former access points. Based on small test holes which indicated natural soil horizons, the extreme western portion of the property appears to be at the natural grade and thus unlikely to have been impacted by the former landfill operations.

6.02. Field Investigation

The objective of the field investigation was to provide a preliminary assessment of the materials that had been previously landfilled on the property. To address this objective, two borings were placed in the rear parking lot, with a total of four samples from these borings being submitted for laboratory analysis. Soil samples chosen for laboratory analysis were selected after field screening with a PID and visual observation for stained soil or odors. In addition, four surface samples of suspected fill materials and one surface sample of suspected foundry sand were collected from the undeveloped area located to the west of the rear parking lot.

The nine samples collected from the former landfill area were analyzed for total phenols. Those samples suspected to be fill materials (based on visual observation) were also analyzed for TCLP metals, semi-volatile organic compounds, and PCBs. Two of the samples appeared to be foundry sand and were analyzed for total RCRA metals in addition to total phenols. Sampling equipment was decontaminated before being used at each sampling location. Following collection, samples were cooled to 4°C and transported to OBG Laboratories for analysis.

6.03. Analytical Results

Total phenol concentrations were below laboratory detection limits for the samples described in the previous section. Of the seven samples submitted for TCLP metals, none of the reported results exceeded TCLP limits. In fact, the only detectable concentration of a TCLP metal was cadmium, which was found at the detection limit of 0.1 ppm in one surface sample. This concentration is well below the TCLP limit for cadmium (1.0 ppm).

Seven samples were submitted for analysis of semi-volatile compounds, with four of the seven samples showing no detectable concentrations of these compounds. One sample collected from a depth of 8 to 10 ft indicated a naphthalene concentration of 440 ppb and a 2-methylnaphthalene concentration of 730 ppb. A second soil sample collected immediately below the first sample indicated no detectable concentrations of either of these two compounds or of other semi-volatile compounds included in the laboratory scan. Based on visual observation, two of the four surface samples suspected of being fill materials indicated no detectable levels of semi-volatile compounds, with the remaining two samples showing the following results:

	Fill #1 (in ppb)	Fill #5 (in ppb)	NYSDEC Guidance (in ppb)
Phenanthrene	7,600	ND	50,000
Flouranthrene	13,000	ND	50,000
Pyrene	11,000	ND	50,000
Chrysene	6,100	ND	400
Benzo (b) flouranthrene	8,800	ND	1,100
Benzo (a) pyrene	5,300	ND	61 or MDL*
2-Methylnaphthalene	ND	4,800	36,400

*MDL = Method detection limit

Seven of the samples were submitted for PCB analysis, with no detectable levels found. Two samples suspected of being foundry sand were submitted for analysis of total RCRA metals, with the following results:

	B-3, 0.5 to 2 ft	Sand #2	NYSDEC Guidance	Typical Soil Background**
Total Arsenic	86 ppm	43 ppm	7.5 ppm or SB*	3 - 12 ppm
Total Barium	38 ppm	110 ppm	300 ppm or SB	15 - 600 ppm
Total Cadmium	ND	ND	1 ppm or SB	0.01 - 0.88 ppm
Total Chromium	13 ppm	15 ppm	10 ppm or SB	1.5 - 40 ppm
Total Lead	19 ppm	140 ppm	30 ppm or SB	4 - 61 ppm
Total Mercury	ND	ND	0.1 ppm	0.042 - 0.066 ppm
Total Selenium	0.5 ppm	ND	2 ppm or SB	<0.1 - 3.9 ppm
Total Silver	ND	ND	SB	---

*SB = Site Background

**"Background Concentrations of 20 Elements in Soils with Special Regard for New York State," NYSDEC (When more than one range of background concentrations was cited, the range most specific to central New York State is quoted in this report. See Attachment 4.)

6.04. Conclusions and Recommendations

The two samples suspected of being spent foundry sand were found to contain concentrations of total RCRA metals that are consistent with typical background levels for industrial sites, and no further action is recommended.

Analytical results pertaining to total phenols, PCBs and TCLP metals do not indicate a need for further action in the area of the former landfill. Three semi-volatile compounds (chrysene, benzo(a)fluoranthrene, and benzo(a)pyrene) from one surface sample exceeded NYSDEC guidance levels as stated in the November 16, 1992 TAGM titled "Determination of Soil Cleanup Objectives and Cleanup Levels." These compounds were found at concentrations of 6,100 ppb, 8,800 ppb, and 5,300 ppb, respectively. This surface sample was collected from one well-defined pile of debris (approximately 1 cubic yard) which should be removed for off-site disposal. This material is located at the end of the former access road in this area (see Figure 1). Since the parameters exceeding NYSDEC guidance levels tend to have a low mobility in soil, contamination of underlying soils or ground water is not probable. A confirmation sample, however, should be collected to document the remediation. This remedial effort could be conducted with the remedial action discussed in Section 4.04.

SECTION 7. CHEMICAL STORAGE AREAS

7.01. Site Description

Two chemical storage areas were identified by plant personnel for investigation: one is located inside Building 1 (referred to as the interior storage area) and one located in a small wooden shed adjacent to the west wall of Building 18 (referred to as the exterior storage area). The interior storage area is the older of the two storage facilities, and has been used to store a variety of drummed or otherwise containerized materials. These materials have reportedly included plating line sludge, used oil, and plating line materials that contained zinc, nickel, brass, and copper. The exterior storage area is located on asphalt and is enclosed by wood-framed walls and roof. This area has been used to store waste methyl ethyl ketone (MEK), soldering flux, and a freon/oil mixture.

7.02. Field Investigation

The objective of the field investigation was to assess the potential for soil contamination that may have resulted from the use of the chemical storage areas. To address this objective, the floor of each area was cored and a sample of the underlying soil was collected for laboratory analysis of total RCRA metals and PCBs. The concrete floor of the interior storage area was cored using a tripod-mounted drilling rig. The soil sample was collected with a split-spoon sampler. For the exterior storage area, a portion of the asphalt floor and underlying gravel base was removed with a metal probe and a two-pound hammer. The soil sample was then collected using a dedicated plastic scoop. Sampling equipment was decontaminated before being used at each location. Following collection, samples were cooled to 4°C until delivered to OBG Laboratories for analysis.

7.03. Analytical Results

Analytical results for the samples collected from the chemical storage areas are as follows:

	Interior Area	Exterior Area	NYSDEC Guidance	Typical Soil Background**
Total Arsenic	1.2 ppm	36 ppm	7.5 ppm or SB*	3 - 12 ppm
Total Barium	17 ppm	53 ppm	300 ppm or SB	15 - 600 ppm
Total Cadmium	ND	ND	1 ppm or SB	0.01 - 0.88 ppm
Total Chromium	2 ppm	12 ppm	10 ppm or SB	1.5 - 40 ppm
Total Lead	51 ppm	47 ppm	30 ppm or SB	4 - 61 ppm
Total Mercury	ND	ND	0.1 ppm	0.042 - 0.066 ppm
Total Selenium	ND	ND	2 ppm or SB	<0.1 - 3.9 ppm
Total Silver	ND	ND	SB	---
PCBs	ND	ND	10.0 ppm	---

*SB = Site Background

**"Background Concentrations of 20 Elements in Soils with Special Regard for New York State," NYSDEC (When more than one range of background concentrations was cited, the range most specific to central New York State is quoted in this report. See Attachment 4.)

7.04. Conclusions and Recommendations

Several analytical results from the chemical storage areas exceed NYSDEC-recommended soil cleanup objectives, as presented in the NYSDEC TAGM titled "Determination of Soil Cleanup Objectives and Cleanup Levels" (see Section 7.03). The parameter that most significantly exceeded guidance levels was arsenic, detected in the sample from the exterior storage area, for which the laboratory result was 36 ppm. The NYSDEC guidance level for arsenic is 7.5 ppm or site background. While site background was not established for the site, there is a mitigating factor in that both chemical storage areas are capped with either asphalt or concrete. Since these areas are not exposed, migration of compounds from the subsurface and subsequent impact to ground water would be unlikely to occur. Based on the presence of the already existing caps, no further action is recommended for these areas.

SECTION 8. TWO FORMER UNDERGROUND STORAGE TANKS

8.01. Site Description

Two, 20,000-gallon underground storage tanks were closed in-place in December 1987. Documentation pertaining to these tanks is included in Attachment 3 and indicates that both tanks were constructed of bare steel, installed in December 1978, and used to store No. 2 fuel oil. These tanks were located off the southwest corner of Building 18. Closure of the tanks was performed by the firm Clean Harbors, which emptied and cleaned the tanks, then filled them with solid inert material. While no confirmatory sampling was conducted at closure, Clean Harbor reported that "[u]pon visual inspection by our field service personnel, there was no evidence of leaks and the tanks appeared to be intack [*sic*]."

8.02. Field Investigation

The objective of O'Brien & Gere's field investigation was to assess the potential for past soil contamination related to the two closed tanks. To address this objective, three soil borings were advanced in the vicinity of the two tanks. These soil borings were advanced to ground water, with continuous samples being collected via a split spoon sampler. Soil samples collected during drilling were screened with a PID and were observed for discolored soil or odors. Based on this field screening, one sample per boring was submitted to OBG Laboratories for analysis of VOCs and total petroleum hydrocarbons (TPH). Sampling equipment was decontaminated before being used at each location. Following collection, samples were cooled to 4°C before being submitted to the laboratory.

8.03. Analytical Results

For the three samples submitted for laboratory analysis, results indicated no detectable levels of VOCs or TPHs.

8.04. Conclusions and Recommendations

Documentation included in Attachment 3 and the analytical data indicate that no further action is required at this area. Ground water was encountered at the approximate elevation of the bottom of the tanks, and the borings could therefore not assess the condition of the underlying soil. However, the Clean Harbor documentation states that there was no indication of leakage from the tanks.

SECTION 9. FORMER UNDERGROUND STORAGE TANK NEAR MAINTENANCE SHOP

9.01. Site Description

Facility personnel indicated that a third underground storage tank was also closed in-place, although documentation regarding this closure was not available. The tank was reportedly used for the storage of No. 2 fuel oil. The closed tank is a 23,000-gallon, bare steel tank, and is located in a U-shaped area surrounded on three sides by Buildings 7, 12, 6, and 13 (see Figures 1 and 2). A fence and the southern property boundary border this area to the south, with Conrail railroad tracks located adjacent to the area.

The tank fill port and vent were not visible at the time of O'Brien & Gere's on-site activities, and were likely removed at the time of closure. Two undated maps of the site indicate the presence of the tank, but in two different configurations: one being parallel to the fence and one being perpendicular. A magnetic metal detector was used by O'Brien & Gere in an attempt to define the tank's location. This was unsuccessful due to the amount of interference encountered in the area. The interference appears to be related to the presence of other scrap metal (possibly mill scale from the former steel mill) and buried concrete debris or foundations containing steel rebar. However, based on the pattern of refusal encountered during the subsequent placement of soil borings, it appears the tank lies parallel to the fence (see Figure 2).

9.02. Field Investigation

The objective of the field investigation was to assess the potential for soil contamination associated with the past usage of the tank. To address this objective, three soil borings were installed in the Phase 1 investigation, with continuous sampling via a split-spoon sampler. The collected samples were screened with a PID and observed for staining or odors. Based on this field screening, one sample per boring was submitted to OBG Laboratories for analysis of VOCs and TPH.

Following receipt of the Phase 1 data (see following section), an additional five borings were installed, including boring SB-4 which was used to evaluate both this area of concern and the alley outside the former electroplating area. During the Phase 2 field work, the same sampling procedures were followed, but samples were submitted to OBG Laboratories for VOCs and semi-volatile organic compounds. Soil samples were screened with a PID and observed for staining or odors. Sampling equipment was decontaminated before being used at each location, and collected samples were cooled to 4°C before being submitted for laboratory analysis.

9.03. Analytical Results

Phase 1 analytical results indicated no detectable levels of VOCs in two of the three samples, but a TCE concentration of 980 ppb was detected in the third sample. Conversely, the sample that was found to contain TCE contained no detectable levels of TPH, while the remaining two samples contained TPH concentrations of 2,100 ppm and 2,500 ppm, respectively. Based on these initial results, the second phase of soil borings were installed. Only one of the five soil borings (Boring SB-4) indicated VOC concentrations above trace levels, with the following constituents and concentrations:

	SB-4 Results	NYSDEC Guidance
1,2-Dichloroethylene	1,300 ppb	300 ppb
Tetrachloroethylene	2,600 ppb	1,400 ppb
Trichloroethylene	3,800 ppb	700 ppb
Vinyl chloride	550 ppb	200 ppb

Similarly, only one of the five borings (Boring SB-5) indicated semi-volatile compounds above method detection limits, although some compounds were found at estimated concentrations below the detection levels. Boring SB-5 was found to contain the following concentrations of semi-volatile compounds:

	SB-5 Results	NYSDEC Guidance
Phenanthrene	730 ppb	50,000 ppb
Fluoranthrene	730 ppb	50,000 ppb
Pyrene	480 ppb	50,000 ppb

9.04. Conclusions and Recommendations

As indicated in Figure 2, the pattern of refusal encountered during the installation of the soil borings indicates that the underground tank may be oriented in a position parallel to the adjacent fence.

While several volatile and semi-volatile organic compounds were detected in this area, the specific compounds identified are not generally associated with No. 2 fuel oil. The VOCs found above trace levels in this area are chlorinated compounds usually associated with paints and solvents. Little evidence was therefore found that the reported former use of this tank may have impacted soils in this area.

There are several potential explanations as to the source of the contamination found in this area. The semi-volatile compounds found in the area were also found, along with other compounds, in the former empty oil drum storage area. As noted in Section 4.04, these compounds may have been associated with the use of coal or coal tar as fill material.

The pattern and distribution of the investigation results does not indicate the pervasive disposal of materials in this area, and the area does not appear to have been used as a routine loading or unloading area.

Based on the recommended soil cleanup objectives stated in the NYSDEC TAGM titled "Determination of Soil Cleanup Objectives and Cleanup Levels," the semi-volatile compounds encountered in this area are below recommended soil cleanup levels. Of the eight borings in this area, two (Borings B-15 and SB-4) contained concentrations of VOCs in excess of the recommended cleanup objectives. These compounds include the following:

	On-site Concentration	Cleanup Objective
Trichloroethylene	3,800 ppb	700 ppb
1,2-Dichloroethylene	1,300 ppb	300 ppb
Tetrachloroethylene	2,600 ppb	1,400 ppb
Vinyl chloride	550 ppb	200 ppb

Further work in this area, therefore, should include excavating soils around the areas of B-15 and SB-4 to the depths from which the samples were collected. The excavated soil would then be characterized for off-site disposal and confirmatory samples from the sides and bottom of each excavation would be collected and analyzed for VOCs. If the confirmatory samples contain VOC levels below NYSDEC guidance cleanup levels, soil remediation should be completed in this area.

SECTION 10. THREE FORMER ABOVE-GROUND FUEL OIL STORAGE TANKS

10.01. Site Description

Three, 4,000-gallon above-ground storage tanks were formerly located between Building 18 and the rear parking lot. These tanks were installed in 1975 in response to a petroleum shortage and were used to store No. 2 fuel oil to be used in the event of another shortage if supplies were interrupted. A Petroleum Bulk Storage Registration Certificate issued in March 1987, indicates that the tanks were still present at that time. Plant personnel indicated that the tanks had been filled with fuel oil once, but were never used after that. These tanks are no longer present at the site, but a January 18, 1990 registration form (see Attachment 3) indicates that the tanks were still in use at that time. The area is currently paved with asphalt.

10.02. Field Investigation

The objective of the field investigation was to assess potential soil contamination from the previous use of the three above-ground storage tanks. To address this objective, the Phase 1 investigation included coring the asphalt in the center of the identified area, removing the 2 to 4-inch layer of gravel, and collecting a sample of the underlying soil for analysis of VOCs and TPH. Following receipt of the Phase 1 results (see Section 10.03), a Phase 2 investigation included the installation of two shallow borings with the collection of a soil sample from each boring at a depth of 2 to 4 ft. These samples were submitted for laboratory analysis of semi-volatile organic compounds. Sampling equipment was decontaminated before being used at each location, and samples were cooled to 4°C until delivered to OBG Laboratories for analysis.

10.03. Analytical Results

Phase 1 analytical results indicated no detectable concentrations of VOCs, but a TPH level of 3,500 ppm. Since the TPH level could have been associated with the asphalt paving, Phase 2 samples were collected approximately 18 inches below the base of the asphalt and stone, and were analyzed for semi-volatile organic compounds. No detectable concentrations were found in the Phase 2 samples, indicating the likelihood that its presence in the Phase 1 samples is attributable to the asphalt paving.

10.04. Conclusions and Recommendations

Based on the analytical results discussed in Section 10.03, no further action is recommended in this area.

SECTION 11. SUMMARY OF RECOMMENDATIONS

Based on the results of the Phase 1 and 2 investigations of the Pass & Seymour facility, three areas of soil remediation are recommended:

1. As detailed in Section 4 of this report, a small area of soil contaminated with semi-volatile organic compounds should be excavated and disposed off-site. A confirmatory sample should be collected of the sides and base of this excavation to establish that remediation is complete or whether further excavation is required.
2. As discussed in Section 6 of this report, one small pile of debris is located at the end of the former access road to the former landfill. This material should be removed from the site for off-site disposal, and a confirmation sample collected to establish that remediation is complete.
3. As discussed in Section 9 of this report, two small areas outside the Maintenance Shop doorway should be excavated and disposed off-site. Confirmatory samples should be collected from the sides and bottoms of each excavation to assess whether additional soil should be removed.

Additional sampling and testing will likely be required for excavated soils to identify appropriate methods of handling and off-site disposal.

Respectfully submitted:

O'BRIEN & GERE ENGINEERS, INC.

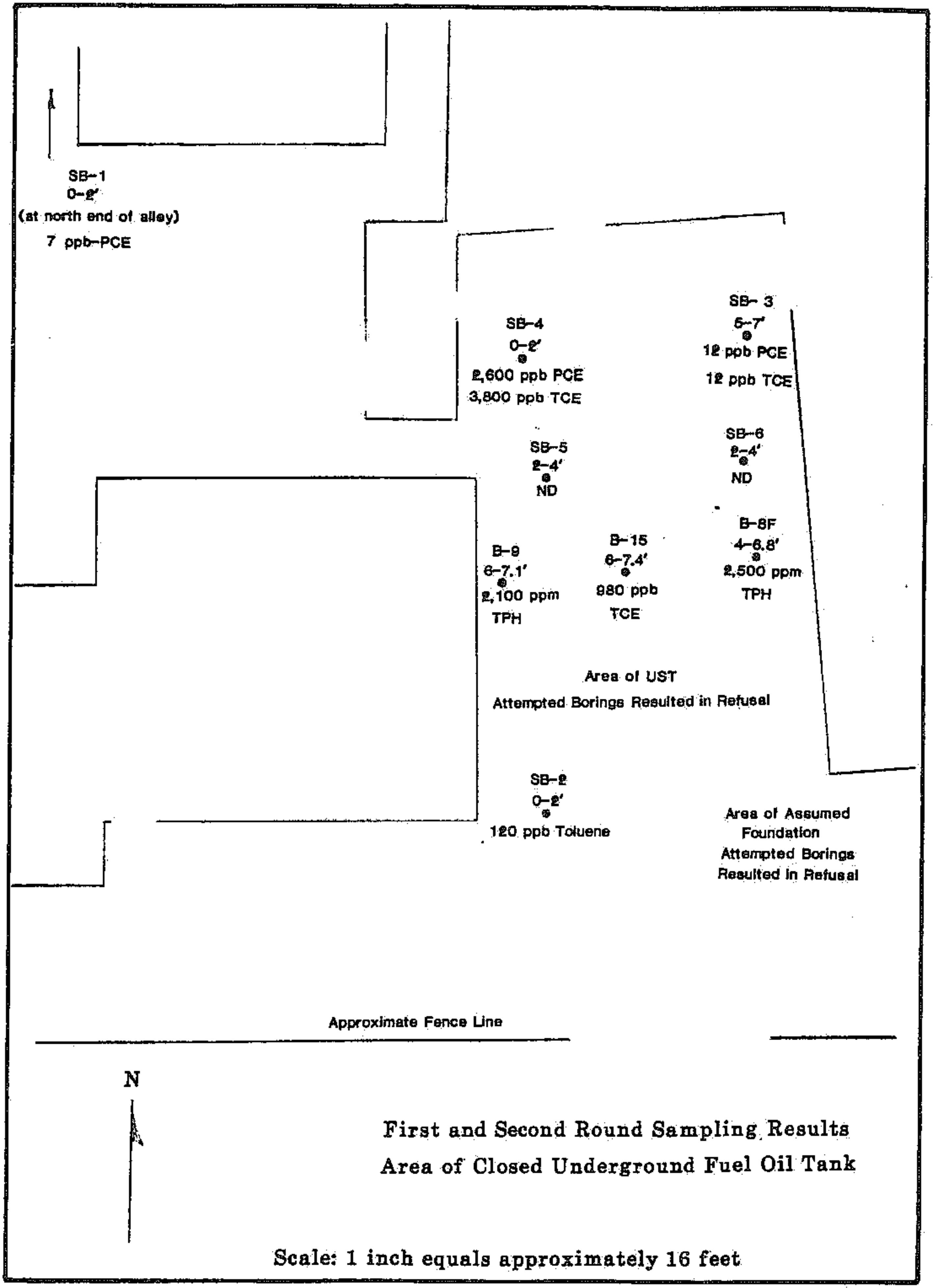
Cheryl L. Cundall

Cheryl L. Cundall, P.E., Esq.
Managing Engineer

Prepared by: David K. Meixell

Figures

FIGURE 2



First and Second Round Sampling Results
Area of Closed Underground Fuel Oil Tank

Scale: 1 inch equals approximately 16 feet

O'BRIEN & GERE ENGINEERS INC

Attachments

ATTACHMENT 1

FIRST PHASE ANALYTICAL RESULTS AND BORING LOGS

LABORATORIES, INC.

Laboratory Report

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517
DESCRIPTION Solvay, NY
MATRIX: Soil
DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

Description	B3 (8-10')	B3 (10-12')	B4 (2-4')	Landfill #1	Landfill #3
Sample #	Q5730	Q5731	Q5733	Q5751	Q5753
TCLP Metals:					
ARSENIC	<0.5	<0.5	<0.5	<0.5	<0.5
BARIUM	<10.	<10.	<10.	<10.	<10.
CADMIUM	<0.1	<0.1	<0.1	0.1	<0.1
CHROMIUM	<0.5	<0.5	<0.5	<0.5	<0.5
LEAD	<0.5	<0.5	<0.5	<0.5	<0.5
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
SELENIUM	<0.1	<0.1	<0.1	<0.1	<0.1
SILVER	<0.5	<0.5	<0.5	<0.5	<0.5

Comments:

Certification No.: 10155

Units: mg/l

Authorized:

Date: November 5, 1992

LABORATORIES, INC.

Laboratory Report

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517
DESCRIPTION Solvay, NY
MATRIX: Soil
DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

Description	Landfill #4	Landfill #5			
Sample #	Q5754	Q5755			
TCLP Metals:					
ARSENIC	<0.5	<0.5			
BARIUM	<10.	<10.			
CADMIUM	<0.1	<0.1			
CHROMIUM	<0.5	<0.5			
LEAD	<0.5	<0.5			
MERCURY	<0.0005	<0.0005			
SELENIUM	<0.1	<0.1			
SILVER	<0.5	<0.5			

Comments:

Certification No.: 10155
Units: mg/l

Authorized:
Date: November 5, 1992

LABORATORIES, INC.

Laboratory Report

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

Description	B14 (0.6-4.1')	Landfill Foundry Sand #2 Area #1	Exterin Chem Storage		
Sample #	Q5744	Q5752	Q5756		
Total Metals:					
ARSENIC	1.2	43.	36.		
BARIUM	17.	110.	53.		
CADMIUM	<1.	<1.	<1.		
CHROMIUM	2.	15.	12.		
LEAD	51.	140.	47.		
MERCURY	<0.6	<0.6	<0.5		
SELENIUM	<0.6	<0.6	<0.5		
SILVER	<1.	<1.	<11.*		

Comments: *Elevated detection limits due to matrix complexity and/or interferences

Certification No.: 10155

Units: mg/kg dry weight

Authorized:

Date: November 5, 1992

LABORATORIES, INC.

Volatile Organics
Method 8010/8020

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

DATE COLLECTED 9-19,20-92 DATE RECEIVED 9-21-92 DATE ANALYZED 9-24,25-92

DESCRIPTION:	B-1 2'-4'	B-5 6'-8'	B-6 6'-8'	B-7 10'-12'	B-9 6'-7.1'	B-15 6'-7.4'
SAMPLE NO.:	Q5726	Q5734	Q5735	Q5736	Q5737*	Q5738
Benzene	<1.	<1.	<1.	<1.	<140.	<6.
Benzyl chloride	<11.	<11.	<11.	<11.	<1400.	<61.
Bis (2-chloroethoxy) methane	<570.	<530.	<540.	<560.	<69,000.	<3000.
Bromobenzene	<6.	<5.	<5.	<6.	<690.	<30.
Bromodichloromethane	<1.	<1.	<1.	<1.	<140.	<6.
Bromoform	<11.	<11.	<11.	<11.	<1400.	<61.
Bromomethane	<11.	<11.	<11.	<11.	<1400.	<61.
Carbon tetrachloride	<1.	<1.	<1.	<1.	<140.	<6.
Chlorobenzene	↓	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<11.	<11.	<11.	<11.	<1400.	<61.
Chloroform	<1.	<1.	<1.	<1.	<140.	<6.
1-Chlorohexane	<11.	<11.	<11.	<11.	<1400.	<61.
Chloromethane	<11.	<11.	<11.	<11.	<1400.	<61.
Chloromethylmethyl ether	<110.	<110.	<110.	<110.	<14,000.	<610.
2-Chlorotoluene	<6.	<5.	<5.	<6.	<690.	<30.
4-Chlorotoluene	<6.	<5.	<5.	<6.	<690.	<30.
Dibromochloromethane	<1.	<1.	<1.	<1.	<140.	<61.
Dibromomethane	<11.	<11.	<11.	<11.	<1400.	<610.
1,2-Dichlorobenzene	<6.	<5.	<5.	<6.	<690.	<30.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<11.	<11.	<11.	<11.	<1400.	<61.

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Volatile Organics
Method 8010/8020

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

DATE COLLECTED 9-19,20-92 DATE RECEIVED 9-21-92 DATE ANALYZED 9-24,25-92

DESCRIPTION:	B-1 2'-4'	B-5 6'-8'	B-6 6'-8'	B-7 10'-12'	B-9 6'-7.1'	B-15 6'-7.4'
SAMPLE NO.:	Q5726	Q5734	Q5735	Q5736	Q5737*	Q5738
1,1-Dichloroethane	<1.	<1.	<1.	<1.	<140.	<6.
1,2-Dichloroethane	↓	↓	↓	↓	↓	↓
1,1-Dichloroethylene	↓	↓	↓	↓	↓	↓
1,2-Dichloroethylene (total)	↓	↓	↓	↓	↓	↓
Dichloromethane	↓	↓	↓	↓	↓	↓
1,2-Dichloropropane	↓	↓	↓	↓	↓	<61.
cis-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
trans-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
Ethylbenzene	↓	↓	↓	↓	↓	<6.
1,1,2,2-Tetrachloroethane	↓	↓	↓	↓	↓	↓
1,1,1,2-Tetrachloroethane	↓	↓	↓	↓	↓	↓
Tetrachloroethylene	↓	↓	↓	↓	↓	↓
Toluene	↓	↓	↓	↓	↓	↓
1,1,1-Trichloroethane	↓	↓	↓	↓	↓	↓
1,1,2-Trichloroethane	↓	↓	↓	↓	↓	<61.
Trichloroethylene	22.	↓	↓	↓	↓	980.
Trichlorofluoromethane	<1.	↓	↓	↓	↓	<6.
1,2,3-Trichloropropane	↓	↓	↓	↓	↓	↓
Vinyl chloride	↓	↓	↓	↓	↓	↓
Xylene (total)	<3.	<3.	<3.	<3.	<420.	<18.

Comments: *Elevated detection limits due to matrix interference, suspected petroleum pattern.

Methodology: USEPA,SW-846, November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Page 2 of 2

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Volatile Organics
Method 8010/8020

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

DATE COLLECTED 9-20-92 DATE RECEIVED 9-21-92 DATE ANALYZED 9-25,10-2,5-92

DESCRIPTION:	B-8F 4'-6.8'	TCE Tank #1	TCE Tank #2	Storage Tank #1
SAMPLE NO.:	Q5739*	Q5749	Q5750**	Q5757
Benzene	<130.	<1.	<1.	<1.
Benzyl chloride	<1300.	<11.	<11.	<10.
Bis (2-chloroethoxy) methane	<64,000.	<540.	<540.	<520.
Bromobenzene	<640.	<5.	<5.	<5.
Bromodichloromethane	<130.	<1.	<1.	<1.
Bromoform	<1300.	<11.	<11.	<10.
Bromomethane	<1300.	<11.	<11.	<10.
Carbon tetrachloride	<130.	<1.	<1.	<1.
Chlorobenzene	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓
2-Chloroethylvinyl ether	<1300.	<11.	<11.	<10.
Chloroform	<130.	<1.	<1.	<1.
1-Chlorohexane	<1300.	<11.	<11.	<10.
Chloromethane	<1300.	<11.	<11.	<10.
Chloromethylmethyl ether	<13,000.	<110.	<110.	<100.
2-Chlorotoluene	<640.	<5.	<5.	<5.
4-Chlorotoluene	<640.	<5.	<5.	<5.
Dibromochloromethane	<130.	<1.	<1.	<1.
Dibromomethane	<1300.	<11.	<11.	<10.
1,2-Dichlorobenzene	<640.	<5.	<5.	<5.
1,3-Dichlorobenzene	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓
Dichlorodifluoromethane	<1300.	<11.	<11.	<10.

Authorized:

Date: November 6, 1992

OBG
LABORATORIES, INC.

Volatile Organics
Method 8010/8020

CLIENT BOND, SCHOENECK & KING
JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

DATE COLLECTED 9-20-92
DATE RECEIVED 9-21-92
DATE ANALYZED 9-25,10-2,5-92

DESCRIPTION:	B-8F 4'-6.8'	TCE Tank #1	TCE Tank #2	Storage Tank #1
SAMPLE NO.:	Q5739*	Q5749	Q5750**	Q5757
1,1-Dichloroethane	<130.	<1.	<1.	<1.
1,2-Dichloroethane	↓	↓	↓	↓
1,1-Dichloroethylene	↓	↓	↓	↓
1,2-Dichloroethylene (total)	↓	↓	↓	↓
Dichloromethane	↓	↓	↓	↓
1,2-Dichloropropane	↓	↓	↓	↓
cis-1,3-Dichloropropylene	↓	↓	↓	↓
trans-1,3-Dichloropropylene	↓	↓	↓	↓
Ethylbenzene	↓	↓	↓	↓
1,1,2,2-Tetrachloroethane	↓	↓	↓	↓
1,1,1,2-Tetrachloroethane	↓	↓	↓	↓
Tetrachloroethylene	↓	↓	↓	↓
Toluene	↓	↓	↓	↓
1,1,1-Trichloroethane	↓	↓	↓	↓
1,1,2-Trichloroethane	↓	↓	↓	↓
Trichloroethylene	↓	7.	8.	↓
Trichlorofluoromethane	↓	<1.	<1.	↓
1,2,3-Trichloropropane	↓	↓	↓	↓
Vinyl chloride	↓	↓	↓	↓
Xylene (total)	<390.	<3.	<3.	<3.

Comments: *Elevated detection limit due to matrix interference.

**Sample was anayzed outside of the holding time.

Methodology: USEPA,SW-846, November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Page 2 of 2

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Volatile Organics
Method 8010/8020

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-2 2'-4' MATRIX: Soil

SAMPLE NO. Q5727 DATE COLLECTED 9-19-92 DATE REC'D. 9-21-92 DATE ANALYZED 10-15-92

Benzene	<6.	Dichlorodifluoromethane	<63.
Benzyl chloride	<63.	1,1-Dichloroethane	<6.
Bis (2-chloroethoxy) methane	<3100.	1,2-Dichloroethane	↓
Bromobenzene	<31.	1,1-Dichloroethylene	↓
Bromodichloromethane	<6.	1,2-Dichloroethylene (total)	↓
Bromoform	<63.	Dichloromethane	↓
Bromomethane	<6.	1,2-Dichloropropane	↓
Carbon tetrachloride	↓	Ethylbenzene	↓
Chlorobenzene	↓	cis-1,3-Dichloropropylene	↓
Chloroethane	↓	trans-1,3-Dichloropropylene	↓
2-Chloroethylvinyl ether	<63.	1,1,2,2-Tetrachloroethane	↓
Chloroform	<6.	1,1,1,2-Tetrachloroethane	↓
1-Chlorohexane	<63.	Tetrachloroethylene	↓
Chloromethane	<6.	Toluene	↓
Chloromethylmethyl ether	<630.	1,1,1-Trichloroethane	↓
2-Chlorotoluene	<31.	1,1,2-Trichloroethane	↓
4-Chlorotoluene	<31.	Trichloroethylene	↓
Dibromochloromethane	<6.	Trichlorofluoromethane	↓
Dibromomethane	<63.	1,2,3-Trichloropropane	↓
1,2-Dichlorobenzene	<31.	Vinyl chloride	↓
1,3-Dichlorobenzene	↓	Xylene (total)	<19.
1,4-Dichlorobenzene	↓	PERCENT TOTAL SOLIDS	80.

Comments: Anaylsis performed beyond the prescribed holding times at client's request

Methodology: USEPA,SW-846, November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight, unless otherwise noted

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Laboratory Report

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

Analyzed 10-4-92 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

	Sample #	PCB	Aroclor	PERCENT TOTAL SOLIDS
B3 (8-10')	Q5730	<0.6	-	89.
B3 (10-12')	Q5731	<0.6	-	88.
B4 (2-4')	Q5733	<0.6	-	90.
B14 (0.6-4.1')	Q5744	<0.6	-	82.
Oil Transformer Pad #1	Q5745	<0.5*	-	-
Oil Transformer Pad #2	Q5746	2.3*	1248+1260	-
Oil Transformer Pad #3	Q5747	3.9*	1248+1260	-
Landfill #1	Q5751	<0.6	-	83.
Landfill #3	Q5753	<0.6	-	76.
Landfill #4	Q5754	<0.6	-	85.
Landfill #5	Q5755	<0.6	-	82.
Chem. Ext. Storage Area #1	Q5756	<0.5	-	95.

Comments:

Certification No.: 10155

Units: mg/kg dry weight
*mg/kg

Authorized:

Date: November 6, 1992

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-2 (6-6.8') MATRIX: Soil

SAMPLE NO. Q5728 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-23-92

Phenol	<360.	4-Chloro-3-methylphenol	<360.
Bis (2-chloroethyl) ether	│	2-Methylnaphthalene	│
2-Chlorophenol	│	Hexachlorocyclopentadiene	│
1,3-Dichlorobenzene	│	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	│	2,4,5-Trichlorophenol	<1800.
Benzyl alcohol	│	2-Chloronaphthalene	<360.
1,2-Dichlorobenzene	│	2-Nitroaniline	<1800.
2-Methylphenol	│	Dimethylphthalate	<360.
Bis (2-chloroisopropyl) ether	│	Acenaphthylene	│
4-Methylphenol	│	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	│	3-Nitroaniline	<1800.
Hexachloroethane	│	Acenaphthene	<360.
Nitrobenzene	│	2,4-Dinitrophenol	<1800.
Isophorone	│	4-Nitrophenol	<1800.
2-Nitrophenol	│	Dibenzofuran	<360.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	│
Benzoic acid	<1800.	Diethylphthalate	│
Bis (2-chloroethoxy) methane	<360.	4-Chlorophenyl-phenylether	│
2,4-Dichlorophenol	│	Fluorene	↓
1,2,4-Trichlorobenzene	│	4-Nitroaniline	<1800.
Naphthalene	│	4,6-Dinitro-2-methylphenol	<1800.
4-Chloroaniline	│	N-Nitrosodiphenylamine	<360.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<360.

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Authorized:

Date: November 6, 1992

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-2 (6-6.8') MATRIX: Soil

SAMPLE NO. Q5728 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-23-92

Hexachlorobenzene	<360.	Benzo (a) anthracene	<360.
Pentachlorophenol	<1800.	Chrysene	↓
Phenanthrene	<360.	Bis (2-ethylhexyl) phthalate	↓
Anthracene	↓	Di-n-octylphthalate	↓
Di-n-butylphthalate	↓	Benzo (b) fluoranthene	↓
Fluoranthene	↓	Benzo (k) fluoranthene	↓
Pyrene	↓	Benzo (a) pyrene	↓
Butylbenzylphthalate	↓	Indeno (1,2,3-cd) pyrene	↓
3,3'-Dichlorobenzidine	<730.	Dibenz (a,h) anthracene	↓
		Benzo (g,h,i) perylene	↓

Comments:

Methodology: EPA Target Compound List By 8270, SW-846, November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-3 (8-10') MATRIX: Soil

SAMPLE NO. Q5730 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 9-21-92

Phenol	<380.	4-Chloro-3-methylphenol	<380.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	730.
2-Chlorophenol	↓	Hexachlorocyclopentadiene	<380.
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	<380.
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<1800.
Benzyl alcohol	↓	2-Chloronaphthalene	<380.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<1800.
2-Methylphenol	↓	Dimethylphthalate	<380.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<1800.
Hexachloroethane	↓	Acenaphthene	<380.
Nitrobenzene	↓	2,4-Dinitrophenol	<1800.
Isophorone	↓	4-Nitrophenol	<1800.
2-Nitrophenol	↓	Dibenzofuran	<380.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<1800.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<380.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<1800.
Naphthalene	440.	4,6-Dinitro-2-methylphenol	<1800.
4-Chloroaniline	<380.	N-Nitrosodiphenylamine	<380.
Hexachlorobutadiene	<380.	4-Bromophenyl-phenylether	<380.

Authorized:

Date: November 6, 1992

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-3 (8-10') MATRIX: Soil

SAMPLE NO. Q5730 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 9-21-92

Hexachlorobenzene	<380.	Benzo (a) anthracene	<380.
Pentachlorophenol	<1800.	Chrysene	↓
Phenanthrene	<380.	Bis (2-ethylhexyl) phthalate	↓
Anthracene	↓	Di-n-octylphthalate	↓
Di-n-butylphthalate	↓	Benzo (b) fluoranthene	↓
Fluoranthene	↓	Benzo (k) fluoranthene	↓
Pyrene	↓	Benzo (a) pyrene	↓
Butylbenzylphthalate	↓	Indeno (1,2,3-cd) pyrene	↓
3,3'-Dichlorobenzidine	<750.	Dibenz (a,h) anthracene	↓
		Benzo (g,h,i) perylene	↓

Comments:

Methodology: EPA Target Compound List By 8270, SW-846
November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

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Authorized:

Date: November 6, 1992

OBG LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-3 (10-12') MATRIX: Soil

SAMPLE NO. 05731 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-23-92

Phenol	<380.	4-Chloro-3-methylphenol	<380.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	↓
2-Chlorophenol	↓	Hexachlorocyclopentadiene	↓
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<1800.
Benzyl alcohol	↓	2-Chloronaphthalene	<380.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<1800.
2-Methylphenol	↓	Dimethylphthalate	<380.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<1800.
Hexachloroethane	↓	Acenaphthene	<380.
Nitrobenzene	↓	2,4-Dinitrophenol	<1800.
Isophorone	↓	4-Nitrophenol	<1800.
2-Nitrophenol	↓	Dibenzofuran	<380.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<1800.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<380.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<1800.
Naphthalene	↓	4,6-Dinitro-2-methylphenol	<1800.
4-Chloroaniline	↓	N-Nitrosodiphenylamine	<380.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<380.

Authorized:

Date: November 6, 1992

OBG LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-3 (10-12') MATRIX: Soil

SAMPLE NO. Q5731 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-23-92

Hexachlorobenzene	<380.	Benzo (a) anthracene	<380.
Pentachlorophenol	<1800.	Chrysene	↓
Phenanthrene	<380.	Bis (2-ethylhexyl) phthalate	↓
Anthracene	↓	Di-n-octylphthalate	↓
Di-n-butylphthalate	↓	Benzo (b) fluoranthene	↓
Fluoranthene	↓	Benzo (k) fluoranthene	↓
Pyrene	↓	Benzo (a) pyrene	↓
Butylbenzylphthalate	↓	Indeno (1,2,3-cd) pyrene	↓
3,3'-Dichlorobenzidine	<750.	Dibenz (a,h) anthracene	↓
		Benzo (g,h,i) perylene	↓

Comments:

Methodology: EPA Target Compound List By 8270, SW-846
November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

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LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-4 (2-4') MATRIX: Soil

SAMPLE NO. Q5733 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-23-92

Phenol	<370.	4-Chloro-3-methylphenol	<370.
Bis (2-chloroethyl) ether	│	2-Methylnaphthalene	│
2-Chlorophenol	│	Hexachlorocyclopentadiene	│
1,3-Dichlorobenzene	│	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	│	2,4,5-Trichlorophenol	<1800.
Benzyl alcohol	│	2-Chloronaphthalene	<370.
1,2-Dichlorobenzene	│	2-Nitroaniline	<1800.
2-Methylphenol	│	Dimethylphthalate	<370.
Bis (2-chloroisopropyl) ether	│	Acenaphthylene	│
4-Methylphenol	│	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	│	3-Nitroaniline	<1800.
Hexachloroethane	│	Acenaphthene	<370.
Nitrobenzene	│	2,4-Dinitrophenol	<1800.
Isophorone	│	4-Nitrophenol	<1800.
2-Nitrophenol	│	Dibenzofuran	<370.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	│
Benzoic acid	<1800.	Diethylphthalate	│
Bis (2-chloroethoxy) methane	<370.	4-Chlorophenyl-phenylether	│
2,4-Dichlorophenol	│	Fluorene	↓
1,2,4-Trichlorobenzene	│	4-Nitroaniline	<1800.
Naphthalene	│	4,6-Dinitro-2-methylphenol	<1800.
4-Chloroaniline	│	N-Nitrosodiphenylamine	<370.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<370.

Authorized:

Date: November 6, 1992

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LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

B-4 (2-4') MATRIX: Soil

SAMPLE NO. Q5733 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-23-92

Hexachlorobenzene	<370.	Benzo (a) anthracene	<370.
Pentachlorophenol	<1800.	Chrysene	↓
Phenanthrene	<370.	Bis (2-ethylhexyl) phthalate	
Anthracene	↓	Di-n-octylphthalate	
Di-n-butylphthalate		Benzo (b) fluoranthene	
Fluoranthene		Benzo (k) fluoranthene	
Pyrene		Benzo (a) pyrene	
Butylbenzylphthalate		Indeno (1,2,3-cd) pyrene	
3,3'-Dichlorobenzidine	<730.	Dibenz (a,h) anthracene	
		Benzo (g,h,i) perylene	

Comments:

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

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LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

Surf. Comp. Oil Drum Area MATRIX: Soil

SAMPLE NO. Q5748 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-23-92

Phenol	<36,000.	4-Chloro-3-methylphenol	<36,000.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	<36,000. (8900.)
2-Chlorophenol	↓	Hexachlorocyclopentadiene	<36,000.
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	<36,000.
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<170,000.
Benzyl alcohol	↓	2-Chloronaphthalene	<36,000.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<170,000.
2-Methylphenol	↓	Dimethylphthalate	<36,000.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<170,000.
Hexachloroethane	↓	Acenaphthene	39,000.
Nitrobenzene	↓	2,4-Dinitrophenol	<170,000.
Isophorone	↓	4-Nitrophenol	<170,0000.
2-Nitrophenol	↓	Dibenzofuran	<36,000. (25,000.)
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	<36,000.
Benzoic acid	<170,000.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<36,000.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	<36,000. (35,000.)
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<170,000.
Naphthalene	<36,000. (26,000.)	4,6-Dinitro-2-methylphenol	<170,000.
4-Chloroaniline	<36,000.	N-Nitrosodiphenylamine	<36,000.
Hexachlorobutadiene	<36,000.	4-Bromophenyl-phenylether	<36,000.

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING **JOB NO.** 156.200.517

DESCRIPTION Solvay, NY

Surf. Comp. Oil Drum Area MATRIX: Soil

SAMPLE NO. 05748 **DATE COLLECTED** 9-19-92 **DATE RECEIVED** 9-21-92

DATE EXTRACTED 9-29-92 **DATE ANALYZED** 10-23-92

Hexachlorobenzene	<36,000.	Benzo (a) anthracene	150,000.
Pentachlorophenol	<170,000.	Chrysene	130,000.
Phenanthrene	280,000.	Bis (2-ethylhexyl) phthalate	<36,000.
Anthracene	55,000.	Di-n-octylphthalate	<36,000.
Di-n-butylphthalate	<36,000.	Benzo (b) fluoranthene	190,000.
Fluoranthene	320,000.	Benzo (k) fluoranthene	71,000.
Pyrene	260,000.	Benzo (a) pyrene	120,000.
Butylbenzylphthalate	<36,000.	Indeno (1,2,3-cd) pyrene	68,000.
3,3'-Dichlorobenzidine	<72,000.	Dibenz (a,h) anthracene	<36,000. (6700.)
		Benzo (g,h,i) perylene	57,000.

Comments: Values in parentheses are estimated values, detected, but below the quantitation limit.

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: November 6, 1992

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY
Landfill #1 MATRIX: Soil

SAMPLE NO. Q5751 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-24-92

Phenol	<4000.	4-Chloro-3-methylphenol	<4000.
Bis (2-chloroethyl) ether		2-Methylnaphthalene	
2-Chlorophenol		Hexachlorocyclopentadiene	
1,3-Dichlorobenzene		2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene		2,4,5-Trichlorophenol	<19,000.
Benzyl alcohol		2-Chloronaphthalene	<4000.
1,2-Dichlorobenzene		2-Nitroaniline	<19,000.
2-Methylphenol		Dimethylphthalate	<4000.
Bis (2-chloroisopropyl) ether		Acenaphthylene	
4-Methylphenol		2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine		3-Nitroaniline	<19,000.
Hexachloroethane		Acenaphthene	<4000.
Nitrobenzene		2,4-Dinitrophenol	<19,000.
Isophorone		4-Nitrophenol	<19,000.
2-Nitrophenol		Dibenzofuran	<4000.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	
Benzoic acid	<19,000.	Diethylphthalate	
Bis (2-chloroethoxy) methane	<4000.	4-Chlorophenyl-phenylether	
2,4-Dichlorophenol		Fluorene	↓
1,2,4-Trichlorobenzene		4-Nitroaniline	<19,000.
Naphthalene		4,6-Dinitro-2-methylphenol	<19,000.
4-Chloroaniline		N-Nitrosodiphenylamine	<4000.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<4000.

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OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

Landfill #1 MATRIX: Soil

SAMPLE NO. Q5751 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-24-92

Hexachlorobenzene	<4000.	Benzo (a) anthracene	<4000.
Pentachlorophenol	<19,000.	Chrysene	6100.
Phenanthrene	7600.	Bis (2-ethylhexyl) phthalate	<4000.
Anthracene	<4000.	Di-n-octylphthalate	<4000.
Di-n-butylphthalate	<4000.	Benzo (b) fluoranthene	8800.
Fluoranthene	13,000.	Benzo (k) fluoranthene	<4000.
Pyrene	11,000.	Benzo (a) pyrene	5300.
Butylbenzylphthalate	<4000.	Indeno (1,2,3-cd) pyrene	<4000.
3,3'-Dichlorobenzidine	<8000.	Dibenz (a,h) anthracene	<4000.
		Benzo (g,h,i) perylene	<4000.

Comments:

Methodology: EPA Target Compound List By 8270, SW-846
November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

Landfill #3 MATRIX: Soil

SAMPLE NO. Q5753 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-24-92

Phenol	<4300.	4-Chloro-3-methylphenol	<4300.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	↓
2-Chlorophenol	↓	Hexachlorocyclopentadiene	↓
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<21,000.
Benzyl alcohol	↓	2-Chloronaphthalene	<4300.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<21,000.
2-Methylphenol	↓	Dimethylphthalate	<4300.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<21,000.
Hexachloroethane	↓	Acenaphthene	<4300.
Nitrobenzene	↓	2,4-Dinitrophenol	<21,000.
Isophorone	↓	4-Nitrophenol	<21,000.
2-Nitrophenol	↓	Dibenzofuran	<4300.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<21,000.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<4300.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<21,000.
Naphthalene	↓	4,6-Dinitro-2-methylphenol	<21,000.
4-Chloroaniline	↓	N-Nitrosodiphenylamine	<4300.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<4300.

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Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING **JOB NO.** 156.200.517

DESCRIPTION Solvay, NY

Landfill #3 MATRIX: Soil

SAMPLE NO. Q5753 **DATE COLLECTED** 9-19-92 **DATE RECEIVED** 9-21-92

DATE EXTRACTED 9-29-92 **DATE ANALYZED** 10-24-92

Hexachlorobenzene	<4300.	Benzo (a) anthracene	<4300.
Pentachlorophenol	<21,000.	Chrysene	↓
Phenanthrene	<4300.	Bis (2-ethylhexyl) phthalate	
Anthracene	↓	Di-n-octylphthalate	
Di-n-butylphthalate		Benzo (b) fluoranthene	
Fluoranthene		Benzo (k) fluoranthene	
Pyrene		Benzo (a) pyrene	
Butylbenzylphthalate		Indeno (1,2,3-cd) pyrene	
3,3'-Dichlorobenzidine	<8700.	Dibenz (a,h) anthracene	
		Benzo (g,h,i) perylene	

Comments: Elevated quantitation limits due to matrix complexity or interferences

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: November 6, 1992

OBG LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

Landfill #4 MATRIX: Soil

SAMPLE NO. Q5754 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 9-21-92

Phenol	<390.	4-Chloro-3-methylphenol	<390.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	↓
2-Chlorophenol	↓	Hexachlorocyclopentadiene	↓
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<1900.
Benzyl alcohol	↓	2-Chloronaphthalene	<390.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<1900.
2-Methylphenol	↓	Dimethylphthalate	<390.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<1900.
Hexachloroethane	↓	Acenaphthene	<390.
Nitrobenzene	↓	2,4-Dinitrophenol	<1900.
Isophorone	↓	4-Nitrophenol	<1900.
2-Nitrophenol	↓	Dibenzofuran	<390.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<1900.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<390.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<1900.
Naphthalene	↓	4,6-Dinitro-2-methylphenol	<1900.
4-Chloroaniline	↓	N-Nitrosodiphenylamine	<390.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<390.

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

Landfill #4 MATRIX: Soil

SAMPLE NO. Q5754 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 9-21-92

Hexachlorobenzene	<390.	Benzo (a) anthracene	<390.
Pentachlorophenol	<1900.	Chrysene	↓
Phenanthrene	<390.	Bis (2-ethylhexyl) phthalate	↓
Anthracene	↓	Di-n-octylphthalate	↓
Di-n-butylphthalate	↓	Benzo (b) fluoranthene	↓
Fluoranthene	↓	Benzo (k) fluoranthene	↓
Pyrene	↓	Benzo (a) pyrene	↓
Butylbenzylphthalate	↓	Indeno (1,2,3-cd) pyrene	↓
3,3'-Dichlorobenzidine	<780.	Dibenz (a,h) anthracene	↓
		Benzo (g,h,i) perylene	↓

Comments:

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: November 6, 1992

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

Landfill #5 MATRIX: Soil

SAMPLE NO. Q5755 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-24-92

Phenol	<4000.	4-Chloro-3-methylphenol	<4000.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	4800.
2-Chlorophenol	↓	Hexachlorocyclopentadiene	<4000.
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	<4000.
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<20,000.
Benzyl alcohol	↓	2-Chloronaphthalene	<4000.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<20,000.
2-Methylphenol	↓	Dimethylphthalate	<4000.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<20,000.
Hexachloroethane	↓	Acenaphthene	<4000.
Nitrobenzene	↓	2,4-Dinitrophenol	<20,000.
Isophorone	↓	4-Nitrophenol	<20,000.
2-Nitrophenol	↓	Dibenzofuran	<4000.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<20,000.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<4000.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<20,000.
Naphthalene	<4000. (2900)	4,6-Dinitro-2-methylphenol	<20,000.
4-Chloroaniline	<4000.	N-Nitrosodiphenylamine	<4000.
Hexachlorobutadiene	<4000.	4-Bromophenyl-phenylether	<4000.

Authorized:

Date: November 6, 1992

OBG LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

Landfill #5 MATRIX: Soil

SAMPLE NO. Q5755 DATE COLLECTED 9-19-92 DATE RECEIVED 9-21-92

DATE EXTRACTED 9-29-92 DATE ANALYZED 10-24-92

Hexachlorobenzene	<4000.	Benzo (a) anthracene	<4000.
Pentachlorophenol	<20,000.	Chrysene	<4000.(2400.)
Phenanthrene	<4000.(3200.)	Bis (2-ethylhexyl) phthalate	<4000.
Anthracene	<4000.	Di-n-octylphthalate	<4000.
Di-n-butylphthalate	4100.	Benzo (b) fluoranthene	4100.
Fluoranthene	<4000.(3100.)	Benzo (k) fluoranthene	<4000.
Pyrene	<4000.(2600.)	Benzo (a) pyrene	<4000.(2100.)
Butylbenzylphthalate	<4000.	Indeno (1,2,3-cd) pyrene	<4000.
3,3'-Dichlorobenzidine	<8000.	Dibenz (a,h) anthracene	↓
		Benzo (g,h,i) perylene	↓

Comments:

Methodology: EPA Target Compound List By 8270, SW-846
November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: November 6, 1992

LABORATORIES, INC.

Laboratory Report

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

DATE COLLECTED See Below DATE RECEIVED 9-21-92

		Sample #	TOTAL PHENOL	TOTAL PETROLEUM HYDRO-CARBONS	PERCENT TOTAL SOLIDS	CHROMIUM HEXAVALENT	CYANIDE
B-1 (2-4')	9-19-92	Q5726	-	-	88.	-	-
B-2 (2-4')		Q5727	-	-	80.	-	-
B-2 (6-6.8')		Q5728	-	-	91.	-	-
B-3 (0.5-2')		Q5729	<0.5	-	91.	-	-
B-3 (8-10')		Q5730	<0.6	-	89.	-	-
B-3 (10-12')		Q5731	<0.6	-	88.	-	-
B-4 (2-4')		Q5733	<0.6	-	90.	-	-
B-5 (6-8')		Q5734	-	<100.	94.	-	-
B-6 (6-8')		Q5735	-	<100.	92.	-	-
B-7 (10-12')		Q5736	-	<100.	89.	-	-
B-9 (6-7.1')	9-20-92	Q5737	-	2100.	72.	-	-
B-15 (6-7.4')		Q5738	-	<100.	82.	-	-
B-8F (4-6.8')		Q5739	-	2500.	78.	-	-
B-10 (0.0-2.9')	9-19-92	Q5740	-	-	79.	<1.3	<0.6
B11 (0.8-2.8')		Q5741	-	-	83.	<1.2	0.7
B12 (1.3-3.3')		Q5742	-	-	84.	<1.2	<0.6
B13 (1.1-3.1')		Q5743	-	-	88.	1.1	<0.6
B14 (0.6-4.1')		Q5744	-	-	82.	-	-

Comments:

Certification No.: 10155

Units: mg/kg dry weight, unless otherwise noted

Authorized:

Date: November 6, 1992

O'BRIEN & GERE

Memorandum

To: Files
From: CC Calkins
Subject: Soil Vapor Survey Results

Date: October 23, 1992
File: 156.199.182
Copies: JE Banikowski
SW Kaczmar
CL Cundall
D. Meixell

The purpose of this memo is to convey the results of the soil vapor survey conducted by Division 82 at Pass & Seymour, Inc. in Solvay, New York on October 3, 1992.

METHODS

Sample Locations - Samples were collected at the nodes of a ten foot grid system beginning in the vicinity of the former aboveground trichloroethene tank and proceeding to the north and west. As sampling proceeded away from the former tank location, the grid spacing was increased to as much as fifty feet. A total of seventeen (17) samples were collected from the sample locations shown on Figure 1.

Sample Collection - Soil vapor samples were collected using dedicated aluminum shield points attached to a length of 3/16 inch OD teflon tubing. The shield point/teflon tubing assemblies were driven to a depth of approximately three feet using hardened steel probes and an electric impact hammer. Prior to collection of a sample, the probe was retracted three to six inches to expose the vapor intake slots of the shield point. To collect a sample, a 50 milliliter (ml) ground glass syringe equipped with a stopcock was connected to the teflon tubing extending from the probe and plunger drawn back. Prior to collection of the vapor sample for analysis, two collection syringe volumes (100 ml) were purged form the system to minimize ambient air contributions to analytical results. An aliquot of vapor was then withdrawn from the collection syringe using a 100 microliter (μl) gas tight syringe and injected into a Photovac 10S70 portable gas chromatograph (GC), equipped with a photoionization detector, for analysis.

GC Calibration - During the sampling program the GC was calibrated to trichloroethene (TCE), benzene, toluene, and xylene (BTX). Prior to analysis of any samples, a four point calibration was performed for TCE. Included were a method blank and three concentration levels of each calibrant. A mid-level concentration BTX standard was run to establish retention times for these compounds in the event that petroleum hydrocarbon residues were observed. In addition, a mid-level concentration TCE standard was run after every ten samples and at the end of each day.

Sample Quantification - A least squares regression was performed on standard data to develop an equation relating peak area to sample concentration for each standard. Results of the sample analyses were quantified by comparison to calibration equations. Sample peaks which were consistent with a calibrant standard, on the basis of retention time, were quantified using the corresponding calibration equation. Sample peaks which were inconsistent with calibrant standards were grouped, labelled "Other VOCs" and quantified using an average of all calibration equations. The concentration of the calibrant standards and "Other VOCs" were summed to provide a measure of "Total VOCs". Detection limits for each calibrant standard were calculated by placing the minimum detectable area (50 millivolt seconds) into the calibration equations.

RESULTS

Results of the soil vapor survey are summarized in Table 1. TCE was detected in each of the 17 samples analyzed at concentrations ranging from 0.016 to 3.49 parts per million (ppm). In several samples TCE degradation products tetrachloroethene and trans-1,2-dichloroethene were observed at concentrations significantly lower than that of TCE. Tetrachloroethene and trans-1,2-dichloroethene were tentatively identified based on relative retention time comparison to benzene. TCE and "Total VOC" concentrations increased as sampling proceeded to the west of the former tank location. Since ground water flow is believed to be in the north to northeast direction it is unlikely that the VOCs observed to the west of the former tank location originated from a release of the tank. Ed Baumgrass of Pass & Seymour conveyed to O'Brien and Gere that underground piping was used to transport TCE from the tank to areas within the building. Based on this information, one or more of these underground pipes may have leaked resulting in the presence of subsurface VOCs upgradient of the former tank.

CONCLUSIONS/RECOMMENDATIONS

The highest concentrations TCE were observed in the parking lot area west of the former tank location. These residues do not appear to have originated from the tank. It is recommended that additional soil vapor sampling be performed in the area west of the former tank and north of the chain link fence surrounding the site to further delineate the areal extent of subsurface halogenated hydrocarbon residues.

TABLE 1
BOND, SCHOENECK & KING
PASS & SEYMOUR, INC.
SOIL VAPOR SURVEY RESULTS

SAMPLE	TRICHLOROETHENE	OTHER VOCs	TOTAL VOCs
SV-1	0.381	0.739	1.120
SV-2	0.032	0.238	0.270
SV-3	0.652	0.594	1.250
SV-4	0.206	<0.002	0.206
SV-5	0.016	<0.002	0.016
SV-6	1.220	0.050	1.270
SV-7	0.069	0.016	0.085
SV-8	0.843	0.013	0.856
SV-9	0.064	0.010	0.074
SV-10	1.090	0.090	1.180
SV-11	2.043	0.337	2.380
SV-12	3.180	1.030	4.210
SV-13	3.492	0.678	4.170
SV-14	1.739	0.071	1.810
SV-15	2.532	0.118	2.650
SV-16	1.507	0.323	1.830
SV-17	1.202	0.148	1.350

NOTE: All values expressed in parts per million (ppm) by volume.

LABORATORIES, INC.

Volatile Organics
Method 8010/8020

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

DATE COLLECTED 12-5-92 DATE RECEIVED 12-7-92 DATE ANALYZED 12-8,11-92

DESCRIPTION:	SB-1 0'-2'	SB-2 0'-2'	SB-3 5'-7'	SB-4 0'-2'	SB-5 2'-4'	SB-6 2'-4'
SAMPLE NO.:	R0633	R0634	R0635	R0636	R0637	R0638
Benzene	<1.	<120.	<1.	<120.	<1.	<1.
Benzyl chloride	<11.	<1200.	<12.	<1200.	<13.	<12.
Bis (2-chloroethoxy) methane	<560.	<60,000.	<610.	<61,000.	<660.	<610.
Bromobenzene	<6.	<600.	<6.	<610.	<7.	<6.
Bromodichloromethane	<1.	<120.	<1.	<120.	<1.	<1.
Bromoform	<11.	<1200.	<12.	<1200.	<13.	<12.
Bromomethane	<1.	<120.	<1.	<120.	<1.	<1.
Carbon tetrachloride	↓	↓	↓	↓	↓	↓
Chlorobenzene	↓	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<11.	<1200.	<12.	<1200.	<13.	<12.
Chloroform	<1.	<120.	<1.	<120.	<1.	<1.
1-Chlorohexane	<11.	<1200.	<12.	<1200.	<13.	<12.
Chloromethane	<1.	<120.	<1.	<120.	<1.	<1.
Chloromethylmethyl ether	<110.	<12,000.	<120.	<12,000.	<130.	<120.
2-Chlorotoluene	<6.	<600.	<6.	<610.	<7.	<6.
4-Chlorotoluene	<6.	<600.	<6.	<610.	<7.	<6.
Dibromochloromethane	<1.	<120.	<1.	<120.	<1.	<1.
Dibromomethane	<11.	<1200.	<12.	<1200.	<13.	<12.
1,2-Dichlorobenzene	<6.	<600.	<6.	<610.	<7.	<6.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<11.	<1200.	<12.	<1200.	<13.	<12.

Page 1 of 2

Authorized:

Date: January 21, 1993

Volatile Organics
Method 8010/8020

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Soil

DATE COLLECTED 12-5-92 DATE RECEIVED 12-7-92 DATE ANALYZED 12-8,11-92

DESCRIPTION:	SB-1 0'-2'	SB-2 0'-2'	SB-3 5'-7'	SB-4 0'-2'	SB-5 2'-4'	SB-6 2'-4'
SAMPLE NO.:	R0633	R0634	R0635	R0636	R0637	R0638
1,1-Dichloroethane	<1.	<120.	<1.	<120.	<1.	<1.
1,2-Dichloroethane	↓	↓	↓	↓	↓	↓
1,1-Dichloroethylene	↓	↓	↓	↓	↓	↓
1,2-Dichloroethylene (total)	↓	↓	↓	1300.	↓	↓
Dichloromethane	1.	↓	1.	<120.	3.	↓
1,2-Dichloropropane	<1.	↓	<1.	↓	<1.	↓
cis-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
trans-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
Ethylbenzene	↓	<360.*	↓	↓	↓	↓
1,1,2,2-Tetrachloroethane	↓	<120.	↓	↓	↓	↓
1,1,1,2-Tetrachloroethane	↓	↓	↓	↓	↓	↓
Tetrachloroethylene	↓	↓	12.	2600.	↓	↓
Toluene	↓	120.	<1.	<120.	↓	↓
1,1,1-Trichloroethane	↓	<120.	↓	↓	↓	↓
1,1,2-Trichloroethane	↓	↓	↓	↓	↓	↓
Trichloroethylene	7.	↓	12.	3800.	3.	1.
Trichlorofluoromethane	<1.	↓	<1.	<120.	<1.	<1.
1,2,3-Trichloropropane	↓	↓	↓	↓	↓	↓
Vinyl chloride	↓	↓	↓	550.	↓	↓
Xylene (total)	<3.	<1200.*	<4.	<370.	<4.	<4.

Comments: *Elevated detection limits due to matrix interference.

Methodology: USEPA,SW-846, November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: January 21, 1993

LABORATORIES, INC.

Laboratory Report

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Solid

DATE COLLECTED 12-5-92 DATE RECEIVED 12-7-92

	Sample #	PERCENT TOTAL SOLIDS
SS-1	R0631	79.
SB-1 0-2'	R0633	89.
SB-2 0-2'	R0634	83.
SB-3 5-7'	R0635	82.
SB-4 0-2'	R0636	82.
SB-5 2-4'	R0637	76.
SB-6 2-4'	R0638	82.
SB-7 2-4'	R0639	87.
SB-8 2-4'	R0640	93.

Comments:

Certification No.: 10155

Units: %

Authorized:

Date: January 21, 1993

OBG
LABORATORIES, INC.

Laboratory Report

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

MATRIX: Solid

DATE COLLECTED 12-5-92 DATE RECEIVED 12-7-92

Description:	SB-1 0-2'	SB-4 0-2'
Sample #	R0633	R0636
Total Metals:		
ARSENIC	7.6	41.
CADMIUM	2.	2.
CHROMIUM	20.	14.
COPPER	3000.	120.
LEAD	120.	61.
MERCURY	<0.6	<0.6
NICKEL	100.	100.
ZINC	760.	610.
Other Analyses:		
HEXAVALENT CHROMIUM	<1.	<1.
TOTAL CYANIDE	<0.6	<0.6

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized:

Date: January 21, 1993

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT: BOND, SCHOENECK & KING
JOB NO.: 156.200.517
DESCRIPTION: Solvay, NY
SS-1
MATRIX: Soil
SAMPLE NO.: R0631
DATE COLLECTED: 12-05-92
DATE RECEIVED: 12-07-92
DATE EXTRACTED: 12-15-92
DATE ANALYZED: 01-10-93

Phenol	<420,000.	4-Chloro-3-methylphenol	<420,000.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	<420,000.(43,000.)
2-Chlorophenol	↓	Hexachlorocyclopentadiene	<420,000.
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<2,100,000.
Benzyl alcohol	↓	2-Chloronaphthalene	<420,000.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<2,100,000.
2-Methylphenol	↓	Dimethylphthalate	<420,000.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<2,100,000.
Hexachloroethane	↓	Acenaphthene	<420,000.
Nitrobenzene	↓	2,4-Dinitrophenol	<2,100,000.
Isophorone	↓	4-Nitrophenol	<2,100,000.
2-Nitrophenol	↓	Dibenzofuran	<420,000.(130,000.)
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	<420,000.
Benzoic acid	<2,100,000.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<420,000.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	<420,000.(200,000.)
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<2,100,000.
Naphthalene	<420,000.(94,000)	4,6-Dinitro-2-methylphenol	<2,100,000.
4-Chloroaniline	<420,000.	N-Nitrosodiphenylamine	<420,000.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<420,000.

Page 1 of 2

Authorized:

Date: January 21, 1993

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SS-1 MATRIX: Soil

SAMPLE NO. R0631 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-10-93

Hexachlorobenzene	<420,000.	Benzo (a) anthracene	960,000.
Pentachlorophenol	<2,100,000.	Chrysene	850,000.
Phenanthrene	2,100,000.	Bis (2-ethylhexyl) phthalate	<420,000.
Anthracene	460,000.	Di-n-octylphthalate	<420,000.
Di-n-butylphthalate	<420,000.	Benzo (b) fluoranthene	1,300,000.
Fluoranthene	2,500,000.	Benzo (k) fluoranthene	500,000.
Pyrene	1,900,000.	Benzo (a) pyrene	880,000.
Butylbenzylphthalate	<420,000.	Indeno (1,2,3-cd) pyrene	520,000.
3,3'-Dichlorobenzidine	<840,000.	Dibenz (a,h) anthracene	<420,000. (130,000.)
		Benzo (g,h,i) perylene	430,000.

Comments:

Values in parentheses are estimated values, detected, but below the quantitation limit.

Methodology: EPA Target Compound List By 8270, SW-846
November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Page 2 of 2

Authorized:

Date: January 21, 1993

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-1 0-2' MATRIX: Soil

SAMPLE NO. R0633 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-10-93

Phenol	<37,000.	4-Chloro-3-methylphenol	<37,000.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	↓
2-Chlorophenol	↓	Hexachlorocyclopentadiene	↓
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<190,000.
Benzyl alcohol	↓	2-Chloronaphthalene	<37,000.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<190,000.
2-Methylphenol	↓	Dimethylphthalate	<37,000.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<190,000.
Hexachloroethane	↓	Acenaphthene	<37,000.
Nitrobenzene	↓	2,4-Dinitrophenol	<190,000.
Isophorone	↓	4-Nitrophenol	<190,000.
2-Nitrophenol	↓	Dibenzofuran	<37,000.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<190,000.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<37,000.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	<37,000. (1400.)
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<190,000.
Naphthalene	↓	4,6-Dinitro-2-methylphenol	<190,000.
4-Chloroaniline	↓	N-Nitrosodiphenylamine	<37,000.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<37,000.

Page 1 of 2

Authorized:

Date: January 21, 1993

OBG

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-1 0-2' MATRIX: Soil

SAMPLE NO. R0633 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-10-93

Hexachlorobenzene	<37,000.	Benzo (a) anthracene	<37,000.
Pentachlorophenol	<190,000.	Chrysene	<37,000. (10,000.)
Phenanthrene	<37,000. (15,000.)	Bis (2-ethylhexyl) phthalate	<37,000.
Anthracene	<37,000. (4100.)	Di-n-octylphthalate	<37,000.
Di-n-butylphthalate	<37,000. (1600.)	Benzo (b) fluoranthene	<37,000. (16,000.)
Fluoranthene	<37,000. (23,000.)	Benzo (k) fluoranthene	<37,000. (5900.)
Pyrene	<37,000. (17,000.)	Benzo (a) pyrene	<37,000. (11,000.)
Butylbenzylphthalate	<37,000.	Indeno (1,2,3-cd) pyrene	<37,000. (6900.)
3,3'-Dichlorobenzidine	<75,000.	Dibenz (a,h) anthracene	<37,000.
		Benzo (g,h,i) perylene	<37,000.

Comments:

Values in parentheses are estimated values, detected, but below the quantitation limit.

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

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Authorized:

Date: January 21, 1993

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT: BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION: Solvay, NY

SB-2 0-2' MATRIX: Soil

SAMPLE NO. R0634 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-09-93

Phenol	<4000.	4-Chloro-3-methylphenol	<4000.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	↓
2-Chlorophenol		Hexachlorocyclopentadiene	
1,3-Dichlorobenzene		2,4,6-Trichlorophenol	
1,4-Dichlorobenzene		2,4,5-Trichlorophenol	<20,000.
Benzyl alcohol		2-Chloronaphthalene	<4000.
1,2-Dichlorobenzene		2-Nitroaniline	<20,000.
2-Methylphenol		Dimethylphthalate	<4000.
Bis (2-chloroisopropyl) ether		Acenaphthylene	↓
4-Methylphenol		2,6-Dinitrotoluene	
N-Nitroso-di-n-propylamine		3-Nitroaniline	<20,000.
Hexachloroethane		Acenaphthene	<4000.
Nitrobenzene		2,4-Dinitrophenol	<20,000.
Isophorone		4-Nitrophenol	<20,000.
2-Nitrophenol		Dibenzofuran	<4000.
2,4-Dimethylphenol		2,4-Dinitrotoluene	↓
Benzoic acid	<20,000.	Diethylphthalate	
Bis (2-chloroethoxy) methane	<4000.	4-Chlorophenyl-phenylether	
2,4-Dichlorophenol	↓	Fluorene	
1,2,4-Trichlorobenzene		4-Nitroaniline	<20,000.
Naphthalene		4,6-Dinitro-2-methylphenol	<20,000.
4-Chloroaniline		N-Nitrosodiphenylamine	<4000.
Hexachlorobutadiene		4-Bromophenyl-phenylether	<4000.

Authorized:

Date: January 21, 1993

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT	BOND, SCHOENECK & KING	JOB NO.	156.200.517
DESCRIPTION	Solvay, NY		
	SB-2 0-2'	MATRIX:	Soil
SAMPLE NO.	R0634	DATE COLLECTED	12-05-92
		DATE RECEIVED	12-07-92
		DATE EXTRACTED	12-15-92
		DATE ANALYZED	01-09-93

Hexachlorobenzene	<4000.	Benzo (a) anthracene	<4000.
Pentachlorophenol	<20,000.	Chrysene	↓
Phenanthrene	<4000. (660.)	Bis (2-ethylhexyl) phthalate	↓
Anthracene	<4000.	Di-n-octylphthalate	↓
Di-n-butylphthalate	<4000.	Benzo (b) fluoranthene	↓
Fluoranthene	<4000. (830.)	Benzo (k) fluoranthene	↓
Pyrene	<4000. (614.)	Benzo (a) pyrene	↓
Butylbenzylphthalate	<4000.	Indeno (1,2,3-cd) pyrene	↓
3,3'-Dichlorobenzidine	<8000.	Dibenz (a,h) anthracene	↓
		Benzo (g,h,i) perylene	↓

Comments:

Values in parentheses are estimated values, detected, but below the quantitation limit.

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

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Authorized:

Date: January 21, 1993

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-3 5-7' MATRIX: Soil

SAMPLE NO. R0635 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-10-93

Phenol	<4000.	4-Chloro-3-methylphenol	<4000.
Bis (2-chloroethyl) ether		2-Methylnaphthalene	
2-Chlorophenol		Hexachlorocyclopentadiene	
1,3-Dichlorobenzene		2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene		2,4,5-Trichlorophenol	<20,000.
Benzyl alcohol		2-Chloronaphthalene	<4000.
1,2-Dichlorobenzene		2-Nitroaniline	<20,000.
2-Methylphenol		Dimethylphthalate	<4000.
Bis (2-chloroisopropyl) ether		Acenaphthylene	
4-Methylphenol		2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine		3-Nitroaniline	<20,000.
Hexachloroethane		Acenaphthene	<4000.
Nitrobenzene		2,4-Dinitrophenol	<20,000.
Isophorone		4-Nitrophenol	<20,000.
2-Nitrophenol		Dibenzofuran	<4000.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	
Benzoic acid	<20,000.	Diethylphthalate	
Bis (2-chloroethoxy) methane	<4000.	4-Chlorophenyl-phenylether	
2,4-Dichlorophenol		Fluorene	↓
1,2,4-Trichlorobenzene		4-Nitroaniline	<20,000.
Naphthalene		4,6-Dinitro-2-methylphenol	<20,000.
4-Chloroaniline		N-Nitrosodiphenylamine	<4000.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<4000.

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Authorized:

Date: January 21, 1993

OBG LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT: BOND, SCHOENECK & KING
JOB NO. 156.200.517
DESCRIPTION: Solvay, NY
SB-4 0-2'
MATRIX: Soil
SAMPLE NO. R0636
DATE COLLECTED 12-05-92
DATE RECEIVED 12-07-92
DATE EXTRACTED 12-15-92
DATE ANALYZED 01-10-93

Phenol	<40,000.	4-Chloro-3-methylphenol	<40,000.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	<40,000. (9900.)
2-Chlorophenol	↓	Hexachlorocyclopentadiene	<40,000.
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	<40,000.
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<200,000.
Benzyl alcohol	↓	2-Chloronaphthalene	<40,000.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<200,000.
2-Methylphenol	↓	Dimethylphthalate	<40,000.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<200,000.
Hexachloroethane	↓	Acenaphthene	<40,000.
Nitrobenzene	↓	2,4-Dinitrophenol	<200,000.
Isophorone	↓	4-Nitrophenol	<200,000.
2-Nitrophenol	↓	Dibenzofuran	<40,000.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<200,000.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<40,000.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<200,000.
Naphthalene	<40,000. (6400.)	4,6-Dinitro-2-methylphenol	<200,000.
4-Chloroaniline	<40,000.	N-Nitrosodiphenylamine	<40,000.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<40,000.

Authorized:

Date: January 21, 1993

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LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-4 0-2' MATRIX: Soil

SAMPLE NO. R0636 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-10-93

Hexachlorobenzene	<40,000.	Benzo (a) anthracene	<40,000.
Pentachlorophenol	<200,000.	Chrysene	<40,000.(3300.)
Phenanthrene	<40,000.(9100.)	Bis (2-ethylhexyl) phthalate	<40,000.
Anthracene	<40,000.(1400.)	Di-n-octylphthalate	↓
Di-n-butylphthalate	<40,000.	Benzo (b) fluoranthene	
Fluoranthene	<40,000.(6000.)	Benzo (k) fluoranthene	
Pyrene	<40,000.(5900.)	Benzo (a) pyrene	
Butylbenzylphthalate	<40,000.	Indeno (1,2,3-cd) pyrene	
3,3'-Dichlorobenzidine	<80,000.	Dibenz (a,h) anthracene	
		Benzo (g,h,i) perylene	

Comments:

Values in parentheses are estimated values, detected, but below the quantitation limit.

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: January 21, 1993

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LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-5 2-4' MATRIX: Soil

SAMPLE NO. R0637 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-09-93

Phenol	<430.	4-Chloro-3-methylphenol	<430.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	↓
2-Chlorophenol	↓	Hexachlorocyclopentadiene	↓
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<2200.
Benzyl alcohol	↓	2-Chloronaphthalene	<430.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<2200.
2-Methylphenol	↓	Dimethylphthalate	<430.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<2200.
Hexachloroethane	↓	Acenaphthene	<430.
Nitrobenzene	↓	2,4-Dinitrophenol	<2200.
Isophorone	↓	4-Nitrophenol	<2200.
2-Nitrophenol	↓	Dibenzofuran	<430.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<2200.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<430.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<2200.
Naphthalene	↓	4,6-Dinitro-2-methylphenol	<2200.
4-Chloroaniline	↓	N-Nitrosodiphenylamine	<430.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<430.

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Authorized:

Date: January 21, 1993

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING
JOB NO. 156.200.517
DESCRIPTION Solvay, NY
SB-5 2-4'
MATRIX: Soil
SAMPLE NO. R0637
DATE COLLECTED 12-05-92
DATE RECEIVED 12-07-92
DATE EXTRACTED 12-15-92
DATE ANALYZED 01-09-93

Hexachlorobenzene	<430.	Benzo (a) anthracene	<430.
Pentachlorophenol	<2200.	Chrysene	
Phenanthrene	730.	Bis (2-ethylhexyl) phthalate	
Anthracene	<430.	Di-n-octylphthalate	
Di-n-butylphthalate	<430.	Benzo (b) fluoranthene	
Fluoranthene	730.	Benzo (k) fluoranthene	
Pyrene	480.	Benzo (a) pyrene	
Butylbenzylphthalate	<430.	Indeno (1,2,3-cd) pyrene	
3,3'-Dichlorobenzidine	<870.	Dibenz (a,h) anthracene	
		Benzo (g,h,i) perylene	

Comments:

Methodology: EPA Target Compound List By 8270, SW-846
November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: January 21, 1993

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-6 2-4' MATRIX: Soil

SAMPLE NO. R0638 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-09-93

Phenol	<400.	4-Chloro-3-methylphenol	<400.
Bis (2-chloroethyl) ether	↓	2-Methylnaphthalene	↓
2-Chlorophenol	↓	Hexachlorocyclopentadiene	↓
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	↓
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<2000.
Benzyl alcohol	↓	2-Chloronaphthalene	<400.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<2000.
2-Methylphenol	↓	Dimethylphthalate	<400.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<2000.
Hexachloroethane	↓	Acenaphthene	<400.
Nitrobenzene	↓	2,4-Dinitrophenol	<2000.
Isophorone	↓	4-Nitrophenol	<2000.
2-Nitrophenol	↓	Dibenzofuran	<400.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	↓
Benzoic acid	<2000.	Diethylphthalate	↓
Bis (2-chloroethoxy) methane	<400.	4-Chlorophenyl-phenylether	↓
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<2000.
Naphthalene	↓	4,6-Dinitro-2-methylphenol	<2000.
4-Chloroaniline	↓	N-Nitrosodiphenylamine	<400.
Hexachlorobutadiene	↓	4-Bromophenyl-phenylether	<400.

Authorized:

Date: January 21, 1993

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING **JOB NO.** 156.200.517

DESCRIPTION Solvay, NY

SB-6 2-4' MATRIX: Soil

SAMPLE NO. R0638 **DATE COLLECTED** 12-05-92 **DATE RECEIVED** 12-07-92

DATE EXTRACTED 12-15-92 **DATE ANALYZED** 01-09-93

Hexachlorobenzene	<400.	Benzo (a) anthracene	<400.
Pentachlorophenol	<2000.	Chrysene	↓
Phenanthrene	<400.	Bis (2-ethylhexyl) phthalate	↓
Anthracene	↓	Di-n-octylphthalate	↓
Di-n-butylphthalate	↓	Benzo (b) fluoranthene	↓
Fluoranthene	↓	Benzo (k) fluoranthene	↓
Pyrene	↓	Benzo (a) pyrene	↓
Butylbenzylphthalate	↓	Indeno (1,2,3-cd) pyrene	↓
3,3'-Dichlorobenzidine	<800.	Dibenz (a,h) anthracene	↓
		Benzo (g,h,i) perylene	↓

Comments:

Methodology: EPA Target Compound List By 8270, SW-846
November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: January 21, 1993

OBG
LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-7 2-4' MATRIX: Soil

SAMPLE NO. R0639 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-09-93

Phenol	<3800.	4-Chloro-3-methylphenol	<3800.
Bis (2-chloroethyl) ether		2-Methylnaphthalene	
2-Chlorophenol		Hexachlorocyclopentadiene	
1,3-Dichlorobenzene		2,4,6-Trichlorophenol	
1,4-Dichlorobenzene		2,4,5-Trichlorophenol	<19,000.
Benzyl alcohol		2-Chloronaphthalene	<3800.
1,2-Dichlorobenzene		2-Nitroaniline	<19,000.
2-Methylphenol		Dimethylphthalate	<3800.
Bis (2-chloroisopropyl) ether		Acenaphthylene	
4-Methylphenol		2,6-Dinitrotoluene	
N-Nitroso-di-n-propylamine		3-Nitroaniline	<19,000.
Hexachloroethane		Acenaphthene	<3800.
Nitrobenzene		2,4-Dinitrophenol	<19,000.
Isophorone		4-Nitrophenol	<19,000.
2-Nitrophenol		Dibenzofuran	<3800.
2,4-Dimethylphenol		2,4-Dinitrotoluene	
Benzoic acid	<19,000.	Diethylphthalate	
Bis (2-chloroethoxy) methane	<3800.	4-Chlorophenyl-phenylether	
2,4-Dichlorophenol		Fluorene	
1,2,4-Trichlorobenzene		4-Nitroaniline	<19,000.
Naphthalene		4,6-Dinitro-2-methylphenol	<19,000.
4-Chloroaniline		N-Nitrosodiphenylamine	<3800.
Hexachlorobutadiene		4-Bromophenyl-phenylether	<3800.

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Authorized:

Date: January 21, 1993

LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-7 2-4' MATRIX: Soil

SAMPLE NO. R0639 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-09-93

Hexachlorobenzene	<3800.	Benzo (a) anthracene	<3800.
Pentachlorophenol	<19,000.	Chrysene	
Phenanthrene	<3800.	Bis (2-ethylhexyl) phthalate	
Anthracene		Di-n-octylphthalate	
Di-n-butylphthalate		Benzo (b) fluoranthene	
Fluoranthene		Benzo (k) fluoranthene	
Pyrene		Benzo (a) pyrene	
Butylbenzylphthalate		Indeno (1,2,3-cd) pyrene	
3,3'-Dichlorobenzidine	<7600.	Dibenz (a,h) anthracene	
		Benzo (g,h,i) perylene	

Comments:

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

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Authorized:

Date: January 21, 1993

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LABORATORIES, INC.

Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517

DESCRIPTION Solvay, NY

SB-8 2-4' MATRIX: Soil

SAMPLE NO. R0640 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92

DATE EXTRACTED 12-15-92 DATE ANALYZED 01-10-93

Phenol	<3500.(200.)	4-Chloro-3-methylphenol	<3500.
Bis (2-chloroethyl) ether	<3500.	2-Methylnaphthalene	<3500.(200.)
2-Chlorophenol	↓	Hexachlorocyclopentadiene	<3500.
1,3-Dichlorobenzene	↓	2,4,6-Trichlorophenol	<3500.
1,4-Dichlorobenzene	↓	2,4,5-Trichlorophenol	<18,000.
Benzyl alcohol	↓	2-Chloronaphthalene	<3500.
1,2-Dichlorobenzene	↓	2-Nitroaniline	<18,000.
2-Methylphenol	↓	Dimethylphthalate	<3500.
Bis (2-chloroisopropyl) ether	↓	Acenaphthylene	↓
4-Methylphenol	↓	2,6-Dinitrotoluene	↓
N-Nitroso-di-n-propylamine	↓	3-Nitroaniline	<18,000.
Hexachloroethane	↓	Acenaphthene	<3500.
Nitrobenzene	↓	2,4-Dinitrophenol	<18,000.
Isophorone	↓	4-Nitrophenol	<18,000.
2-Nitrophenol	↓	Dibenzofuran	<3500.
2,4-Dimethylphenol	↓	2,4-Dinitrotoluene	<3500.
Benzoic acid	<18,000.	Diethylphthalate	<3500.(190.)
Bis (2-chloroethoxy) methane	<3500.	4-Chlorophenyl-phenylether	<3500.
2,4-Dichlorophenol	↓	Fluorene	↓
1,2,4-Trichlorobenzene	↓	4-Nitroaniline	<18,000.
Naphthalene	<3500.(85.)	4,6-Dinitro-2-methylphenol	<18,000.
4-Chloroaniline	<3500.	N-Nitrosodiphenylamine	<3500.
Hexachlorobutadiene	<3500.	4-Bromophenyl-phenylether	<3500.

Authorized:

Date: January 21, 1993

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Semivolatile Organics
Method 8270

CLIENT BOND, SCHOENECK & KING JOB NO. 156.200.517
DESCRIPTION Solvay, NY
SB-8 2-4' MATRIX: Soil
SAMPLE NO. R0640 DATE COLLECTED 12-05-92 DATE RECEIVED 12-07-92
DATE EXTRACTED 12-15-92 DATE ANALYZED 01-10-93

Hexachlorobenzene	<3500.	Benzo (a) anthracene	<3500.
Pentachlorophenol	<18,000.	Chrysene	↓
Phenanthrene	<3500.(260.)	Bis (2-ethylhexyl) phthalate	
Anthracene	<3500.(270.)	Di-n-octylphthalate	
Di-n-butylphthalate	<3500.(350.)	Benzo (b) fluoranthene	
Fluoranthene	<3500.(2400.)	Benzo (k) fluoranthene	
Pyrene	<3500.	Benzo (a) pyrene	
Butylbenzylphthalate	<3500.	Indeno (1,2,3-cd) pyrene	
3,3'-Dichlorobenzidine	<7100.	Dibenz (a,h) anthracene	
		Benzo (g,h,i) perylene	

Comments:

Values in parentheses are estimated values, detected, but below the quantitation limit.

Methodology: EPA Target Compound List By 8270, SW-846 November 1986, 3rd Edition

Certification No.: 10155

Units: µg/kg dry weight

Authorized:

Date: January 21, 1993

TEST BORINGS
SITE INVESTIGATION
PASS AND SEYMOUR FACILITY
SOLVAY, NEW YORK

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429
FAX 315/437-1770

September 30, 1992

Mr. Guy A. Swenson, CPG
O'Brien and Gere Engineers, Inc.
5000 Brittonfield Parkway
P.O. Box 4873
Syracuse, New York 13221

Re: 92259
Site Investigation
Pass and Seymour Facility
Solvay, New York
File #156.199

Dear Mr. Swenson:

Enclosed are driller's field logs of sixteen test borings made for you for the above project.

Soil samples from these borings were retained by your representative at the job site.

The borings were made at points located by you and drilling was done in accordance with your instructions.

Thank you for this opportunity to work with you.

Very truly yours,

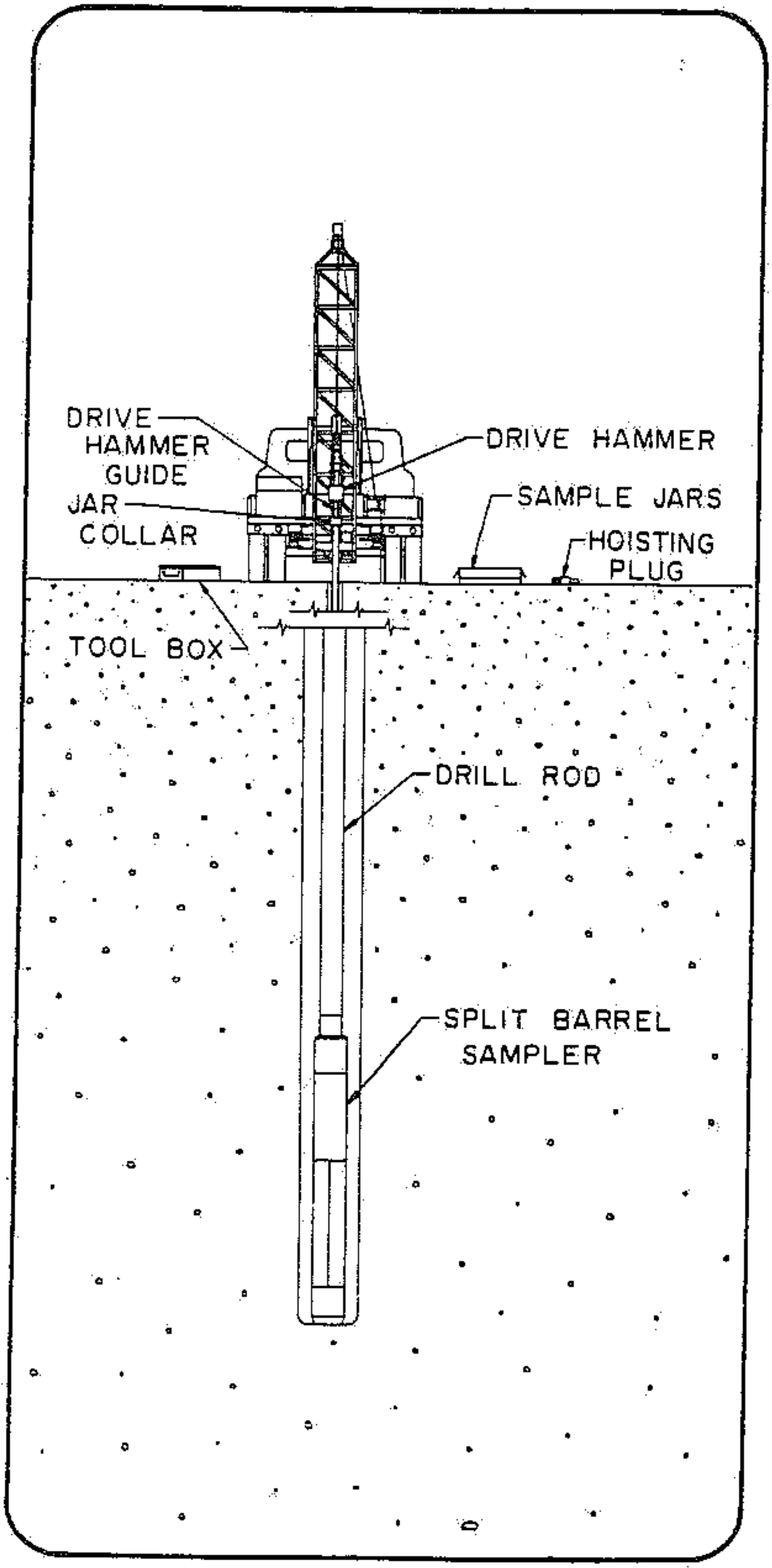
PARRATT - WOLFF, INC.

Steffen Wolff

Steffen Wolff
SW/lc
encs:

SOIL SAMPLING-METHODS

parratt
wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429



Split barrel sampling

The following excerpts are from "Standard Method for penetration test and split-barrel sampling of soils,"[1] (ASTM designation: D-1586-67 AASHO Designation: T-206-70.)

1. Scope

1.1 This method describes a procedure for using a split-barrel sampler to obtain respresentative samples of soil for identification purposes and other laboratory tests, and to obtain a measure of the resistance of the soil to penetration of the sampler.

2. Apparatus

2.1 Drilling Equipment — Any drilling equipment shall be acceptable that provides a reasonably clean hole before insertion of the sampler to ensure that the penetration test is performed on undisturbed soil, and that will permit the driving of the sampler to obtain the sample and penetration record in accordance with the procedure described in 3. Procedure. To avoid "whips" under the blows of the hammer, it is recommended that the drill rod have stiffness equal to or greater than the A-rod. An "A" rod is a hollow drill rod or "steel" having an outside diameter of 1-5/8 in. or 41.2 mm and an inside diameter of 1-1/8 in. or 28.5 mm, through which the rotary motion of drilling is transferred from the drilling motor to the cutting bit. A stiffer drill rod is suggested for holes deeper than 50 ft (15m). The hole shall be limited in diameter to between 2-1/4 and 6 in. (57.2 and 152mm).

2.2 Split-Barrel Sampler — The sampler shall be constructed with the dimensions indicated (in Fig. 1.) The drive shoe shall be of hardened steel and shall be replaced or repaired when it becomes dented or distorted. The coupling head shall have four 1/2-in. (12.7-mm) (minimum diameter) vent ports and shall contain a ball check valve. If sizes other than the 2-in. (50.8-mm) sampler are permitted, the size shall be conspicuously noted on all penetration records.

2.3 Drive Weight Assembly — The assembly shall consist of a 140-lb (63.5-kg) weight, a driving head, and a guide permitting a free fall of 30 in. (0.76 m). Special precautions shall be taken to ensure that the energy of the falling weight is not reduced by friction between the drive weight and the guides.

2.4 Accessory Equipment — Labels, data sheets, sample jars, paraffin, and other necessary supplies should accompany the sampling equipment.

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TELEPHONE AREA CODE 315/437-1429

GENERAL NOTES

1. Soil boring logs, notes and other data shown are the results of personal observations and interpretations made by Parratt-Wolff, Inc.

Exploration records prepared by our drilling foreman in the field form the basis of all logs, and samples of subsurface materials retained by the driller are observed by technical personnel in our laboratory to check field classifications.

2. Explanation of the classifications and terms:

   a. Bedrock — Natural solid mineral matter occurring in great thickness and extent in its natural location. It is classified according to geological type and structure (joints, bedding, etc.) and described as solid, weathered, broken or fragmented depending on its condition.

   b. Soils — Sediments or other unconsolidated accumulations of particles produced by the physical and chemical disintegration of rocks and which may or may not contain organic matter.

PENETRATION RESISTANCE

COHESIONLESS SOILS		*COHESIVE SOILS*	
Blows Per Ft.	Relative Density	Blows Per Ft.	Consistency
0 to 4	Very Loose	0 to 2	Very Soft
4 to 10	Loose	2 to 4	Soft
10 to 30	Medium Dense	4 to 8	Medium Stiff
30 to 50	Dense	8 to 15	Stiff
Over 50	Very Dense	15 to 30	Very Stiff
		Over 30	Hard

Size Component Terms

Boulder		Larger than 8 inches	
Cobble		8 inches to 3 inches	
Gravel	— coarse	3 inches to 1 inch	
	— medium	1 inch to 3/8 inch	
	— fine	3/8 inch to 4.76 mm	
Sand	— coarse	4.76 mm to 2.00 mm	(#10 sieve)
	— medium	2.00 mm to 0.42 mm	(#40 sieve)
	— fine	0.42 mm to 0.074 mm	(#200 sieve)
Silt and Clay		Finer than 0.074 mm	

Proportion By Weight

Major component is shown with all letters capitalized.

Minor component percentage terms of total sample are:

and . . . 35 to 50 percent
some . 20 to 35 percent
little . . 10 to 20 percent
trace . . 1 to 10 percent

   c. Gradation Terms — The terms coarse, medium and fine are used to describe gradation of Sand and Gravel.

   d. The terms used to describe the various soil components and proportions are arrived at by visual estimates of the recovered soil samples. Other terms are used when the recovered samples are not truly representative of the natural materials, such as soil containing numerous cobbles and boulders which cannot be sampled, thinly stratified soils, organic soils, and fills.

   e. Ground water — The measurement was made during exploration work or immediately after completion, unless otherwise noted. The depth recorded is influenced by exploration methods, soil type and weather conditions during exploration. Where no water was observed it is so indicated. It is anticipated that the ground water will rise during periods of wet weather. In addition, perched ground water above the water levels indicated (or above the bottom of the hole where no ground water is indicated) may be encountered at changes in soil strata or top of rock.

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TELEPHONE AREA CODE 315/437-142

A BRIEF DESCRIPTION OF THE UNIFIED SOIL SYSTEM

The Unified Classification System is an engineering soil classification that is an outgrowth of the Air-Field classification developed by Casagrande.

The system incorporates the textural characteristics of a soil into the engineering classification. All soils are classified into fifteen groups, each group being designated by two letters. These letters are as follows: G—gravel, S—sand, M—Non plastic or low plasticity fines, C—plastic fines, Pt—peat, humus and swamp soils, O—organic, W—well graded, P—poorly graded, L—low liquid limit, H—high liquid limit.

GW and SW Groups

These groups comprise well graded gravelly and sandy soils which contain less than 5% of non plastic fines passing a #200 sieve. Fines which are present must not noticeably change the strength characteristics of the coarse grain fraction and must not interfere with its free draining characteristics. In areas subject to frost action the material should not contain more than about 3% of soil grains smaller than .02 millimeters in size.

GP and SP Groups

These groups are poorly graded gravels and sands containing less than 5% non plastic fines. They may consist of uniform gravels, uniform sands, or non uniform mixtures of very coarse material and very fine sand with intermediate sizes lacking. Materials of this latter type are sometimes referred to as skip graded, cap graded, or step graded.

GM and SM Groups

In general, these groups include gravels or sands which contain more than 12% of fines having little or no plasticity. The plasticity index and liquid limit of a soil in either of these groups plot below the "A" line on a plasticity chart. Gradation is not important and both low grade and poorly graded materials are included. Some sands and gravels in these groups may have a binder composed of natural cementing agents so proportioned that the mixture shows negligible swelling or shrinkage. Thus, the dry strength is provided by a small amount of soil binder or dry cementation of calcareous materials or iron oxide. A fine fraction of non cemented materials may be composed of silts or rock flour types having little or no plasticity, and the mixture will exhibit no dry strength.

GC and SC Groups

These groups comprise gravelly or sandy soils with more than 12% of fines which exhibit either low or high plasticity. The plasticity index and liquid limit of a soil in either of these groups plot above the "A" line on the plasticity chart. Gradation of these materials is not important. Plasticity of the binder fraction has more influence on the behavior of the soils than does the variation in gradation. A fine fraction is generally composed of clays.

ML and MH Groups

These groups include predominantly silty materials and micaceous or diatomaceous soils. An arbitrary division between the two groups has been established with a liquid limit of 50. Soils in these groups are sandy silts, clayey silts or organic silts with relatively low plasticity. Also included are loessial soils and rock flours. Micaceous and diatomaceous soils generally fall within the MH group, but may extend into the ML group when their liquid limit is less than 50. The same is true for certain types of kaolin clays and some illite clays having relatively low plasticity.

CL and CH Groups

The CL and CH groups embrace clays with low and high liquid limits respectively. They are primarily inorganic clays. Low plasticity clays are classified as CL and are usually lean clays, sandy clays, and silty clays. The medium plasticity and high plasticity clays are classified as CH. These include fat clays, gumbo clays, certain volcanic clays and bentonite.

OL and OH Groups

The soils in these groups are characterized by the presence of organic matter including organic silts and clays. They have a plasticity range that corresponds with the ML and MH groups.

Pt Group

Highly organic soils which are very compressible have undesirable construction characteristics and are classified in one group with the symbol Pt. Peat, humus and swamp soils with a highly organic texture are typical of the group. Particles of leaves, grass, branches of bushes and other fibrous vegetable matter are common components of these soils.

Borderline Classification

Soils in the GW, SW, GP and SP groups are non plastic materials having less than 5% passing the #200 sieve, while GM, SM, GC, and SC soils have more than 12% passing the #200 sieve. When these coarse grain materials contain between 5% and 12% of fines they are classified as borderline, and are designated by the dual symbol such as GW-GM. Similarly coarse grain soils which have less than 5% passing the #200 sieve, but which are not free draining or in which the fine fraction exhibits plasticity are also classed as borderline and are given a dual symbol. Still another type of borderline classification occurs when a liquid limit of a fine grain soil is less than 29 and the plasticity index lies in the range of four to seven. These limits are indicated by the shaded area on the plasticity chart.

Silty and Clayey

In the Unified System, these terms are used to describe soils whose Atterberg limits plot below and above the "A" line on the plasticity chart. The adjectives silty and clayey are used to describe soils whose limits plot close to the "A" line.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

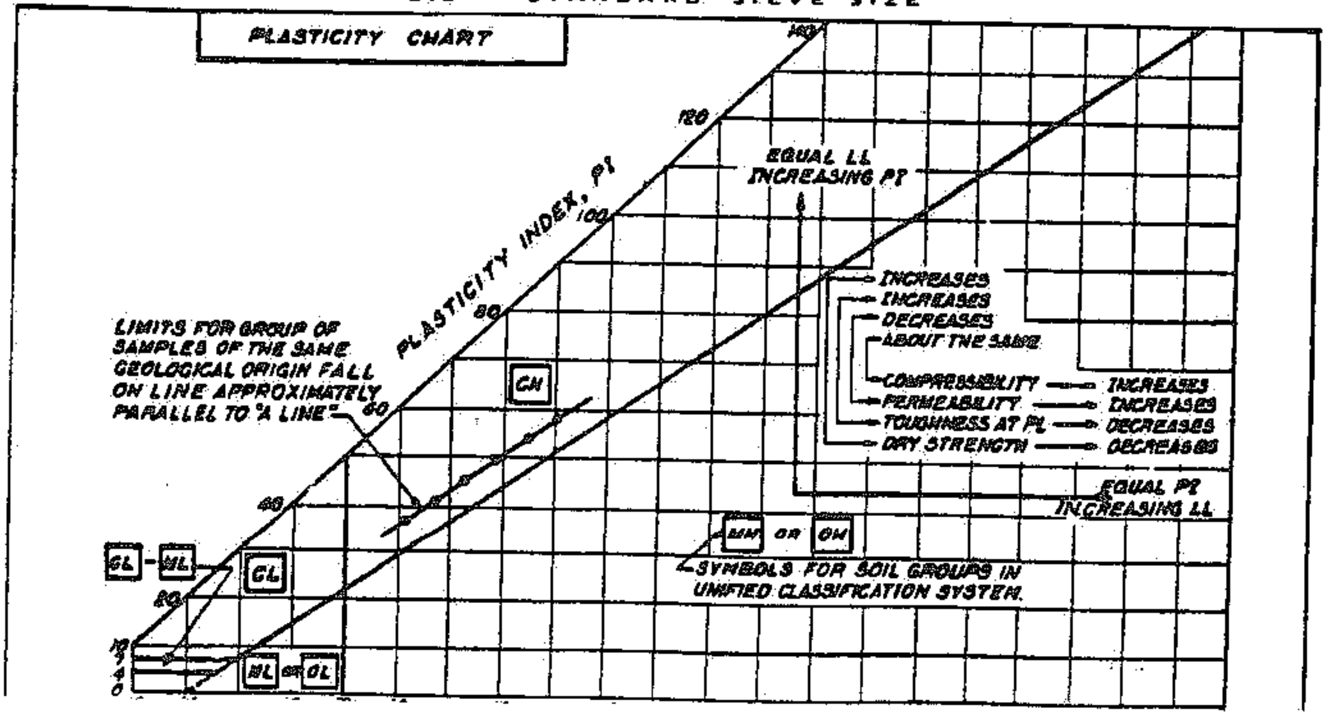
BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

No. 200 No. 40 No. 10 No. 4 ¾ in. 3 in. (12 in.)

U.S STANDARD SIEVE SIZE



parratt wolff inc

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-1-92-508
SURF. EL.
JOB NO. 92259
GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		5/7		Brown moist medium dense fine to coarse SAND, little fine to medium gravel	1.0'
	2.0'			12/6	19		
	2.0'-	2		7/10			
	4.0'			14/15	24	Black moist stiff SILT, little fine to medium gravel, little coal	2.0'
5.0	4.0'-	3		4/9			
	6.0'			20/36	29	Brown moist very stiff SILT, little clay, little fine gravel, trace fine to coarse sand	5.0'
	6.0'-	4		42/50-.3'			
	6.8'						
	8.0'	5		50-.0'		Brown dry hard silty weathered SHALE	
10.0						Bottom of Boring	8.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-2-92-509
SURF. EL.
JOB NO. 92259
GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.5'-	1		14		ASPHALT	0.3'
	2.0'			34/23	57	Black moist very dense fine to coarse	
	2.0'-	2		11/13		SAND, some fine to medium gravel,	
	4.0'			14/14	27	trace silt	2.0'
5.0	4.0'-	3	No	16/15		Brown moist very stiff SILT, little clay,	
	5.8'		Rec	29/50-.3'	44	little brick, little porcelain	6.0'
	6.0'-	4		54/50-.3'		Brown dry hard silty weathered SHALE	
	6.8'						
	8.0'-	5		55/50-.1'			
10.0	8.6'					Bottom of Boring	8.6'

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT	Site Investigation	HOLE NO.	B-3-95-510
LOCATION	Pass and Seymour Facility Solvay, New York	SURF. EL.	
DATE STARTED	9/19/92 DATE COMPLETED 9/19/92	JOB NO.	92259

GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.5'-	1		12		ASPHALT	0.3'
	2.0'			12/8	24	Black moist medium dense COAL, little fine sand, little silt	
	2.0'-	2		9/11			
	4.0'			11/11	22		
5.0	4.0'-	3		7/6			
	6.0'			5/14	11		
	6.0'-	4		7/6			
	8.0'			5/13	11		8.0'
	8.0'-	5		3/2		Black moist loose COAL and PORCELAIN	
10.0	10.0'			2/3	4		10.0'
	10.0'-	6		2/4		Brown moist medium stiff SILT, little fine to medium gravel, little clay, trace fine to coarse sand	
	12.0'			7/17	11		
	12.0'-	7		13/15			11.5'
	14.0'			27/28	42	Brown moist hard SILT, some fine to medium gravel, little clay, trace fine to coarse sand	
15.0							
						Bottom of Boring	14.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-4-92-511
SURF. EL.
JOB NO. 92259
GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		24/9		ASPHALT	0.5'
	2.0'			9/9	18	Black-brown moist medium dense COAL, some fine to coarse sand, little fine to medium gravel	
	2.0'-	2		6/4			
	4.0'			5/12	9		2.0'
5.0						Gray moist loose fine SAND, trace silt	
						Bottom of Boring	4.0'

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation

LOCATION Pass and Seymour Facility
Solvay, New York

DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-5-92-512

SURF. EL.

JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING 9.5'

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		1/3		Brown moist very soft SILT, some roots, trace fine sand	
	2.0'			3/6	6		0.5'
	2.0'-	2		3/2		Black moist medium stiff SILT, little clay, trace coal	
	4.0'			2/2	4		1.5'
5.0	4.0'-	3		3/2		Brown moist loose fine to medium SAND	
	6.0'			3/2	5		
	6.0'-	4		2/2			
	8.0'			2/2	4		
	8.0'-	5		1/1			
10.0 ▼	10.0'			1/1	2		9.5'
WL	10.0'-	6		1/1		Brown wet very loose fine to medium SAND	
	12.0'			1/2	2		
						Bottom of Boring	12.0'
15.0							

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation

LOCATION Pass and Seymour Facility
Solvay, New York

DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-6-92-513

SURF. EL.

JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING 9.5'

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		3/7		Brown moist soft SILT, some roots, trace fine sand	
	2.0'			12/8	19		0.5'
	2.0'-	2		6/5		Brown moist stiff SILT, some fine to medium gravel, trace fine to coarse sand	
	4.0'			3/3	8		
5.0	4.0'-	3		3/2			1.5'
	6.0'			2/2	4	Brown moist medium dense to loose to very loose fine to medium SAND	
	6.0'-	4		2/2			
	8.0'			2/2	4		
▼	8.0'-	5		WH-2.0'			
10.0	10.0'						9.5'
WL	10.0'-	6		1/7		Brown wet very loose fine to medium SAND	
	12.0'			1/7	8		
						Bottom of Boring	12.0'
15.0							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT	Site Investigation	HOLE NO.	B-7-92-514
LOCATION	Pass and Seymour Facility Solvay, New York	SURF. EL.	
DATE STARTED	9/19/92 DATE COMPLETED 9/19/92	JOB NO.	92259
		GROUND WATER DEPTH WHILE DRILLING	Dry
		BEFORE CASING REMOVED	Dry
		AFTER CASING REMOVED	Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		2/2		Brown moist soft SILT, some roots,	
	2.0'			4/4	6	trace fine to coarse sand	1.0'
	2.0'-	2		4/4		Brown moist medium stiff SILT, some	
	4.0'			13/15	17	fine to medium gravel, trace clay, trace	
5.0	4.0'-	3		5/5		fine to coarse sand	3.5'
	6.0'			11/14	16	Black wet medium dense COAL and	
	6.0'-	4		11/10		GLASS, little fine to coarse sand	5.0'
	8.0'			12/15	22	Brown moist very stiff SILT, some	
	8.0'-	5		9/13		fine to medium gravel, little clay, trace	
10.0	10.0'			25/22	38	fine to coarse sand	9.0'
	10.0'-	6		14/32		Brown moist hard SILT, some fine to	
	12.0'			39/32	71	medium gravel, little clay, trace fine	
	12.0'-	7		41/100-.4'		to coarse sand	
	12.9'						
15.0	14.0'	8		50-.0'		Bottom of Boring	14.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation

LOCATION Pass and Seymour Facility
Solvay, New York

DATE STARTED 9/20/92 DATE COMPLETED 9/20/92

HOLE NO. B-8-92-515

SURF. EL.

JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		2/6		Black moist soft SILT, little fine gravel, trace fine to coarse sand	0.5'
	2.0'			9/5	15		
	2.0'-	2		32/50-.0'		Brown moist stiff SILT, some fine to medium gravel, trace fine to coarse sand	2.0'
	2.5'						
5.0						Brown moist hard SILT, some fine to coarse gravel, trace fine to coarse sand	
						Bottom of Boring	2.5'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation

LOCATION Pass and Seymour Facility
Solvay, New York

DATE STARTED 9/20/92 DATE COMPLETED 9/20/92

HOLE NO. B-8A-92-516

SURF. EL.

JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

DRILLER'S FIELD LOG

SHEET 1 OF 1

File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		4/7		Black moist very stiff SILT, ROOTS and COAL	
	1.5'			20/50-.0'	27		1.5'
						RUBBLE	
							4.0'
5.0	4.0'-	2		4/5		Brown moist stiff SILT, some clay, little fine to medium gravel, trace fine to coarse sand	
	6.0'			5/6	10		
	6.0'-	3		12/100-.3'			6.5'
	6.8'					Brown dry hard silty weathered SHALE	
						Bottom of Boring	6.8'
10.0							

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT	Site Investigation	HOLE NO.	B-9-92-517
LOCATION	Pass and Seymour Facility Solvay, New York	SURF. EL.	
DATE STARTED	9/20/92 DATE COMPLETED 9/20/92	JOB NO.	92259

GROUND WATER DEPTH
WHILE DRILLING 5.5'
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.5'-	1		19		ASPHALT	0.3'
	2.0'			6/3	9	Black moist medium dense COAL, little fine sand	2.5'
	2.0'-	2		4/13			
	4.0'			17/13	30	Brown moist hard SILT, some fine to medium gravel, trace clay, trace fine to coarse sand	4.0'
5.0	4.0'-	3		8/7			
WL	6.0'			8/8	15		
	6.0'-	4		10/13		Brown moist stiff SILT, little clay, little fine to medium gravel, trace fine to coarse sand	5.5'
	7.1'			100-.1'			
10.0							
						Brown wet stiff SILT, little clay, little fine gravel, trace fine to coarse sand	7.0'
						Brown dry hard silty weathered SHALE	
						Bottom of Boring	7.1'

wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-10-92-519
SURF. EL.
JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						CONCRETE	0.9'
	0.9'–	1		6/5		Brown moist stiff SILT, little fine to medium gravel, trace fine to coarse sand	
	2.9'			6/13	11		
5.0						Bottom of Boring	2.9'

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FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-11-92-520
SURF. EL.
JOB NO. 92259
GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						CONCRETE	0.8'
	0.8'-	1		10/10		Black-brown moist medium dense CINDERS and fine to coarse GRAVEL, some fine to coarse sand, little silt	
	2.8'			8/7	18		
5.0						Bottom of Boring	2.8'

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-12-92-521
SURF. EL.
JOB NO. 92259
GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						CONCRETE	1.3'
	1.3'–	1		7		Brown-black moist medium dense BRICK, CINDERS and fine to coarse GRAVEL, little fine to coarse sand, trace silt	
	3.3'			6/5	11		
				2			
5.0						Bottom of Boring	3.3'

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation

LOCATION Pass and Seymour Facility
Solvay, New York

DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-13-92-522

SURF. EL.

JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						CONCRETE	1.1'
	1.1'-	1		9/7		Brown-black moist medium dense fine to coarse SAND, some brick, some cinders, some fine to coarse gravel, trace silt	
	3.1'			6/5	13		
5.0							
						Bottom of Boring	3.1'

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation

LOCATION Pass and Seymour Facility
Solvay, New York

DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-14-92-523

SURF. EL.

JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.6'-	1		14		CONCRETE	0.6'
	2.6'			12/19	31	Red-white moist medium dense BRICK	
	2.6'-	2		9/5			
	4.1'			4/6	9		4.0'
5.0						Red-brown moist stiff SILT, little fine gravel, trace fine to coarse sand	
						Bottom of Boring	4.1'

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/20/92 DATE COMPLETED 9/20/92

HOLE NO. B-15-92-518
SURF. EL.
JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		6/5		Black moist loose COAL, little fine to coarse sand	1.5'
	2.0'			3/3	8		
	2.0'-	2		5/8		Brown moist medium stiff SILT, little clay, trace fine sand	2.0'
	4.0'			12/13	20		
5.0	4.0'-	3		8/6		Brown moist very stiff SILT, little clay, trace fine gravel, trace fine to coarse sand	4.0'
	6.0'			8/9	14		
	6.0'-	4		10/12		Brown moist stiff SILT, some fine to medium gravel, trace clay, trace fine to coarse sand	7.0'
	7.4'			100-.4'		Brown dry hard silty weathered SHALE	
						Bottom of Boring	7.4'
10.0							

TEST BORINGS
SITE INVESTIGATION
PASS AND SEYMOUR FACILITY
SOLVAY, NEW YORK

parratt
wolff inc

FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429
FAX 315/437-1770

September 30, 1992

Mr. Guy A. Swenson, CPG
O'Brien and Gere Engineers, Inc.
5000 Brittonfield Parkway
P.O. Box 4873
Syracuse, New York 13221

Re: 92259
Site Investigation
Pass and Seymour Facility
Solvay, New York
File #156.199

Dear Mr. Swenson:

Enclosed are driller's field logs of sixteen test borings made for you for the above project.

Soil samples from these borings were retained by your representative at the job site.

The borings were made at points located by you and drilling was done in accordance with your instructions.

Thank you for this opportunity to work with you.

Very truly yours,

PARRATT - WOLFF, INC.

Steffen Wolff
SW/lc
encs:

SOIL SAMPLING-METHODS

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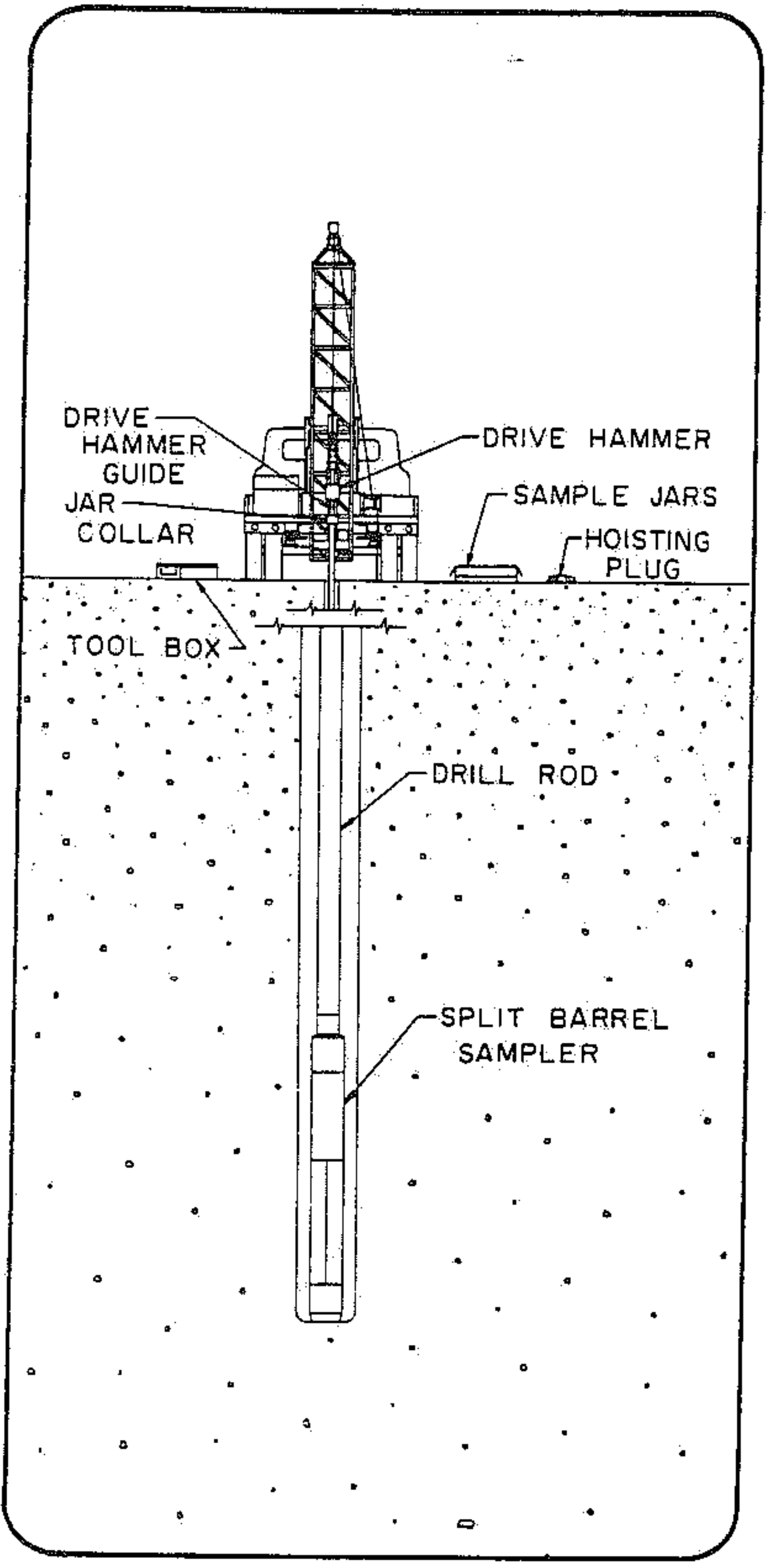
TELEPHONE AREA CODE 315/437-1429



Split barrel sampling

The following excerpts are from "Standard Method for penetration test and split-barrel sampling of soils."[1] (ASTM designation: D-1586-67 AASHO Designation: T-206-70.)

1. Scope

1.1 This method describes a procedure for using a split-barrel sampler to obtain respresentative samples of soil for identification purposes and other laboratory tests, and to obtain a measure of the resistance of the soil to penetration of the sampler.

2. Apparatus

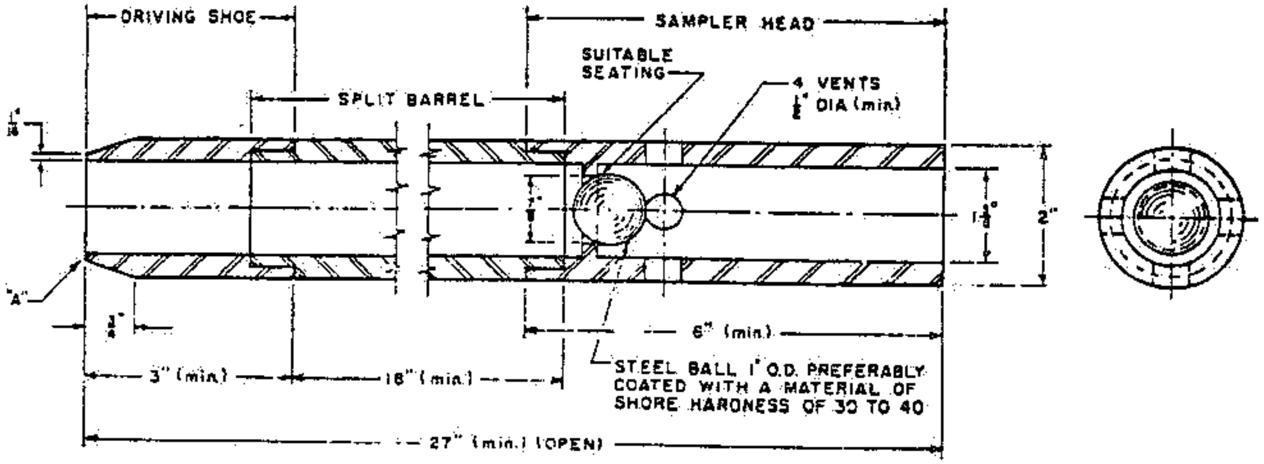
2.1 Drilling Equipment — Any drilling equipment shall be acceptable that provides a reasonably clean hole before insertion of the sampler to ensure that the penetration test is performed on undisturbed soil, and that will permit the driving of the sampler to obtain the sample and penetration record in accordance with the procedure described in 3. Procedure. To avoid "whips" under the blows of the hammer, it is recommended that the drill rod have stiffness equal to or greater than the A-rod. An "A" rod is a hollow drill rod or "steel" having an outside diameter of 1-5/8 in. or 41.2 mm and an inside diameter of 1-1/8 in. or 28.5 mm, through which the rotary motion of drilling is transferred from the drilling motor to the cutting bit. A stiffer drill rod is suggested for holes deeper than 50 ft (15m). The hole shall be limited in diameter to between 2-1/4 and 6 in. (57.2 and 152mm).

2.2 Split-Barrel Sampler — The sampler shall be constructed with the dimensions indicated (in Fig. 1.) The drive shoe shall be of hardened steel and shall be replaced or repaired when it becomes dented or distorted. The coupling head shall have four 1/2-in. (12.7-mm) (minimum diameter) vent ports and shall contain a ball check valve. If sizes other than the 2-in. (50.8-mm) sampler are permitted, the size shall be conspicuously noted on all penetration records.

2.3 Drive Weight Assembly — The assembly shall consist of a 140-lb (63.5-kg) weight, a driving head, and a guide permitting a free fall of 30 in. (0.76 m). Special precautions shall be taken to ensure that the energy of the falling weight is not reduced by friction between the drive weight and the guides.

2.4 Accessory Equipment — Labels, data sheets, sample jars, paraffin, and other necessary supplies should accompany the sampling equipment.

SOIL SAMPLING-METHODS



Note 1 – Split barrel may be 1-1/2 in. inside diameter provided it contains a liner of 16-gage wall thickness.

Note 2 – Core retainers in the driving shoe to prevent loss of sample are permitted.

Note 3 – The corners at A may be slightly rounded.

Table of Metric Equivalents.

In.	Mm	Cm	In.	Mm	Cm
1/16 (16 gage)	1.5	. . .	2	. . .	5.08
1/2	12.7	. . .	3	. . .	7.62
3/4	19.0	1.90	6	. . .	15.24
7/8	22.2	2.22	18	. . .	45.72
1-3/8	34.9	3.49	27	68.58	
1-1/2	38.1	3.81			

Fig. 1 — Standard Split Barrel Sampler Assembly

3. Procedure

3.1 Clear out the hole to sampling elevation using equipment that will ensure that the material to be sampled is not disturbed by the operation. In saturated sands and silts withdraw the drill bit slowly to prevent loosening of the soil around the hole. Maintain the water level in the hole at or above ground water level.

3.2 In no case shall a bottom-discharge bit be permitted. (Side-discharge bits are permissible.) The process of jetting through an open-tube sampler and then sampling when the desired depth is reached shall not be permitted. Where casing is used, it may not be driven below sampling elevation. Record any loss of circulation or excess pressure in drilling fluid during advancing of holes.

3.3 With the sampler resting on the bottom of the hole, drive the sampler with blows from the 140-lb (63.5 kg) hammer falling 30 in. (0.76 m) until either 18 in. (0.45 m) have been penetrated or 100 blows have been applied.

3.4 Repeat this operation at intervals not longer than 5 ft (1.5 m) in homogeneous strata and at every change of strata.

3.5 Record the number of blows required to effect each 6 in. (0.15 m) of penetration or fractions thereof. The first 6 in. (0.15 m) is considered to be a seating drive. The number of blows required for the second and third 6 in. (0.15 m) of penetration added is termed the penetration resistance, N. If the sampler is driven less than 18 in. (0.45 m), the penetration resistance is that for the last 1 ft (0.30 m) of penetration (if less than 1 ft (0.30 m) is penetrated, the logs shall state the number of blows and the fraction of 1 ft (0.30 m) penetrated).

3.6 Bring the sampler to the surface and open. Describe carefully typical samples of soils recovered as to composition, structure, consistency, color, and condition; then put into jars without ramming. Seal them with wax or hermetically seal to prevent evaporation of the soil moisture. Affix labels to the jar or make notations on the covers (or both) bearing job designation, boring number, sample number, depth penetration record, and length of recovery. Protect samples against extreme temperature changes.

4. Report

4.1 Data obtained in borings shall be recorded in the field and shall include the following:

4.1.1 Name and location of job,
4.1.2 Date of boring — start, finish,
4.1.3 Boring number and coordinate, if available,
4.1.4 Surface elevation, if available,
4.1.5 Sample number and depth,
4.1.6 Method of advancing sampler, penetration and recovery lengths,
4.1.7 Type and size of sampler,
4.1.8 Description of soil,
4.1.9 Thickness of layer,
4.1.10 Depth to water surface; to loss of water; to artesian head; time at which reading was made,
4.1.11 Type and make of machine,
4.1.12 Size of casing, depth of cased hole,
4.1.13 Number of blows per 6 in. (0.15 m)
4.1.14 Names of crewmen, and
4.1.15 Weather, remarks.

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[1] Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee D-18 on Soil and Rock for Engineering Purposes. A list of members may be found in the ASTM Year Book.

Current edition accepted October 20, 1967. Originally issued, 1958. Replaces D-1586-64T.

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TELEPHONE AREA CODE 315/437-1429

GENERAL NOTES

1. Soil boring logs, notes and other data shown are the results of personal observations and interpretations made by Parratt-Wolff, Inc.

Exploration records prepared by our drilling foreman in the field form the basis of all logs, and samples of subsurface materials retained by the driller are observed by technical personnel in our laboratory to check field classifications.

2. Explanation of the classifications and terms:

a. Bedrock — Natural solid mineral matter occurring in great thickness and extent in its natural location. It is classified according to geological type and structure (joints, bedding, etc.) and described as solid, weathered, broken or fragmented depending on its condition.

b. Soils — Sediments or other unconsolidated accumulations of particles produced by the physical and chemical disintegration of rocks and which may or may not contain organic matter.

PENETRATION RESISTANCE

COHESIONLESS SOILS

Blows Per Ft.	Relative Density
0 to 4	Very Loose
4 to 10	Loose
10 to 30	Medium Dense
30 to 50	Dense
Over 50	Very Dense

COHESIVE SOILS

Blows Per Ft.	Consistency
0 to 2	Very Soft
2 to 4	Soft
4 to 8	Medium Stiff
8 to 15	Stiff
15 to 30	Very Stiff
Over 30	Hard

Size Component Terms

Boulder		Larger than 8 inches	
Cobble		8 inches to 3 inches	
Gravel	— coarse	3 inches to 1 inch	
	— medium	1 inch to 3/8 inch	
	— fine	3/8 inch to 4.76 mm	
Sand	— coarse	4.76 mm to 2.00 mm	(#10 sieve)
	— medium	2.00 mm to 0.42 mm	(#40 sieve)
	— fine	0.42 mm to 0.074 mm	(#200 sieve)
Silt and Clay		Finer than 0.074 mm	

Proportion By Weight

Major component is shown with all letters capitalized.

Minor component percentage terms of total sample are:

and	35 to 50 percent
some	20 to 35 percent
little	10 to 20 percent
trace	1 to 10 percent

c. Gradation Terms — The terms coarse, medium and fine are used to describe gradation of Sand and Gravel.

d. The terms used to describe the various soil components and proportions are arrived at by visual estimates of the recovered soil samples. Other terms are used when the recovered samples are not truly representative of the natural materials, such as soil containing numerous cobbles and boulders which cannot be sampled, thinly stratified soils, organic soils, and fills.

e. Ground water — The measurement was made during exploration work or immediately after completion, unless otherwise noted. The depth recorded is influenced by exploration methods, soil type and weather conditions during exploration. Where no water was observed it is so indicated. It is anticipated that the ground water will rise during periods of wet weather. In addition, perched ground water above the water levels indicated (or above the bottom of the hole where no ground water is indicated) may be encountered at changes in soil strata or top of rock.

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A BRIEF DESCRIPTION OF THE UNIFIED SOIL SYSTEM

The Unified Classification System is an engineering soil classification that is an outgrowth of the Air-Field classification developed by Casagrande.

The system incorporates the textural characteristics of a soil into the engineering classification. All soils are classified into fifteen groups, each group being designated by two letters. These letters are as follows: G—gravel, S—sand, M—Non plastic or low plasticity fines, C—plastic fines, Pt—peat, humus and swamp soils, O—organic, W—well graded, P—poorly graded, L—low liquid limit, H—high liquid limit.

GW and SW Groups

These groups comprise well graded gravelly and sandy soils which contain less than 5% of non plastic fines passing a #200 sieve. Fines which are present must not noticeably change the strength characteristics of the coarse grain fraction and must not interfere with its free draining characteristics. In areas subject to frost action the material should not contain more than about 3% of soil grains smaller than .02 millimeters in size.

GP and SP Groups

These groups are poorly graded gravels and sands containing less than 5% non plastic fines. They may consist of uniform gravels, uniform sands, or non uniform mixtures of very coarse material and very fine sand with intermediate sizes lacking. Materials of this latter type are sometimes referred to as skip graded, cap graded, or step graded.

GM and SM Groups

In general, these groups include gravels or sands which contain more than 12% of fines having little or no plasticity. The plasticity index and liquid limit of a soil in either of these groups plot below the "A" line on a plasticity chart. Gradation is not important and both low grade and poorly graded materials are included. Some sands and gravels in these groups may have a binder composed of natural cementing agents so proportioned that the mixture shows negligible swelling or shrinkage. Thus, the dry strength is provided by a small amount of soil binder or dry cementation of calcareous materials or iron oxide. A fine fraction of non cemented materials may be composed of silts or rock flour types having little or no plasticity, and the mixture will exhibit no dry strength.

GC and SC Groups

These groups comprise gravelly or sandy soils with more than 12% of fines which exhibit either low or high plasticity. The plasticity index and liquid limit of a soil in either of these groups plot above the "A" line on the plasticity chart. Gradation of these materials is not important. Plasticity of the binder fraction has more influence on the behavior of the soils than does the variation in gradation. A fine fraction is generally composed of clays.

ML and MH Groups

These groups include predominantly silty materials and micaceous or diatomaceous soils. An arbitrary division between the two groups has been established with a liquid limit of 50. Soils in these groups are sandy silts, clayey silts or organic silts with relatively low plasticity. Also included are loessial soils and rock flours. Micaceous and diatomaceous soils generally fall within the MH group, but may extend into the ML group when their liquid limit is less than 50. The same is true for certain types of kaolin clays and some illite clays having relatively low plasticity.

CL and CH Groups

The CL and CH groups embrace clays with low and high liquid limits respectively. They are primarily inorganic clays. Low plasticity clays are classified as CL and are usually lean clays, sandy clays, and silty clays. The medium plasticity and high plasticity clays are classified as CH. These include fat clays, gumbo clays, certain volcanic clays and bentonite.

OL and OH Groups

The soils in these groups are characterized by the presence of organic matter including organic silts and clays. They have a plasticity range that corresponds with the ML and MH groups.

Pt Group

Highly organic soils which are very compressible have undesirable construction characteristics and are classified in one group with the symbol Pt. Peat, humus and swamp soils with a highly organic texture are typical of the group. Particles of leaves, grass, branches of bushes and other fibrous vegetable matter are common components of these soils.

Borderline Classification

Soils in the GW, SW, GP and SP groups are non plastic materials having less than 5% passing the #200 sieve, while GM, SM, GC, and SC soils have more than 12% passing the #200 sieve. When these coarse grain materials contain between 5% and 12% of fines they are classified as borderline, and are designated by the dual symbol such as GW-GM. Similarly coarse grain soils which have less than 5% passing the #200 sieve, but which are not free draining or in which the fine fraction exhibits plasticity are also classed as borderline and are given a dual symbol. Still another type of borderline classification occurs when a liquid limit of a fine grain soil is less than 29 and the plasticity index lies in the range of four to seven. These limits are indicated by the shaded area on the plasticity chart.

Silty and Clayey

In the Unified System, these terms are used to describe soils whose Atterberg limits plot below and above the "A" line on the plasticity chart. The adjectives silty and clayey are used to describe soils whose limits plot close to the "A" line.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

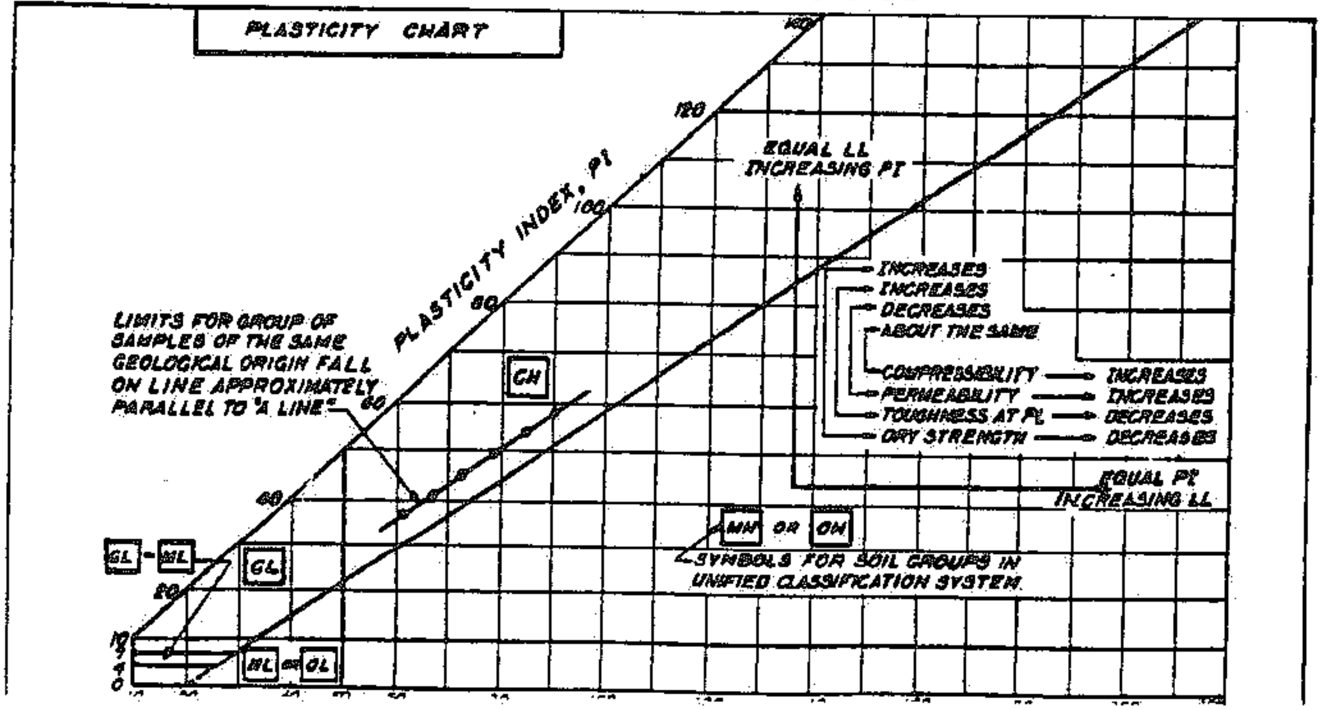
BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

No. 200 No. 40 No. 10 No. 4 ¾ in. 3 in. (12 in.)

U. S STANDARD SIEVE SIZE



Wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation

LOCATION Pass and Seymour Facility
Solvay, New York

DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-1-92-508

SURF. EL.

JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		5/7		Brown moist medium dense fine to coarse SAND, little fine to medium gravel	1.0'
	2.0'			12/6	19		
	2.0'-	2		7/10			
	4.0'			14/15	24	Black moist stiff SILT, little fine to medium gravel, little coal	2.0'
5.0	4.0'-	3		4/9			
	6.0'			20/36	29	Brown moist very stiff SILT, little clay, little fine gravel, trace fine to coarse sand	5.0'
	6.0'-	4		42/50-.3'			
	6.8'						
	8.0'	5		50-.0'		Brown dry hard silty weathered SHALE	
10.0							
						Bottom of Boring	8.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-2-92-509
SURF. EL.
JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.5'-	1		14		ASPHALT	0.3'
	2.0'			34/23	57	Black moist very dense fine to coarse	
	2.0'-	2		11/13		SAND, some fine to medium gravel,	
	4.0'			14/14	27	trace silt	2.0'
5.0	4.0'-	3	No	16/15		Brown moist very stiff SILT, little clay,	
	5.8'		Rec	29/50-.3'	44	little brick, little porcelain	6.0'
	6.0'-	4		54/50-.3'		Brown dry hard silty weathered SHALE	
	6.8'						
	8.0'-	5		55/50-.1'			
10.0	8.6'					Bottom of Boring	8.6'

wolff inc

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

PROJECT	Site Investigation	HOLE NO.	B-3-95-510
LOCATION	Pass and Seymour Facility Solvay, New York	SURF. EL.	
DATE STARTED	9/19/92 DATE COMPLETED 9/19/92	JOB NO.	92259

GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.5'-	1		12		ASPHALT	0.3'
	2.0'			12/8	24	Black moist medium dense COAL, little fine sand, little silt	
	2.0'-	2		9/11			
	4.0'			11/11	22		
5.0	4.0'-	3		7/6			
	6.0'			5/14	11		
	6.0'-	4		7/6			
	8.0'			5/13	11		8.0'
	8.0'-	5		3/2		Black moist loose COAL and PORCELAIN	
10.0	10.0'			2/3	4		10.0'
	10.0'-	6		2/4		Brown moist medium stiff SILT, little fine to medium gravel, little clay, trace fine to coarse sand	
	12.0'			7/17	11		11.5'
	12.0'-	7		13/15		Brown moist hard SILT, some fine to medium gravel, little clay, trace fine to coarse sand	
	14.0'			27/28	42		
15.0						Bottom of Boring	14.0'

wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation

LOCATION Pass and Seymour Facility
Solvay, New York

DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-4-92-511

SURF. EL.

JOB NO. 92259

GROUND WATER DEPTH
WHILE DRILLING Dry

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		24/9		ASPHALT	0.5'
	2.0'			9/9	18	Black-brown moist medium dense COAL,	
	2.0'-	2		6/4		some fine to coarse sand, little fine to	
	4.0'			5/12	9	medium gravel	2.0'
5.0						Gray moist loose fine SAND, trace silt	
						Bottom of Boring	4.0'

TEST BORING LOG

Wolff inc

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Site Investigation
LOCATION Pass and Seymour Facility
Solvay, New York
DATE STARTED 9/19/92 DATE COMPLETED 9/19/92

HOLE NO. B-5-92-512
SURF. EL.
JOB NO. 92259
GROUND WATER DEPTH
WHILE DRILLING 9.5'
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #156.199

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		1/3		Brown moist very soft SILT, some roots, trace fine sand	
	2.0'			3/6	6		0.5'
	2.0'-	2		3/2		Black moist medium stiff SILT, little clay, trace coal	
	4.0'			2/2	4		1.5'
5.0	4.0'-	3		3/2		Brown moist loose fine to medium SAND	
	6.0'			3/2	5		
	6.0'-	4		2/2			
	8.0'			2/2	4		
▼	8.0'-	5		1/1			
10.0	10.0'			1/1	2		9.5'
WL	10.0'-	6		1/1		Brown wet very loose fine to medium SAND	
	12.0'			1/2	2		
						Bottom of Boring	12.0'
15.0							

ATTACHMENT 2

SECOND PHASE ANALYTICAL RESULTS AND BORING LOGS

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY: BSK

LOCATION: Solvay

SAMPLED BY: Dave Meixell / John [illegible]

ORGANIZATION: OBG

STATION NUMBER	SAMPLE LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX	COMP. OR GRAB	NO. OF CONTAINERS	ANALYSIS REQUIRED
SS-1	Surface Soil sample by bldg	12/5/92	0940	Soil	Grab	1	8270
SS-2	Surface soil sample by fence	"	0950	"	"	1	~~8270~~ Hold
SB-1	0-2 ft		0915			2	~~8270~~, 8010/8020, Metals*
SB-2	0-2 ft		1000				8270, 8010/8020
SB-3	5-7 ft		1010				8270, 8010/8020
SB-4	0-2 ft		1030				8270, 8010/8020, Metals*
SB-5	2-4 ft		1045				8270, 8010/8020, ~~Metals~~
SB-6	2-4 ft		1100			↓	8270, 8010/8020
SB-7	2-4 ft		1130			1	8270
SB-8	2-4 ft	↓	1140	↓	↓	1	8270

Relinquished By:	DATE	TIME	Received By:	DATE	TIME
Dave Meixell	12/7	0835			
Relinquished By:	DATE	TIME	Received By:	DATE	TIME
Relinquished By:	DATE	TIME	Received by Laboratory: Wendy Smith	DATE 12-7-92	TIME 0835

COMMENTS:

*Metals –
- Lead
- Nickel
- Cadmium
- Mercury
- Zinc
- Cyanide
- Arsenic
- Chromium (Total)
- Chromium (Hexavalent)
- Copper

METHOD OF SHIPMENT:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

CASE FILE

Survey: Bond, Schaneck & King Date Collected: 12-5-92
Sampler: D. Maxwell Date Received: 12-7-92

Client Name and Ref. #: O'B&G Engineers
OBG Laboratory Client #: 156.200.577

CONDITION OF SHIPMENT: 20432 sw Held located in Bin. with other samples.

RADIOACTIVITY SCREENING*:

✓ The sample cooler(s) were screened for radioactivity and found safe for handling.

___ The samples come from a safe source and do not need to be screened.

Signed: Ann Barnes
Sample Coordinator

****

DISPOSAL PROCEDURE**: Routine

Signed:
Date: 1-20-93

*The radioactivity screen is performed to alert our employees of unexpected radioactivity at hazardous waste sites.

**Samples are disposed of four (4) weeks after a typed report is signed and mailed to the client. The routine method of disposal is: water samples are filtered through carbon to a sanitary sewer, solid samples are sent to a sanitary landfill.

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-1
PAGE 1 OF 1

CLIENT: BS&K - Solvay

PROJECT LOCATION: Solvay, New York

FILE NO.: 156.199

SAMPLER: Split Spoon

HAMMER: 140 lbs

FALL: 30"

LOCATION:

START DATE: 12/5/92
END DATE: 12/5/92

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Butch Stevens
OBG GEOLOGIST: John Mason

LEGEND: ▨ Grout ▨ Sand Pack ■ Pellets ▬ Screen ☐ Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	
										HNu (ppm)
0	1	0-2	10-19-	2'/1'	29	Dry to damp, light brown to black, fine to medium SAND, little very fine sand, trace broken porcelain				0
			10-6							
1										
2	2	2-4	9-6-5-6	2'/1'	11	Moist to wet, light brown to black, fine to medium SAND, changes to wet, red brown, fine to coarse SAND, some silt				0
3										
4	3	4-6	10-7-6-8	2'/1'	13	Same as above – wet				0
5										
6						Bottom of boring 6 ft.				
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-2
PAGE 1 OF 1

CLIENT: BS&K - Solvay
PROJECT LOCATION: Solvay, New York
FILE NO.: 156.199

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

LOCATION:
START DATE: 12/5/92
END DATE: 12/5/92

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Butch Stevens
OBG GEOLOGIST: John Mason

LEGEND: ▨ Grout ▨ Sand Pack ■ Pellets ▤ Screen ☐ Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING HNu (ppm)
0	1	0-2	10-8-6-4	2'/1'	14	Moist, dark brown to red brown, fine to medium SAND, some brick			0
1									
2	2	2-4	7-5-55—	1.5'/0.1'	60	Wet, red BRICK and SILTSTONE, petroleum odor noted			14
3									
4						Bottom of boring 4 ft.			
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

O'BRIEN & GERE ENGINEERS, INC.	**TEST BORING LOG**	**REPORT OF BORING** SB-3 **PAGE** 1 **OF** 1
CLIENT: BS&K - Solvay **PROJECT LOCATION:** Solvay, New York **FILE NO.:** 156.199	**SAMPLER:** Split Spoon **HAMMER:** 140 lbs **FALL:** 30"	**LOCATION:** **START DATE:** 12/5/92 **END DATE:** 12/5/92
BORING COMPANY: Parratt-Wolff, Inc. **FOREMAN:** Butch Stevens **OBG GEOLOGIST:** John Mason		**LEGEND:** ░ Grout ▒ Sand Pack ▓ Pellets ▬ Screen ☐ Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNu (ppm)
0						ASPHALT to 1 ft.				
1	1	1–3	6–6–8–8	2'/1.5'	14	Moist to damp, black, fine to medium SAND, changes to damp, red brown, fine to medium SAND and SILT (Till?)				0.1
2										
3	2	3–5	6–7–7–9	2'/1'	14	Damp to moist, red brown, fine to medium SAND and SILT (Till?)				0
4										
5	3	5–7	6–11– 15–21	2'/1'	26	Moist, light tan SILT and very fine SAND, siltstone rock at bottom				1.0
6										
7						Bottom of boring 7 ft.				
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-4
PAGE 1 OF 1

CLIENT: BS&K - Solvay
PROJECT LOCATION: Solvay, New York
FILE NO.: 156.199

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

LOCATION:
START DATE: 12/5/92
END DATE: 12/5/92

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Butch Stevens
OBG GEOLOGIST: John Mason

LEGEND: ▨ Grout ▨ Sand Pack ■ Pellets ▤ Screen ☐ Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING HNu (ppm)
0	1	0–2	6–6–7–7	2'/1'	13	Dry to damp, black with white to yellow specks, fine to medium SAND, changes to damp, red brown, fine to coarse SAND and SILT (TILL?)			14
1									
2	2	2–4	5–4–9–15	2'/1'	13	Damp to moist, red brown, fine to coarse SAND and SILT (TILL?)			0
3									
4	3	4–6	11–15– 13–10	2'/1'	28	Wet, same as above			1
5									
6						Bottom of boring 6 ft.			
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-5
PAGE 1 OF 1

CLIENT: BS&K - Solvay
PROJECT LOCATION: Solvay, New York
FILE NO.: 156.199

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

LOCATION:
START DATE: 12/5/92
END DATE: 12/5/92

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Butch Stevens
OBG GEOLOGIST: John Mason

LEGEND:
▨ Grout
▨ Sand Pack
■ Pellets
▭ Screen
☐ Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNu (ppm)
0						ASPHALT and BOULDER to 2 ft.				
1										
2	1	2-4	8-6-5-7	2'/1'	11	Damp, black, fine to medium SAND, changes to damp, red brown, fine to coarse SAND and SILT (Till?)				0
3										
4	2	4-6	12-20- 12-15	2'/0.1'	32	Damp, light red, very fine SILTSTONE				0
5										
6						Bottom of boring 6 ft.				
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-6
PAGE 1 OF 1

CLIENT: BS&K - Solvay
PROJECT LOCATION: Solvay, New York
FILE NO.: 156.199

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

LOCATION:
START DATE: 12/5/92
END DATE: 12/5/92

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Butch Stevens
OBG GEOLOGIST: John Mason

LEGEND: ░ Grout ▒ Sand Pack ▓ Pellets ▤ Screen ☐ Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNu (ppm)
0						ASPHALT and BRICKS to 2 ft.				
1										
2	1	2-4	3-4-4-5	2'/1'	8	Damp to moist, red brown, fine to coarse				0
						SAND and SILT (Till?)				
3										
4	2	4-6	5-8-	2'/0'	20	No recovery (wet)				—
			12-13							
5										
6						Bottom of boring 6 ft.				
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-7
PAGE 1 **OF** 1

CLIENT: BS&K - Solvay
PROJECT LOCATION: Solvay, New York
FILE NO.: 156.199

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

LOCATION:
START DATE: 12/5/92
END DATE: 12/5/92

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Butch Stevens
OBG GEOLOGIST: John Mason

LEGEND: ░ Grout ▒ Sand Pack ▓ Pellets ▬ Screen ☐ Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	
										HNu (ppm)
0	1	0-2	22-7-5-5	2'/1'	12	Damp, black with white specks, fine to medium SAND				0.1
1										
2	2	2-4	4-4-4-3	2'/1'	8	Same as above				10
3										
4						Bottom of boring 4 ft.				
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

REPORT OF BORING SB-8
PAGE 1 OF 1

CLIENT: BS&K - Solvay
PROJECT LOCATION: Solvay, New York
FILE NO.: 156.199

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

LOCATION:
START DATE: 12/5/92
END DATE: 12/5/92

BORING COMPANY: Parratt-Wolff, Inc.
FOREMAN: Butch Stevens
OBG GEOLOGIST: John Mason

LEGEND:
▨ Grout
▨ Sand Pack
■ Pellets
▭ Screen
☐ Riser

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	HNu (ppm)
0	1	0–2	63–35–	2'/0.5'	45	Dry, light gray, fine SAND, some very fine				0.1
			10–12			sand				
1										
2	2	2–4	4–4–4–4	2'/1'	8	Same as above				0.1
3										
4						Bottom of boring 4 ft.				
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

ATTACHMENT 3

UNDERGROUND STORAGE TANK DOCUMENTATION

PASS & SEYMOUR®

A member of the legrand group.

To: NYS Environmental Conservation Depar
Petroleum Bulk Storage Section
615 Erie Blvd West
Syracuse, New York 13204

Subject: Tank Testing

Please be advised that the two tanks refe

BULK STORAGE NOTICE" #105708 were taken out of service in December of 1987.

Attached please find the following:

1. Copy of the letter from Clean Harbours Inc. certifing the cleaning, inspection, and filling of the two tanks with inert material.

2. Copy of the Manifest used for material removed from the tanks.

3. Copy of the Purchase Order for the above service.

truly yours

d F. Baumgras

---

nys Environmental Conser
Petroleum Bulk Storage
615 Erie Blvd West
Syracuse, Ny 13204

	$ .45
Certified Fee	.85
Special Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	.90
TOTAL Postage and Fees	$ 2.20

Postmark or Date

USPS SYRACUSE MAIN OFFICE
AUG 8 1989

PASS & SEYMOUR, INC.
P. O. BOX 4822
SYRACUSE, N. Y. 13221

PS Form 3800, June 1985

E. Baumgras

● **SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.
1. ☐ Show to whom delivered, date, and addressee's address. *(Extra charge)*
2. ☐ Restricted Delivery *(Extra charge)*

3. Article Addressed to:
NYS Environmental Conserv.
Petroleum Bulk Storage
615 Erie Blvd. West.
Syracuse, Ny 13204

4. Article Number
P-099-973-243

Type of Service:
☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Address
X

6. Signature — Agent
X

7. Date of Delivery
8/10/89

8. Addressee's Address *(ONLY if requested and fee paid)*

PS Form **3811**, Mar. 1988 ★ U.S.G.P.O. 1988-212-865 **DOMESTIC RETURN RECEIPT**

PASS & SEYMOUR®
A member of the legrand group.

August 8, 1989

To: NYS Environmental Conservation Department
Petroleum Bulk Storage Section
615 Erie Blvd West
Syracuse, New York 13204

Subject: Tank Testing

Please be advised that the two tanks referenced on the "PETROLEUM BULK STORAGE NOTICE" #105708 were taken out of service in December of 1987.

Attached please find the following:

1. Copy of the letter from Clean Harbours Inc. certifing the cleaning, inspection, and filling of the two tanks with inert material.

2. Copy of the Manifest used for material removed from the tanks.

3. Copy of the Purchase Order for the above service.

4. Copy of the Quotation for the above service.

Very truly yours

Edward F. Baumgras

PETROLEUM BULK STORAGE NOTICE

Required Test Schedule for Underground Storage Tanks

Tests must be completed by the last day of the month Indicated.
Reporting requirements are indicated on the back of this form.

PETROLEUM BULK STORAGE NUMBER		TANK NUMBER	DUE DATE	TANK TYPE	CAPACITY	PRODUCT	INDICATE TEST RESULTS (P-pass; F-fail)				
							Tank		Piping		Unable To Test
Test Date(s)	Method(s)						P	F	P	F	

Please see attached documentation regarding tanks

6/5/87

This notice and a copy of the underground test report should be returned to DEC with the following information:

Tester's Name____________________

Tester's Address____________________

NAME OF FACILITY

I affirm that:

1. I am trained in performance of the test and have an understanding of the variables which affect the test.
2. The test methods used meet the Department's criteria.

Tester's Signature____________________

Owner's Signature____________________

NAME OF OWNER

DEC DISPOSITION:

OWNER COPY

6799
3217
1349

CleanHarbors
...AN ENVIRONMENTAL SERVICES COMPANY...

DECEMBER 18, 1987

MR. EDWARD R. BAUMGRAS
PASS & SEYMOUR, INC.
PO BOX 4822
SYRACUSE, NY 13221

Dear Mr. Baumgras:

During the week of December 7, 1987, Clean Harbors cleaned and filled with solid inert material the two 20,000 gallon underground #2 fuel oil tanks according to 6 NYCRR Part 613.9(b). Upon visual inspection by our field service personnel, there was no evidence of leaks and the tanks appeared to be intack.

If you have any questions or if I can be of any further assistance, please do not hesitate to call me.

Sincerely,

Debbie Phillips

Debbie Phillips
Sales Representative

24 HOUR SERVICE
P.O. BOX 1812
ALBANY, N.Y. 12201
(518)434-0149

24 HOUR SERVICE
1-800-OIL TANK

P.O. BOX 6769
SYRACUSE, N.Y. 13217
(315)463-1349

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF SOLID AND HAZARDOUS WASTE

One Winter Street
Boston, Massachusetts 02108

W030263

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator US EPA ID No. NYD002228799 Manifest Document No. 00001	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Pass & Seymour, Inc.
50 Boyd Ave. , Syracude, NY 13209
4. Generator's Phone (315) 468-6211

A. State Manifest Document Number MA C 319095
B. State Gen. ID

5. Transporter 1 Company Name: Clean Harbors of Kingston
6. US EPA ID Number: MAD039322250
C. State Trans. ID: 5442 MA
D. Transporter's Phone 617 585-5111

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Trans. ID
F. Transporter's Phone ( )

9. Designated Facility Name and Site Address
Clean Harbors of Braintree
385 Quincy Ave.
Braintree, MA 02184
10. US EPA ID Number: MAD053452637
G. State Facility's ID: Not Required
H. Facility's Phone (617) 849-1800

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. Waste Oil Combustible Liquid UN 1270 NoS	001	TT	2150	G	NA 1270 ~~M001~~
b.					
c.					
d.					

GENERATOR

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)
a. #2 oil
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. S01
b.
c.
d.

15. Special Handling Instructions and Additional Information
Rinse Water + #2 oil From tank Clean out.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Date Month Day Year
EDWARD BAUMGRAS	Edward Baumgras	12 07 87

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month Day Year
Kurt S Warnstadt	Kurt S Warnstadt	12 07 87

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Date Month Day Year
LISA D. FAULKNER	Lisa D. Faulkner	12 30 87

Form Approved OMB No. 2050-0039. Expires 9-30-88
EPA Form 8700-22 (Rev. 9-86) Previous editions are obsolete.

MA C 319095 COPY 5: GENERATOR-MAILED BY TSDF

PURCHASE ORDER
PASS & SEYMOUR INC.

SHIP TO: 50 BOYD AVENUE, SYRACUSE, NEW YORK 13209
BILL TO: P.O. BOX 4822, SYRACUSE, NEW YORK 13221
CABLE: PASSMOUR SYR PHONE: (315) 468-6211

463-1439
PURCHASE ORDER NO.
SP- 7598

THIS ORDER NOT VALID UNLESS P.O. NUMBER IS ISSUED BY PURCHASING DEPT.

VENDOR
Clean Harbors
P.O. Box 6787
Syracuse, NY 13217

THIS IS A PURCHASE ORDER
VENDOR MUST ACKNOWLEDGE RECEIPT OF THIS ORDER WITH PRICE AND DELIVERY INFORMATION IF DIFFERENT THAN STATED BELOW.
GOODS AND MATERIALS SUPPLIED TO US ON THIS ORDER SHALL COMPLY WITH ALL STATE AND FEDERAL LAWS.
PLEASE RENDER INVOICES IN DUPLICATE
P.O. # MUST BE REFERENCED ON INVOICE & PACKING LIST
See Terms & Conditions

ORDER DATE Nov 10, 1987

DATE REQUIRED ASAP	SHIP VIA	ACCT. # 5000460480

F.O.B. ☐ SHIPPING POINT ☐ DESTINATION
TAX ☐ N.Y. STATE 4 % ☐ ONONDAGA COUNTY 3 % ☐ TAX EXEMPT NO. 15-0412360

VENDOR PLEASE NOTE:

ANY QUESTIONS REGARDING THIS ORDER PLEASE CONTACT →

DELIVER TO (PRINT) NAME	EXT.	DEPT.
BAUMGRAS	216	48

QUANTITY	U/M	DESCRIPTION OF MATERIAL AND/OR SERVICES TO BE SUPPLIED	PRICE EA. EST.	TOTAL ESTIMATE
Clean	and	fill (2) 20,000 gallon oil tanks		located
found	building	#17 as per quote dated		9/23/87
		Clean and fill		$3,710
		Cleaning residue disposal incl-		120
		lab work as required for		100
		certified closure.		

TOTAL $ 3,930

P.O. AUTHORIZATION
BY 11/10/87 DATE ORIGINATOR APPROVAL

BY DATE UP TO $250
BY DATE UP TO $2500
BY DATE OVER $2500

NOTICE TO SUPPLIER THE TOTAL COST OF THIS ORDER, AND YOUR SUBSEQUENT INVOICE MUST NOT EXCEED THE TOTAL AMOUNT AUTHORIZED WITHOUT PRIOR WRITTEN AUTHORIZATION.

USED ON: COMPLIANCE

PURCHASING AGENT

REGION: 7

93-06-004 (4/85)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PETROLEUM BULK STORAGE REGISTRATION CERTIFICATE

FEE PAID 250

TANK NUMBER	TESTING DUE DATE	DATE LAST TESTED	TANK TYPE	CAPACITY	DATE INSTALLED
001	12/88		BARE STEEL	20,000	12/78
002	12/88		BARE STEEL	20,000	12/78
003	*		BARE STEEL	4,000	12/75
004	*		BARE STEEL	4,000	12/75
005	*		BARE STEEL	4,000	12/75

* Aboveground tanks require monthly visual inspections and documented internal inspections every ten years as described in 6 NYCRR Part 613.

As authorized representative of the above named facility, I affirm under penalty of perjury that the information displayed on this form is correct to the best of my knowledge. Additionally, I recognize that I am responsible for assuring that this facility is in compliance with all sections of 6 NYCRR Parts 612, 613 and 614, not just those cited below:

- The facility must be reregistered if there is a transfer of ownership.
- The Department must be notified within 30 days prior to adding, replacing, reconditioning, or permanently closing a stationary tank.
- The facility must be operated in accordance with the Code for Storing Petroleum, 6 NYCRR Part 613.
- Any new facility or substantially modified facility must comply with the Code for New and Substantially Modified Facilities, 6 NYCRR Part 614.
- **This certificate must be displayed on the premises at all times.**

Signature of Representative/Owner

4-1-87
Date

ISSUED BY:
COMMISSIONER HENRY G. WILLIAMS

PETROLEUM BULK STORAGE ID NUMBER 105708

DATE ISSUED 03/24/87

EXPIRATION DATE 03/24/92

OPERATOR
PASS & SEYMOUR INC
50 BOYD AVENUE
SYRACUSE NY 13209

FACILITY
PASS & SEYMOUR INC
50 BOYD AVENUE
SYRACUSE NY 13209

OWNER
PASS & SEYMOUR INC
50 BOYD AVENUE
SYRACUSE NY 13209

EMERGENCY CONTACT
EDWARD BAUMGRAS
14 KIDD KOVE
BALDWINSVILLE NY 13027

15 ERIE BLVD WEST
SYRACUSE, NY 13204
(315) 426-7519

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

93-06-004 (4/85)

PETROLEUM BULK STORAGE REGISTRATION CERTIFICATE

FEE PAID 250

TANK NUMBER	TESTING DUE DATE	DATE LAST TESTED	TANK TYPE	CAPACITY	DATE INSTALLED
003	*		BARE STEEL	4,000	12/75
004	*		BARE STEEL	4,000	12/75
005	*		BARE STEEL	4,000	12/75

* Aboveground tanks require monthly visual inspections and documented internal inspections every ten years as described in 6 NYCRR Part 613.

As authorized representative of the above named facility, I affirm under penalty of perjury that the information displayed on this form is correct to the best of my knowledge. Additionally, I recognize that I am responsible for assuring that this facility is in compliance with all sections of 6 NYCRR Parts 612, 613 and 614, not just those cited below:

- The facility must be reregistered if there is a transfer of ownership.
- The Department must be notified within 30 days prior to adding, replacing, reconditioning, or permanently closing a stationary tank.
- The facility must be operated in accordance with the Code for Storing Petroleum, 6 NYCRR Part 613.
- Any new facility or substantially modified facility must comply with the Code for New and Substantially Modified Facilities, 6 NYCRR Part 614.
- This certificate must be displayed on the premises at all times.

1-26-90

Signature of Representative/Owner Date

ISSUED BY: COMMISSIONER THOMAS C. JORLING	OPERATOR PASS & SEYMOUR INC 50 BOYD AVENUE SYRACUSE NY 13209	
PETROLEUM BULK STORAGE ID NUMBER 105708		
DATE ISSUED 01/18/90 EXPIRATION DATE 03/24/92		
FACILITY PASS & SEYMOUR INC 50 BOYD AVENUE SYRACUSE NY 13209	OWNER PASS & SEYMOUR INC 50 BOYD AVENUE SYRACUSE NY 13209	EMERGENCY CONTACT EDWARD BAUMGRAS 14 KIDD KOVE BALDWINSVILLE NY 13027 (315) 638-2830

OWNER COPY

ATTACHMENT 4

BACKGROUND CONCENTRATIONS OF 20 ELEMENTS IN SOILS WITH SPECIAL REGARD FOR NEW YORK STATE

Background concentrations of 20 elements in soils with special regard for New York State.

E. Carol McGovern
Fish and Wildlife Technician
Wildlife Pathology Unit
Wildlife Resources Center
New York State Department of
Environmental Conservation
Delmar, New York 12054

Introduction

The main source of elements in soils is from the parent material from which they were derived. Usually this material is weathered bedrock or overburden transported by wind, water or glaciation (Thornton, 1979). Climatic and biological factors as well as agricultural and industrial operations have a major effect on the concentration of elements in soils (Shacklette et al, 1971). Developed and developing countries have an ever increasing production and demand for elements. This increases the probability of their dispersal and contact in the environment. An element may be dispersed into the environment from the time it is mined until it becomes usuable as a finished product or ingredient of a product (Adriano, 1986). The long agricultural and industrial history of this country may have altered the "natural" background of some elements in some materials. The widespread atmospheric effects of leaded gasoline may have altered the lead content of soils far from any pollution sources. Likewise for any element entering the atmosphere from agricultural or industrial sources (Connor and Shacklette, 1974).

A natural background level for 20 elements; aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, sodium, vanadium and zinc is being established for New York State. A wide range of literature has been reviewed to obtain soil values of these elements from areas thought to be uncontaminated, undisturbed or areas far from pollution sources. All values are in ppm dry weight.

Aluminum

Jackson (1964) stated that aluminum makes up 2-12% (20,000 - 120,000 ppm) of soils. Vinogradov (1959) gave 71,300 ppm as the average for the concentration of aluminum in world soils. A cultivated soil profile 0-30 cm, from Eastham, MA, averaged 34,000 ppm aluminum (Laul, 1983). Holmes et al (1938) conducted a study on the chemical composition of soils and colloids of the Norfolk and related soil series. All of the soils that they studied were within a 15 mile radius of Kingston, NC. In a soil profile of the Orangeburg series, mostly consisting of sandy loams and loamy sands, the aluminum content from the A horizon was 9,800 ppm, from the B horizon 95,600 ppm and 51,200 ppm for the C. A soil profile from the Dunbar soil series, a sandy loam, from a heavily forested area revealed an aluminum concentration of 8,300 ppm in the A_1 horizon, 14,000 ppm in the A_2 horizon, 27,900 ppm for the B_1 and and 34,500 ppm for the B_2 horizon. A highly acidic, pH 4.3, fine sandy loam of the Coxville soil series provided a profile that contained 25,400 ppm aluminum in the A horizon, 54,600 in the B horizon and 69,700 ppm in the C.

Shacklette (1984) compiled samples of surficial material, that were unaltered or very little altered from their natural condition, of the United States to give estimates of the range of elemental abundance, with a total of 1,318 sampling sites. All samples were taken at a depth of 24 cm. Although many sites were within 100 m of roads, the roads contained only light vehicular traffic or were newly introduced interstates. The geometric mean of 450 samples of soils and other surficial materials lying east of the 97th meridian was 33,000 ppm aluminum, with a range of 7,000-100,000 ppm.

Arsenic

The average amount of arsenic found in soils is 5 ppm (Vinogradov, 1959; Reay, 1972; Peterson and Alloway, 1979; Miesch and Claude, 1972; Woolson, 1983). No clearly defined relationship exists between the arsenic content of soils and the parent material or the climate conditions under which the soils were formed. Walsh et al (1977) stated that arsenic in uncontaminated soils is usually found in the range of 0.2 - 40 ppm. For 195 U.S. soil samples the arsenic content ranged from 0.1 - 42 ppm (Vinogradov, 1959). From erosion experiment stations widely scattered throughout the midwest and south, covering 5 major soil types, the arsenic content fell in the range of 1 - 20 ppm (Mitchell, 1964). Greaves (1934) found arsenic in western virgin soils to the extent of 4 ppm. A study of virgin soils of Colorado in 1910 found arsenic in amounts of 2.5 - 5.0 ppm.

Frank et al (1976) sampled 296 agricultral fields throughout Ontario, Canada. For 207 samples from soils with no history of arsenic use, the arsenic concentration ranged from 1.1 - 16.7 ppm with an average of 6.27 ppm. The arsenic content of uncontaminated soils was slightly increased with increased clay content. Sandy soils averaged 5.84 ppm arsenic and 6.43 ppm was the average arsenic content for clay soils.

A profile from a Muskingum silt loam - a gray-brown podzolic soil, with an immature profile, from Zanesville, Ohio revealed 10 ppm arsenic in the 0 - 17.5 cm zone, 16 ppm in the 17.5 - 32.5 cm zone, 10 ppm in the 32.5 - 60 cm zone (Slater et al, 1937).

Chattopadhyay et al (1974) determined the mean arsenic content from a crop growing organic soil profile from a Holland marsh area near Toranto, Ontario to be 1.5 ppm.

In the Harrison Experiment Forest, near Saucier, Mississippi, having a strongly acidic, poarch fine sandy loam soil, the arsenic content for the 0 - 75 cm profile ranged from 0.6 - 1.4 ppm (DeGroot, 1979). In a sandy loam control plot the arsenic concentration averaged 7 ppm for 0 - 30 cm (Hiltbolt, 1975).

Walsh et al (1975) gave a range of 3 - 12 ppm for the arsenic content in uncontaminated New York State soils. The geometric mean content of arsenic in the surficial materials of the eastern United States was found to be 4.8 ppm, with a range of <0.1 - 73 ppm by Shacklette and Boerngen (1984).

Barium

Vinogradov (1959) quoted 500 ppm as the average amount of barium in world soils. For 40 various soil samples from the U.S. the barium content ranged from 10 - 3,000 ppm. In another study of 100 U.S. soil samples the barium level ranged from 60 - 800 ppm. Bowen (1979) stated 500 ppm as the average barium content in soils, with a range of

100 - 3,000 ppm. In 1910 the great plains soils were found to contain between 100 - 1,100 ppm barium (Slater et al, 1937).

The average barium content of a cultivated soil profile, 0 - 30 cm, from Eastham, MA was 180 ppm, with a range of 140 - 250 ppm (Laul, 1983).

From an organic crop growing soil profile from the Holland Marsh area near Toranto, Ontario the barium level in the surface$_1$ was found to be 285 ppm, in surface$_2$ it was 270 ppm. For a depth of 0 - 7.5 cm the barium content was 252 ppm, for 7.5 - 15 cm it was 293 ppm and 300 ppm for 15 - 22.5 cm (Chattopadhyay et al, 1974).

Shacklette and Boerngen (1984) found the geometric mean for 541 samples east of the 97th meridian in the U.S. to be 290 ppm, with a range of 10 - 1,500 ppm.

Beryllium

Beryllium is estimated to have a crustal abundance of 2 ppm (Tepper, 1980). Mitchell (1964) gave 0.3 - 10 ppm as the common range for beryllium in soils. Bowen (1979) gave 0.3 ppm as the average level of beryllium in soils with a range of 0.01 - 40 ppm. Adriano (1986) gave the range of 0.1 - 0.89 ppm for the concentration of beryllium in Canadian surface soils. Shacklette and Boerngen (1984) determined the geometric mean of beryllium in 169 soil samples of the eastern U.S. to be 0.55 ppm with a range of <1-7 ppm. The arithmetic mean was 0.85 ppm.

Cadmium

Vinogradov (1959) gave 0.5 ppm as the average amount of cadmium in world soils. Mitchell (1964) quoted 0.2 ppm as the average crustal abundance for cadmium. Peterson and Alloway (1979) stated that cadmium had an estimated crustal abundance of 0.15 - 0.20 ppm. Bowen (1979) gave an average of 0.35 ppm for world soil cadmium concentration, with a range of 0.01 - 2 ppm. Eisler (1985) stated that for soils of nonvolcanic origin the cadmium content ranged from 0.01 - 1.0 ppm and for soils of volcanic origin the cadmium concentration could be as high as 0.45 ppm. Based on the cadmium level found in common rocks it can be concluded that, on the average, soils derived from igneous rocks would contain the lowest total cadmium concentration, soils from metamorphic rocks intermediate and those derived from sedimentary rocks would contain the largest amounts of cadmium. Soils derived from igneous rocks range in cadmium concentration from 0.1 - 0.3 ppm, metamorphic soils 0.1 - 1.0 ppm and sedimentary soils 0.3- 11 ppm (Page and Bingham, 1973).

For 173 agricultural soils from New York State, removed from mobile and point source contamination, the mean cadmium content was 0.45 ppm. For 40 West Virginia agricultural soils the mean cadmium level was 0.32 ppm, for 81 crop growing soils from Ohio 0.38 ppm, for

57 Maryland farms 0.08 ppm, 0.17 ppm cadmium for 4 agricultural soils of Delaware, 0.17 ppm for 31 farms from Maine, and 0.21 ppm for 45 agricultural soils from Pennsylvania (Sommers, 1987).

Page et al (1987) gave a range of 0.1 - 1.0 ppm for non-contaminated agricultural soils of the U.S., except for a number of soils derived from parent materials high in cadmium. Organic soils (Histosols) tend to contain the highest total cadmium concentrations and highly weathered soils (Ultisols and Alfisols) contain the lowest cadmium levels.

An extensive study of 3,305 soil samples from crop-producing areas in 36 states, took great care to insure that these areas were free from any known source of contamination. The cadmium content from these soils ranged from 0.05 - 2.4 ppm with a mean and median values of 0.27 ppm and 0.20 ppm respectively. For 293 samples from the northeast, including 5 states, the Cd content ranged from 0.08 - 0.21 ppm with an average of 0.17 ppm.

Adriano (1986) reported that normal Canadian soils contain from 0.01 - 0.10 ppm total Cd with a mean of 0.07 ppm. Normal glacial tills and other glacial materials had a Cd concentration of 0.01 - 0.70 ppm with an average of 0.07 ppm.

Pierce et al (1982) sampled 16 Minnesota soils from 7 major materials to obtain a baseline for 6 metals. The average cadmium concentration, from a depth of 0 - 15 cm, was 0.39 ppm and ranged from 0.24 - 0.68 ppm. The highest Cd content was found in calcareous soils developed in the lacustrine sediment and DesMoines Lobe Till (prairie) and generally in surface soils and soils with free carbonates. The association of Cd with carbonates reflects it's ability to substitute for Cd^{+2} in the crystal lattice of calcite, due to similarities in ionic radii 1.03A and 1.06A respectively.

Luce (1985) quoted a range of 0.01 - 0.7 ppm and an average of 0.06 ppm for the cadmium content of soils. For 98 New York mineral soils used in the production of commercial fruits and vegetables the cadmium content averaged 0.21 ppm, with a maximum value of 0.67 ppm. For 63 New York State organic soils the average Cd content was 0.74, with a maximum value of 1.80 ppm.

A regional study of 15 benchmark or major soils of the Northeast containing 6 soils with a coarse - loamy texture had an average total Cd level of 0.22 ppm, the other 9 had a fine loamy to clayey texture contained 0.56 ppm cadmium on the average. The total Cd content of 26 Massachusetts surface soils (Ap or A horizons) averaged 0.2 ppm and ranged from 0.01 - 0.88 ppm.

Calcium

Mitchell (1964) stated that calcium makes up 3.6% (36,000 ppm) of the earth's crust by weight and 1.48% (14,800 ppm) by volume. Vinogradov (1959) gave 13,700 ppm as the average content of calcium in soils. Calcium makes up approximately 1% (10,000 ppm) of soils (Jackson, 1964). Bowen (1979) gave 15,000 ppm as the average amount

In three experimental fields, in Illinois, the calcium content ranged from 450 - 2,170 ppm, for the profile of 0 - 72" (Snider, 1943). From a study by Holmes et al (1938) of Norfolk and related soil series, within a 15 mile radius of Kingston, NC, the A horizon of an Orangeburg fine sandy loam soil contained 6,100 ppm Ca, the B horizon 280 ppm Ca and the C 500 ppm Ca. A profile of a Dunbar fine sandy loam horizons; A_1, A_2, B_1 and B_2, all contained 70 ppm Ca. A profile of a Coxville fine sandy loam contained 640 ppm calcium in the A horizon, 357 ppm in the B and 100 ppm in the C. A profile of a Bladen loam soil contained 500 ppm Ca in A, B and C horizons.

Seventy residential soil samples from Grand Rapids, Michigan, taken from low density population areas and areas with substantial amounts of unimproved woodlands, averaged 2,300 ppm calcium. All samples were taken 30 - 50' from any road and usually taken from an established grassy area. Ninety one agricultural samples in the area contained 1,400 ppm calcium (Klein, 1972).

In 1979 approximately 20,000 field crop samples from approximately 200,000 acres were sampled from New York. The calcium content ranged from 778 - 3,532 ppm and averaged 1,651 ppm for 127 samples (Klausner and Reid, 1981). Shacklette and Boerngen (1984) gave the geometric mean of 3,400 ppm for the eastern U.S. with a range of 100 - 280,000 ppm.

Chromium

Chromium has an estimated crustal abundance of 100 ppm and an estimated mean soil content of 100 ppm (Peterson and Alloway, 1979). Vinogradov (1959) gave 20 ppm as the average chromium content of world soils. A study of 50 American soils by Slater, Holmes and Byers in 1937 gave a range of 2 - 270 ppm chromium. Cary (1982) gave an average of 43 ppm chromium for Canadian soils.

A profile of crop growing organic soils from the Holland Marsh area near Toronto, Ontario had an average of 24.6 ppm chromium (Chattopadhyay et al, 1974). For 12 organic soils from farmlands from throughout Ontario, Canada the average chromium content was 14.6 ppm, with a range of 4.1 - 39.0 ppm, 125 sandy soils had a mean chromium content of 10.0 ppm and ranged from 2.6 - 33.5 ppm, 98 loam soils ranged from 3.9 - 46.2 ppm and averaged 14.7 ppm, 60 clay soils had a range of 10.2 - 45.8 ppm chromium and a mean of 22.3 ppm. Samples having a chromium content over 35 ppm were mainly located on the Canadian shield or were soils high in clay content (Frank et al, 1976). Mills and Zwarich (1975) gave an average chromium content of 23 ppm for the A horizon of 16 agricultural soils from Manitoba, Canada and a mean of 16 ppm for the C horizon. The average chromium for 6 noncultivated fields was 22 ppm. Adriano (1986) reported a range of 20 - 125 ppm in Canadian soils and stated that the majority of U.S. soils contain between 20 - 75 ppm chromium.

A Rubicon sand from Muskegon Co., Michigan, sampled from the top 5-10 cm, contained <0.1 ppm chromium. The total chromium concentration from a Morley clay loam from Ionia Co., Michigan was 16 ppm (Grove and Ellis, 1980). Sixteen Minnesota soils derived from 7 major parent materials, from throughout the state, were tested to determine a baseline for 6 metals. The chromium content averaged 39 ppm for a depth of 0 - 75 cm and ranged 14 - 104 ppm. The three high concentrations of 104, 106 and 111 ppm were from a Rainy Lobe Till. If the Rainy Lobe Till values are excluded the range in chromium content would be 14 - 50 ppm (Pierce et al, 1982). A muskingum silt loam, a gray-brown podzolic soil with an immature profile from Zanesville, Ohio, had a mean chromium concentration of 3 ppm for the depth of 0 - 72", ranging from 2-4 ppm (Slater et al, 1937).

For 70 residential soil samples from Grand Rapids, Michigan the mean chromium level was 3.2 ppm and for 91 agricultural samples the mean was 4.6 ppm (Klein, 1972). Prince (1957) gave a range of 20-75 ppm chromium and an average of 38.5 ppm for 10 major agricultural soils from throughout New Jersey. The range in chromium concentration, in a poarch fine sandy loam of high acidity, from the Harrison Experiment Forest near Saucier, Mississippi was 3.8 - 9.2 ppm, for the depth of 0-62 cm (DeGroot et al, 1979).

Chromium extracted by 1M HCl, from a recent survey of Vermont soils, ranged from 0.1 - 18 ppm. Higher levels were associated with spodic horizons (Bartlette and Kimble, 1976). A cultivated soil profile from Eastham, MA contained an average of 120 ppm chromium, with a range of 90 - 140 ppm, for the depth of 0 - 30 cm (Laul, 1983). Luce (1985) quoted an average of 100 ppm for the chromium content in soils. For 6 major coarse loamy textured soils of the northeast the average total chromium concentration was 72 ppm. Nine other benchmark soils, loams to clays, averaged 93 ppm chromium. Uncultivated Elkton silt loam surface soils of Delaware average 65 ppm chromium.

Shacklette and Boerngen (1984) gave 33 ppm as the geometric mean content of chromium in 541 soils east of the 97th meridian, in the U.S., and a range of 1 - 1,000 ppm.

Cobalt

Vinogradov (1959) gave an average of 8 ppm for the concentration of cobalt in world soils. The cobalt content of 49 U.S. soils ranged from 0.1 - 2.4 ppm. Bowen (1979) also gave 8 ppm as the average content of cobalt in soils and a range of 0.05 - 65 ppm.

Virgin profiles of four major soil groups from eastern Canada had a range of 1.4 - 10.3 ppm for a podzol soil profile, 7.5 - 18.2 ppm for a brown podzol profile, 5.9 - 11.7 ppm for a gray-brown podzol and 7.3 - 11.3 ppm for a brown forest soil type (Wright et al, 1955). Agricultural soils from 296 farms from throughout Ontario had a range of 1.0 - 16.7 ppm cobalt and a mean of 4.4 ppm (Frank et al, 1976).

Ten important agricultural soil types from throughout New Jersey were sampled and ranged from 2 ppm - 18 ppm cobalt (Prince, 1957). For 70 residential soil samples, from the Grand Rapids, Michigan area.

the cobalt level averaged 2.3 ppm and for 91 agricultural samples the cobalt content had a mean of 2.7 ppm (Klein, 1972). From a cultivated soil profile from Eastham, MA, 0 - 30 cm, the average cobalt content was 2.2 ppm with a range of 1.7 - 2.5 ppm (Laul, 1983).

Shacklette and Boerngen (1984) gave 5.9 ppm as the geometric mean for 403 samples from the eastern United States, with a range of <0.3 - 70 ppm.

Copper

Goldschmidt (1958) stated that copper in virgin soils, under humid conditions, usually ranges from 1-10 ppm and rarely exceeds 20 ppm. In arid regions 50 ppm copper have been reported. Vinogradov (1959) gives an average copper content in soils of 20 ppm. For 51 various U.S. soils sampled the copper content ranged from 1 - 34 ppm. Adriano (1986) gave a mean value of 25 ppm for the copper concentration in U.S. soils with a range of 5 - 50 ppm for Canadian soils with an average of 22 ppm.

Pierce et al (1982) sampled 16 Minnesota soils from 7 major parent materials to obtain baselines for 6 metals. The average copper content of surface soils was 23 ppm and ranged from 16 - 28 ppm. For 70 residential soil samples from the Grand Rapids, Michigan area the average copper content was 8.0. Ninety one agricultural soils had a mean copper content of 8.8 ppm (Klein, 1972).

Seven Atlantic Coastal Plain soil profiles, from within 15 miles of Kingston, NC all formed from essentially the same parent material and developed under similar climatic conditions were sampled. All 7 of these soil groups are severely weathered and leached. The average copper content was 16 ppm, through the varying depths, and ranged from 5 - 27 ppm. The copper concentration of alluvial soils, of eastern tributaries to the Mississippi River, ranged from 19-28 ppm with an average of 23 ppm. A Brasau sandy loam from Groton, NH developed from granitic and gneissic till ranged 13-28 ppm copper for a depth of 0-19". A Hermon sandy loam from Canaan, NH, developed from granitic and other coarse-grained gneissic materials, for a depth of 0-32" ranged 17-28 ppm copper (Holmes, 1943).

For 15 unimproved agricultural fields, from Ontario, Canada, the copper content averaged 23 ppm and ranged 7.3 - 36.7 ppm (Frank et al, 1976). Wright et al (1955) studied virgin profiles from four great soil groups of eastern Canada. The range in copper content for the brown forest soil type was 5 - 19 ppm, the brown podzolic ranged 4-23 ppm copper and 5-21 ppm was the range for the podzolic soil type.

For a Muskingum silt loam, a gray-brown podzolic soil, with an immature profile that grades into the weathered parent shale, from Zanesville, Ohio contained 18 ppm copper in the 0-7" zone, 27 ppm for 8-13", 28 ppm for 14-24", and 34 ppm copper from 25-46" (Slater et al, 1937). Prince (1957) studied 10 major agricultural soils throughout New Jersey, the copper content ranged from 9-61 ppm, with an average of 23 ppm.

For 173 agricultural soils, removed from mobile and point source contamination, from New York the copper content averaged 74.8 ppm. From 81 farms in Ohio the copper content averaged 28.1 ppm, for 57 agricultural soils from Maryland the mean copper concentration was 8.1 ppm, for 47 samples from Virginia 9.4 ppm copper were found, for 4 farms in Delaware the average copper content was 5.0 ppm, for 31 agricultural soils of Maine 0.7 ppm was the mean copper content and 5.3 ppm was the mean copper content for 45 agricultural soils from Pennsylvania (Sommers et al, 1987).

Luce (1985) stated that for 54 U.S. samples the average copper level was 24 ppm with a range of 9 - 57 ppm. Seven sandy soils from the Atlantic coastal plain ranged from 9 - 25 ppm in their copper content and averaged 16 ppm. Two virgin spodosols from NH contained 24 ppm copper in the surface mineral horizon. The range for 26 Mass. soils was 5 - 38 ppm copper and averaged 16 ppm. Uncultivated surface soils of Connecticut, formed from glacial sediments from gneiss and schist, averaged 13 ppm in their copper concentration and ranged 6 - 20 ppm. The average for surface soils formed in glacial sediment derived from trap rock was 9 ppm and ranged 5-21 ppm. Glacial sediment derived from arkose sandstone averaged 6 ppm with a range of 5-8 ppm. The A horizon of 13 NJ soils from the Appalachian Province averaged 26 ppm copper and ranged from 13 - 61 ppm. The B horizon of these soils ranged from 12 - 32 ppm in copper concentration with an average of 20 ppm. Seven surface soils from coastal plains province of NJ averaged 9 ppm copper with a range of 2 -19 ppm. Fifteen major soils of the northeast averaged 59 ppm copper.

Shacklette and Boerngen (1984) found the geometric average copper content of eastern United States soils to be 13 ppm with a range of <1-700, and an estimated arithmetic mean of 22 ppm.

<u>Iron</u>

Jackson (1964) stated that iron makes up 1-6% (10,000 - 60,000 ppm) of soils. Kraushopf (1972) gave 10,000 - 100,000 ppm for the range of iron concentration in soils. Bowen (1979) and Vinogradov (1959) gave 40,000 ppm and 38,000 ppm respectively as the average amount of iron to be found in soils.

For 296 farms throughout Ontario, Canada the iron content ranged from 2,560 - 38,900 ppm with a mean of 14,470 ppm. Sandy soils contained the lowest iron and the clays the highest. From 13 organic soil samples the iron content averaged 13,480 ppm with a range of 2,660 - 24,800 ppm. For the 125 sandy soils the iron content was 9,030 ppm and ranged from 2,650 - 25,300 ppm, 98 loam samples averaged 16,440 ppm iron and ranged 5,400 - 32,300 ppm, the 60 clay samples averaged 22,770 and ranged 9,900 - 38,900 ppm (Frank et al, 1976).

The iron content of a poarch fine sandy loam, a strongly acidic soil from the Harrison Experiment Forest of Saucier, Miss. ranged from 4,000 - 11,000 ppm in a 0-52" profile (DeGroot et al, 1979). For 70 residential soil samples from the Grand Rapids, Michigan area the iron concentration average 2,200 ppm and from 91 agricultural samples the iron content average was 2,600 (Klein, 1972).

Holmes et al (1938) studied the Norfolk and related soils all within a 15 mile radius of Kingston, NC. A profile of a Dunbar fine sandy loam contained 3,070 ppm iron in the A_1 horizon, 3,870 ppm in the A_2 horizon, 8,020 ppm in the B_1 and 54,700 ppm in the B_2 horizon. A profile from the Coxville fine sandy loam contained 5,760 ppm in the A horizon, 20,180 ppm in the B and 18,900 in the C horizon. A profile of the Bladen loam contained 3,870 ppm iron in the A horizon, 11,700 ppm in the B and 11,200 in the C horizon. The iron content of a cultivated soil profile from Eastham, MA ranged from 11,000 - 14,000 ppm with a mean of 13,000 ppm (Laul, 1983).

Shacklette and Boerngen (1984) determined the geometric mean content of iron of soils east of the 97th meridian in the continental U.S. to be 14,000 ppm with a range of 100 - 100,000 ppm for 539 samples, the estimated arithmetic mean was 25,000 ppm.

<u>Lead</u>

Miesch and Claude (1972) stated that the average concentration of lead in uncontaminated soils was 16 ppm and that 95% of soils in the U.S. contain between 4 and 61 ppm lead. Soils outside but adjacent to Helena Valley, Montana contained 15 ppm lead and surface soils remote from Helena Valley contaned 15 ppm lead. Peterson and Alloway (1979) and Vinogradov (1969) stated the average concentration of lead in soil was 10 ppm, with a range between 2-200 ppm. Bowen (1979) gave 12 ppm as the average soil content of lead. Nriagu (1978) gave a range of 10-37 ppm for lead in normal soils and an average of 20 ppm.

Mills and Zwarich (1975) studied the agricultural soils of southern and western Manitoba, Canada. The parent material of most mineral soils in the agricultural areas of Manitoba are Late-Wisconsin glacial deposits. The components of which are derived from the shales of the western uplands, the carbonate rocks of the lowlands and the igneous rocks of the Canadian shield. The A and C horizon of summer fallow fields, including a range of textures and parent material were sampled. The mean lead concentration for 16 agricultural soils of the A horizon was 17 ppm and 19 ppm for the C horizon. For 6 samples from uncultivated soils (pasture or hayland adjacent to cultivated fields) averaged 16 ppm lead.

For 15 unimproved soils from Ontario, Canada the average lead concentration was 12.5 ppm and ranged from 3.2 - 33.7 ppm (Frank et al, 1976).

The lead content of two virgin profiles of four major soil groups of eastern Canada was determined by Wright et al (1955). The brown forest soil type contained between 8-23 ppm lead, the gray-brown podzol 16-33 ppm, the brown podzolic 13-30 ppm and the podzolic 9-15 ppm.

Pierce et al (1982), in establishing baseline levels of 6 metals for 16 soil series in Minnesota, stated that the total lead for all soils was low, in all cases below the detectable limit of 25 ppm.

Adriano (1986) gave an average of 5-25 ppm as an average amount of lead in soils far from human activity. Background levels of lead in 173 samples from 53 soils widely dispersed in Canada averaged 20 ppm.

For 173 New York State agricultural soil samples, from sites removed from mobile and point source contamination, the mean lead content was 17 ppm, for 81 Ohio farm samples the average lead concentration was 19 ppm, for 57 agricultural soils from Maryland 11 ppm was the mean lead level, for 4 agricultural soils from Delaware 10 ppm was the average lead content, from 31 Maine farms 10 ppm was the mean lead concentration, and for 45 Pennsylvania agricultural sites the average lead content was 24 ppm (Sommers, 1987).

For 98 mineral soils from New York State, utilized in the production of commerical fruits and vegetables, contained 15 ppm lead, on the average, with a maximum value of 30 ppm. For 63 organic soils the lead content averaged 20 ppm, with a maximum of 36 ppm (Luce, 1985).

Shacklette and Boerngen (1984) determined the geometric mean for the lead content of soils found in the eastern U.S. to the 14 ppm and ranged from <10-300 ppm, for 422 samples.

Magnesium

Vinogradov (1959) stated the average content of magnesium in soils was 6,300 ppm. Bowen (1979) gave 5,000 ppm as the average content of magnesium in soils, with a range of 400-9,000 ppm.

Crop growing organic soils from the Holland Marsh area near Toronto, Ontario were found to contain 780 ppm and 765 ppm magnesium in two surface soil samples. A soil profile from 0 - 7.5 cm was found to contain 640 ppm, the depth 7.5 - 15 cm contained 420 ppm and from 15 - 22.5 cm 400 ppm magnesium were found (Chattopadhyay, 1974).

Holmes et al (1938) determined the chemical composition of soils and colloids of Norfolk and related soil series. For a Fuston fine sandy loam the magnesium content in the A horizon was 241 ppm in the B horizon 723 ppm and 543 ppm in the C horizon. The Dunbar fine sand loam profile revealed a magnesium content of 60 ppm in the A_1 horizon, 60 ppm in the A_2 horizon, 600 ppm in the B_1 horizon, and 180 ppm in the B_2. The chemical analysis of the Coxville fine sandy loam revealed 543 ppm magnesium in the A horizon, 663 ppm in the B and 543 ppm in the C.

Shacklette and Boerngen (1984) determined the geometric mean content of magnesium in soils and surficial materials to be 2,100 ppm in the eastern U.S. with a range of 50-50,000 ppm, for 528 samples.

Manganese

Vinogradov (1959) gave 850 ppm as the average amount of manganese to be found in soils. In 162 samples of New Jersey soils the manganese concentration ranged from 100-2,000 ppm. Bowen (1979) stated 1,000 ppm as the average amount of manganese to be found in soils. Goldschmidt (1958) stated that the manganese content in soils varies from 200-5,000 ppm. Adriano (1986) gives 850 ppm as the average manganese content of soils, with a range of 100-4,000 ppm.

Two virgin profiles were taken from four great soil types of eastern Canada. The manganese content ranged from 328-667 ppm in the podzol profile, 508-1,329 ppm in the brown podzolic, 358-1,088 ppm in the gray-brown podzolic and 406-1,380 ppm in the brown forest soil type (Wright et al. 1955). For 15 unimproved agricultural soils from throughout Ontario the average amount of manganese found was 490 ppm with a range of 91-1,190. For 13 organic agricultural soils the mean manganese content was 338 ppm, with a range of 240-540 ppm, for 125 sandy soils the average manganese content was 428 ppm with a range of 90 - 1,790 ppm, for 98 loam soils 606 ppm was the average manganese content with a range of 138-2,010 ppm, for 60 clay samples 662 ppm was the mean manganese content with a range of 140-3,000 ppm. For all 296 agricultural samples 530 ppm was the mean manganese content with a range of 90 - 3,000 ppm (Frank et al. 1976).

Blair and Prince (1936) determined the manganese content of virgin soils from Burlington, Co., New Jersey to be 46.5 ppm. In fields with no fertilizer treatment the manganese content ranged from 101-302 ppm. From some uncultivated soils of New Jersey the manganese content was found to range from 264-736 ppm. For ten major agricultural soils from throughout New Jersey the manganese content was found to be 130-1,560 ppm, with an average of 789 ppm (Prince, 1957). A control plot at Oklahoma State University contained 268 ppm manganese (Mortvedt, 1987). For a cultivated soil profile from Eastham, MA, 0-30 cm, the manganese content ranged from 340-350 ppm (Laul, 1983).

For 173 samples from 53 Canadian soils the manganese content ranged from 100-1,200 ppm with a mean of 520 ppm. The mean manganese content of Ontario soils was 530 ppm and ranged from 90-3,000 ppm (Adriano, 1986).

Shacklette and Boerngen (1984) gave the mean content of manganese in soils in the eastern U.S. to be 260 ppm with a range of <2 - 7,000 ppm for 537 samples.

Mercury

The average concentration of mercury in soil, according to Vinogradov (1959), is 0.01 ppm. Bowen (1979) gave 0.06 ppm as the average content of mercury in soils, with a range of 0.01 - 0.5 ppm. Dewey (1983) quoted 0.05 ppm as the average concentration of mercury in soils and rocks. Organic matter in soils may contain up to 1.0 ppm mercury. The upper limit of the mercury concentration in soils of the

Adriano (1986) gave 0.161 ppm as the average content of mercury in the A horizon of soils, with a range of 0.06 - 0.2 ppm. An average of 0.089 ppm for the B horizon ranging between 0.03 - 0.14 ppm and 0.096 ppm for the C horizon ranging between 0.025 - 0.15 ppm. A mean content of 0.013 ppm was given by Anderson (1979) for the mercury amount found in the sand fraction of soil, 0.029 ppm for silt and 0.094 ppm for clay. This indicates that the mercury concentration increases with increased surface area and increased alteration from the parent material.

For 17 samples of cultivated U.S. soils the average mercury content was 0.06 ppm, forest soils from the A_o horizon of Norway contained 0.02-0.15 ppm mercury, cultivated and uncultivated A horizon soils from Canada had a range of 0.005 - 0.036 ppm mercury for 27 samples, for 65 virgin Canadian soil samples the range in mercury concentration was <0.005 - 0.66 ppm with an average of 0.06 ppm (Anderson, 1979).

MacLean et (1973) stated that normal soils contain 0.07 ppm mercury. Sites on the Central Experiment Farm Ottawa, Ontario contained 0.05 ppm mercury. The average mercury level of 65 virgin soils of Canada 234 samples from various layers, was found to be 0.081 ppm by McKeague and Kloosterman (1974). Gracey and Stewart (1974) found a range of 0.005 - 0.057 ppm mercury in 9 uncultivated soil profiles, 3-6 samples were taken from each profile, from settled areas of Saskatchewan, Canada. For 15 samples from unimproved fields of Ontario the mercury content ranged from 0.03 - 0.49 ppm, with an average of 0.08 ppm (Frank et al, 1976).

Fifty agricultural soils from four areas throughout N. Dakota revealed a mean of 0.03 ppm mercury (Sell et al, 1975). A survey of farm soils from 16 major wheat-growing states of the U.S. revealed a geometric mean mercury concentration of 0.105 ppm, with a range of 0.05 - 0.36 ppm, for 24 samples. Agricultural surface soils from 29 eastern U.S. states gave a mean mercury content of 0.08 ppm for 275 samples and 0.07 ppm for 104 noncropland samples (Adriano, 1986).

Shacklette and Boerngen (1984) gave 0.081 ppm as the geometric mean for 534 samples from the eastern U.S., with a range of 0.01 - 3.4 ppm.

Nickel

Peterson and Alloway (1979) gave 40 ppm as the average content of nickel in soils, with a range of 10 - 1,000 ppm. Bowen (1979) gave 50 ppm for a mean value of nickel in soils and a range of 2 - 750 ppm. An average of 40 ppm was given by Vinogradov (1959). In 49 soils sampled in the U.S. the nickel concentration ranged from 0.5 - 23 ppm. The average nickel content for U.S. soils is 20 ppm and ranges from 5 - 50 ppm for Canadian soils (Adriano, 1986).

Sixteen agricultural soils from Manitoba on the average contained 42 ppm nickel in the A horizon, 39 ppm in the C horizon. For 6 noncultivated soil samples the nickel content averaged 39 ppm (Mills and Zwarich, 1975). Two surface soil samples, from crop growing organic soils from the Holland Marsh area near Toronto, Ontario, averaged 7.98 ppm nickel. From 0-7.5 cm the nickel concentration was 6.21 ppm, 6.64 ppm for 7.5 - 15 cm and for 15 - 22.5 cm it was 5.21 ppm (Chattopadhay et al, 1974).

For 17 organic agricultural soils from Ontario the nickel content averaged 28.6 ppm and ranged 6.6 - 119 ppm, for 125 sandy soils the nickel concentration averaged 7.6 ppm with a range of 1.3 - 34.2 ppm, for 97 loam samples the mean was 17.9 ppm, ranging from 3.0-97.5 ppm, 60 clay samples averaged 27.8 ppm, ranging 8.0 - 88.0 ppm. For all 293 agricultural samples the mean nickel level was 15.9 ppm and ranged from 1.3 - 119.0 ppm (Frank et al, 1976).

Sixteen Minnesota soils from 7 major parent materials were analyzed to obtain a baseline for 6 metals. The average nickel concentration from surface soils from throughout the state was 18 ppm, ranging from 7 - 39 ppm (Pierce et al, 1982). From 10 major agricultural soils from throughout New Jersey the nickel level ranged from 14 - 61 ppm with a mean of 27.3 ppm (Prince, 1957). A muskingum silt loam, a gray-brown podzolic soil from Zanesville, Ohio, had an average nickel content of 26 ppm from 0 - 72" (Slater et al, 1937).

For 26 Massachusetts soils the nickel content ranged from 6 - 41 ppm. With an average of 26 ppm. Thirteen surface soils (A or Ap horizon), of the Appalachian Province of N.J., ranged from 11 - 40 ppm in their nickel content with a mean of 20 ppm. The B horizon had on average of 22 ppm with a range of 14 - 41 ppm. Fifteen benchmark soils from the northeast averaged 37 ppm in their nickel content, these soils were found in Connecticut River Valley alluvium. An average nickel content of 23 ppm was determined for the Ap horizon of four Hadley Silt loam pedons sampled from Connecticut, the range was from 20 - 27 ppm (Luce, 1985).

The mean nickel content for 173 New York State agricultural soils sampled away from mobile and point source contamination was 19.5 ppm. For 40 W. Virginia agricultural samples the mean nickel concentration was 23.3 ppm, for 81 Ohio farm 28.2 ppm, for 57 Maryland agricultural soils 12.4 ppm, for 46 Virginia farms 22.3 ppm, for 31 Maine samples 41.5 ppm and for 45 Pennsylvania farms the mean nickel content was 10.4 ppm (Sommers et al, 1987).

Shacklette and Boerngen (1984) determined the geometric mean nickel content for 443 samples from the eastern U.S. to be 11 ppm, with a range of <5 - 700 ppm.

Potassium

Vinogradov (1959) gave 13,600 ppm as the average amount of potassium in soils. Bowen (1979) gave 14,000 ppm as the mean content of potassium in soils with a range of 80 - 37,000 ppm. Jackson (1964) stated that potassium made up 0.05-3.5% (500-35,000 ppm) of mineral soils and that agricultural soils of the U.S. contain between 1-2% (10,000 - 20,000 ppm) potassium.

Holmes et al (1938) studied the chemical composition of the Norfolk and related soil series. The potassium content in an Orangeburg fine sandy loam was 249 ppm in the A horizon, 995 ppm in the B and 912 ppm in the C horizon. A profile from the Dunbar fine sandy loam revealed a potassium content of 83 ppm in the A_1 horizon, 83 ppm in the A_2, 497 ppm in the B_1 and 249 ppm in the B_2. In the Coxville fine sand loam 1,244 ppm potassium were found in the A horizon, and 2,736 ppm in both the B and C horizons.

From a cultivated soil sample from Eastham, MA, 0-30 cm, the potassium concentration averaged 11,000 ppm (Laul, 1983).

In 1979 Klausner and Reid (1981) compiled 20,000 field samples covering roughly 200,000 acres of New York State. The potassium ranged from 47.5 - 117.5 ppm for 127 samples with an average of 79.6 ppm.

Shacklette and Boerngen (1984) gave the geometric mean of the potassium level in soils of the eastern U.S. to be 12,000 ppm for 537 samples with a range of 50 - 37,000 ppm.

Selenium

Peterson and Alloway (1979) stated that 0.05 ppm was the average crustal abundance of selenium. The estimated average soil concentration of selenium was 0.2 ppm with a range of 0.01 - 2 ppm. Eisler (1985) gave 0.2 ppm as the average soil content of selenium. Vinogradov (1959) stated that 0.01 ppm was the mean selenium content of soils. From a study conducted in 1936 of 1,406 plains soil samples the selenium content ranged from 0.2 - 140 ppm. Bowen (1979) gave 0.4 ppm as the average content of selenium in soils with a range of 0.01 - 12 ppm.

Levesque (1974) obtained 54 soil samples from 4 soil types and 6 horizon layers from the northwest territories of Canada, chosen for remoteness. The selenium concentration ranged from 0.073 - 2.090 ppm. Two surface soil samples from crop growing organic soils, from the Holland Marsh area near Toronto, Ontario, contained 1.10 and 1.43 ppm selenium. A profile of this soil contined 1.22 ppm from 0-7.5 cm, 0.81 ppm from 7.5 - 15.0 cm and 0.62 ppm selenium from 15 - 22.5 cm and 0.62 ppm selenium from 15 - 22.5 cm (Chattopadhyay et al, 1974).

A cultivated soil profile, 0 - 30 cm, from Eastham, MA had a range in selenium content from 2.4 - 5.1 with an average of 3.5 ppm (Laul, 1983). A soil profile, 0.72", was taken from a muskingum silt loam, a gray-brown podzolic soil, from Zanesville, Ohio had an average selenium content of 0.25 ppm with a range of 0.02 - 0.5 ppm (Slater et al, 1937).

Shacklette and Boerngen (1984) found the geometric mean content of selenium in soils of the eastern U.S. to be 0.3 ppm with a range of <0.1 - 3.9 ppm for 449 samples.

Sodium

Vinogradov (1959) gave 6,300 ppm as the average concentration of sodium in soils. Jackson (1964) stated that sodium makes up between 0.1 - 1% (1,000 - 10,000 ppm) of soils. Bowen (1979) quoted 5,000 ppm as the mean concentration of sodium in soil with a range of 150 - 25,000 ppm.

Holmes et al (1938) studied the chemical make up of the Norfolk and related soils. The B horizon of the Orangeburg fine sandy loam contained 223 ppm sodium and the C horizon 74 ppm sodium. A profile of the Ruston fine sandy loam revealed 1,261 ppm sodium in the A horizon, 223 ppm in the B and 445 ppm in the C. A profile of the Dunbar fine sandy loam contained 816 ppm sodium in the A_1 horizon, 74 ppm in the A_2, 446 ppm in the B_1 and 74 ppm in the B_2.

A profile from a cultivated soil sample from Eastham, MA from 0-30 cm, on the average contained 4,300 ppm sodium and ranged from 3,900 - 4,800 ppm (Laul, 1983).

Shacklette and Boerngen (1984) determined the geometric mean for 363 soil samples from the eastern U.S. to be 2,500 ppm, with a range of 500 - 50,000 ppm.

Vanadium

Vinogradov (1959) gave 100 ppm as the average content of vanadium in soils. For 50 various U.S. soils the vanadium concentration ranged from 2 - 270 ppm. Bowen (1979) gave 90 ppm as the mean concentration of vanadium in soils.

Adriano (1986) stated that the vanadium content in igneous rocks, shale, sandstone and limestone of the U.S. was 135 ppm, 130 ppm, 20 ppm and 20 ppm respectively. Soils from sandstone and limestone contain lower amounts of vanadium than soils developed from shales and igneous rocks.

Prince (1957) found the vanadium content of 10 major agricultural soils from throughout New Jersey to range from 11-119 ppm with an average of 53.6 ppm. A profile of a crop growing organic soil from the Holland Marsh area near Toronto, Ontario revealed a vanadium content of 11.0 ppm in the surface, 15.2 ppm 0-7.5 cm, 21.4 ppm 7.5-15.0 cm, and 26.1 ppm from 15-22.5 cm (Chattopadhyay et al, 1974).

A soil profile of a muskingum silt loam, a gray-brown podzolic soil from Zanesville, Ohio, had a mean vanadium content of 72 ppm for 0-72", with a range of 20-96 ppm (Slater et al, 1937).

The geometric mean content of vanadium in the superficial materials of the eastern U.S. was found to be 43 ppm by Shacklette and Boerngen (1984) with a range of <7-300 ppm for 516 samples.

Zinc

The average concentration of zinc in soils is 50 ppm (Vinogradov, 1959; Peterson and Alloway, 1979; Schroeder, 1967). Miesch and Claude (1972) gave 44 ppm as the average zinc content in soils. The zinc content of soils often ranges from 10 - 300 ppm (Peterson and Alloway, 1979; Schroeder et al, 1967).

Four great soil groups, all developed on glacial till and all well drained, from eastern Canada had two virgin profiles analyzed. The range in zinc content for the podzolic profile, 0-30", the zinc range was from 53-150 ppm, for the gray-brown podzolic 62-87 ppm and for the brown forest soil 36-74 ppm (Wright et al, 1955). For 15 unimproved fields in Ontario the average zinc content was 48.5 ppm, ranging from 5.3 - 116 ppm (Frank et al, 1976). The mean zinc concentration from the A horizon of 16 agricultural soils of Manitoba, Canada was 116 ppm, and 66 ppm for the C horizon of these soils. For 6 noncultivated soil samples the average zinc content was 119 ppm (Mills and Zwarich, 1975).

Various soils and horizons from the U.S. Erosion Experiment Stations revealed a range of 3-147 ppm for acid soluble zinc (Goldschmidt, 1958). Sixteen Minnesota soils from 7 major parent materials zinc concentration ranged from 40-74 ppm for 0-15 cm, with an average of 60 ppm (Pierce et al, 1982). For 70 residential soil samples the mean zinc content was 21.1 ppm from the Grand Rapids, Michigan area. And for 91 agricultural samples from this area revealed a mean zinc content of 22.1 ppm (Klein, 1972).

Holmes (1943) gave a range of 59-97 ppm zinc, from a depth of 0-12", for the eastern tributaries to the Mississippi River. A Brasau sandy loam from Groton, NH, from 0-20", had a zinc content of 27-42 ppm. A Hermon sandy loam from Canaan Ctr. NH, from 0-32", had a range in zinc content from 26-40 ppm.

The mean zinc content for a soil profile from a muskingum silt loam a gray-brown podzolic soil, from Zanesville, Ohio was 7 ppm for 0-72" (Slater et al, 1937). For ten agricultural soils from throughout NJ the zinc concentration ranged from 21-180 ppm with an average of 82.7 ppm (Prince, 1957). A soil profile, 0-30 cm, from Eastham, MA had an average zinc concentration of 33 ppm with a range of 30-40 ppm (Laul, 1983).

From 173 agricultural soils from New York State, removed from mobile and point source contamination, the zinc content averaged 64 ppm. For 40 agricultural soils from W. Virginia the zinc content averaged 84 ppm, for 81 Ohio farms the zinc mean concentration was 89 ppm, for 57 Maryland agricultural soils 31 ppm, for 4 Delaware farms 25 ppm, 46 Virginia soils 56 ppm, for 31 Maine agricultural soils 74 ppm and 45 Pennsylvania farms the zinc content averaged 30 ppm (Sommers et al, 1987).

Two virgin spodzols from NH contained 28 ppm zinc. For 6 coarse-loamy textured soils of the northeast the mean zinc content was 53 ppm, while 9 fine-loamy to clayey soils averaged 86 ppm zinc.

Twenty five Mass. soils ranged from 15 - 104 ppm zinc and averaged 62 ppm (Luca, 1985).

Shacklette and Boerngen (1984) have determined the geometric mean of 473 samples from the eastern U.S. to be 40 ppm, with a range of <5-2,900 ppm.

AVERAGES AND RANGES OF THE CONCENTRATION OF SOME ELEMENTS IN UNCONTAMINATED SOILS

All values in ppm, dry weight.

	Average Conc. of Element Found in Uncontaminated Soils	References for Averages	Conc. Range of Element Found in Uncontaminated Soils	References for Ranges
Aluminum	Eastern U.S.* 33,000	8, 43	Albany, NY Area 1,000 - 25,000	8, 43
	Agricultural Soil 0 - 30 cm Eastham, MA 34,000	24		
Arsenic	5	5, 8, 16, 29, 36, 40, 43, 44, 50, 53	U.S. Range 0.1 - 45	1, 5, 29, 36, 50, 52 53
			NYS 3-12	52
			Albany Area <0.1-6.5	43
Barium	Average abundance in earth's crust 430	31	NYS 15-600	43, 44
	Eastern U.S.* 290	8, 43	Albany Area 250-350	43
	Eastham, MA Soil 180	24		
eryllium	All Soils 0.3	5	All Soils 0.1-10	31, 50
	Eastern U.S.* 0.6	8, 43, 44	Canadian Surface Soils 0.1 - 0.89	1
			NYS 0 - 1.75 (except for 1 sample 1.75-7)	43, 44
			Albany Area 0 - 0.9	43, 44
mium	Average abundance in earths crust 0.15-0.2	31, 36	0.01 - 2	5
	26 MA soils and 15 northeastern soils 0.2	13, 26	0.0001 - 1.0	26, 35, 36, 41, 47
			soils of nonvolcanic origin 0.01-1.0	11
	0.35	5	soils of volcanic origin up to 0.45	11
	98 NYS mineral agricultural soils 0.21	26	26 MA soils 0.01 - 0.88	26

	Average Conc. of Element Found in Uncontaminated Soils	References for Averages	Conc. Range of Element Found in Uncontaminated Soils	Referenc for Rang
Calcium	Eastern U.S.* 3,400	8, 23	Eastern U.S.* 100-28,000	43
	70 Residential Soils, Mich. 2,300	22	Eastern U.S.* 100-16,000	8
	91 Agricultural Soils, Mich. 1,400	22	NYS 130-35,000	43
	127 NYS Agricultural Soils 1,631	21	Albany Area 150-5,000	44
			Albany Area 2,900-6,500	43
Chromium	Canadian soils 43	6	Most U.S. soils 25-85	1
	World soils 20	50	Eastern U.S.* 1-100	8
	Eastern U.S.* 33	8,43	10 NJ soils 20-75	39
			NYS 1.5-40	8
			Albany Area 1.5-25	8, 43
Cobalt	All soils 7	5, 8, 31, 36, 50	0.1-40	14, 36
	Eastern U.S.* 5.9	43	NJ Agr. Soils 2-18	39
			NYS 2.5-60	8, 43
			Albany Area 2.5-6	43
Copper	All soils 30	26	2-250	5, 36
	All soils 20	36, 49, 50	10-80	23
	10 NJ Agr. Soils 23	39	1-10 under humid conditions	14
	Eastern U.S.* 13	8.43	up to 50 in arid conditions	14
			26 MA Soils 5-38	26
			Albany Area <1-15	8, 43

	Average Conc. of Element Found in Uncontaminated Soils	References for Averages	Conc. Range of Element Found in Uncontaminated Soils	References for Ranges
Iron	Eastern U.S.* 14,000	8, 43	2,000 - 550,000	5
	Eastham MA Agr. Soil 13,000	24	700 - 100,000	23, 43
			Eastham, MA 11,000-14,000	24
			Albany Area 17,500 - 25,000	8, 43
Lead	All soils 10	5, 36, 50	Range in "normal" soils 10-37	1, 33
	Eastern U.S.* 14	8, 29, 33, 43	95% of U.S. soils 4-61	29
	98 NJ agr. soils mineral 15 organic 20	26	Albany Area 1 - 12.5	8, 43
	173 NY agr. soils 17	47		
agnesium	All soils 6,300	50	400 - 9,000	5
	Eastern U.S.* 2,300 2,100	8 43	100 - 5,000	8, 43
			Albany Area 2,500 - 6,000 1,700 - 4,000	 8 43
nganese	All soils 850	1, 50	100 - 4,000	1
	Eastern U.S.* 285 260	8 43	10 Agr. NJ soils 130-1,560	39
	10 Agr. NJ Soils 789	38	NJ Cultivated Soils 264-736	4
	Eastham, MA Agr. Soil 345	24	NYS 50-5,000	8, 43
			Albany Area 400-600	8, 43
ury	All Soils 0.06	1, 2, 5	0.001 - 0.2	2, 13, 28, 50
	Eastern U.S.* 0.081	43	Albany Area 0.042 - 0.066	43

	Average Conc. of Element Found in Uncontaminated Soils	References for Averages	Conc. Range of Element Found in Uncontaminated Soils	Referenc for Rang
Mercury (cont.)	234 samples Sackatchewan, Canada 0.081	15		
	Northeastern U.S. upper limit 0.04	10		
Nickel	All Soils 40	5, 26, 36, 50	0.5 - 60	26, 39, 4
	All Soils 20	1	26 MA Agr. Soils 6-41	26
	173 NY Agr. Soils 19.5	47	NYS 0.5-25	8
	Eastern U.S. 12	8.43	Albany Area 6-12.5	8, 43
Potassium	U.S. Average 12,000	5, 8, 20, 24, 50	All Soils 100-37,000	5, 8, 20,
	Eastern U.S.* 7,400 12,000	8 43	NYS 8,500-43,000	43
			Albany Area 12,500 - 17,500	42, 43
Selenium	0.2	12, 36	0.01 - 12	5, 36
	Eastern U.S.* 0.3	43	Eastern U.S. <0.1-3.9	43
	Eastham, MA 3.5	24	Albany Area <0.1-0.125	43
Sodium	All Soils 6,300	50	Eastern U.S.* <500-50,000 150-15,000	43 8
	Eastern U.S.* 2,500	8, 43	Albany Area 6,000 - 8,000	43
Vanadium	All Soils 100	5, 50	Eastern U.S.* 1-300	8, 43
	Eastern U.S.* 43	8, 43	10 NJ Agr. Soils 11-119	50
	10 NJ Agr. Soils 53.6	39	50 U.S. Soils 2-270	39
			Albany Area 25-60	

	Average Conc. of Element Found in Uncontaminated Soils	References for Averages	Conc. Range of Element Found in Uncontaminated Soils	References for Ranges
Zinc	50	26, 36, 41, 50	All Soils 10-300	26, 36, 41
	Eastern U.S.* 40	8, 24, 29, 43	9-50	31
	173 NY Agr. Soils 64	47	Albany Area 37-60	43

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* Eastern U.S. Soil values are the geometric mean element concentration from a depth of 24 cm. in soils east of the 97th meridian.

LITERATURE CITED

1. Adriano, D.C. 1986. Trace Elements in the Terrestrial Environment. Springer-Verlag, New York, 529 p.

2. Anderson, Arne. 1979. "Mercury in Soils". In: The Biogeochemistry of Mercury in the Environment, Jerome O. Nriagu ed. Elsevier/North Holland Biomedical Press, New York.

3. Bartlett, R.J. and J.M. Kimble. 1976. "Behavior of Chromium in Soils: I Trivalent Forms". Journal of Environmental Quality. Vol. 5, No. 4, p. 379-382.

4. Blair, A.W. and A.L. Prince. 1936. "Manganese in New Jersey Soils". Soil Science, Vol. 42, p. 327-333.

5. Bowen, Humphrey J.M. 1979. Environmental Chemistry of the Elements. Academic Press, New York.

6. Cary, E.E. 1982. "Chromium in Air, Soil and Natural Waters". In: Biological and Environmental Aspects of Chromium, Sverre Langard ed. Elsevier Biomedical Press, New York.

7. Chattopadhyay, Amares and R.E. Jervis. 1974. "Multielement Determination in Market-Garden Soils by Instrumental Photon Activation Analysis". Analytical Chemistry, Vol. 46, No. 12, p. 1630-1639.

8. Connor, Jon J., Hansford T. Shacklette. Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States, with sections on "Field Studies" by R.J. Ebens, J.A. Erdman, T.A. Miesch, R.R. Tidball, and H.A. Tourtelot. U.S. Geological Survey Professional Paper, 574-F, 168 p.

9. DeGroot, R.C., T.W. Popham, L.R. Gjovik, and T. Forehand. 1979. "Distribution of Arsenic, Copper and Chromium Around Preservative - Treated Wooden Stakes". J. of Env. Qual., Vol 8, No. 1, p. 39-41.

10. Dewey, Dr. J.E. 1983. Mercury - An Overview. Cornell Fact Sheet, Chemicals - Pesticides Program.

11. Eisler, Ronald. 1985. "Cadmium Hazards to Fish, Wildlife and Invertebrates: A Synoptic Review". Biological Report 85(1.2), Contaminant Hazard Reviews Report No. 2. Fish and Wildlife Service, U.S. Dept. of the Interior.

12. Eisler, Ronald. 1985. "Selenium Hazards to Fish, Wildlife and Invertebrates: A Synoptic Review". Biological Report 85(1.5), Contaminant Hazard Review Report No. 5, Fish and Wildlife Service, U.S. Dept. of the Interior.

13. Frank, R., K. Ishida, and P. Suda. 1976. "Metals in Agricultural Soils of Ontario". Canadian Journal of Soil Science, Vol. 56, p. 181-196.

14. Goldschmidt, Victor M. 1958. *Geochemistry*. Claredon Press, Oxford, England.

15. Gracey, H.I. and J.W.G. Stewart. 1974. "Distribution of Mercury in Saskatchewan Soils and Crops". Can. J. Soil Sci., Vol. 54, p. 105-108.

16. Greaves, J.E. 1934. "The Arsenic Content of Soils". Soil Science, Vol. 38, p. 355-362.

17. Hiltbolt, A.E. 1975. "Behavior of Organoarsenicals in Plants and Soils". In: *Arsenical Pesticides*. ACS Symposium Series 7. American Chemical Society, Wash., D.C., p. 53-69.

18. Holmes, R.S. 1943. "Copper and Zinc Contents of Certain United States Soils". Soil Science, Vol. 56, p. 359-370.

19. Holmes, R.S., W.E. Hearn, and H.G. Byers. 1938. "The Chemical Composition of Soils and Colloids of the Norfolk and Related Soil Series". U.S.D.A. Technical Bulletin #594.

20. Jackson, Marion L. 1964. "Chemical Composition of Soils". In: *Chemistry of the Soil*. Firman E. Bear ed. Second edition. Reinhold Publishing Corp., New York, p. 71-141.

21. Klausner, S.D. and W.S. Reid. 1981. *Summary of Soil Test Results for Field Crops Grown in New York State During 1979*. Agronomy Mimeo 81-27.

22. Klein, David H. "Mercury and Other Metals in Urban Soils". Env. Sci. Tech., Vol. 6, No. 6, p. 560-562.

23. Kraushopf, Konrad B. 1972. "Geochemistry of Micronutrients". In: *Micronutrients in Agriculture*, J.J. Mortvedt ed. Soil Science Society of America, Inc. Madison, Wisconsin.

24. Laul, J.C., W.C. Weimer, and L.A. Rancitelli. 1983. "Biogeochemical Distribution of Rare and Other Trace Elements in Plants and Soils". Water, Air and Soil Pollution, Vol. 11, p. 819-827.

25. Levesque, M. 1974. "Selenium Distribution in Canadian Soil Profiles". Canadian Journal of Soil Science, Vol. 54, p. 63-68.

26. Luce, H.D. 1985. "Soil Resources of the Northeast". In: *Criteria and Recommendations for Land Applications of Sludges in the Northeast*. The Pennsylvania State University. Bulletin 851.

27. MacLean, A.J., B. Stone and W.E. Cordukes. 1973. "Amounts of Mercury in Soil of Some Golf Course Sites". Can. J. Soil Sci., Vol. 53, p. 130-132.

28. McKeague, J.A. and B. Kloosterman. 1974. "Mercury in Horizons of Some Soil Profiles in Canada". Can. J. Soil Sci., Vol, 54, p. 503-507.

29. Miesch, A.T. and Claude Huffman Jr. 1972. "Abundance and Distribution of Lead, Zinc, Cadmium and Arsenic in Soils". In: Helena Valley, Montana Area Environmental Pollution Study. U.S. EPA, Office of Air Programs, Research Triangle Park, N.C., p. 65-80.

30. Mills, J.G. and M.A. Zwarich. 1975. "Heavy Metal Content of Agricultural Soils in Manitoba". Can. J. Soil Sci., Vol. 55, p. 295-300.

31. Mitchell, Robert L. 1964. "Chemistry of the Soil". In: Trace Elements in Soils, Firman E. Bear ed. Reinhold Publishers Corp., New York, p. 320-368.

32. Mortvedt, J.J. 1987. "Cadmium Levels in Soils and Plants from Some Long-term Soil Fertility Experments in the U.S.A." J. of Env. Qual., Vol. 16, No. 2, p. 137-142.

33. Nriagu, J.O. 1978. "Lead in Soils, Sediments and Major Rock Types". In: The Biogeochemistry of Lead in the Environment, J.O. Nriagu ed. Elsevier/North Holland Biomedical Press, New York.

34. Page, A.L. and F.T. Bingham. 1973. "Cadmium Residues in the Environment". Residue Review, Vol. 48, p. 1-44.

35. Page, A.L., A.C. Chang and Mohamed El-Amamy. 1987. "Cadmium Levels in Soils and Crops in the United States". In: Lead, Mercury, Cadmium and Arsenic in the Environment, T.C. Hutchinson and K.M. Meema eds. John Wiley and Sons, Ltd., New York, p. 119-146.

36. Peterson, P.J. and B.J. Alloway. 1979. "Cadmium in Soils and Vegetation". In: The Chemistry, Biochemistry and Biology of Cadmium, M. Webb ed. Elsevier/North Holland Biomedical Press, New York.

37. Pierce, A.P., J.M. Botbol and R.E. Learned. 1970. "Mercury Content of Rocks, Soils and Stream Sediments". In: Mercury in the Environment. U.S. Geological Survey Professional Paper. Vol. 713, p. 14-16.

38. Pierce, F.J., R.H. Dowdy and D.F. Grigal. 1982. "Concentrations of Six Trace Metals in Some Major Minnesota Soil Series". J. of Env. Qual. Vol. 11, No. 3, p. 416-422.

39. Prince, Arthur L. 1957. "Trace Element Delivering Capacity of Ten New Jersey Soil Types as Measured by Spectrographic Analysis of Soils and Mature Corn Leaves". Soil Science, Vol. 84, p. 413-418.

40. Reay, P.F. 1972. "The Accumulation of Arsenic from Arsenic-rich Natural Waters by Aquatic Plants". J. of Applied Ecology, Vol. 9, p. 557-565.

41. Schroeder, Henry A., Alexis P. Nason, Isabel H. Tipton, Joseph J. Balassa. 1967. "Essential Trace Metals in Man: Zinc. Relation to Environmental Cadmium". Journal of Chronic Diseases, Vol. 20, p. 179-210.

42. Sell, J.L., F.D. Deitz and M.L. Buchanan. 1975. "Concentration of Mercury in Animal Products and Soils of North Dakota". Archives of Environmental Contamination and Toxicology, Vol. 3, p. 278-288.

43. Shacklette, Hansford T. and Josephine G. Boerngen. 1984. Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Professional Paper 1270. U.S. Government Printing Office, Washington, D.C. 105 p.

44. Shacklette, H.T., J.C. Hamilton, J.G. Boerngen and J.M. Bowles. 1971. Elemental Composition of Surficial Materials in the Conterminous United States. U.S. Geological Survey Professional Paper 574-D. Vol. 713-715A. 71 p.

45. Slater, C.S., R.S. Holmes and H.G. Byers. 1937. "Trace Elements in the Soils from the Erosion Experiment Stations with Supplementary Data on Other Soils". U.S.D.A. Technical Bulletin No. 552.

46. Snider, H.J. 1943. "Manganese in Some Illinois Soils and Crops". Soil Science, Vol. 56, p. 187-195.

47. Sommers, Lee, V. VanVolk, Paul M. Giordano, William E. Sopper, and Robert Bastin. 1987. "Effects of Soil Properties on Accumulation of Trace Elements by Crops". In: Land Application of Sludge, A.L. Page, T.G. Logan, and J.A. Ryan eds. Lewis Publishers, Chelsa, Michigan.

48. Tepper, L.B. 1980. "Beryllium". Metals in the Environment, H.A. Waldron ed. Academic Press, New York, 327 p.

49. Thornton, Iain. 1979. "Copper in Soils and Sediments". In: Copper in the Environment. Part I. Ecological Recycling, Jerome O. Nriagu ed. John Wiley and Sons Inc., New York.

50. Vinogradov, A.P. 1959. The Geochemistry of Rare and Dispersed Chemical Elements in Soils. Second Edition Consultants Bureau, New York. 189 p.

51. Walsh, Leo M. and D.R. Keeney. 1975. "Behavior and Phytotoxicity of Inorganic Arsenicals in Soils". In: Arsenical Pesticides. ACS Symposium Series 7. Americal Chemical Society, Wash. D.C., p. 53-69.

52. Walsh, Leo M., Malcolm M. Summer, and Dennis R. Keeney. 1977. "Occurrence and Distribution of Arsenic in Soils and Plants". Environmental Health Perspectives, Vol. 19, p. 67-71.

53. Woolson, Edwin A. 1983. "Emmisions, Cycling and Effects of Arsenic in Soil Ecosystems". In: Biological and Environmental Effects of Arsenic. Bruce A. Fowler ed. Elsevier Scientific Publishing Co., New York.

54. Wright, J.R., R. Levick and H.J. Atkinson. 1955. "Trace Element Distribution in Virgin Profiles Representing Four Great Soil Groups". Soil Sci. Soc. Proc., Vol. 19, p. 340-344.