Addendum
Remedial Investigation Report
Area Of Concern #5
LNAPL/DNAPL Investigation

Farrell Road Plant
Geddes, New York
NYSDEC Site No. 734055

Prepared For:
Lockheed Martin Corporation

January 1996
Revised August 1996

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

6723 Towpath Road
Syracuse, New York 13214
(315) 446-9120

Table of Contents

1.0 INTRODUCTION

This Addendum to the Remedial Investigation (RI) Report presents the results of an investigation conducted to evaluate the presence, extent, and composition of light, non-aqueous phase liquids (LNAPLs) and to assess whether dense, non-aqueous phase liquids (DNAPLs) are present in the subsurface at Area of Concern #5 (AOC #5) at the Farrell Road Plant in Geddes, New York. The site map included as Figure 1 indicates key site features, including: approximate former underground solvent storage tank (UST) locations, the approximate location of a former dry well, soil boring locations within the area of investigation, and components of the soil vapor extraction (SVE) system (vapor extraction/air injection wells and equipment building). Attachment 1 includes selected text, figures, boring logs, and data tables from previous investigations at AOC #5.

The USTs were removed in 1986 and the dry well was removed in 1992. During subsurface investigations in the vicinity of the former solvent tanks and dry well beginning in 1992 (ERM, 1992), residual solvents were observed to be present in the soil based on field screening and laboratory analysis. LNAPL was observed at the approximate depth of the water table at borings and test pits installed near the location of the former solvent tanks. Soil sampling and analysis and a soil gas survey indicated elevated volatile organic compound (VOC) concentrations, including chlorinated and aromatic hydrocarbons, in the soil. A ground-penetrating radar survey indicated disturbed soil and buried pipes in the vicinity of the former tanks. Ground-water samples obtained upgradient (west) of the former tank locations contained only trace VOC concentrations. However, downgradient of the tanks, beneath the building, a suite of dissolved VOCs was detected similar to those in the vicinity of the former tanks. Geologic characterization based on soil borings indicated a till consisting of dense, red silt and clay located approximately 7 to 12 feet below grade. The till surface, which dips toward the south, was interpreted as a confining layer. Following the installation of SVE system wells in October 1994, free-phase LNAPL was observed at four of the wells. DNAPL was not monitored at the wells prior to the investigation activities in September to November 1995, which are discussed below.

The scope of work for the investigation activities described in this RI Addendum was described in the letter to the New York State Department of Environmental Conservation (NYSDEC) dated July 14, 1995; approved by the NYSDEC in a letter dated September 11, 1995; and implemented by Blasland, Bouck & Lee, Inc. (BBL) between September 15 and November 2, 1995. Modifications to the scope of work, based on field conditions, were approved by the NYSDEC. These modifications included the installation of additional soil borings BBL-2 and BBL-5 (discussed in Section 2.2) and the implementation of a NAPL monitoring and removal program (discussed in Section 2.3). The preliminary results of the investigation were presented to the NYSDEC project manager and staff geologist in a conference call on November 10, 1995.

This RI Report Addendum is presented in the following sections:

- Section 1: Introduction, which provides the background and framework for this RI Report Addendum;

- Section 2: Field Activities and Results, which briefly describes the field sampling procedures and presents the field data;

- Section 3: Discussion, which presents the substantive findings based on the data generated during the investigation; and

- Section 4: Summary, which highlights the key results of the LNAPL/DNAPL investigation.

2.0 FIELD ACTIVITIES AND RESULTS

The following section describes the field investigation activities performed to evaluate the presence and distribution of LNAPL and DNAPL.

2.1 Fluid Thickness Monitoring and NAPL Sampling

BBL obtained two rounds of fluid thickness measurements at accessible monitoring locations near AOC #5 on September 15 and September 25, 1995, using an oil/water interface probe and a bottom-loading bailer. The fluid thickness monitoring data are presented in Table 1 and summarized on Figure 2. LNAPL was observed at wells AIW-201, AIW-204, AIW-206, and VRW-207. The maximum LNAPL thicknesses observed during these monitoring events ranged from 0.02 feet at AIW-201 to 1.32 feet at VRW-207. DNAPL was observed at two locations, with maximum observed thicknesses ranging from 0.2 feet at AIW-201 to 2.37 feet at VRW-203.

Three LNAPL samples from wells AIW-204, AIW-206, and VRW-207 and one DNAPL sample from well VRW-203 were collected on September 25, 1995 and submitted to Adirondack Environmental Services, Inc. (AES) for VOC analyses by USEPA Method 8260. These wells were selected for NAPL sampling because they were found to contain sufficient NAPL for laboratory analysis. A blind duplicate DNAPL sample from well VRW-203 was also submitted for analysis. In addition, an LNAPL sample from well VRW-207 and a DNAPL sample from well VRW-203 were submitted to Saybolt-Heinrici, Inc., for measurement of viscosity by ASTM D-445, density by ASTM D-4052, and interfacial tension by ASTM D-971. The LNAPL/DNAPL VOC analytical and physical parameter results are presented in Table 2 and the chemical and physical data are included as Attachments 2 and 3, respectively. The three LNAPL samples consisted primarily of xylenes, toluene, 1,1,1-trichloroethane (TCA), and ethylbenzene. The composition of the DNAPL sample was similar, consisting of the same compounds detected in the LNAPL plus trichloroethene (TCE). The average chemical mole fractions (i.e., the ratios of chemical constituents, based on the number of moles of the compounds per mass of NAPL) were calculated for the three LNAPL samples and for one DNAPL sample, as summarized below:

Compound	Specific Gravity (g/cm^3)	Average LNAPL Mole Fraction	Average DNAPL Mole Fraction
TCA	1.34	10 %	35 %
Toluene	0.87	36 %	53 %
Ethylbenzene	0.87	8.0 %	2.0 %
Xylenes	0.86 - 0.88	46 %	10 %
TCE	1.46	ND	0.4 %

Note:
ND = not detected.
Mole fraction percentages are rounded to two significant figures.

The measured densities of the LNAPL from VRW-207 and the DNAPL from VRW-203 were 0.89 and 1.03 grams per cubic centimeter (g/cm^3), respectively, compared to a specific gravity of 1.0 g/cm^3 for water. The chemical and physical NAPL results were used to assess the nature and extent of NAPLs in AOC #5, as described in Section 3.0 of this RI Report Addendum.

2.2 Drilling and Sampling of Soil Borings

Five soil borings (BBL-1 through BBL-5) were drilled by Parratt-Wolff, Inc. (PW) as directed by BBL, from September 25 to 27, 1995. Proposed drilling locations were adjusted in the field as necessary, based on utility locations and drill rig access. Borings BBL-1, BBL-3, and BBL-4 were drilled at approximately the proposed locations. BBL-2 was drilled at a location agreed upon with the NYSDEC to evaluate the extent of LNAPL. In accordance with a NYSDEC request, BBL-5 was added southwest of BBL-4 to evaluate the extent of DNAPL. Final drilling locations were agreed upon in the field by BBL and the on-site NYSDEC representative. The approximate drilling locations, based on BBL field tie-ins to select site features, are shown on Figure 1.

PW installed the borings with a CME-55 drill rig equipped with 4.25-inch inner-diameter (I.D.) hollow-stem augers. The subsurface soils were continuously sampled with 2-inch diameter split-spoons samplers. Drilling and sampling equipment were decontaminated by steam cleaning prior to drilling, between borings, and after the completion of site activities. Each boring was filled to grade with cement/bentonite grout upon completion. Investigation-derived soils and fluids were containerized and stored in the waste storage area on site.

Three of the borings (BBL-2, BBL-3, and BBL-4) were sampled until till was confirmed. Two deeper borings (BBL-1 and BBL-5) were sampled 17 feet and 7.5 feet into the till, respectively, to characterize the till. No evidence of NAPL or VOC contamination was observed at these locations. Therefore, as approved by the on-site NYSDEC representative, temporary casings were not installed prior to drilling into the till. An apparent slight sheen and solvent odor were observed in the soil sample obtained at BBL-4 between 12.5 and 13 feet below ground surface (bgs). This observation necessitated the addition of another boring (BBL-5) to the southwest of BBL-4, to delineate the extent of potential residual DNAPL. Prior to drilling at BBL-5, this additional boring location was agreed upon by BBL and the on-site NYSDEC representative.

Each soil sample was field screened with a photoionization detector (PID). Further, each soil sample was described, using the modified Burmister (1959) soil classification system, and placed in a sealable plastic bag for subsequent headspace analysis with a PID equipped with a 11.7 eV lamp. The soil boring geologic and drilling data are presented in Table 3. As shown in Table 3, the soils encountered above the till were generally described as medium-brown fine sand, with some to trace silt, and trace fine gravel. These soils were underlain by dense, hard till generally described as red-brown clayey silt and fine sand, with trace gravel. Figure 1 shows the location of a generalized geologic cross-section trending southwest-northeast through AOC #5. As shown on the geologic cross section (Figure 3), the till encountered at the site dips generally to the southwest in the vicinity of AOC #5.

To aid in detecting NAPL, soil samples were field screened with a long-wave/short-wave ultraviolet (UV) lamp and Sudan IV hydrophobic dye, as described by Cohen, et al. (1992). Each soil sample tested negative for the presence of NAPL, based on the UV and hydrophobic dye field screening. In addition, as discussed in Section 3.0, none of the soil samples submitted for laboratory analysis exhibited VOC concentrations indicative of NAPL in soil. These findings contrast with the PID screening results and observation of an apparent sheen in the soil sample obtained at BBL-4 from 12.5 to 13 feet bgs. Based on the negative results for the other indicators of NAPL, however, if NAPL was present in this sample, it was an extremely limited, residual quantity. No other soil sample showed any evidence of NAPL, based on field screening and observation.

To further evaluate the distribution of NAPL in the AOC #5 subsurface soils and confirm field observations, BBL selected soil samples for VOC analysis by USEPA Method 8260 with NYSDEC ASP 91-1 protocols and total organic carbon (TOC) by the Lloyd Kahn Method and submitted them to AES. Soil samples were collected near the water table (8 to 10 feet bgs) at borings BBL-1, BBL-2, and BBL-3 to evaluate the distribution of LNAPL. Additional soil samples were obtained near the top of the till unit at all five borings (BBL-1 through BBL-5) to evaluate the distribution of DNAPL along the top of this relatively impermeable unit. These samples were obtained at depths varying from 16 to 16.4 feet at boring BBL-1 to 24 to 26 feet at boring BBL-5. Soil samples were also collected to provide a vertical profile of TOC content at BBL-1 from 4 to 14 feet bgs, and from two samples within the till unit (16 to 18 and 20 to 22 feet bgs) to support partitioning calculations and evaluate the NAPL distribution. In addition, selected soils were submitted to PW for physical characterization, including grain size analyses, bulk density, percent moisture, and porosity. Physical parameters were analyzed to evaluate the potential for further downward migration of DNAPL into the subsurface soils. The soil samples selected for each analysis are indicated on Table 3. Laboratory VOC results are provided as Attachment 4 and summarized in Table 4. Physical parameter results are provided as Attachment 5.

As shown in Table 4, methylene chloride, acetone, 1,1-dichloroethene, 1,1-dichloroethane, TCA, and toluene were occasionally detected in the soil samples at low part per billion (ppb) levels at estimated concentrations (i.e., J-qualified by the analytical laboratory) below the detection limit. Acetone was also detected in an associated blank (i.e., B-qualified by the analytical laboratory). Besides these J- and B-qualified VOC detections, tetrachloroethene (PCE), ethylbenzene, and xylenes were detected and quantified in one soil sample, obtained at boring BBL-4 from 12 to 14 feet bgs. A blind duplicate sample from this interval was also submitted to AES for VOC analysis. Between the original sample and its duplicate, the maximum observed detections were xylenes at 950 micrograms per kilogram (ug/Kg), PCE at 130 ug/Kg, and ethylbenzene at 79 ug/Kg. Ethylbenzene was not detected in the duplicate analysis.

TOC concentrations in BBL-1 soil samples ranged from 463 milligrams per kilogram (mg/kg) from 4 to 6 feet bgs to 39,900 mg/kg from 20 to 20.8 feet bgs. In general, the TOC concentrations increased with depth to 10,590 mg/kg at a depth of 13 to 14 feet bgs, above the till. TOC concentrations in the till ranged from 2,130 mg/kg from 16 to 18 feet bgs to 39,900 mg/kg from 20 to 20.8 feet bgs.

2.3 NAPL Monitoring and Removal

To provide a semi-quantitative assessment of NAPL recharge rates at wells VRW-203 and VRW-207, BBL implemented a NAPL monitoring and removal program, as described in a letter dated October 6, 1995. These wells were selected for the NAPL monitoring and removal program because they contained a sufficient initial thicknesses of DNAPL or LNAPL, respectively, to allow a reliable assessment of NAPL recharge rates. The program was approved by the NYSDEC in a letter dated October 10, 1995. Wells VRW-203 and VRW-207 were monitored for the presence of NAPL over a four week period on the following schedule:

- Three times per week for the first two weeks; and
- Twice per week for the last two weeks.

A transparent, bottom-loading bailer was used to measure the NAPL thickness and to remove any NAPL present to the extent practicable. The data obtained from this NAPL monitoring and removal program are summarized in Table 5.

During the NAPL monitoring and removal program, approximately 6 gallons of DNAPL were removed from well VRW-203 and 1.7 gallons of LNAPL were removed from well VRW-207. The DNAPL thickness observed at well VRW-203 decreased from 2.3 feet on September 15, 1995, to 0.4 feet by October 30, 1995. As shown on Figure 4, the DNAPL thickness measured during each monitoring event (prior to DNAPL removal) generally decreased with time during the removal program. The NAPL removal effort also reduced the thickness of LNAPL at well VRW-207 from 1.5 feet on September 15, 1995, to a barely discernable film by October 11, 1995. To provide additional information, BBL also monitored the LNAPL thickness at wells AIW-201, AIW-204, and AIW-206, where LNAPL was observed on September 15 and 25, 1995. The highest LNAPL thickness observed at these wells were 0.02 feet at well AIW-201, 0.81 feet at well AIW-204, and 0.31 feet at well AIW-206. The LNAPL thickness at these locations was also reduced to little or no measurable LNAPL due to bailing during the course of this program.

3.0 DISCUSSION

During the investigation, LNAPL was observed in wells AIW-201, AIW-204, AIW-206, AIW-209, and VRW-207. DNAPL was observed at wells VRW-203 and AIW-201. A likely source of these NAPLs was the former underground solvent storage tanks, which were situated at the approximate location shown on Figures 1, 2, and 3. Another possible source of NAPL in the vicinity of AOC #5 includes a former dry well that was situated at the approximate location shown on Figures 1, 2, and 3. The USTs were removed in 1986 and the dry well was excavated during a source control action (ERM, Environmental Investigation Report, July 1992).

As shown on Figure 3, the former underground solvent storage tanks were located above a concrete slab, which would promote the mixing and co-solution of any solvent liquids released from the tanks. This inference is supported by the multicomponent LNAPLs and DNAPLs observed in the subsurface at AOC #5. For example, while the former underground solvent storage tanks containing toluene (Tank T-63) and TCA (Tank T-58) were approximately 15 feet apart, both of these compounds were detected at relatively high concentrations in both LNAPL and DNAPL samples obtained during the investigation.

LNAPL recovered from wells AIW-204, AIW-206, and VRW-207 consisted primarily of the following VOCs, in order of decreasing mole fraction: xylenes, toluene, TCA, and ethylbenzene. Similarly, the DNAPL recovered from VRW-203 consisted primarily of the following VOCs, also in order of decreasing mole fraction: toluene, TCA, xylenes, ethylbenzene, and TCE. Both the LNAPL and DNAPL are chemically similar, multicomponent NAPLs. The locations where the multicomponent DNAPL and LNAPL were observed are consistent with the analytical results from the NAPL samples obtained during the investigation. The LNAPLs have a higher proportion of light aromatic hydrocarbons, such as xylenes (specific gravity 0.86 to 0.88 g/cm^3) and toluene (specific gravity 0.87 g/cm^3). The DNAPL has a relatively high proportion of dense chlorinated hydrocarbons, such as TCA (specific gravity 1.34 g/cm^3) and TCE (specific gravity 1.46 g/cm^3).

The NAPL monitoring and removal program results illustrate that the DNAPL is recoverable. DNAPL continues to enter well VRW-203, although at an apparent reduced rate (Figure 4). The reduction in observed DNAPL thickness in well VRW-203 suggest that free-phase, mobile DNAPL in the surrounding soil has been reduced. LNAPL was reduced to barely discernable films during this program.

To delineate the extent of NAPL in soil, VOC detections in soil were compared to calculated threshold concentrations for NAPL constituents, above which NAPL would be inferred as present. Threshold concentrations were calculated based on partitioning principles presented by Feenstra, et al. (1991, Equation 14). To determine the threshold concentration, the effective solubility for each NAPL component was substituted for the chemical concentration of the contaminant in the pore water in Equation 14 (Feenstra, et al., 1991). Threshold value calculations are included in Attachment 6. The resulting threshold concentrations are presented below.

Chemical Constituent	LNAPL Threshold Concentrations (ug/Kg)	DNAPL Threshold Concentrations (ug/Kg)
TCA0	140,000	480,000
Toluene	480,000	710,000
Ethylbenzene	110,000	27,000
Xylenes	200,000	44,000
TCE	NA	5,400

Note:

NA = Not applicable.

These results indicate that the threshold concentrations that would indicate the presence of NAPL in soil are two to four orders of magnitude higher than the concentrations of NAPL components detected in soil (Table 4). Therefore, based on partitioning calculations, NAPL is interpreted as not present in the soil samples submitted to the laboratory for analysis.

The soil boring locations were selected in a configuration to delineate the extent of NAPL in AOC #5. Of the borings installed during this investigation, the locations of borings BBL-1, BBL-3, and BBL-4 were selected prior to field activities, based on a review of previous subsurface drilling logs and other available site information. Boring BBL-2 was installed at a location agreed upon in the field with NYSDEC. Due to the observation of a possible sheen and solvent odor at the 12.5- to 13- foot depth interval, BBL-4 did not extend into the till as originally proposed. Boring BBL-4 was terminated at the top of till, where the soil PID reading [4.2 parts per million (ppm)] was substantially less than at the 12.5- to 13- foot depth interval where a possible sheen was observed (770 ppm). Deep boring BBL-5 was performed southwest of BBL-4 to delineate the extent of VOCs in the subsurface and to characterize the till. A deep boring was also installed at BBL-1, as proposed, to evaluate the extent of VOCs hydraulically downgradient of AOC #5 and to characterize the till.

The field interpretation of an apparent sheen on a soil sample from boring BBL-4 (12.5- to 13-foot depth interval) suggests the potential presence of residual NAPL at that location. However, other NYSDEC-approved methods of detecting NAPL were negative with respect to the same soil sample. Ultra-violet luminescence and hydrophobic dye yielded negative screening results, and the laboratory analytical results from this soil sample indicated VOC concentrations that were two to four orders of magnitude below threshold concentrations indicative of NAPL in the soil. These results indicate that, if any NAPL was present in that soil sample, the NAPL quantity was extremely limited and "residual."

At borings BBL-1, BBL-2, BBL-3, and BBL-5, no indication of NAPL was observed, and detected VOC concentrations were orders of magnitude less than NAPL threshold concentrations. These four borings, in conjunction with the information obtained from the SVE system wells, are satisfactory to delineate the horizontal extent of LNAPL and DNAPL in the vicinity of AOC #5.

The physical characteristics of the till unit underlying AOC #5 indicate that this layer would impede the downward migration of DNAPL. In addition, the physical characteristics of the fine sand and silt layer above the till would prevent DNAPL from descending to the top of till. BBL used DNAPL mobility calculations to delineate the potential vertical extent of DNAPL at AOC #5. To evaluate downward DNAPL migration potential, BBL calculated the thickness of free-phase DNAPL ("pool height") required to initiate migration of DNAPL into either the till unit or the fine sand and silt layer observed above the till at BBL-4 and BBL-5. A summary table of these calculations is provided as Attachment 7. For this calculation, BBL used the till characteristics obtained during this investigation including porosity (0.2), estimated hydraulic conductivity based on grain-size data (3.0×10^{-6} centimeters per second (cm/sec), per US Bureau of Reclamation estimation method (Vukovic and Soro, 1992), and DNAPL characteristics of density (1.03 g/ cm^3), and DNAPL interfacial tension (3 dynes/cm). Based on the maximum stable DNAPL pool height formula presented by Pankow and Cherry (1995), the pool height required to mobilize a hypothetical DNAPL pool into the till would be approximately 43 feet high. This calculation clearly demonstrates that the till would provide an effective capillary barrier that would prevent downward DNAPL migration. However, the DNAPL observed at well VRW-203 may not even descend to the top of till.

Stable pool height calculations were also performed to estimate the pool height required for DNAPL to migrate into the fine sand and silt layer above the till at AOC #5. These calculations assumed the same DNAPL characteristics, typical range of hydraulic conductivity values for fine sand and silt [1×10^{-6} to 1×10^{-4} cm/sec (Fetter, 1988)], and a porosity value calculated based on the measured moisture content (0.4). The required pool height for DNAPL mobilization further into the fine sand and silt was calculated as 12 to 88 feet. The largest thickness of DNAPL observed at the site, approximately 2.3 feet, is substantially less than the calculated pool height required for DNAPL to penetrate the fine sand and silt layer above the top of till. These findings indicate that the DNAPL observed at AOC #5 has penetrated no further than the depth depicted in the geologic cross-section on Figure 3, and provide a technical basis from which the vertical distribution of DNAPL at AOC #5 can be considered delineated.

4.0 SUMMARY

The following is a summary of the results of this investigation:

- The horizontal and vertical extent of LNAPL and DNAPL in AOC #5 have been delineated to the extent practicable, based on NAPL thickness measurements, soil analytical data, and DNAPL mobility calculations using DNAPL and soil physical data.

- The DNAPL and LNAPL at AOC #5 are chemically similar, multi-component NAPLs; the proportion of each chemical constituent in the NAPL determines the physical characteristics of the NAPL.

- Comparison of soil concentrations to calculated NAPL threshold concentrations, and field screening for the presence of NAPL using ultra-violet luminescence and hydrophobic dye, suggest that residual NAPL was not present in the subsurface soil samples collected during this investigation. However, the observation of an apparent sheen on a soil sample from boring BBL-4 (12.5- to 13-foot depth interval) suggests the potential of residual NAPL at that location.

- The locations of the former underground solvent storage tanks above a concrete slab resulted in mixing of released solvent liquids into multicomponent LNAPL and DNAPL, and the distribution of LNAPL and DNAPL are consistent with the relative fractions of the dense (chlorinated) or light (non-chlorinated) solvent compounds in the multicomponent NAPL samples analyzed during this investigation.

- Pool height calculations indicate that a DNAPL pool height between 12 and 88 feet high would be required to initiate further DNAPL mobilization vertically downward into the fine sand and silt layer above the till. Thus, DNAPL likely has not reached, and will not reach the till.

- If the DNAPL were to reach the till, the DNAPL pool height required to exceed capillary forces and initiate mobilization of the DNAPL into the till is 43 feet. Thus, if DNAPL were to reach the till, it would not penetrate the till.

- Remediation of the LNAPL and DNAPL in AOC #5 will be further evaluated in the Feasibility Study.

- At this point it is believed that the LNAPL in AOC #5 will be addressed through the operation of the existing SVE system.

- At this point it is believed that the DNAPL in AOC #5 can be further evaluated through additional monitoring and removal by manual bailing using a bottom-loading bailer at well VRW-203.

Tables

TABLE 1

LOCKHEED MARTIN CORPORATION
FARRELL ROAD PLANT, GEDDES, NEW YORK
AREA OF CONCERN #5 LNAPL/DNAPL INVESTIGATION

FLUID THICKNESS MONITORING RESULTS

Well Number	Stickup	Depth of well *	Diameter of well (in.)	Depth to LNAPL * 9/15/95	Depth to Water * 9/15/95	Depth to DNAPL * 9/15/95	LNAPL Thickness (Probe/Bailer) 9/15/95	DNAPL Thickness (Probe/Bailer) 9/15/95	Depth to LNAPL * 9/25/95	Depth to Water * 9/25/95	Depth to DNAPL * 9/25/95	LNAPL Thickness (Probe/Bailer) 9/25/95	DNAPL Thickness (Probe/Bailer) 9/25/95	Comment
AIW-201	3.18	16.23	2	15.33	15.35	15.82	0.0/0.02	0.0/0.21	15.10	15.11		0.01/0.02		
AIW-202	-0.17	14.09	2		12.32					12.42				
AIW-203	3.24	15.69	2		15.10					14.98				
AIW-204	3.18	16.43	2	15.00	15.82		0.82/0.81		15.07	15.28		0.21/0.18		C
AIW-205	-0.23	13.09	2		12.14					12.24				
AIW-206	3.20	17.09	2	14.73	15.32		0.59/0.31		14.80	15.00		0.07/0.20		C
AIW-207	-0.26	12.43	2		12.11					12.15				
AIW-208	3.21	6.34	2		No Water					No Water				
AIW-209	3.34	16.91	2	15.53	15.79		0.0/0.26			15.96				
AIW-210	-0.18	14.91	2		12.02					12.26				
VRW-201	-0.33	14.23	4		12.13					12.13				
VRW-202	3.94	14.18	4		No Water					No Water				
VRW-203	3.79	17.60	4		No Water	15.21	0.0/0.01	2.38/2.32		No Water	15.23		2.37/1.93	P, C
VRW-204	-0.28	13.31	4		12.30					12.26				
VRW-205	-0.49	13.59	4		11.92					11.94				
VRW-206	-0.34	14.33	4		12.20					12.08				
VRW-207	-0.47	14.40	4	11.72	13.32		1.60/1.49		11.80	13.12		1.32/0.73		P, C
VRW-208	-0.36	14.63	4		11.91					11.98				
VRW-209	-0.38	12.11	4		11.89					11.98				
VRW-210	3.76	17.60	4		15.24					15.32				
VRW-211	3.85	16.79	4		14.69					14.7				
VRW-212	4.41	19.11	4		15.30					15.29				

Notes:
C – NAPL sampled on 9/25/95 and submitted for chemical characterization of VOCs by EPA Method 8260.
P – NAPL sampled on 9/25/95 and submitted for physical characterization (density, viscosity, and interfacial tension) by ASTM Methods.
* – Referenced to top of inner casing, measured using oil/water interface probe.
All measurements in feet, except where otherwise noted.
Blank spaces indicate that LNAPL/DNAPL was not present.

TABLE 2

LOCKHEED MARTIN CORPORATION
FARRELL ROAD PLANT, GEDDES, NEW YORK
AREA OF CONCERN #5 LNAPL/DNAPL INVESTIGATION

NAPL ANALYTICAL RESULTS (VOCs AND PHYSICAL PARAMETERS)

	AIW-204	AIW-206	VRW-207	VRW-203	VRW-203(DUP)
VOCs (mg/L)					
1,1,1-Trichloroethane	77000	98000	47000	460000	230000
Trichloroethene	5000 U	5000 U	12000 U	12000 U	7800 J
Toluene	97000	250000 D	190000	490000	220000
Ethylbenzene	19000	64000	48000	18000	12000 J
Xylenes, Total	120000 B	390000	280000	98000 B	55000
PHYSICAL PARAMETERS					
Viscosity @5°C, cSt	NA	NA	0.95	0.98	NA
Density @10°C, g/cm3	NA	NA	0.89	1.03	NA
Interfacial Tension @20°C, dynes/cm	NA	NA	16	3	NA

NOTES:

All volatile organic compound (VOC) concentrations are reported in milligrams per liter (mg/L) equivalent to parts per million (ppm).
U = The compound was not detected.
B = The compound was also found in an associated blank.
D = The result was determined in a dilution run.
J = The concentration is estimated.
NA = Not analyzed.
cSt = centiStokes.

TABLE 3

LOCKHEED MARTIN CORPORATION
FARRELL ROAD PLANT, GEDDES, NEW YORK
AREA OF CONCERN #5 LNAPL/DNAPL INVESTIGATION

SOIL BORING GEOLOGIC AND DRILLING DATA

Boring	Sample No.	Depth	Recovery	Blow Counts (per 6 inches)	Soil Description (modified Burmister, 1959)
BBL-1	S-1	0.0'-2.0'	1.9'	5-4-4-5	Topsoil- med. brown fine SAND, trace Silt, moist, loose.
	S-2	2.0'-4.0'	1.6'	4-4-3-4	Med. brown fine SAND, trace Silt, moist, loose.
	S-3[2]	4.0'-6.0'	1.7'	4-3-3-2	Med. brown fine SAND, trace Silt, moist, loose.
	S-4[2]	6.0'-8.0'	1.6'	5-3-3-4	S.A.A. w/ fine Sand/Silt layers, wet, loose.
	S-5[1,2]	8.0'-10.0'	1.8'	3-2-5-4	Med. brown fine SAND, little Silt, wet, loose.
	S-6[2]	10.0'-12.0'	1.8'	5-7-8-6	Med. brown fine SAND, little Silt, wet, med. dense.
	S-7[2]	12.0'-14.0'	1.6'	15-22-30-42	Med. brown fine SAND, little Silt, wet, very dense.
	S-8[3,4,5]	14.0'-16.0'	1.8'	20-20-21-19	Red brown clayey SILT and fine SAND, trace fine Gravel, moist, hard. (TILL @ 13.0')
	S-9[1,2,3,6,7,8]	16.0'-18.0'	2.0'	61-119-140-200/0.2'	S.A.A.
	S-10	18.0'-20.0'	1.9'	91-113-96-100/0.1'	S.A.A.
	S-11[2]	20.0'-22.0'	0.8'	94-200/0.3'	S.A.A.
	S-12[1]	22.0'-24.0'	1.9'	46-97-119-134	S.A.A.
	S-13	24.0'-26.0'	0.3'	59-100/0.2'	S.A.A.
	S-14	26.0'-28.0'	1.7'	26-46-67-84	S.A.A.
	S-15[3]	28.0'-30.0'	1.9'	62-70-103-116	S.A.A.
BBL-2	S-1	0.0'-2.0'	1.5'	14-9-13	Asphalt (0-0.2'), med. brown fine SAND, trace Silt, moist, med. dense.
	S-2	2.0'-4.0'	1.7'	12-14-12-19	Med. brown fine SAND, little Silt, moist, thinly bedded, med. dense.
	S-3	4.0'-6.0'	1.6'	6-5-4-6	Med. brown fine SAND, little Silt, moist, loose.
	S-4	6.0'-8.0'	1.6'	5-3-3-5	S.A.A.
	S-5[1]	8.0'-10.0'	1.7'	4-5-4-3	Med. brown fine to medium SAND, little Silt, saturated, loose.
	S-6	10.0'-12.0'	1.6'	4-4-4-7	S.A.A.
	S-7	12.0'-14.0'	1.7'	12-15-25-20	S.A.A.
	S-8[1]	14.0'-16.0'	1.0'	14-12-13-23	Red-brown clayey SILT and fine SAND, little fine Gravel, moist, hard. (TILL @ 14.0')
BBL-3	S-1	0.0'-2.0'	0.8'	9-14	Asphalt (0-0.5'), med. brown fine to medium SAND, trace fine Gravel, trace Silt, moist.
	S-2	2.0'-4.0'	1.8'	8-9-11-13	Med. brown fine SAND, trace Silt, moist, med. dense.
	S-3	4.0'-6.0'	1.6'	5-5-5-5	S.A.A.
	S-4	6.0'-8.0'	1.7'	4-3-2-2	S.A.A., saturated at 7.5'.
	S-5[1]	8.0'-10.0'	1.6'	2-2-4-3	S.A.A.
	S-6	10.0'-12.0'	1.5'	4-4-4-4	S.A.A.
	S-7[1]	12.0'-14.0'	1.5'	5-9-9-8	S.A.A.
	S-8	14.0'-16.0'	1.8'	8-9-11-12	Med. brown fine to medium SAND, trace Silt, moist, med. dense.
	S-9	16.0'-18.0'	1.8'	9-11-11-10	S.A.A.
	S-10	18.0'-20.0'	0.8'	15-50/0.1'	S.A.A.
	S-11	20.0'-22.0'	0.4'	14-15-21-16	Red brown clayey SILT and fine SAND, little fine to medium Gravel, moist. (TILL @ 20.0')
	S-12[1]	22.0'-24.0'	1.0'	30-37-50-88	S.A.A.

TABLE 3

LOCKHEED MARTIN CORPORATION
FARRELL ROAD PLANT, GEDDES, NEW YORK
AREA OF CONCERN #5 LNAPL/DNAPL INVESTIGATION

SOIL BORING GEOLOGIC AND DRILLING DATA

Boring	Sample No.	Depth	Recovery	Blow Counts (per 6 inches)	Soil Description (modified Burmister, 1959)
BBL-4	S-1	0.0'-2.0'	1.7'	4-4-7-8	Topsoil (0-0.3'), med. brown fine to medium SAND, trace Silt, moist, med. dense.
	S-2	2.0'-4.0'	1.9'	9-11-12-10	Med. brown fine to medium SAND, trace Silt, moist, med. dense.
	S-3	4.0'-6.0'	1.8'	8-9-9-8	Med. brown fine SAND, little Silt, moist, med. dense.
	S-4	6.0'-8.0'	1.7'	8-6-4-7	S.A.A., wet.
	S-5	8.0'-10.0'	1.9'	2-2-5-5	S.A.A., saturated at 8.5'.
	S-6	10.0'-12.0'	1.8'	5-5-5-5	S.A.A.
	S-7[1]	12.0'-14.0'	1.6'	2-3-6-5	S.A.A., sheen from 12.5' to 13.0', solvent odor.
	S-8	14.0'-16.0'	1.7'	7-10-12-9	Med. brown fine SAND and SILT, saturated, no odor, med. dense.
	S-9[3,4]	16.0'-18.0'	1.6'	8-10-8-7	S.A.A.
	S-10	18.0'-20.0'	1.5'	WOH-10-10	S.A.A.
	S-11[1]	20.0'-22.0'	1.8'	5-6-5-115	S.A.A. to 21.5', @ 21.5', red brown clayey SILT and fine SAND, moist, hard. (TILL @ 21.5')
BBL-5	S-1	0.0'-2.0'	1.0'	35-43-36	Asphalt (0-0.2'), FILL- coarse GRAVEL, little coarse to med. Sand, moist, very dense.
	S-2	2.0'-4.0'	1.8'	15-9-8-7	Med. brown fine to medium SAND, trace Silt, trace fine Gravel, moist, medium dense.
	S-3	4.0'-6.0'	1.8'	6-7-5-10	Med. brown fine SAND, little clayey Silt, moist, medium dense.
	S-4	6.0'-8.0'	1.6'	10-10-3-5	Med. brown fine to medium SAND, little clayey Silt, moist, medium dense.
	S-5	8.0'-10.0'	1.7'	3-3-2-3	Med. brown fine SAND, little to some clayey Silt, saturated, loose.
	S-6	10.0'-12.0'	1.6'	3-2-3-4	Med. brown fine to medium SAND, trace clayey Silt, saturated, loose.
	S-7[1]	12.0'-14.0'	1.5'	4-4-5-4	Med. brown fine to medium SAND, trace Silt, saturated, loose.
	S-8	14.0'-16.0'	0.4'	3-2-3-2	Med. brown fine SAND, little Silt, saturated, loose.
	S-9	16.0'-18.0'	1.8'	5-5-4-5	S.A.A.
	S-10	18.0'-20.0'	1.8'	3-4-4-10	Med. brown fine to medium SAND, some clayey Silt, saturated, loose.
	S-11	20.0'-22.0'	1.8'	WOH-WOH-3-3	S.A.A.
	S-12	22.0'-24.0'	1.7'	5-5-4-5	Med. brown fine to medium SAND and SILT, saturated, loose.
	S-13[1]	24.0'-26.0'	1.7'	6-8-9-8	S.A.A. to 25.5'. (TILL @ 25.5')
	S-14	26.0'-28.0'	1.1'	10-25-30-39	Red brown clayey SILT and fine SAND, trace fine to medium Gravel, moist, hard.
	S-15[1]	28.0'-30.0'	0.8'	29-38-65	Red brown clayey SILT, trace fine Gravel, trace fine Sand, moist, hard.
	S-16	30.0'-32.0'	1.2'	NA	Red brown clayey SILT, little fine to medium Gravel, moist, hard.

Notes:
S.A.A. = Same as above.
NA = Not available.
WOH = Weight of hammer.
[1] Soil sample submitted for laboratory analysis of volatile organic compounds (VOCs) by ASP 91-1 methods.
[2] Soil sample submitted for laboratory analysis of total organic carbon (TOC) by Lloyd Khan methods.
[3] Soil sample submitted for laboratory analysis of Natural Moisture Content by ASTM D2216.
[4] Soil sample submitted for laboratory Sieve Analysis by ASTM D422 & D1140.
[5] Soil sample submitted for laboratory Hydrometer Analysis by ASTM D422.
[6] Soil sample submitted for laboratory Specific Gravity Analysis by ASTM D854.
[7] Soil sample submitted for laboratory Bulk (Natural) Soil Density Analysis by Corps of Engineers EM-1110-2-1906, Appendix II Displacement Method.
[8] Soil sample submitted for laboratory Porosity Analysis by Corps of Engineers EM-1110-2-1906, Appendix II.
Headspace screening measurements obtained using a Photoionization Detection unit (PID) with a 11.7 eV bulb.
Additional screening using a long-wave/short-wave UV lamp and Sudan IV hydrophobic dye (Cohen & Mercer, 1993) indicated negative results on all samples screened

TABLE 4

LOCKHEED MARTIN CORPORATION
FARRELL ROAD PLANT, GEDDES, NEW YORK
AREA OF CONCERN #5 LNAPL/DNAPL INVESTIGATION

SUMMARY OF SOIL ANALYTICAL RESULTS (VOCs)

	BBL-1 (8-10')	BBL-1 (16-16.4')	BBL-1 (22-24')	BBL-2 (8-10')	BBL-2 (14-16')	BBL-3 (8-10')	BBL-3 (12-14')
VOCs							
Methylene Chloride	12 U	11 U	11 U	7 J	8 J	13 U	12 U
Acetone	12 U	11 U	11 U	12 U	25 B	13 U	12 U
1,1-Dichloroethene	12 U	11 U	11 U	12 U	11 U	13 U	12 U
1,1-Dichloroethane	12 U	11 U	11 U	12 U	11 U	13 U	12 U
1,1,1-Trichloroethane	12 U	11 U	11 U	3 J	11 U	13 U	12 U
Toluene	12 U	1 J	2 J	12 U	11 U	13 U	2 J
Tetrachloroethene	12 U	11 U	11 U	12 U	11 U	13 U	12 U
Ethylbenzene	12 U	11 U	11 U	12 U	11 U	13 U	12 U
Xylenes (Total)	12 U	11 U	11 U	12 U	11 U	13 U	12 U

	BBL-3 (22-24')	BBL-4 (12-14')	BBL-4 (12-14') (DUP)	BBL-4 (21-22)	BBL-5 (12-14')	BBL-5 (24-26')	BBL-5 (28-30')
VOCs							
Methylene Chloride	11 U	30 U	30 U	12 U	12 U	11 U	12 U
Acetone	11 U	24 J	30 U	12 U	9 J	11 U	12 U
1,1-Dichloroethene	11 U	30 U	30 U	9 J	12 U	11 U	12 U
1,1-Dichloroethane	11 U	30 U	30 U	12 U	12 U	3 J	12 U
1,1,1-Trichloroethane	11 U	30 U	30 U	8 J	12 U	10 J	12 U
Toluene	6 J	30 U	30 U	4 J	12 U	1 J	2 J
Tetrachloroethene	11 U	86	130	12 U	12 U	11 U	12 U
Ethylbenzene	11 U	79	30 U	12 U	12 U	11 U	12 U
Xylenes (Total)	11 U	810	950	8 J	10J	11 U	12 U

NOTES:

Volatile organic compound (VOC) results reported in micrograms per kilogram (ug/Kg) equivalent to parts per billion (ppb).
Table includes analytical results for detected VOC parameters only.
U = The compound was not detected; the detection limit is indicated.
J = Estimated concentration.
B = The compound was also detected in an associated blank.

TABLE4.WK3

19-Aug-96

TABLE 5

LOCKHEED MARTIN CORPORATION
FARRELL ROAD PLANT, GEDDES, NEW YORK
AREA OF CONCERN #5 LNAPL/DNAPL INVESTIGATION

NAPL MONITORING AND REMOVAL RESULTS

DNAPL Well VRW-203

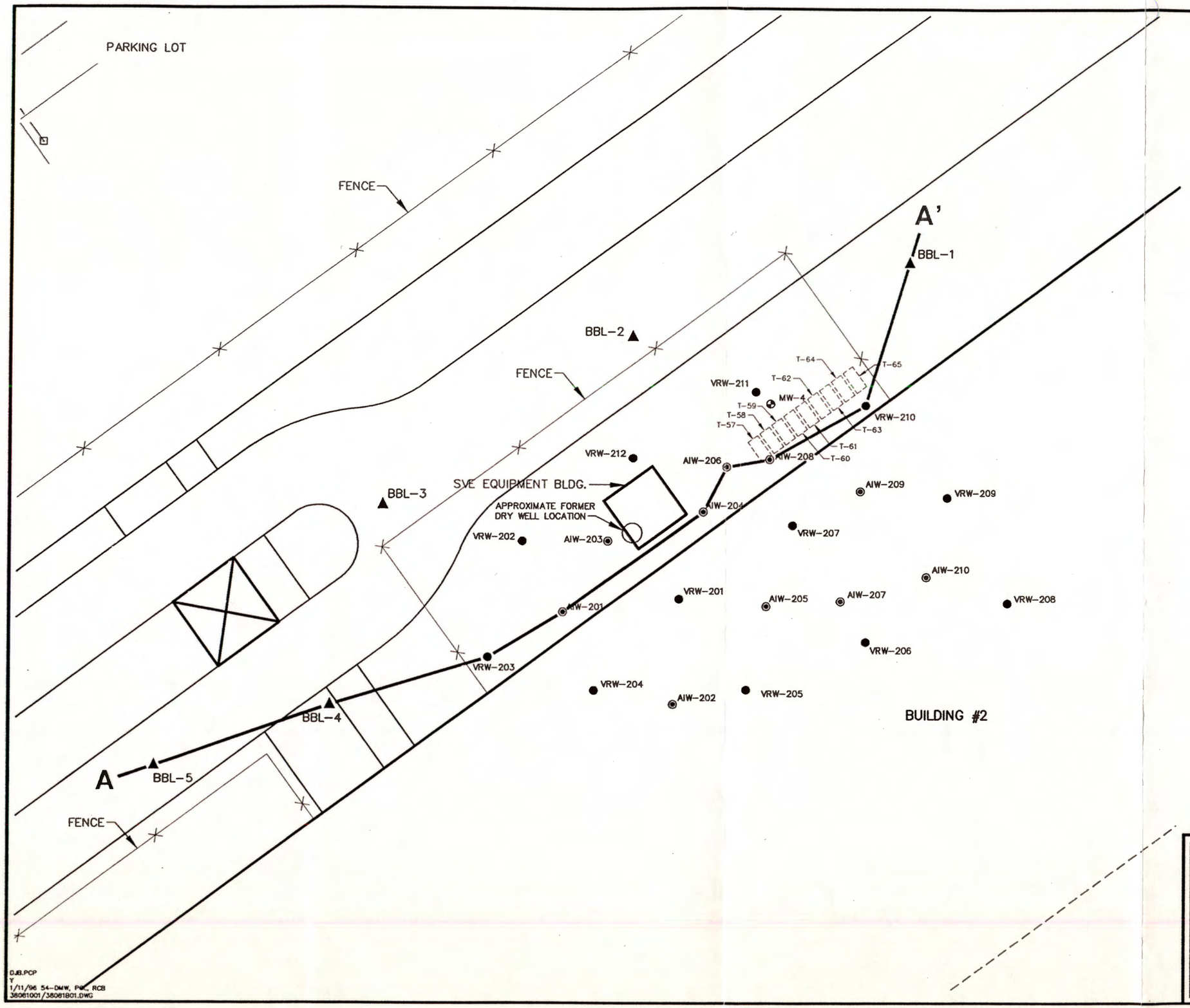
Monitoring Date	DNAPL [1] Thickness (ft.)	DNAPL [2] Removed (gal)
9/15/95	2.32	0.5
9/25/95	1.93	.20
9/28/95	0.67	1.5
9/29/95	0.5	0.12
10/9/95	1.7	0.82
10/11/95	0.9	0.54
10/13/95	1.2	0.46
10/16/95	1.4	0.37
10/18/95	0.55	0.22
10/20/95	0.55	0.22
10/24/95	0.71	0.41
10/27/95	0.27	0.12
10/30/95	0.44	0.24
11/2/95	0.44	0.25
		5.97

LNAPL Well VRW-207

Monitoring Date	LNAPL [1] Thickness (ft.)	LNAPL [2] Removed (gal)
9/15/95	1.49	0.20
9/25/95	0.73	0.20
9/29/95	0.93	1.30
10/9/95	0.01	0.00
10/11/95	Film	0.00
10/13/95	0.05	0.02
10/16/95	0.01	0.00
10/18/95	NA	NA
10/20/95	Film	0.00
10/24/95	0.02	0.00
10/27/95	Film	0.00
10/30/95	Film	0.00
11/2/95	0.02	0.00
Total Volume Removed		1.72

Notes:
NA = Not Accessible.
[1] Maximum observed thickness during monitoring event, based on NAPL thicknesses observed in bailer.
[2] DNAPL and LNAPL removed to the extent practicable using bottom loading bailer, except on 9/15/95 and 9/25/95.
NAPL monitoring performed on wells AIW-201, AIW-204, and AIW-206 indicated little or no measureable NAPL, as discussed in the text.

Figures



LEGEND

- MONITORING WELL (MW)
- AIR INJECTION WELL (AIW)
- VAPOR RECOVERY WELL (VRW)
- LNAPL/DNAPL INVESTIGATION SOIL BORING
- A——A' CROSS SECTION LOCATION

NOTES:

1. BASE MAP PREPARED FROM D.W. HANNIG L. S., P.C. SURVEY DRAWING NUMBER J955493, DATED 5/10/95; PHOTOCOPY OF ERM DRAWING NUMBER P-2, DATED 9/93; PHOTOCOPY OF ERM DRAWING ENTITLED "LOCATIONS OF PNEUMATIC OBSERVATION WELLS AND VACUUM EXTRACTION WELL", DATED 10/93 AND MEASUREMENTS BY BBL FIELD PERSONNEL.
2. ALL LOCATIONS ARE APPROXIMATE.
3. TANK INFORMATION FROM HISTORIC GE PLANS (DRAWING PL-1602 DATED 9/28/91 AND PL-2085 DATED 7/17/85).

SCALE:
20' 0 20'

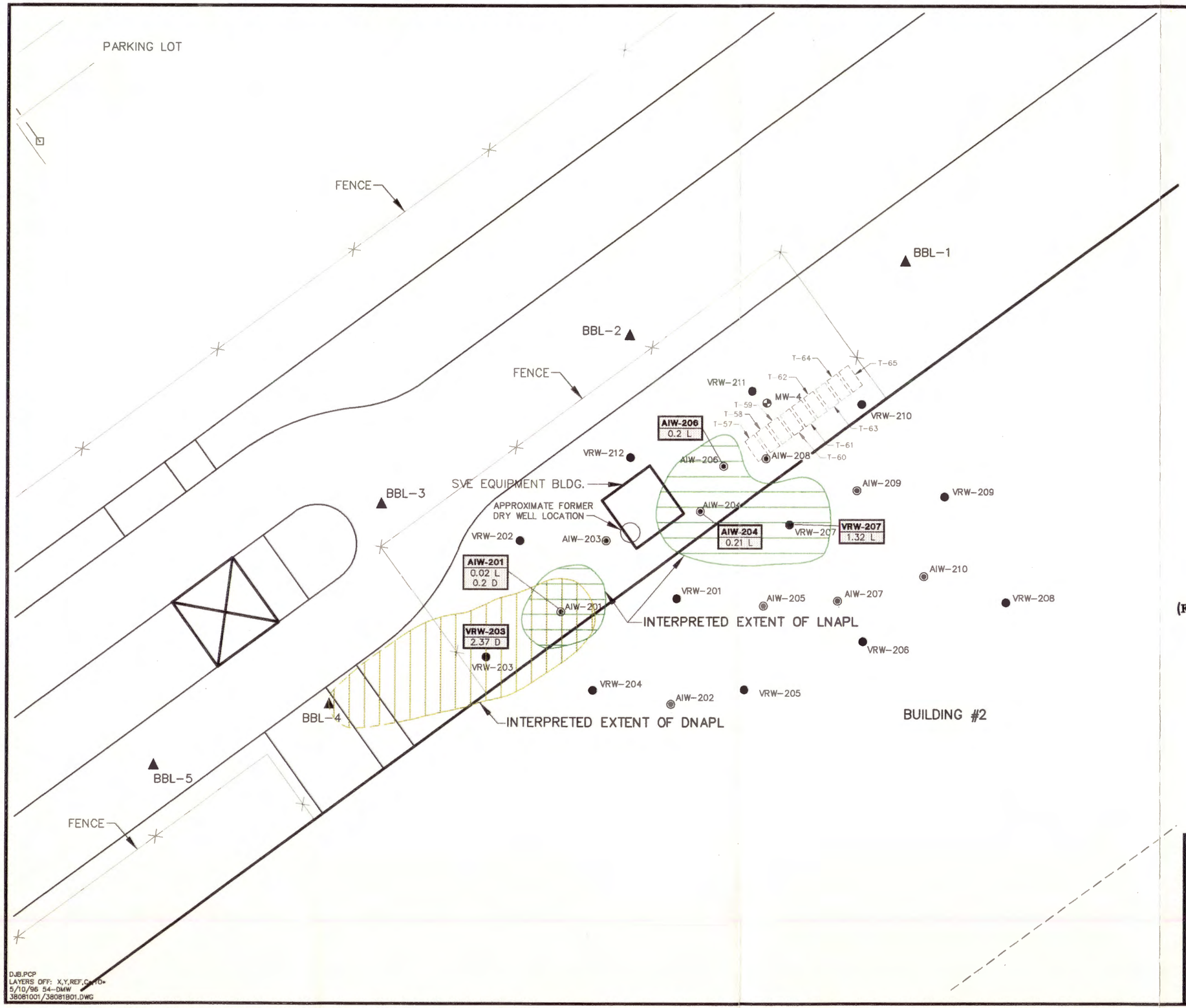
BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

FARRELL ROAD PLANT, GEDDES, NEW YORK
AOC#5 LNAPL/DNAPL INVESTIGATION

SITE MAP

FIGURE 1

OJB.PCP
Y
1/11/96 54-DMW, PBL, RCB
38061001/38061B01.DWG



LEGEND

- MONITORING WELL (MW)
- AIR INJECTION WELL (AIW)
- VAPOR RECOVERY WELL (VRW)
- LNAPL/DNAPL INVESTIGATION SOIL BORING

NAPL THICKNESS (FT):

AIW-201	WELL NUMBER
0.02 L	LNAPL THICKESS
0.20 D	DNAPL THICKNESS

NOTES:

1. BASE MAP PREPARED FROM D.W. HANNIG L. S., P.C. SURVEY DRAWING NUMBER J955493, DATED 5/10/95; PHOTOCOPY OF ERM DRAWING NUMBER P-2, DATED 9/93; PHOTOCOPY OF ERM DRAWING ENTITLED "LOCATIONS OF PNEUMATIC OBSERVATION WELLS AND VACUUM EXTRACTION WELL", DATED 10/93 AND MEASUREMENTS BY BBL FIELD PERSONNEL.
2. ALL LOCATIONS ARE APPROXIMATE.
3. TANK INFORMATION FROM HISTORIC GE PLANS (DRAWING PL-1602 DATED 9/28/91 AND PL-2085 DATED 7/17/85).
4. NAPL THICKNESSES PLOTTED REFLECT MAXIMUM THICKNESS OBSERVED 9/25/95. THE OTHER AIW AND VRW WELLS WERE ALSO MONITORED, BUT CONTAINED NO MEASURABLE LNAPL OR DNAPL.

(Figure revised based on NYSDEC comments dated 4/9/96)

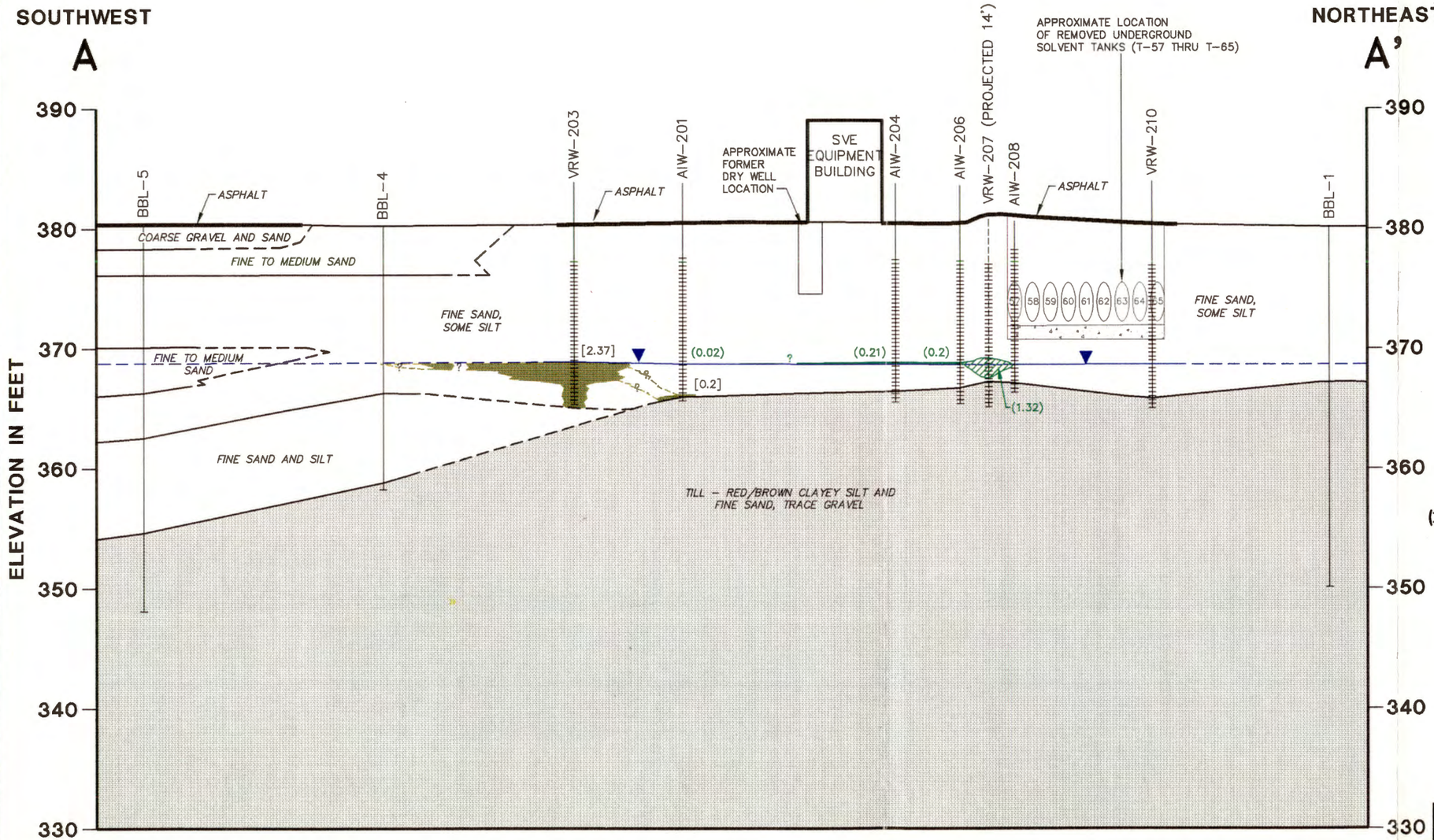
SCALE:
20' 0 20'

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

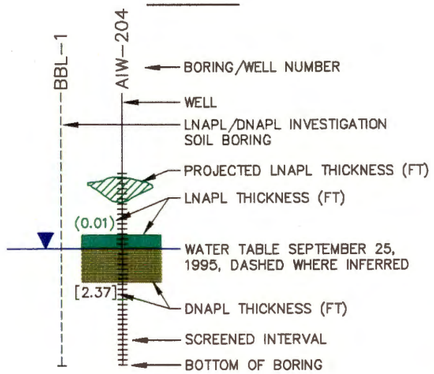
FARRELL ROAD PLANT, GEDDES, NEW YORK
AOC#5 LNAPL/DNAPL INVESTIGATION

NAPL THICKNESS SUMMARY

FIGURE **2**



LEGEND



NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. ELEVATIONS AT BBL BORINGS APPROXIMATE ONLY
3. NAPL THICKNESS DATA INDICATE LARGER MEASURED RESULT FROM OIL/WATER INTERFACE PROBE AND BAILER, 9/25/95.
4. TANK INFORMATION FROM HISTORIC GE PLANS (DRAWING PL-1602 DATED 9/28/91 AND PL-2085 DATED 7/17/85).

(Figure revised based on NYSDEC comments dated 4/9/96)

HORIZONTAL SCALE:

20' 0 20'

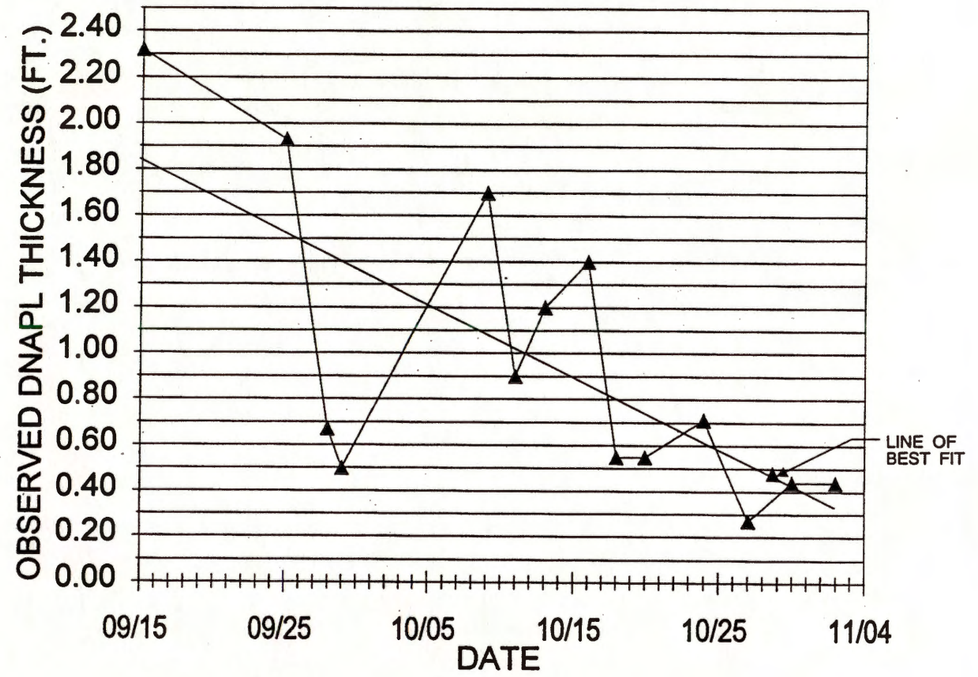
BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

FARRELL ROAD PLANT, GEDDES, NEW YORK
AOC#5 LNAPL/DNAPL INVESTIGATION

GEOLOGIC CROSS SECTION A-A'

FIGURE 3

DJB.PCP
5/10/96 54-DMW
38061001/38061CSA.DWG



NOTE:

Thickness Measurements Observed in Bottom-Loading Bailer

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

FARRELL ROAD PLANT, GEDDES, NEW YORK

AOC#5 LNAPL/DNAPL INVESTIGATION

OBSERVED DNAPL THICKNESS AT VRW-203

FIGURE **4**

11/95 DS4 JVM
38081001/38081n01.CDR

Attachments

1 *Information from Historical Investigations at AOC #5*
2 *Chemical Data Summary Report for NAPL (VOCs)*
3 *Physical Data for NAPL Samples (Density, Viscosity, and Interfacial Tension)*
4 *Chemical Data Summary Report for Soils (VOCs and TOC)*
5 *Physical Data for Soils*
6 *Threshold Concentration Calculations*
7 *DNAPL Pool Height Calculation Summary*

Attachment 1

Information from Historical Investigations at AOC #5

ERM-Northeast

1992 ENVIRONMENTAL INVESTIGATION
GE FARRELL ROAD PLANT TWO (FRP-2)
SYRACUSE, NEW YORK

JULY 10, 1992

PREPARED FOR:

GE AEROSPACE
ELECTRONICS PARK
SYRACUSE, NEW YORK 13221

PREPARED BY:

ERM-NORTHEAST, INC.
6700 KIRKVILLE ROAD
E. SYRACUSE, NY 13057

ERM-NORTHEAST PROJECT NO. 380.047.08

3. Removed Tanks on the East Side of FRP-2

It was reported by GE personnel that above ground tanks or storage trailers were used to store chemicals along the east side of FRP-2. The area was investigated with soil borings and no evidence of release was discovered. No further action is required at this area.

4. Removed Solvent Tanks and Drywell

Up to nine 275-gallon USTs, which had been used to store solvents, were located along the west wall of the building. The tanks were removed prior to ERM's involvement at the site. ERM advanced soil boring and excavated test trenches near the removed tanks. Field screening and laboratory analysis indicated that solvents were present in the soil and free-phase floating product was present on the ground water near the removed tanks.

Further investigation revealed an unreported drywell near the removed solvent tanks. The drywell was part of the original building construction and was apparently used to hold "paint drippings" from the paint shop. Test trenches located the drywell and it was removed and disposed.

A release of solvents from the drywell and/or solvent tanks has impacted the soil and ground water adjacent to and beneath FRP-2 (detected VOC concentrations exceed NYSDEC ground water standards).

ERM recommends remediation of the soil in the vicinity of the drywell and removed USTs, and remediation of the ground water downgradient of the area. ERM recommends soil venting as the most appropriate method for soil remediation and source control. Soil venting in the source will need to be combined with hydraulic control of ground water to remediate downgradient excursions.

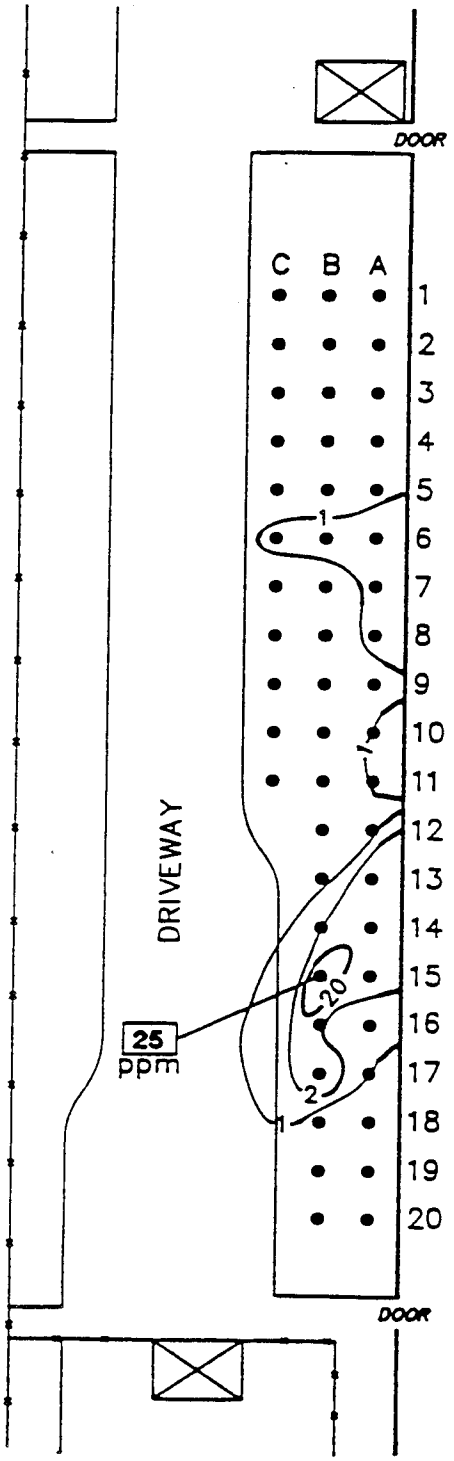
5.4 Removed Solvent Tanks and Drywell

A review of building plans and plant personnel interviews indicated that up to nine solvent USTs and a drywell were located along the west wall of FRP-2 (Area 5, Plate 2). A soil gas survey of the area revealed elevated concentrations of VOCs in the soil (Figure 5-2). A GPR survey revealed buried pipes and a large area of disturbed soil, apparently at the location of the former tanks.

The initial soil boring program encountered residual solvents (Table 5-3) in the soil and ground water near the removed tanks (B13, B31 through B40 on Figure 5-3). The area of affected soil outside the building was readily and easily defined; however, the extent of solvent residuals beneath the building was not known at the end of the initial soil boring program.

ERM conducted a soil boring program throughout the interior of FRP-2 to determine the extent of affected soil and ground water beneath the building. Soil borings were installed by first coring through the concrete floor of the building with a diamond tipped concrete corer. Hand augers were then used to drill the borings, which were generally less than 15 feet deep (see Plate 9 for the location of all soil borings around and beneath FRP-2). The area of affected soil, for the most part, is limited to the area around the solvent tanks and drywell, there is very little affected soil away from the source areas (Figure 5-3). Table 5-4 presents the analytical data from soil collected beneath the buildings. Boring B47, which is located adjacent to the solvent tanks and drywells contained the highest concentration of residual solvents. The suite of six compounds detected contained three chlorinated solvents (1,1-dichloroethene (1,1-DCE); 1,1-dichloroethane (1,1-DCA); and 1,1,1-trichloroethane (1,1,1-TCA) and three non-chlorinated solvents (toluene,

DRAFT



BUILDING #2

NOTES

1. SOIL GAS CONTOURS ARE IN PPM
2. SOIL GAS VALUES ARE LESS THAN 1PI UNLESS OTHERWISE NOTED

LEGEND

• = LOCATION OF SOIL GAS SAMPLING POINT.

SOIL GAS SURVEY
SOLVENT TANK AREA
WEST SIDE, BUILDING No.2

PREPARED FOR
GENERAL ELECTRIC COMPANY

ERM ERM-Northeast

SCALE 1"=40'
DATE 3/82
FIGURE 5-

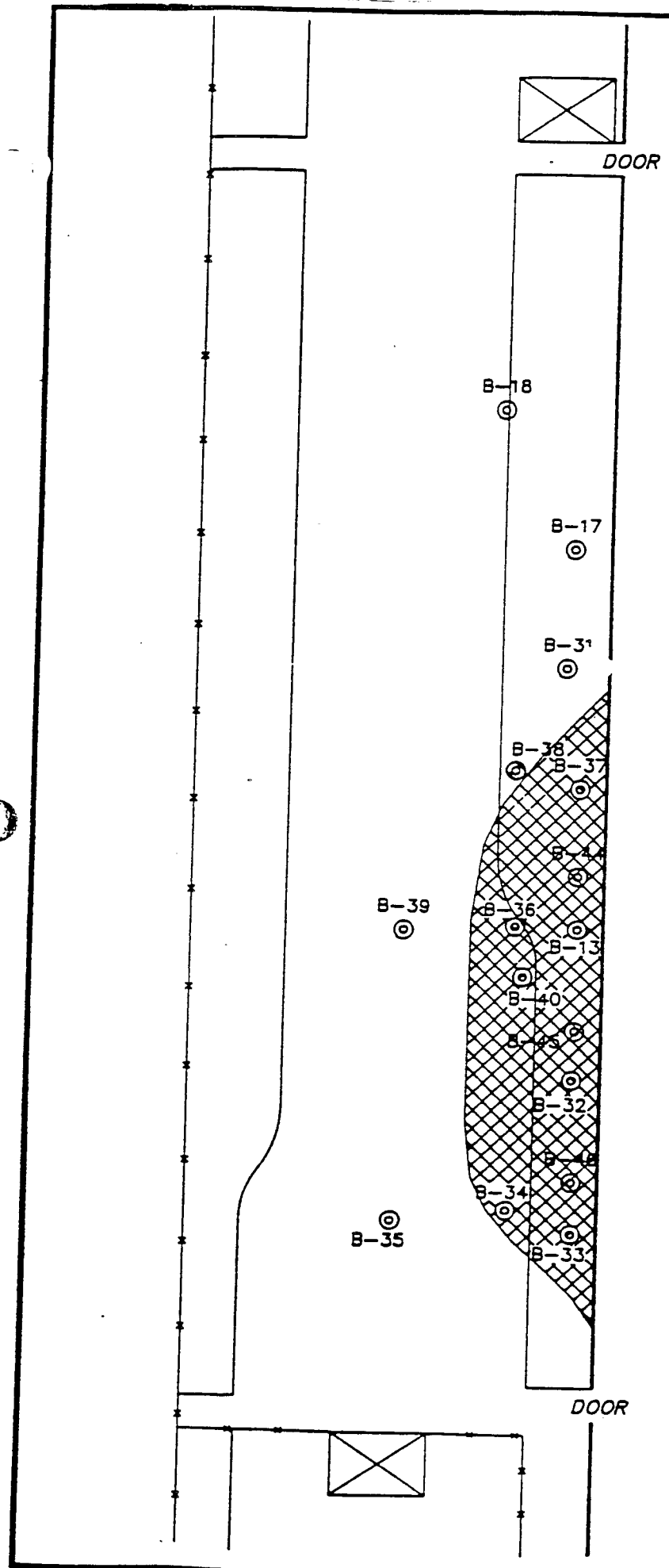
TABLE 5-3
VOC ANALYTICAL DATA
SOIL NEAR REMOVED SOLVENT TANKS
GE FARRELL ROAD PLANT

ANALYTE	B-12 (5)	B-13 (5)	B-17 (10)	B-18 (6-8)	B-31	B-32	B-33	B-34	B-35	B-36	B-37	B-38	B-39	B-40
1,1 DCE	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1,2 DCE	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1,1 DCA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1,1,1-TCA	—	650,000	—	—	30	NS	17,000	NS	—	140,000	NS	14	—	34,000
TCE	—	—	—	—	—	NS	—	NS	—	—	NS	—	—	1,600
Benzene	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	—	2,100,000	—	—	—	NS	80,000	NS	10	740,000	NS	5	9	220,000
Ethylbenzene	—	630,000	—	6	—	NS	2,400	NS	—	220,000	NS	—	—	16,000
MIBK	—	2,000,000	—	—	—	—	—	—	—	—	—	—	—	—
Xylenes	—	4,200,000	—		—	NS	15,000	NS	—	1,200,000	NS	—	—	100,000
TOTAL	0	7,580,000	0		30		144,400		10	2,300,000		19	9	371,600

NOTES:

All values are in ug/kg (ppb).
NS = No sample (field screeing only) for this boring.
— = Compound not detected in this sample but present in another.
All Samples analyzed for priority pollutant volatile organic compound; compounds not listed were not detected in any sample.

DRAFT



Sample	Total detected VOCs
B-38 (5)	19 ug/kg
B-31 (7)	30 ug/kg
B-39 (5)	9 ug/kg
B-33 (9)	11,400 ug/kg
B-35 (5)	10 ug/kg
B-36 (9)	2,800,000 ug/kg
B-40 (13)	4,600 ug/kg
B-40 (8)	37,000 ug/kg

Volume Calculations:

$$\frac{109' \times 23' \times 6.5'}{27} = 603 \text{ Cy}$$

LEGEND

B-33 — *1992 BORING LOCATIONS*

APPROXIMATE AREA OF SOIL IN NEED OF REMEDIATION

SOLVENT TANK AREA
SOIL BORING LOCATION MAP

PREPARED FOR

GENERAL ELECTRIC COMPANY

ERM ERM-Northeast Environmental Resources Management

SCALE 1"=30'

DATE 3/92

FIGURE 5-3

D:\JM\SOLTNKS 03/13/92 MM

TABLE 5-4
VOC ANALYTICAL DATA
SOIL BENEATH BUILDING 2
GE FARRELL ROAD PLANT

ANALYTE	B44 (10)	B45 (8)	B47 (9)	B47A (9)	B52 (8)	B60 (7)	B61 (8)	B62 (7)	B63 (8)	B71 (15)	B77 (8)
1,1-Dichloroethene	—	—	210	25	9	—	8	—	25	—	—
1,1-Dichloroethane	—	—	140	28	42	—	—	—	10	—	—
1,2-Dichloroethene	350	—	—	—	—	—	—	—	—	—	—
1,1,1-Trichloroethane	1,300	80	12,000	40	6	—	—	—	8	—	—
Toluene	—	—	5,600	—	—	—	—	—	—	—	—
Ethylbenzene	—	—	3,800	160	—	—	—	—	—	—	—
Xylenes	—	—	28,000	670	—	—	—	—	—	—	—

NOTES:

NS No samples was collected from this location.
NA Sample not analyzed.
— Analyte not present in this sample but found in another.

* Only soil samples containing VOCs were reported. Soil samples with no detectable VOCs were not reported.

ethylbenzene, and xylenes). The majority of residual solvent in B47 was 1,1,1-TCA (12,000 µg/kg) and xylenes (28,000 µg/kg). Free phase solvent product was observed in the soil immediately above the water table. The soil in boring B47A contained relatively low concentrations of VOCs. The remainder of the borings also contained only minimal concentrations of VOCs in the soil. Figure 5-5 shows the areas of soil near the removed solvent tanks that contain high concentrations of residual solvent.

During the investigation, an abandoned "paint drippings" drywell was identified near the solvent tanks. The drywell was excavated under a source control action. The contents of the drywell were sampled and found to contain the same suite of VOCs as had been discovered in the soil in the solvent tank area (see drywell data in Appendix D.1).

Ground water samples were collected from upgradient (west of the building) and downgradient (beneath the building) directions. Upgradient samples contained only trace amounts of solvents. Downgradient samples contained a suite of compounds similar to the compounds detected in the solvent tanks and drywell area (analytical data are presented on Plate 10). The area of affected ground water extends eastward from the solvent tank area to approximately the center of the building (220 linear feet). From the center of the building it extends northward approximately two-thirds the length of the building (350 linear feet). The total area of affected ground water is approximately two-thirds the area of the building (200,000 square feet).

5.5 Printed Wire Board Assembly Area

GE operated a printed wire board (PWB) assembly area in the southwest corner of FRP-2 (Area 6, Plate 2). A plating facility, as well as etching and soldering baths, were active and used in the assembly process. Four USTs were also associated with the PWB: 1) T-53, an acid storage tank; 2) T-54, cupric chloride tank; 3) T-55, sewer settling tank, and 4) T-56, spill containment tank. To determine the environmental affect from these

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 13

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 1220pm Date & time completed:	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H & W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/2" HSA	Elevation & datum	Completion depth / Rock depth
Bit(s)	Core barrel(s): 2" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1	12"	0	xxxxx		Dk Brown, SILTand GRAVEL,	
				2		rounded clasts, beach	
1				3			
				5			
2	2	4"		5		SAME AS ABOVE	
				4			
3				3			
				3			
4	3	3"	3	2		Dk Brown, GRAVEL, SILT and SAND,	
				1		wet,	
5	4	19"	3	R		Bottom, Red-orange SAND and	Moved to 6' off
			29	4		GRAVEL	the bldg wall
6			17	4		Brown, fine SAND and SILT	
			*	3			*100ppm
7	5	19"	95	4		SAME AS ABOVE, wet	High VOC's
			*	2			*100ppm
8			*	3			*200ppm
			*	5			*200ppm
9	6	16"	*	3		SAME AS ABOVE	*200ppm
			*	4			*300ppm
10			65	7		**	**Evidence of
			70	6			free-phase
11	7	20"	50	7		SAME AS ABOVE	product in
			30	3			sample
12			3	3		Red, CLAY layer	VOC's
			2	4			decrease
13			1	3			
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 13

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 1220pm Date & time completed:	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H & W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/2" HSA	Elevation & datum:	Completion depth: / Rock depth:
Bit(s):	Core barrel(s): 2" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1	12"	0	xxxxx		Dk Brown, SILTand GRAVEL, rounded clasts, beach	
1				2 3 5			
2	2	4"		5 4		SAME AS ABOVE	
3				3 3			
4	3	3"	3	2 1		Dk Brown, GRAVEL, SILT and SAND, wet,	
5	4	19"	3	R		Bottom, Red-orange SAND and GRAVEL	Moved to 6' off the bldg wall
6			29 17	4 4		Brown, fine SAND and SILT	
7	5	19"	* 95	3 4		SAME AS ABOVE, wet	*100ppm High VOC's
8			* *	2 3			*100ppm *200ppm
9	6	16"	* *	5 3		SAME AS ABOVE	*200ppm *200ppm
10			* 65	4 7		**	*300ppm **Evidence of
11	7	20"	70 50	6 7		SAME AS ABOVE	free-phase product in sample
12			30 3	3 3		Red, CLAY layer	VOC's
13			2 1	4 3			decrease
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 17

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 1/22/92 140pm Date & time completed: 1/22/92 210pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H & W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/2" HSA	Elevation & datum	Completion depth / Rock depth
Bit(s)	Core barrel(s): 2" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1	21"		xxxxx 3		Brown, silty SAND, massive, dry 2" Top soil	
1				5 7			
2	2	20"		8 5		Brown , silty SAND, massive, dry	
3				7 6			
4	3	18"		7 2		SAME AS ABOVE	
5				2 2			
6		22"		5 5		SAME AS ABOVE	
7				6 7			
8	4	18"		7 4		SAME AS ABOVE, wet	
9				5 6			
10	5	23"		5 4		SAME AS ABOVE, wet **	
11				8 8		Red, CLAY, small rounded clasts, wet	** Sampled for PAH, TPH and VOC's
12				8			
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 18

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 1/22/92	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H & W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum	Completion depth / Rock depth
Bit(s)	Core barrel(s): 2" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1	21"	0	xxxxx		Brown, silty CLAY, massive, 4" Top soil	
1				1 2 4			
2	2	18"	0	3 3		Brown, silty CLAY, massive, damp	
3				4 4			
4	3	15"	0	4 1		SAME AS ABOVE	
5				1 2			
6	4	24"	2	1		SAME AS ABOVE	
7			6				
8		18"		1 7		Brown, silty CLAY, massive, wet	
9				8 10			Water Table
10				9 4		Brown, medium coarse SAND,	
11				4			
12				3		Red, CLAY, black angular pieces REFUSAL	
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 31

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 1030am Date & time completed: 2/3/92 1050am	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H. & W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum	Completion depth: 10'0" / Rock depth
Bit(s)	Core barrel(s): 2"&3" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1	23	0	xxxxx		Dk Brown, SILT and f/SAND, grass roots, topsoil	Frost on ground
				6			3" split spoon
1				12		Brown, SILT and f/SAND, some clay, dry	
				21			
2	2	22	0	17		SAME AS ABOVE	3" split spoon
				11			
3				7			
				7			
4	3	19	0	7		SAME AS ABOVE	2" split spoon
				3			
5				4			
				4			
6	4	16	0	2		SAME AS ABOVE	2" split spoon
			0	3			
7			##	6		Wet	## 8-20ppm
			0	9		CLAY layer , dry	
8	5			13			2" split spoon
				4			
9				5		Brown, silt and SAND, some clay, wet	Water Table
				4			
10				6			
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 32

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 1100am Date & time completed: 2/3/92 1140am	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H & W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum	Completion depth: 8'0" / Rock depth
Bit(s)	Core barrel(s): 2"&3" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1	20	0	xxxxx 11		Dk Brown, silt and CLAY, some organic material and roots	3" split spoon
1			1.5	11 13		Brown, SILT and f/ SAND, some clay layers, damp	
2	2	17	25	14 12			3" split spoon Headspace 6"
3				11 11		SAME AS ABOVE, wet with a liquid	in hole 30ppm
4	3	24	20	6 4		Dk Brown, CLAY layer 4" thick, Lt Brown, SILT and f/SAND, dry	Free-phase product
5				6 7			
6	4	22	70	4 4		SAME AS ABOVE, bottom 2" wet,	PID > 300ppm VOC at 6'
7				3 4		SAME AS ABOVE, wet with a liquid	PID > 300ppm
8				4		BOTTOM OF BORING 8'0"	VOC sample collected at 8'
9						* Two samples were collected because the liquids looked and smelled different.	
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 33

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 1253pm Date & time completed: 2/3/92 120pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.& W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum:	Completion depth: 10'0" / Rock depth:
Bit(s):	Core barrel(s): 2"&3" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1	20	0	xxxxx		Dk Brown, SILT and CLAY, damp	3" split spoon
			1	28			
1			1	12		Brown, SILT AND f/SAND, damp	
			0	17			
2	2	16	3	18		SAME AS ABOVE	Headspace 6" in hole 1ppm
			3	11		SAME AS ABOVE, wet with a clear liquid	
3			5	12			3" split spoon
			8	9			
4	3	15	2	7		Brown SILT AND f/SAND, damp	
			5	1			
5			4	2			
			>20	4			
6	4	18	6	5		SAME AS ABOVE	Headspace 6" in hole 3ppm
			10	9			
7			13	8			
			25	5			
8	5	19	450	4		SAME AS ABOVE, wet	
			300	5			Sampled for VOC's
9			350	5			
				4			
10				3		Bottom of boring 10'0"	> 200ppm at bottom
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 34

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 130pm Date & time completed: 2/3/92 147pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.& W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum	Completion depth: 10'0" / Rock depth
Bit(s)	Core barrel(s): 2"&3" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0						Top 8" is Blacktop	Auger to 2'
1						Brown, SILT & SAND & CLAY	
2	1	20	1	5		SAME AS ABOVE	
3			3	5			
				6			
4	2	19	7	5		SAME AS ABOVE	
				4			
5			8	4			
				3			Sampled for
6	3		3	4		SAME AS ABOVE, wet	VOC's
			2	4			
7			3	7			
				4			
8	4		70	7		SAME AS ABOVE	
			55	3			
9			90	3			
			300	2			
10				2		BOTTOM OF BORING 10'0"	PID > 200ppm
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 5700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 35

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 214pm Date & time completed: 2/3/92 230pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.& W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum	Completion depth: 8'0" / Rock depth
Bit(s)	Core barrel(s): 2" &3"Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0						Top 8" is Blacktop	Auger to 2'
1						Brown, SILT & SAND & CLAY, soft	
2	1		0	7		SAME AS ABOVE	Headspace 6" in hole 0ppm
3				11 12 11			
4	2		0	12		SAME AS ABOVE	
5				11 8			Sampled for VOC's
6	3		0.5 0.3	7 8		SAME AS ABOVE, appears wet	
7				3 4			
8				3 3		BOTTOM OF BORING 8'0"	
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 36

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 256pm Date & time completed: 2/3/92 305pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.& W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum	Completion depth: 10'0" / Rock depth
Bit(s)	Core barrel(s): 2"&3" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0						top 8" is blacktop	Auger to 2'
1							
2	1	24	5	6		Brown, SILT & SAND & CLAY, soft	
			TR	7			
3			0	6			
			3	5			
4	2	24	TR	6		SAME AS ABOVE	
			1	5			
5			1	7		Wet	
			9	6		Dry	
6	3	22	30	4		SAME AS ABOVE	
			2	3			
7			4	2			
			6	6			
8	4	20	350	4		SAME AS ABOVE, appears dry, damp with product	Sampled for VOC's
			300	4			
9			410	5			
			460	8			
10						BOTTOM OF BORING 10'0"	
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 37

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 310pm Date & time completed: 2/3/92 325pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.& W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum:	Completion depth: 5'0" / Rock depth:
Bit(s):	Core barrel(s): 2"&3" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1	8	0	xxxxx		4" Black, coarse GRAVEL, some grass roots	
			1	4			
1			2	2		Brown, SILT & f/SAND	
			1	3			
2	2	9	15	2		SAME AS ABOVE	
				3			
3				3			
			1	2			
4	3		0	3		SAME AS ABOVE	
			1	6			
5			TR	R		BOTTOM OF BORING 5'0"	Refusal on old solvent tank pad
6							
7						* TR - Trace	
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 38

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 330pm Date & time completed: 2/3/92 355pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.& W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum:	Completion depth: 10'0" / Rock depth:
Bit(s):	Core barrel(s): 2"&3" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	1		0	xxxxx		Dk Gray, SILT & CLAY & f/SAND	3" split spoon
				6			
1				5		Brown, SILT and f/SAND	
				5			
2	2		0	7		SAME AS ABOVE	3" split spoon
			TR	8			
3				9			
				6			
4	3			6		SAME AS ABOVE	
				3			
5			TR	2			
				4			
6	4		6	6		SAME AS ABOVE	
				4			
7				3			
				2			
8	5			5		SAME AS ABOVE	
9							
10						BOTTOM OF BORING 10'0"	
11							
						* TR - Trace	
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 39

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 417pm	Date & time completed: 2/3/92 440pm
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.& W.M.	Sampler hammer: 140 lb — Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum:	Completion depth: 10'0" — Rock depth:
Bit(s):	Core barrel(s): 2"&3"Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0						Top 8" is Blacktop	Auger to 2'
1							
2	1	24	0	17		Brown, SILT & f/SAND	
3				17			
				14			
			TR	11			
4	2	24		12		SAME AS ABOVE	
5			0	9			
				9			
			TR	9			Sampled for
6	3	2	15	8		SAME AS ABOVE	VOC's
7				6			
				5			
				6			
8	4	11	0	8		SAME AS ABOVE	
9				5			
			TR	9			
10				13		BOTTOM OF BORING 10'0"	
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 40

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 2/3/92 447pm Date & time completed: 2/3/92 520pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.& W.M.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum	Completion depth: 15'0" / Rock depth
Bit(s)	Core barrel(s): 2"&3" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0						Top 8" is Blacktop / and gravel	Auger to 5'
1							Headspace 6" in hole 5-7ppm
2						Brown, SILT & f/SAND, soft, massive, damp, strong odor	450ppm in cuttings
3							
4							
5	1			3			
			*	3			* >200ppm Sampled for VOC's
6				3			
				4			
7	2		*	5			* >200ppm
				66			
8				4			
				7			
9	3		150	6			
				7			
10				6			
				12			
11	4			11			
				9			
12				12			
				21		Grayish red, SILT & CLAY,	
13	5		460	21		saturated	Sampled for VOC's
			120	23			
14			12	35		Red, CLAY, damp	Basal till
			1	R			
15						BOTTOM OF BORING 15'0"	
16							
17							
18							
19							
20							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B-44 (P-1)

Project Name & Location: GE-Farrell Road Plant	Project Number: 380-047	Date & time started: 3/16/92 - 0830	Date & time completed: 3/16/92 - 1045
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Drilling Equipment: Concrete Core	Method: Hand Auger / Sampler: E. Hinchey
Elevation and Datum (Feet): 381.0 USGS	Completion Depth (Feet): 12'0"	Rock Depth (Feet):	
Location: FRP - 2 Machine Shop	Surface Description: Boring is through factory floor.	Water Levels (Feet): Date / Time / Depth	

DEPTH	ELEVATION	No.	Recovery (Inches)	HNU OVA (ppm)	Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	381.0			0			6" of Concrete	
1	380.0			TR			Red-Brown GRAVEL, damp	
2	379.0			2			Red-Brown, f/SAND and silt, damp	
3	378.0			2				
4	377.0			0				
	376.0			0				
6	375.0			0			Red-Brown, f/SAND and silt, damp	
7	374.0			0				
8	373.0			TR				
9	372.0			TR				
10	371.0			TR			Greenish Brown, f/SAND and silt, wet	
11	370.0			17				
12	369.0			5				
13	368.0			70				
14	367.0			180				
15	366.0			205			Greenish Brown, f/SAND and silt, wet	Saturated
16	365.0			110				
17	364.0			75				Heaving sands
18	363.0			42				
19	362.0						Bottom of Boring at 12'0"	
20	361.0							

Boring Number B - 45

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING

Project name & location: GE-Farrell Road	Project number: 380.047	Date & time started: 1/12/92 1:55pm	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E. Hinchey	Sampler hammer / Drop
Drilling equipment: Mobile B-53	Method: HSA	Elevation & datum	Completion depth / Rock depth
Bit(s)	Core barrel(s): 2" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES: Sample Number	Blow Counts	Recovery (inches)	Time	HNU/ OVA (ppm)	WELL DETAILS	SOIL DESCRIPTION	REMARKS
							Through floor of FRP-2, 13' south of FD-3 in Paint Shop	
0	1			1355	0		6" - 7" of Concrete Reddish Brown, SILT and f/SAND	
							and GRAVEL	
1							Reddish Brown, SILT and f/SAND, no gravel	
2								
3								
4								
5								
							4" SILT layer, moist	
6					>2<7		VOC reading is suspect, person in paint shop opened a can of thinner	
7								
8								sampled for VOC's
9							Damp	
10								

Page _____ of _____ Signature: _____ Date: _____

Boring Number B - 45

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York 13057

LOG OF BORING

DEPTH (ft below grade)	SAMPLES: Sample Number	Blow Count	Recovery (inches)	Time	HNU/ OVA (ppm)	WELL DEATAILS	SOIL DESCRIPTION	REMARKS
10					0			
11				1533				
							Saturated	
							End Augers	Cored though concrete, hand augered to 12'
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								

Page_____ of _____ Signature:_____ Date:_____

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B-46

Project name & location: GE-FRP	Project number: 380-047	Date & time started: 3/13/92 9:50 AM Date & time completed:	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Sampler(s): E.H.	Sampler hammer: 140 lb / Drop: 5 feet
Drilling equipment: Mobile B - 53	Method: 4 1/4" HSA	Elevation & datum	Completion depth / Rock depth
Bit(s)	Core barrel(s): 2" Split Spoon	Inspector(s): E. Hinchey	

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU (ppm)	OVA (ppm)	Hammer Blows (per 6 inches)	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0							Blacktop	Augered to 4'
1				0			Reddish brown, SILT, sand, & gravel	
2				0				
3				0				
4	1	20		0	13 7		Brown, fine SAND & silt, damp	
5					4 6			
6	2	16		0	5 6		same as above	
7					7 11			
8	3	17		0 1	8 8			VOC Sample
9				3 1	7 9		Brown, SILT and fine sand, wet	
10	4	18.0		1 0.1	15 11			soil is now saturated
11				4 3	12 11		Black & orange stained GRAVEL, wet Red CLAY, with gravel, moist	VOC sample
12	5	8.0		0 0	76 100		Dense, red CLAY, some gravel, damp	Ls. gravel clasts, up to 2 cm in diameter, dry
13								
14				0				PID in cuttings
15	6	16.0		0	43 25			
16					21 20		Red, med SAND & gravel, some clay, wet	
17								Difficult drilling
18								Easier drilling
19	7	14.0		0	35 47		Red CLAY & gravel, some sand, damp	
20					62 51		Red SAND, gravel, & clay	

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B-46

DEPTH (ft below grade)	SAMPLES No.	SAMPLES Recovery (inches)	SAMPLES HNU OVA (ppm)	SAMPLES Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
20							
21							Easy drilling
22							Difficult drilling
23							Easy drilling Difficult drilling
24	8	7	0	54 100		Very dense, red, CLAY, & gravel, dry	
25							Bottom of boring at 25'
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 47A (P-2)

Project Name & Location	Project Number	Date & time started: 4/6/92 - 1006
GE-Farrell Road Plant	380-047	Date & time completed: 4/6/92 - 1210

Drilling company	Foreman	Drilling Equipment	Method	Sampler
Parratt - Wolff	A. Chapman	Concrete Core	Hand Auger	E. Hinchey

Elevation and Datum (Feet)	Completion Depth (Feet)	Rock Depth (Feet)
380.9	12'0"	

Location:	Surface Description:	Water Levels (Feet):
FRP - 2 Machine Shop 22' North of F6 9' west	Boring is through factory floor.	Date / Time / Depth

DEPTH	ELEVATION	No.	Recovery (inches)	HNU OVA (ppm)	Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	380.9						6" of Concrete	No PID
1	379.9						Coarse GRAVEL, sand and silt	
2	378.9						Red-Brown, SILT and clay, damp	
3	377.9							
4	376.9						Red-Brown, SILT and clay, damp	
5	375.9						Thin CLAY, reddish partings	
6	374.9						Red-Brown, SILT and clay, damp	
7	373.9							
8	372.9						Red-Brown, SILT and clay, damp	Sampled for PP VOC
9	371.9						Gray, SILT and clay, wet, soft	
10	370.9							
11	369.9						Gray, SILT and clay, wet, soft	
12	368.9							
13	367.9						Bottom of Boring at 12'0"	
14	366.9							
15	365.9							
16	364.9							
17	363.9							
18	362.9							
19	361.9							
20	360.9							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B - 52 (P-3)

Project Name & Location	Project Number	Date & time started: 4/6/92 - 1006
GE-Farrell Road Plant	380-047	Date & time completed: 4/6/92 - 1210

Drilling company	Foreman	Drilling Equipment	Method	Sampler
Parratt - Wolff	A. Chapman	Concrete Core	Hand Auger	E. Hinchey

Elevation and Datum (Feet)	Completion Depth (Feet)	Rock Depth (Feet)
381.0	12'0"	

Location:	Surface Description:	Water Levels (Feet):
FRP - 2 Machine Shop 22' North of F6 9' west	Boring is through factory floor.	Date / Time / Depth

DEPTH	ELEVATION	No.	Recovery (inches)	HNU OVA (ppm)	Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	381.0						6" of Concrete	No PID
1	380.0						Coarse GRAVEL, sand and silt	
2	379.0						Red-Brown, SILT and clay, damp	
3	378.0							
4	377.0						Red-Brown, SILT and clay, damp	
5	376.0						Thin CLAY, reddish partings	
6	375.0						Red-Brown, SILT and clay, damp	
7	374.0							
8	373.0						Red-Brown, SILT and clay, damp	Sampled for PP VOC
9	372.0						Gray, SILT and clay, wet, soft	
10	371.0							
11	370.0						Gray, SILT and clay, wet, soft	
12	369.0						Bottom of Boring at 12'0"	
13	368.0							
14	367.0							
15	366.0							
16	365.0							
17	364.0							
18	363.0							
19	362.0							
20	361.0							

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: B-53

Project Name & Location	Project Number	Date & time started: 4/25/92 - 1130
GE-Farrell Road Plant	380-047	Date & time completed: 4/25/92

Drilling company	Foreman	Drilling Equipment	Method	Sampler
Parratt Wolff	A. Chapman	Concrete Core	Hand Auger	E. Hinchey

Elevation and Datum (Feet)	Completion Depth (Feet)	Rock Depth (Feet)
384.0	11'8"	

Location:	Surface Description:	Water Levels (Feet):
20' South of F3 3.5' West of F3	Boring is through factory floor.	Date / Time / Depth

DEPTH	ELEVATION	No.	Recovery (Inches)	HNU OVA (ppm)	Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	384.0			0			7" of concrete	
				0			GRAVEL	
1	383.0			0			Red-Brown, f/SAND and silt, damp	
				1				
2	382.0			1			DK Gray, SILT and CLAY, some organics	
				2			"soil" damp	
3	381.0			2			Red-Brown, f/SAND and silt, damp	
				4				
4	380.0			3			Red-Brown, f/SAND and silt, damp	
				3				
5	379.0			4				
				4				
6	378.0			2			Red-Brown, f/SAND and silt, damp	Slight solvent "odor"
				3				moist
7	377.0			2				
				3				
8	376.0			4			Red-Brown, f/SAND and silt, damp	wet
				6			Greenish, f/SAND and silt	
9	375.0			23				Saturated, strong odor,
				32				septic and solvent type odor
10	374.0			28				
				96				
11	373.0			117			Greenish SILT and CLAY, some	
				52			reddish streaks	
12	372.0							
13	371.0						Bottom of Boring at 11'8"	
14	370.0							
15	369.0							
16	368.0							
17	367.0							
18	366.0							
	365.0							
20	364.0							

ERM-Northeast
Suite B-1, 5700 Kirkville Road, East Syracuse, NY 13057, (315) 437-0677

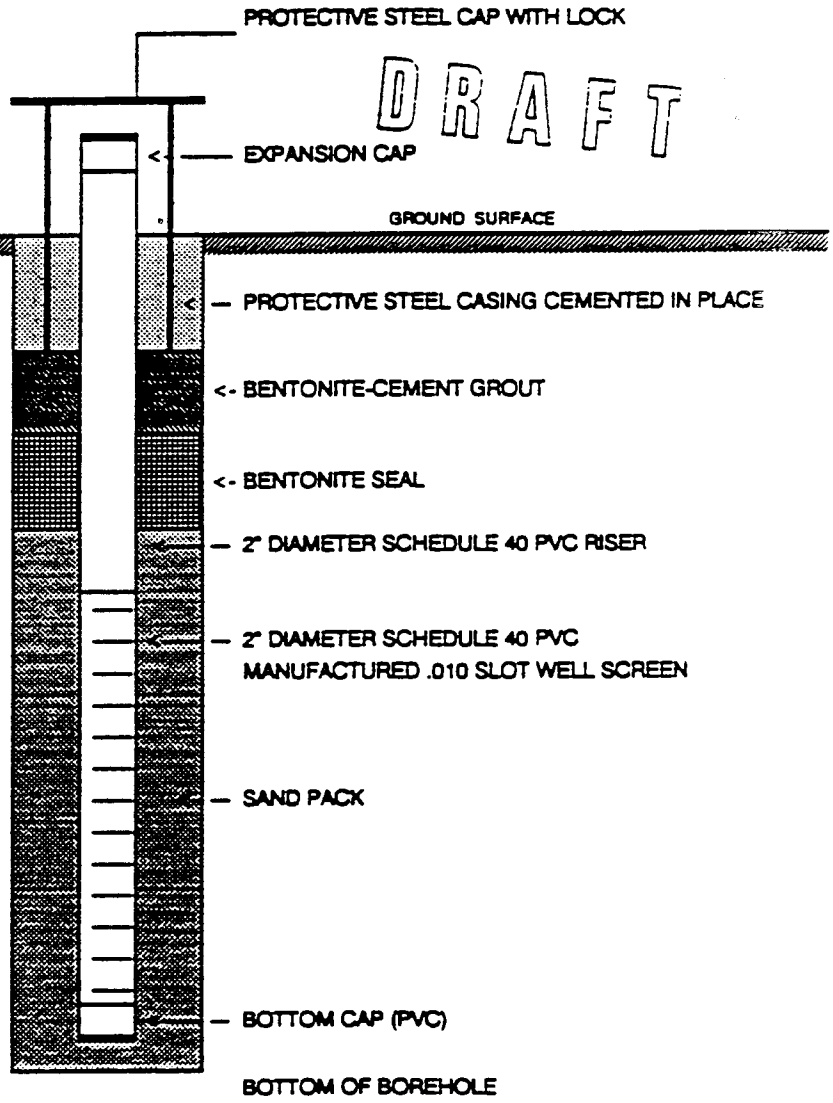
MONITORING WELL CONSTRUCTION

MW - 4

Project Name & Location	Project No.	Water Level(s) (ft below PVC casing)			Site Elevation Datum
GE FRP	380-047				USGS
Drilling Company	Foreman	Date	Time	Level	Ground Elevation
ADT	J. Miranda				377.5
Surveyor					Top of Protective Steel Cap Elevation
Lehr & Associates					
Date and Time of Completion	Inspector				Top of Riser Pipe Elevation
1/29/1992 1100am	E. Hinchey				380.03

Generalized Soil Description	*Elevation	**Depth
	380.03	2.5
	377.50	0.0
Brown, Silty SAND	376.50	1.0
	374.50	2.0
	373.50	4.0
	372.50	5.0
	367.50	10.0
	84.39	10.5

CONSTRUCTION DETAILS



REMARKS

* Elevation (feet) above mean sea level unless noted ** Depth in feet below grade

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: MW - 4

Project Name & Location	Project Number	Date & time started:
GE-Farrell Road Plant	380-047	Date & time completed:

Drilling company	Foreman	Drilling Equipment	Method	Sampler
Aquifer Drilling and Testing	J. Miranda	Mobile B - 53	HSA	E. Hinchey

Elevation and Datum (Feet)	Completion Depth (Feet)	Rock Depth (Feet)
377.5 USGS	12'	NA

Location:	Surface Description:	Water Levels (Feet): Date / Time / Depth

DEPTH	ELEVATION	No.	Recovery (inches)	HNU OVA (ppm)	Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	377.5			0			2" Black Topsoil, SILT and SAND,	Augered to five feet: soil described from cuttings
1	376.5						Brown, silty SAND, soft,dry	
2	375.5							
3	374.5							
4	373.5							
5	372.5	1	24"	0	3			
6	371.5				3			
7	370.5				4			
8	369.5				4			
9	368.5	2	6"	0	12		Red, SILT and SAND, very dense,	Driller note: Change at 8.5'
10	367.5	3	7"	0	44			
11	366.5				33/4"		Red, SILT, SAND, and CLAY, dense, dry	
12	365.5				33			
13	364.5				46			
14	363.5				48		Bottom of Boring at 12'	
15	362.5							
16	361.5							
17	360.5							
18	359.5							
19	358.5							
20	357.5							

ERM-Northeast
Suite B-1, 6700 Kirkville Road, East Syracuse, NY 13057 (315) 437-0677

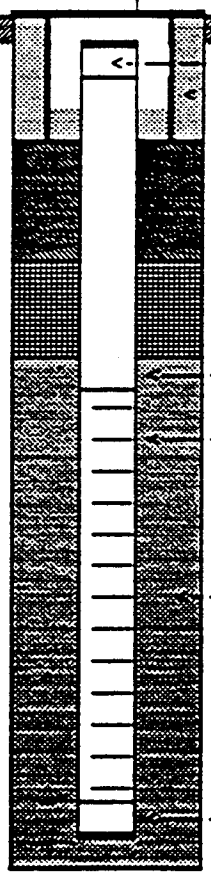
MONITORING WELL CONSTRUCTION

MW - 14 (B-46)

Project Name & Location	Project No.	Water Level(s) (ft below PVC casing)			Site Elevation Datum
GE - Farrell Road Plant	380				USGS
Drilling Company	Foreman	Date	Time	Level	Ground Elevation
Aquifer Drilling and Testing	J. Miranda				379.53
Surveyor					Top of Protective Steel Cap Elevation
Lahr and Associates					
Date and Time of Completion	Inspector				Top of Riser Pipe Elevation
1/13/92 - 1400	E. Hinchey				378.94

Generalized Soil Description	*Elevation	**Depth
	379.53	379.5
	378.94	378.9
	377.53	2.0
	370.53	9.0
	361.53	18.0
	360.53	19.0
	355.53	24.0
	355.03	24.5

CONSTRUCTION DETAILS



REMARKS

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: MW -14

Project Name & Location: GE-Farrell Road Plant	Project Number: 380-047	Date & time started: 3/13/92 - 0950 Date & time completed: 3/13/92	
Drilling company: Aquifer Drilling and Testing	Foreman: J. Miranda	Drilling Equipment: Mobile B - 52	Method: HSA Sampler: E. Hinchey
Elevation and Datum (Feet): 379.5 USGS	Completion Depth (Feet): 24'6"		Rock Depth (Feet): 24'6"
Location: West side FRP - 2 at B - 46; near guard shack	Surface Description: Blacktop in parking lot.		Water Levels (Feet): Date / Time / Depth

DEPTH	ELEVATION	No.	Recovery (inches)	HNU OVA (ppm)	Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	379.5			0			Blacktop	Auger to 4'
1	378.5						Red-Brown, silt , sand and GRAVEL	Fill?
2	377.5							
3	376.5							
4	375.5	1	20"	0	13		Brown, f/SAND and silt, damp	
5	374.5				7			
					4			
					6			
6	373.5	2	16"	0	5		Brown, f/SAND and silt, damp	
7	372.5				6			
					7			
					11			
8	371.5	3	17"	0	8		Brown, f/SAND and silt, damp	
				1	8			
9	370.5			3	7			Sampled for PP VOC
				1	9			
10	369.5	4	18"	1	15		Brown, f/SAND and silt, saturated	Wet
				TR	11			
11	368.5			4	12		Black and orange stained GRAVEL, wet	Sampled for PP VOC
				3	11		Red, CLAY, w/gravel, moist	Top of clay till?
12	367.5	5	8"	0	78/6"		Red, CLAY some gravel, dense, dry	Gravel limestone clasts up to 2cm in diameter
					100/2"			
13	366.5							
14	365.5			0				PID reading in cuttings
15	364.5	6	16"	0	43			
					25			
16	363.5				21		Red, f/SAND and gravel, some clay, wet	
					20			
17	362.5			0				Drilling hard
18	361.5							
								Drilling easy
19	360.5	7	14"	0	35		Red, CLAY and gravel, some sand, damp	
					47		Red, SAND and gravel and clay	
20	359.5				62			
					51			

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: MW-14

DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	HNU OVA (ppm)	Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
20						Red, SAND and gravel and clay	
21							Drilling easy
22						Dense Unit	Drilling hard, jumping rig
23							Drilling easy Drilling Hard
24	8			54 100/2		Red, CLAY and gravel, very dense, dry	Pieces of angular Rx in spoon, bedrock?
25						Bottom of Boring at 24'6"	
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							

ERM-Northeast

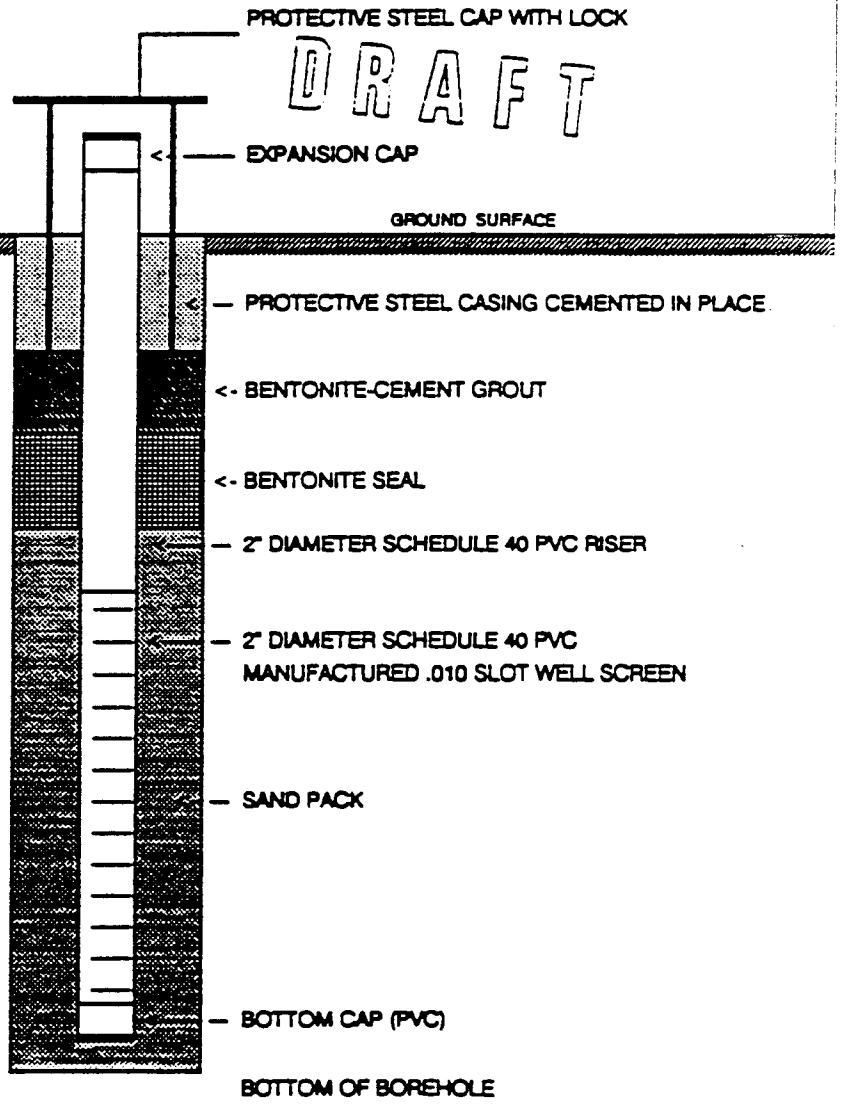
Suite B-1, 6700 Kirkville Road, East Syracuse, NY 13057, (315) 437-0677

MONITORING WELL CONSTRUCTION MW - 19

Project Name & Location	Project No.	Water Level(s) (ft below PVC casing)			Site Elevation Datum
GE - Farrell Road Plant	380-047				USGS
Drilling Company	Foreman	Date	Time	Level	Ground Elevation
Parratt - Wolff	A. Chapman				378.56
Surveyor					Top of Protective Steel Cap Elevation
Lehr & Associates					
Date and Time of Completion	Inspector				Top of Riser Pipe Elevation
4/24/92 - 1240	W. Mahoney				381.01

Generalized Soil Description	*Elevation	**Depth
	381.01	2.4
	378.56	0.0
To a depth of 10.5' the material is medium washed GRAVEL, the clasts are rounded.	377.56	1.0
From 10.5' - 13.0' their is a concrete pad that a cupric chloride tank used to sit on	377.56	
	374.86	3.7
From 13.0' - 21.0' the material consists of Brown f/SAND and silt w/ some clay	373.56	5.0
	363.56	15.0
	357.06	21.5

CONSTRUCTION DETAILS



REMARKS: Spoons were taken down to a depth of 21.0'. The hole was filled with bentonite chips to 16.0'. Sand was then placed from 16.0' to 15.0' where the bottom of the screen is set.

* Elevation (feet) above mean sea level unless noted ** Depth in feet below grade

ERM-Northeast

Suite B-1, 6700 Kirkville Road, East Syracuse, New York, 13057

LOG OF BORING: MW - 19

Project Name & Location	Project Number	Date & time started: 4/24/92 - 0900
GE-Farrell Road Plant	380-047	Date & time completed: 4/24/92 - 1145

Drilling company	Foreman	Drilling Equipment	Method	Sampler
Parratt - Wolff	A. Chappel	CME - 55	HSA	W. Mahoney

Elevation and Datum (Feet)	Completion Depth (Feet)	Rock Depth (Feet)
378.6 USGS	21'	NA

Location:

Surface Description:

Water Levels (Feet):

Date	Time	Depth

DEPTH	ELEVATION	No.	Recovery (inches)	HNU OVA (ppm)	Blow Counts	GRAPHIC LOG	SOIL DESCRIPTION	REMARKS
0	378.6						Grass Material	From cuttings
1	377.6						Black, Green and Red washed medium GRAVEL	
2	376.6							
3	375.6							
4	374.6							
5	373.6						Black, Green and Red washed medium GRAVEL	Spooned from 5' - 7'
6	372.6							
7	371.6							
8	370.6							
9	369.6						Black, Green and Red washed medium GRAVEL	
10	368.6							
11	367.6						Concrete pad	
12	366.6							
13	365.6				24		Brown, f/SAND and silt, some clay	
14	364.6				10			
					10			
15	363.6				10			
					5		Brown, f/SAND and silt, some clay	
16	362.6				6			
					6			
17	361.6				5			
					4		Brown, f/SAND and silt, some clay	
18	360.6				3			
					5			
	359.6				8			
					4		Brown, f/SAND and silt, some clay	
20	358.6				8			
					6			
					7		Bottom of Boring at 21'0"	

SOIL VAPOR EXTRACTION PILOT TEST RESULTS

MARTIN MARIETTA CORPORATION
FARRELL ROAD PLANT
SYRACUSE, NEW YORK

AUGUST 1993

Prepared By:

ERM-NORTHEAST, INC.
6700 Kirkville Road
East Syracuse, New York 13057

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

A soil vapor extraction pilot test was performed at Martin Marietta Corporation's FRP site in the area (Area 5) where volatile organic compound (VOC) contamination has been found. The pilot test was conducted to determine the technical feasibility of employing this technology in site remediation and to collect the necessary data to design a full-scale system. Specifically, the goals of the pilot study were to establish: 1) the effective "radius of influence" in order to determine appropriate well spacing and the number of wells needed for full-scale operation; 2) the soil vapor extraction rate; 3) the required vacuum to be applied to the extraction well; and 4) the air quality of the extracted soil vapor to determine the appropriate vapor treatment alternative.

The approximate extent of unsaturated soil contamination near the old solvent storage tank location has been delineated in a previous report entitled 1992 Environmental Investigation, GE Farrell Road Plant Two (FRP-2) dated July 10, 1992. The extent of contamination is indicated in Figure 1, which shows the locations of the soil borings used to delineate the area. Unsaturated soil contamination was found in six borings B-13, B-33, B-36, B-40, B-44 and B-47. The highest level of contamination was found in B-13, where the concentration of total VOCs was 7,580,000 ppb. The VOCs present at relatively high levels included 1,1,1-TCA, toluene, MIBK, ethyl benzene, and xylene. A summary of the VOC analytical data from soil borings obtained near the removed solvent tanks is presented in Table 1. Contamination was found in soil borings taken at depths of approximately 5.0 feet below grade down to the perched water table, which is approximately 9.0 feet below grade.

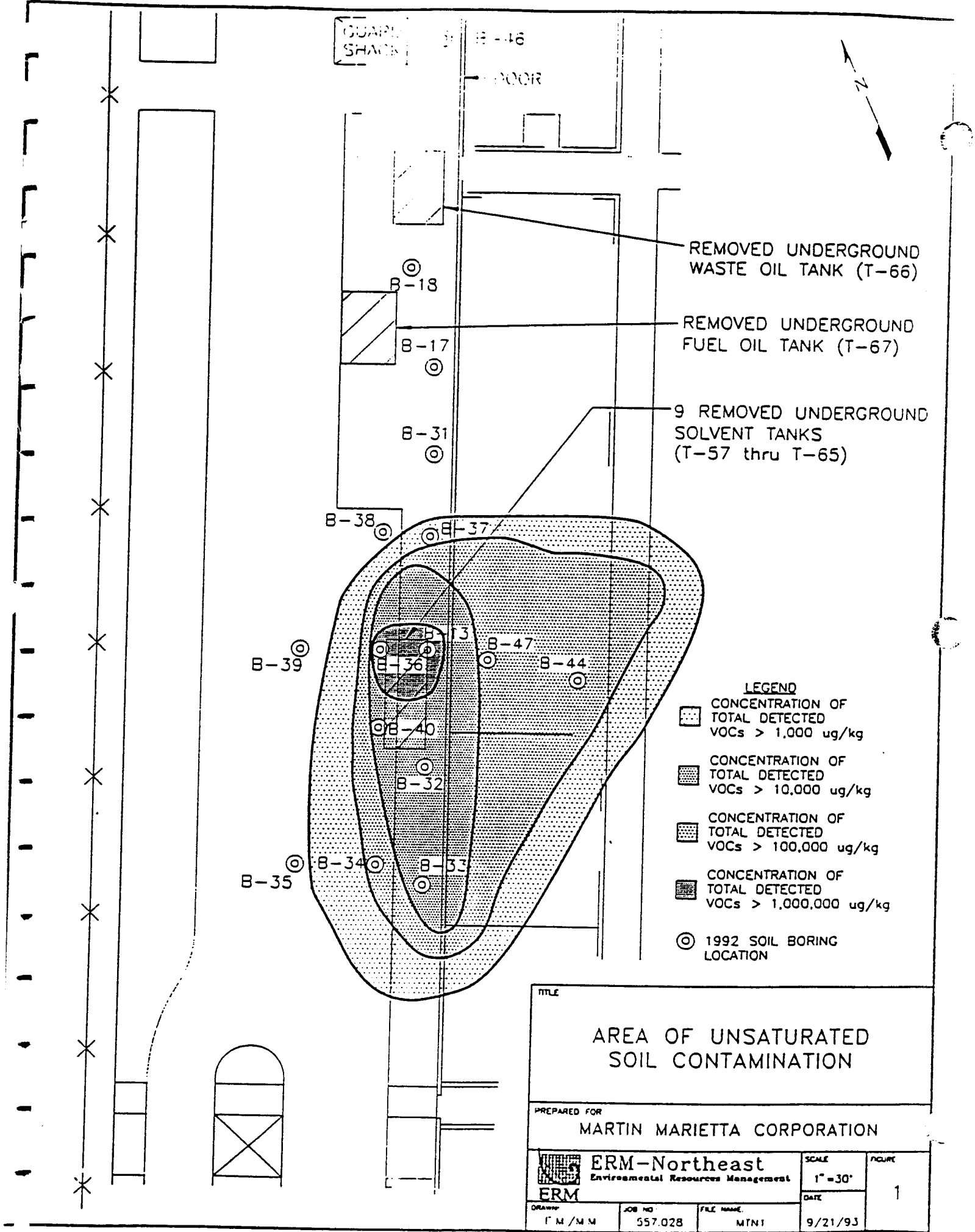

GUARD SHACK
B-46
DOOR
N
REMOVED UNDERGROUND WASTE OIL TANK (T-66)
REMOVED UNDERGROUND FUEL OIL TANK (T-67)
9 REMOVED UNDERGROUND SOLVENT TANKS (T-57 thru T-65)
B-18
B-17
B-31
B-38
B-37
B-13
B-47
B-44
B-39
B-36
B-40
B-32
B-34
B-33
B-35
LEGEND
CONCENTRATION OF TOTAL DETECTED VOCs > 1,000 ug/kg
CONCENTRATION OF TOTAL DETECTED VOCs > 10,000 ug/kg
CONCENTRATION OF TOTAL DETECTED VOCs > 100,000 ug/kg
CONCENTRATION OF TOTAL DETECTED VOCs > 1,000,000 ug/kg
1992 SOIL BORING LOCATION
TITLE
AREA OF UNSATURATED SOIL CONTAMINATION
PREPARED FOR
MARTIN MARIETTA CORPORATION
ERM-Northeast
Environmental Resources Management
ERM
SCALE
1" = 30'
FIGURE
1
DRAWN
T M / M M
JOB NO
557.028
FILE NAME
MTN1
DATE
9/21/93

TABLE I
MARTIN MARIETTA CORPORATION
FARRELL ROAD PLANT

VOC ANALYTICAL DATA
SOIL NEAR REMOVED SOLVENT TANKS

ANALYTE	B-12 (5)	B-13 (6)	B-17 (10)	B-18 (6-8)	B-31	B-32	B-33	B-34	B-35	B-36	B-37	B-38	B-39	B-40	B-44 (6)	B-44 (10)	B-45 (6)	B-46 (6)	B-47 (9)	B-47a (9)
1,1 DCE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	210	25
1,2 DCE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1,1 DCA	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	350	—	—	140	28
1,1,1-TCA	—	650,000	—	—	30	NS	17,000	NS	—	140,000	NS	14	—	34,000	23	1,300	80	—	12,000	40
TCE	—	—	—	—	—	NS	—	NS	—	—	NS	—	—	1,600	—	—	—	—	—	—
Benzene	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	—	2,100,000	—	—	—	NS	80,000	NS	10	740,000	NS	5	9	220,000	—	11,000	—	—	5,600	—
Ethylbenzene	—	630,000	—	6	—	NS	2,400	NS	—	220,000	NS	—	—	16,000	—	780	—	—	3,800	160
MIBK	—	2,000,000	—	—	—	—	—	—	—	—	—	—	—	—	—	21,000	—	—	—	—
Xylenes	—	4,200,000	—		—	NS	15,0000	NS	—	1,200,000	NS	—	—	100,000	—	4,600	—	—	28,000	570
TOTAL	0	7,580,000	0		30		144,400		10	2,300,000		19	9	371,600	35	39,030	80	0	49,750	823

NOTES:

All values are in ug/kg (ppb).
NS = No sample (field screening only) for this boring.
--- = Compound not detected in this sample but present in another.
All Samples analyzed for priority pollutant volatile organic compound; compounds not listed were not detected in any sample.

2.0 DESCRIPTION OF TESTING PROGRAM

The soil vapor extraction test involves pumping air out the soil vapor extraction well, which is screened both above and below the water table. The applied vacuum at the extraction well is varied while measuring the corresponding vapor extraction flow rate. The blower exhaust is monitored with an explosimeter and photoionization detector (PID). If necessary, dilution air is added to keep the gas concentrations below explosive levels to ensure safe operating conditions. The vapor extraction flow rate is then set while monitoring negative changes in pressure at the observation wells. The organic vapor concentration of the blower exhaust and carbon vessel (used for emission control) exhaust is monitored, along with the flow rates of soil vapor and dilution air. To characterize the soil vapor, samples of the blower exhaust are taken, using adsorptive sample tubes or summa canisters, which are analyzed in a laboratory for VOCs.

In some cases, a surface seal is required in order to prevent atmospheric air from being drawn down into extraction well and thus short-circuiting the contaminated soil. In addition, the surface seal prevents excess amounts of rain water from entering the test zone. The pilot testing in this area was conducted with a surface seal in place.

2.1 DETERMINATION OF PNEUMATIC RESPONSE

In order to determine the effective radius of influence at a particular operating condition, the steady state vacuum responses at various distances from the extraction well are monitored. When no passive venting or reinjection is applied, the vacuum response generally decreases exponentially with distance, the pressure gradient also decreases and therefore the soil gas flow rate through that point decreases. Typically, a point is considered effectively influenced if the vacuum response is at least 0.1 inches at that location. Observation wells are installed at various distances from the extraction well in an attempt to empirically determine the distance where the vacuum response falls within this range. Alternatively, by plotting the logarithm of vacuum versus distance, linear interpolation or extrapolation can be done to determine the effective radius of influence (EROI) at that particular extraction flow rate and vacuum.

Typically, steady state vacuum response is reached after 30 to 60 minutes. However, the vacuum may slowly continue to propagate out over a period of several days. As the formation dries out and the pore spaces are evacuated, the EROI would tend to expand slightly. Therefore, results taken after a one hour test would be somewhat conservative, although usually not too different from a longer term test.

2.2 CHARACTERIZATION OF EXTRACTED SOIL GAS

The soil gas is characterized by the frequent use of field monitoring equipment, supplemented by less frequent gas sampling and laboratory analysis to confirm the constituents of the soil vapor and establish the correlation between field monitor readings and actual analytical results.

The field devices used include a photoionization detector (PID) to determine VOC concentration readings and a combustible gas/oxygen meter to determine lower explosive limit (LEL) readings.

The soil vapor is frequently monitored to determine the effects that changes in operating conditions may have on the extracted soil vapor. For example, attempts to minimize short-circuiting may result in higher VOC concentrations. Also, increasing the soil vapor flow rate may result in diffusion or volatilization limiting conditions and/or increase the impacts of short-circuiting, thereby reducing the VOC concentration.

The characteristics of the soil vapor are critical to the selection of the emission control technology. High concentrations of VOCs prohibit the use of activated carbon, and in some cases would cause oxidation systems to operate with large amounts of dilution air in order to keep the oxidizer influent below 25% of the LEL. These could result in very large, oversized units as the concentrations drop off over time.

The laboratory data is necessary to determine the concentrations of the specific compounds present. Certain compounds, such as MIBK, play an important role in determining the control requirements needed to meet air emission regulations. Other less regulated compounds play an important role in adding to the British Thermal Unit (BTU) value of the soil vapor, increasing the explosivity and the loading on treatment equipment.

2.3 *EQUIPMENT USED*

A portable soil vapor extraction unit was mobilized to the site. This unit can deliver up to 250 cfm at a vacuum of 40 inches water column but can also pump less by turning down a throttling valve on the blower inlet piping. A process schematic of the pilot unit is presented on Figure 2.

The mobile unit is equipped with the following: a 10 HP blower, moisture separator, in-line filter, interconnecting piping for soil gas and dilution air, control panel and various instruments and controls.

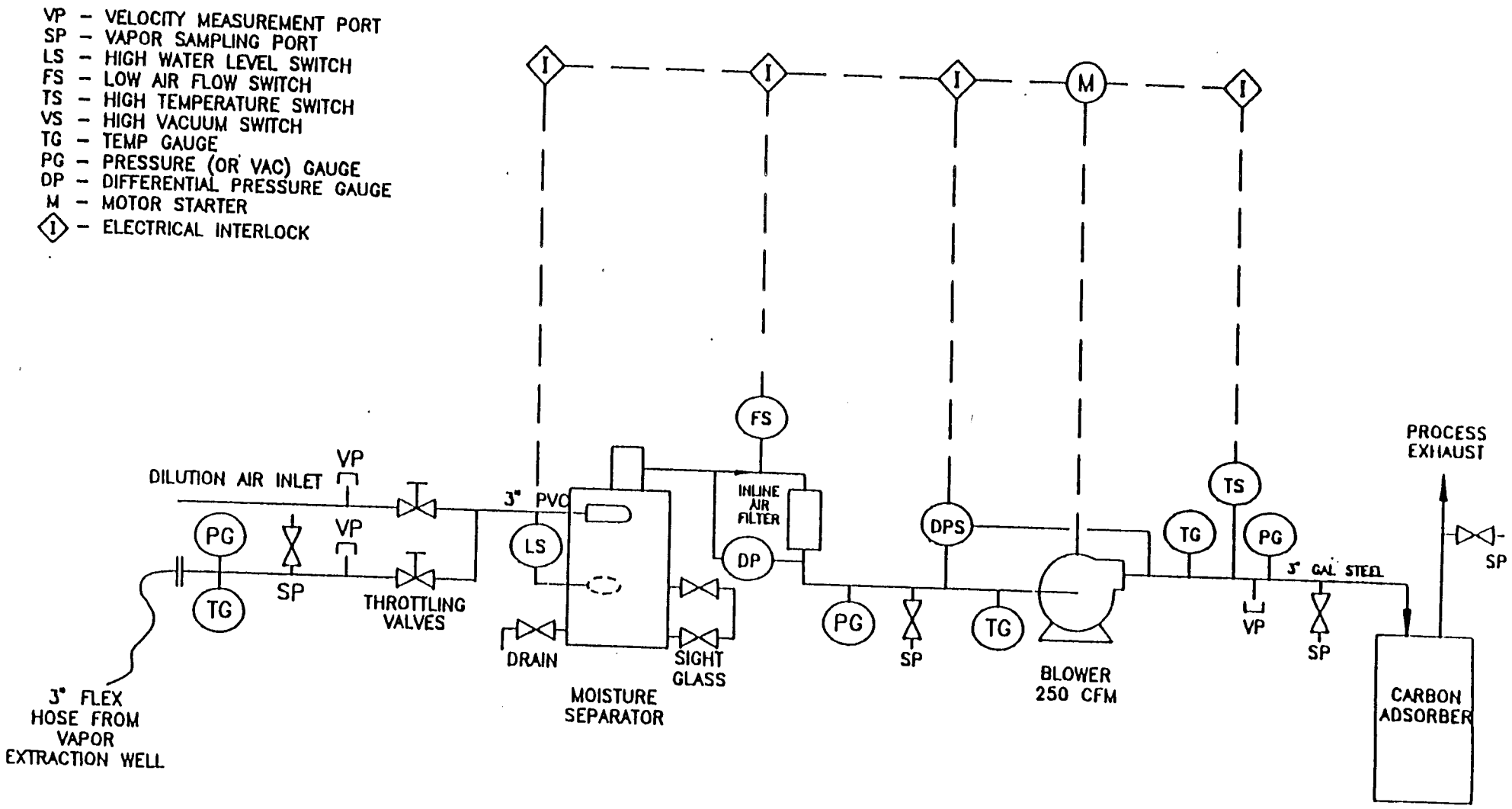
The blower housing, impeller and cover are constructed of spark-proof die-cast aluminum. The blower package includes inlet and outlet internal muffling, (keeping the noise level within OSHA standards), and a direct drive 10 HP explosion-proof motor.

The moisture separator is a high efficiency cyclonic type, designed to remove condensate from the soil gas. It is inherently safe, and includes a drain valve, sight glass, vacuum relief valve and an explosion proof level switch designed to cause a blower shutdown and an alarm to sound at high liquid levels in the moisture separator. A small peristaltic pump can be used to remove liquid from the moisture separator without interrupting the vacuum extraction process.

The in-line filter removes particulates from the air stream to protect the blower. The filter element is easily replaced, if necessary. A differential pressure gauge is provided on the inlet and outlet of the filter to indicate if it needs to be replaced.

The control panel includes the following: motor starter, transformer, alarm shutdown relays, alarm (audio and indicator light), alarm silence and reset, main disconnect, start/stop push buttons, and remote start/stop push buttons on a 25-foot cord. The control panel can be configured to accept either a 240 volt or 480 volt, 3 phase, 60 Hz power supply. The panel housing is a NEMA 4 enclosure.

FIGURE 2
VAPOR EXTRACTION PILOT UNIT FLOW DIAGRAM



ERM-Northeast
Environmental Resources Management
ERM

The interconnecting piping, instrumentation and controls are illustrated on Figure 2. The following alarm/shutdowns are included: high liquid level in moisture separator, low air flow (due to blower failure or a blockage), high differential pressure across blower, high discharge air temperature, and motor overload. The control switches are explosion proof and are configured to protect the blower from permanent damage. These controls prevent a minor, temporary malfunction from causing a major setback in performing the pilot tests.

Various instruments are provided to monitor operating conditions. These instruments include several vacuum, pressure and temperature gauges. A change in readings alerts the operator of a potential problem. Sample ports are provided to allow for easy gas sampling from either the inlet soil gas (before mixing with dilution air), or at the blower outlet. A gas sample pump with a flow meter is available to obtain gas samples.

Throttling valves are provided on the soil gas inlet piping and the dilution valve inlet piping. These allow control of the total air flow by increasing the back pressure on the blower, and/or by varying the ratio of soil gas to dilution (atmospheric) air. Flow measurement ports are provided in the piping on the soil gas inlet, dilution air inlet, and blower discharge. Flow rates were determined using an air velocity meter.

The soil gas inlet piping is connected to the extraction well, with flexible hose. The dilution air inlet draws in atmospheric air through slotted polyvinyl chloride (PVC) pipe.

The blower discharge is connected to a vapor phase carbon adsorption system, situated adjacent to the vapor extraction unit, to treat the extracted gases prior to release to the atmosphere. The carbon system consists of two drums, each containing 200 pounds of activated carbon with a flow

capacity of 100 cfm connected in-series. The purpose of the second drum is to provide back-up emission control if there is contaminant breakthrough in the first drum.

The outlet of the carbon system is discharged to the atmosphere through a 10 foot high stack, and the discharge piping includes sample ports for discharge air monitoring, both after the first carbon drum and at the discharge.

2.4 *TESTING PROCEDURES*

The portable soil vapor extraction unit was used to withdraw subsurface vapor via the pilot extraction well. During system startup, the following were continuously monitored while adjusting the soil vapor and dilution air throttling valves:

- soil vapor flow rate,
- dilution air flow rate,
- applied vacuum, and
- explosive level at the blower discharge.

This information was immediately evaluated to select a range of soil vapor flow rates and vacuums to be applied. An applied vacuum was then set, and the system allowed to operate to reach a steady state condition. During the test run, the following were monitored:

- soil vapor flow rate,
- dilution air flow rate,
- applied vacuum at extraction well,
- vacuum response at each vapor observation well, and

- vapor characteristics at the blower discharge and carbon discharge.

After a steady state condition had been established (or reasonably close to steady state), the next condition was applied. For several of the operating conditions, an air sample of the blower exhaust was collected for laboratory analysis.

Two different types of sampling and analysis protocols were used; EPA Method T0-14 and NIOSH 1003. For the NIOSH method, the sample gas (blower exhaust) is drawn through the tube at a constant rate, using a sample pump and a flow meter. The sample flow rate and sample time is used to calculate the sample volume drawn through the tube. The tube media is then analyzed in the laboratory to determine the mass of contaminants in the tube. Once the mass of contaminants and sample volume is known, the concentration can be calculated. For Method T0-14, a summa canister is used. The laboratory provided summa canister is an evacuated steel container, at a vacuum of about 23 inches mercury. The sample gas is drawn into the canister by simply opening a valve and allowing the sample to flow into the evacuated canister. The laboratory measures the vacuum within the canister before and after the sampling to determine the sample volume drawn into the canister and can then determine the VOC concentrations in the sample.

The sample gas is taken from the blower exhaust, which includes a combination of atmospheric air (dilution air) and soil vapor. The flow rate of both dilution air and soil vapor are measured and used to calculate the dilution factor, which is the ratio of blower exhaust air flow rate to soil vapor air flow rate. The VOC concentration in the blower exhaust is then multiplied by the dilution factor to determine the VOC concentration in the soil vapor.

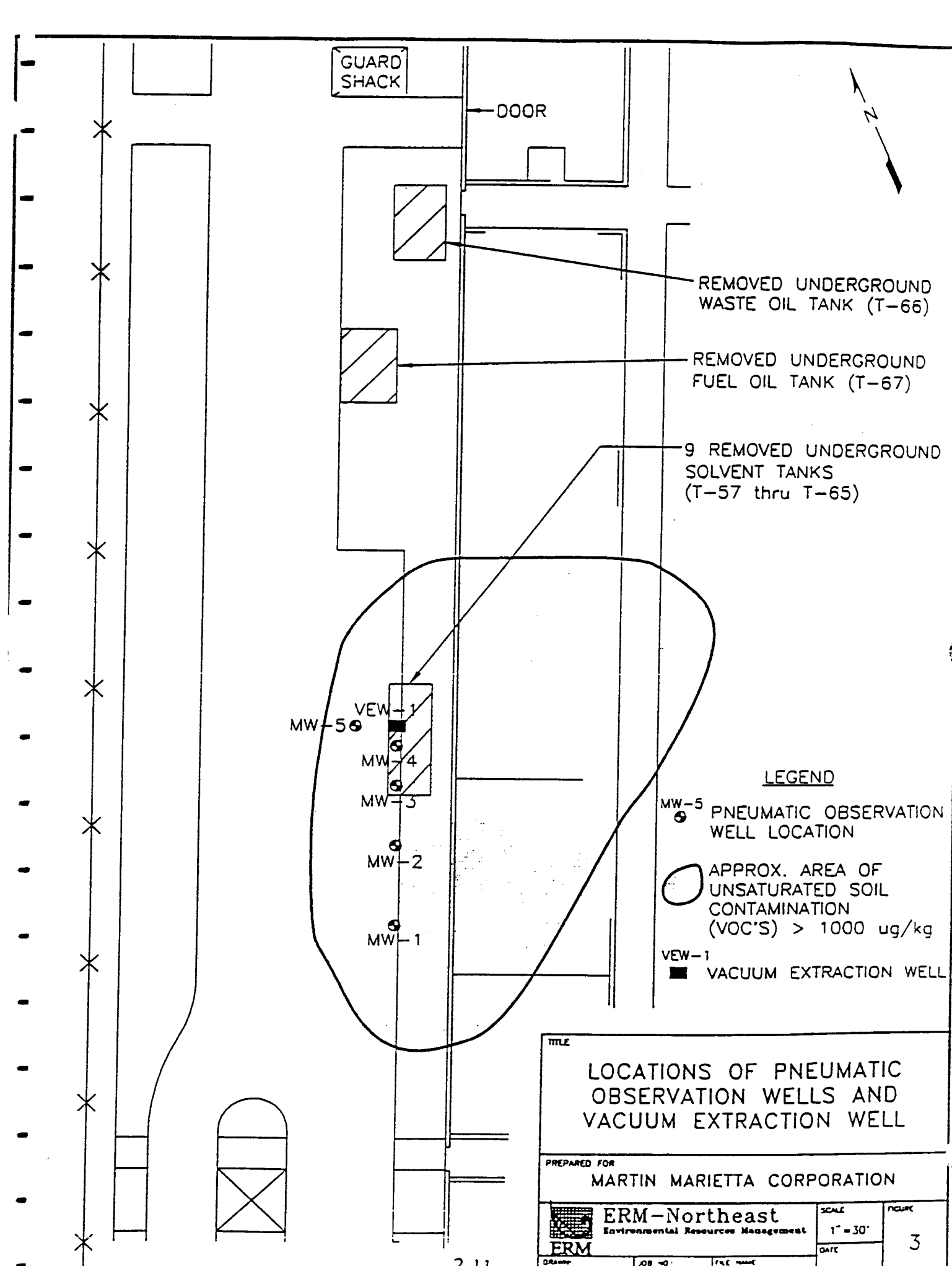
One vacuum extraction well and five pneumatic observation wells were installed for the vapor extraction pilot testing. The vacuum extraction well was installed at the location where the highest concentration of VOC's were detected.

The pilot test was conducted on a newly installed vacuum extraction well, designated as VEW-1. The well was installed by Empire Soils Investigations, Inc. The vacuum extraction well was constructed with four-inch diameter stainless steel, with 12 feet of 0.020 inch slotted screen and 3 feet of riser. The well is installed at a depth of 15 feet below the ground surface, approximately 5 feet into saturated material and has 2 feet of stick up above the ground surface. The annular space was filled with No. 3 sand pack to 2.5 feet below the ground surface. A bentonite pellet seal was placed above the gravel pack to the ground surface, and hydrated.

Five vapor observation wells were installed for the purpose of measuring the subsurface vacuum response to vapor extraction. The wells were installed with a hand driven sub-soil probe. The vapor observation wells were constructed of one inch diameter PVC with five feet of 0.010 inch slotted screen. A bentonite seal was also installed at the ground surface. The five wells were fitted with a cap and brass valve to allow vacuums to be measured with a hand held vacuum gauge. The radial distance and direction of each observation well from the vacuum extraction well (VEW-1), as well as the screen interval data, are presented in Table 2. The locations of the vapor observation wells and vacuum extraction well are illustrated on Figure 3.

TABLE 2
MARTIN MARIETTA CORPORATION
FARRELL ROAD PLANT
SOIL VENTING PILOT TEST
LOCATION AND DESCRIPTION OF PNEUMATIC OBSERVATION WELLS

Well No.	Distance From VEW-1	Screen Interval (Feet)	Depth To Water (Feet)	Saturated Screen Length (Feet)	Unsaturated Screen Length (Feet)
MW-1	50 feet south	3.10 - 8.10	>8.10	0	5.00
MW-2	30 feet south	3.50 - 8.50	>8.50	0	5.00
MW-3	15 feet south	3.00 - 8.00	>8.00	0	5.00
MW-4	5 feet south	3.00 - 8.00	>8.00	0	5.00
MW-5	10 feet west	3.00 - 8.00	>8.00	0	5.00



TITLE

LOCATIONS OF PNEUMATIC OBSERVATION WELLS AND VACUUM EXTRACTION WELL

PREPARED FOR

MARTIN MARIETTA CORPORATION

ERM-Northeast
Environmental Resources Management

ERM

SCALE	FIGURE
1" = 30'	3

DRAWN BY	JOB NO.	FILE NAME	DATE
E.M./M.M.	557023	MTN5	10/20/93

3.0 SOIL VAPOR EXTRACTION PILOT STUDY RESULTS

3.1 PNEUMATIC CONDITIONS

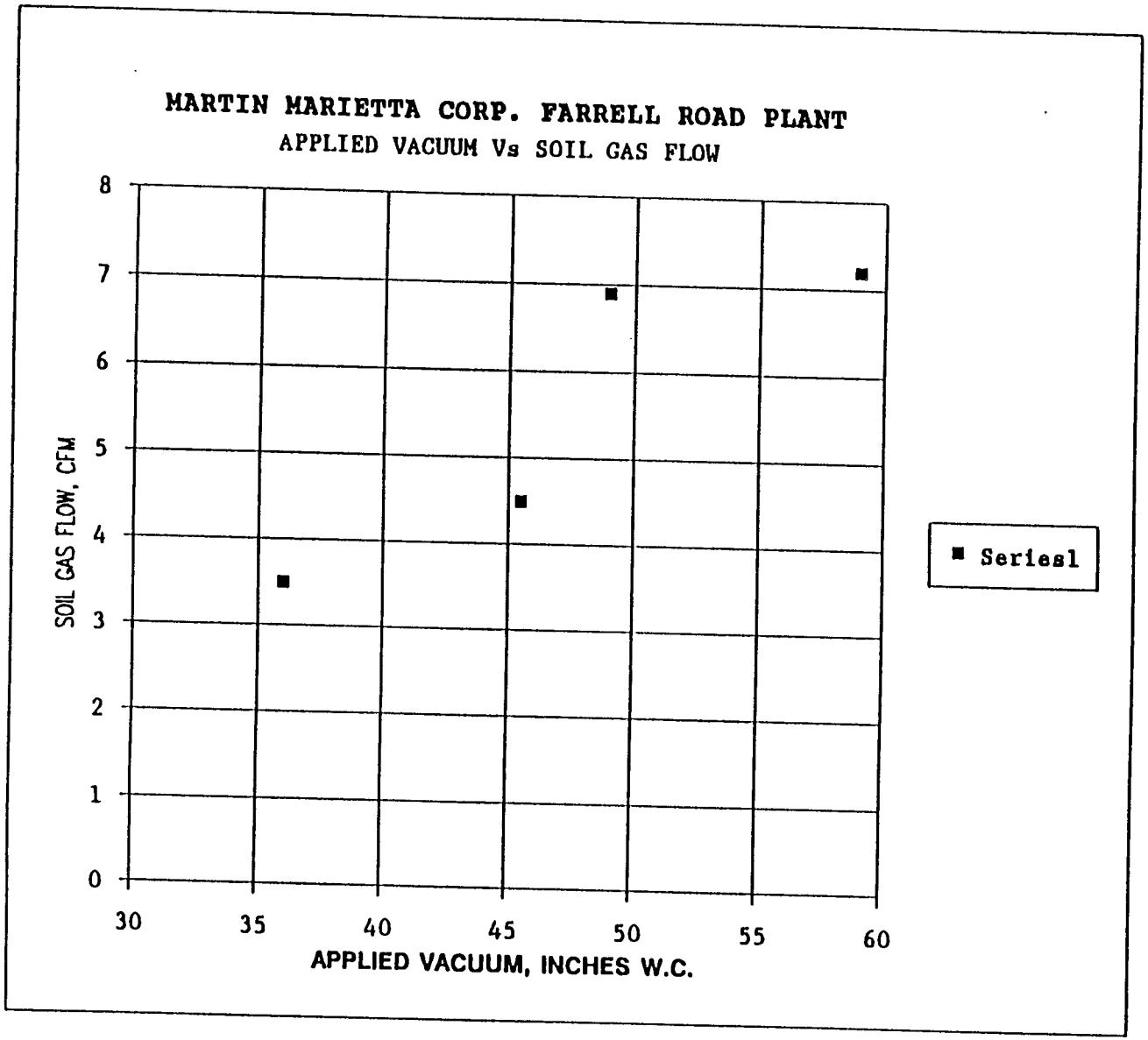
Soil vapor extraction tests were conducted for two days on 27 July 1993 and 28 July 1993. The first day of testing was performed to provide a variety of data for several operating conditions. The second day of testing was utilized to obtain data for optimum conditions based on review of day one observations.

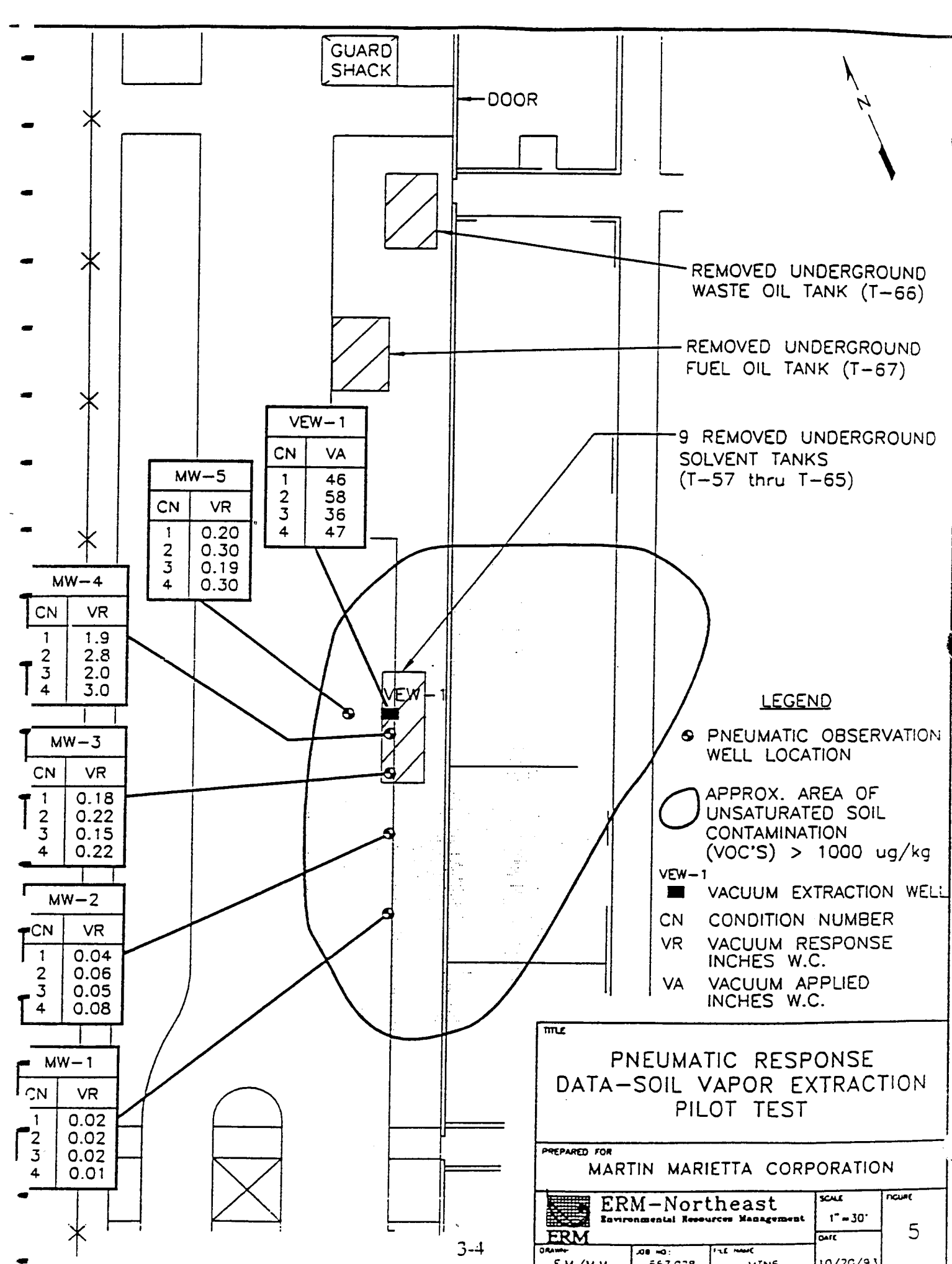
The soil vapor extraction field data for the pilot test is summarized in Table 3. As shown in Table 3, a total of four different testing conditions were evaluated. All of the four conditions were run with a surface seal consisting of 10 millimeter thickness plastic sheeting held in place by ten-foot lengths of 4" x 4" timbers and sandbags. The vacuum applied to the vacuum extraction well was varied between 36 and 58 inches water column. The resulting soil vapor flow rate varied from 3.68 to 7.37 cfm. Figure 4 shows a plot of applied vacuum versus resulting soil vapor flow. Figure 4 illustrates how the flow rate increases as the applied vacuum increases.

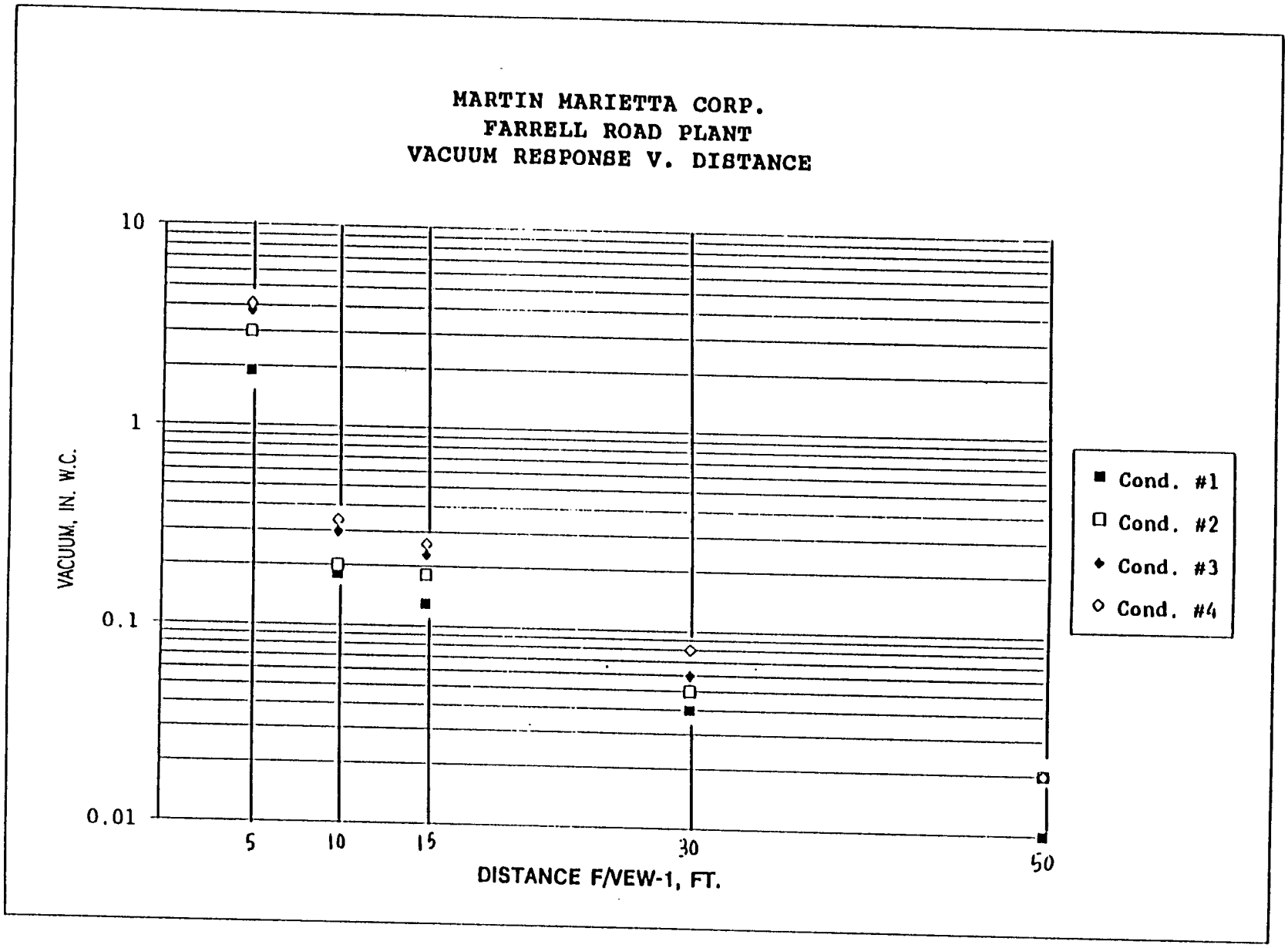
The vacuum response at the observation wells was affected by the distance of the observation well from extraction well, and by the vacuum applied to the extraction well. Figure 5 presents the site plan with the vacuum response data at the observation wells for each test condition. As expected, the vacuum response in each well increased with increases in the vacuum applied to the extraction well. Also as expected, the vacuum response is greatest in the wells closest to the extraction well and decreases as the distance from the extraction wells increases. Both of these trends are demonstrated in Figure 6 which shows a plot of vacuum response versus distance from the extraction well, for each of the four conditions.

SOIL VAPOR EXTRACTION PILOT TEST DATA MARTIN MARIETTA CORPORATION - FARRELL ROAD PLANT				
Condition Number	1	2	3	4
Start: Date Time Stop: Date Time	7/27/93 1:00 p.m. 7/27/93 2:00 p.m.	7/27/93 2:30 p.m. 7/27/93 3:45 p.m.	7/27/93 4:15 p.m. 7/27/93 5:15 p.m.	7/28/93 8:30 a.m. 7/28/93 10:30 a.m.
Soil Gas Flow, CFM	4.91	7.36	3.68	7.37
Blower Exhaust Temp., ºF	160	170	150	150
Dilution Air Flow, CFM	294.6	245.40	255.32	270.05
Total Flow, CFM	299.51	252.76	259.0	277.42
Dilution Factor	61	34	70	38
Surface Seal Status	ON	ON	ON	ON
Vacuum Response, IN. W.C. VEW-1 MW-1 MW-2 MW-3 MW-4 MW-5	 46 0.02 0.04 0.18 1.9 0.20	 58 0.02 0.06 0.22 2.8 0.30	 36 0.02 0.05 0.15 2.0 0.19	 47 0.01 0.08 0.22 3.0 0.30
VOC Concentration, PPM Blower Outlet Soil Vapor	 144 8784	 209 7106	 109 7630	 236 8968
Weather Conditions Temperature(ºF) Relative Humidity(%) Barometer Winds (mph)	 71 93 29.79 I south 10	 71 93 29.79 I south 10	 71 93 29.79 I south 10	 80 57 29.84 I south 13

Note: Vacuum response values are based on conditions near the end of the test run.


MARTIN MARIETTA CORP. FARRELL ROAD PLANT
APPLIED VACUUM Vs SOIL GAS FLOW
SOIL GAS FLOW, CFM
0
1
2
3
4
5
6
7
8
30
35
40
45
50
55
60
APPLIED VACUUM, INCHES W.C.
Series1

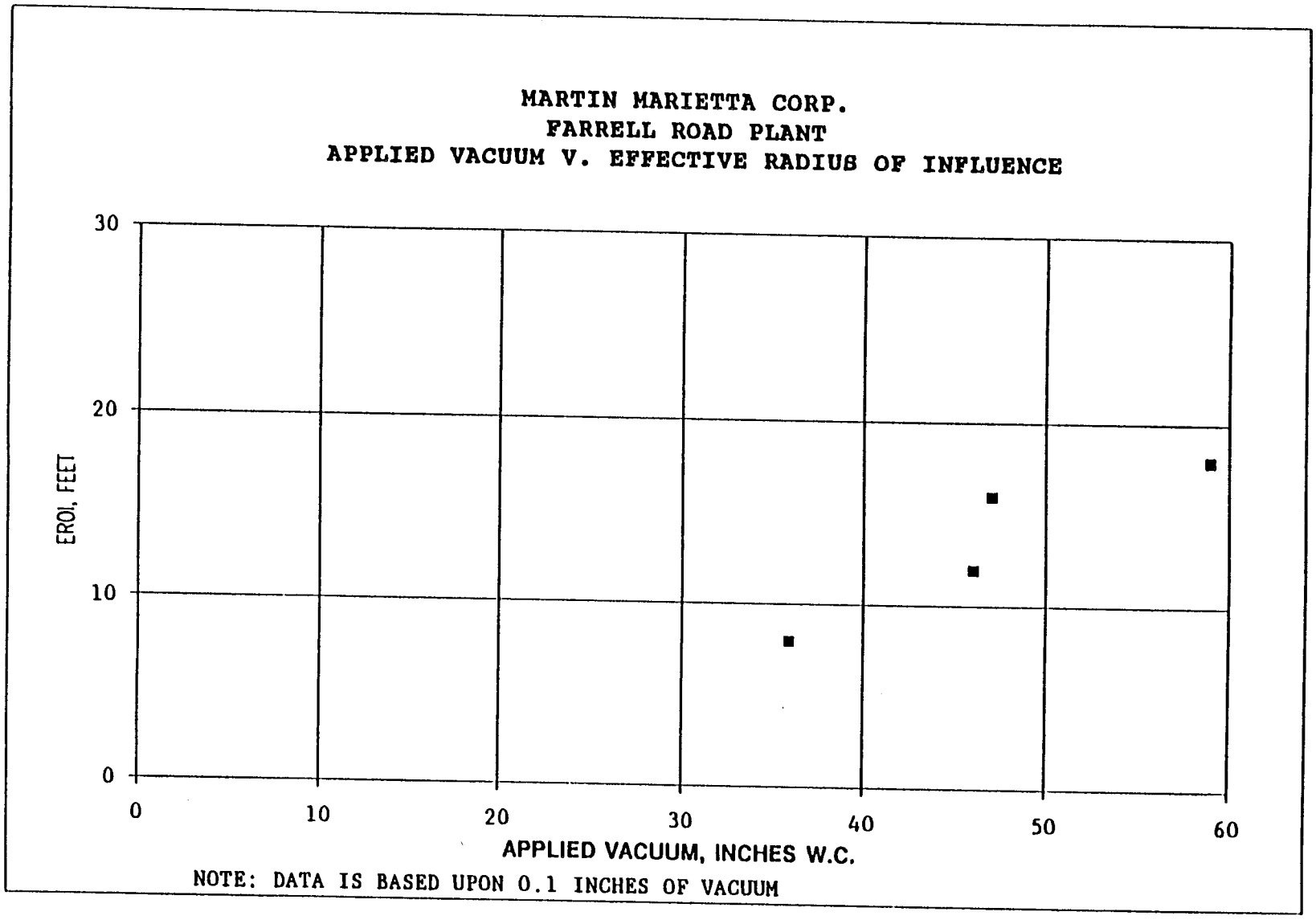

GUARD SHACK
DOOR
N
REMOVED UNDERGROUND WASTE OIL TANK (T-66)
REMOVED UNDERGROUND FUEL OIL TANK (T-67)
9 REMOVED UNDERGROUND SOLVENT TANKS (T-57 thru T-65)
VEW-1
CN VA
1 46
2 58
3 36
4 47
MW-5
CN VR
1 0.20
2 0.30
3 0.19
4 0.30
MW-4
CN VR
1 1.9
2 2.8
3 2.0
4 3.0
MW-3
CN VR
1 0.18
2 0.22
3 0.15
4 0.22
MW-2
CN VR
1 0.04
2 0.06
3 0.05
4 0.08
MW-1
CN VR
1 0.02
2 0.02
3 0.02
4 0.01
VEW-1
LEGEND
PNEUMATIC OBSERVATION WELL LOCATION
APPROX. AREA OF UNSATURATED SOIL CONTAMINATION (VOC'S) > 1000 ug/kg
VEW-1 VACUUM EXTRACTION WELL
CN CONDITION NUMBER
VR VACUUM RESPONSE INCHES W.C.
VA VACUUM APPLIED INCHES W.C.
TITLE
PNEUMATIC RESPONSE DATA-SOIL VAPOR EXTRACTION PILOT TEST
PREPARED FOR
MARTIN MARIETTA CORPORATION
ERM-Northeast
Environmental Resources Management
SCALE 1" = 30'
FIGURE 5
DRAWN E.M./M.M
JOB NO: 557 028
FILE NAME MTNS
DATE 10/20/93


MARTIN MARIETTA CORP.
FARRELL ROAD PLANT
VACUUM RESPONSE V. DISTANCE
10
1
0.1
0.01
VACUUM, IN. W.C.
5
10
15
30
50
DISTANCE F/VEW-1, FT.
Cond. #1
Cond. #2
Cond. #3
Cond. #4

With the exception of observation well VW-4, the semi-log plot of vacuum (log scale) versus distance from the extraction well is linear. The vacuum response for VW-4 is greater then expected based on the data from the other wells. Using the data from observation wells MW-1, MW-2, MW-3 and MW-5 and linear regression analysis, the distance from the extraction well at which the vacuum response is equal to 0.1 inches water can be determined for each run. As discussed earlier, this distance represents the effective radius of influence (EROI). This has been done and the EROI has been determined for each run. A plot of EROI versus applied vacuum is presented in Figure 7. This plot shows how the EROI increases with increasing applied vacuum but then levels off at the higher vacuums. A curve has been drawn through the data points in Figure 7 which can be used to estimate the EROI for any applied vacuum. From the plot, it appears that the optimum applied vacuum is 50 inches water column, (W.C.) which would result in an EROI of 20 feet.

For establishing a design basis for the full-scale soil vapor extraction system, a margin of safety should be applied. It is therefore recommended that an applied vacuum of 50 inches W.C. be used as the design basis with an EROI of 20 feet. From Figure 4, at 50 inches W.C. the expected soil vapor flow rate is approximately 7.0 scfm, although for condition 3, the flow rate was measured at 7.37 cfm at 48 inches W.C. To be conservative, the design soil vapor flow rate (to be used for sizing the emission control system) is 10 scfm per well. The pneumatic design basis is summarized below:

Vacuum Applied to each Extraction Well	50 inches W.C.
Soil Vapor Flow Rate per Well	10 scfm
Effective Radius of Influence	20 feet


MARTIN MARIETTA CORP.
FARRELL ROAD PLANT
APPLIED VACUUM V. EFFECTIVE RADIUS OF INFLUENCE
EROI, FEET
30
20
10
0
0
10
20
30
40
50
60
APPLIED VACUUM, INCHES W.C.
NOTE: DATA IS BASED UPON 0.1 INCHES OF VACUUM

The laboratory analytical results of the soil vapor samples are presented in Table 4. As previously discussed, two types of analytical methods were used, EPA Method TO-14 and NIOSH 1003. The following is a summary of information related to the air sampling.

Sample ID	Condition	Pump On (minutes)	Flowrate (ℓ/min)	Volume (ℓ)
MMCS1	Background	13	0.15	1.95
MMCS2	1	14	0.15	2.10
MMCS3	2	14	0.15	2.10
MMCS4A	3	15	0.15	2.25
SUMMA 0002	2	---	---	---

As shown in Table 4, five soil vapor samples were analyzed, each at a different operating condition, including a background condition. The results of samples MMCS2, MMCS3 and MMCS4A were used to calculate the average contaminant concentration to be used for the design basis. As shown in Table 4, the average total VOC concentration is 5272 ppm, the majority of which consists of toluene (2247 ppm), xylenes (994 ppm) and 1,1,1-trichloroethane (1627 ppm).

TABLE 4
MARTIN MARIETTA CORPORATION
FARRELL ROAD PLANT
SOIL VAPOR EXTRACTION ANALYTICAL RESULTS

			CONDITION									
		Background	1	1*	2	2*	3	3*	2	2*		
Code	Compound	MMCS1 (ppm)	MMCS2 (ppm)	(ppm)	MMCS3 (ppm)	(ppm)	MMCS4A (ppm)	(ppm)	SUMMA 0002 (ppm)	(ppm)	Average Design Condition (ppm)	lbs/hr
0856	n-octane	7.2	ND<0.92	56	ND<0.92	31	ND<0.86	60	ND	0	49	0.08
0859	toluene	2100.	41.	2501	65.	2210	29.	2030	15.	510	2247	3.53
0860	ethylbenzene	140.	3.3	201	6.2	211	2.9	203	1.5	51	205	0.32
0861	xylenes	730.	15.	915	32.	1088	14.	980	6.8	231	994	1.56
0869	methylethylketone	10.	ND<1.6	98	ND<1.6	54	ND<1.5	105	ND	0	86	0.14
0883	1,1-dichloroethane	19.	ND<1.2	73	ND<1.2	41	ND<1.1	77	ND	0	64	0.10
0885	1,1,1-trichloroethane	1700.	32.	1952	45.	1530	20.	1400	25.	850	1627	2.56
	Total	76,976.20	91.3	5796	148.2	5165	65.9	4855	48.3	1642	5272	8.29

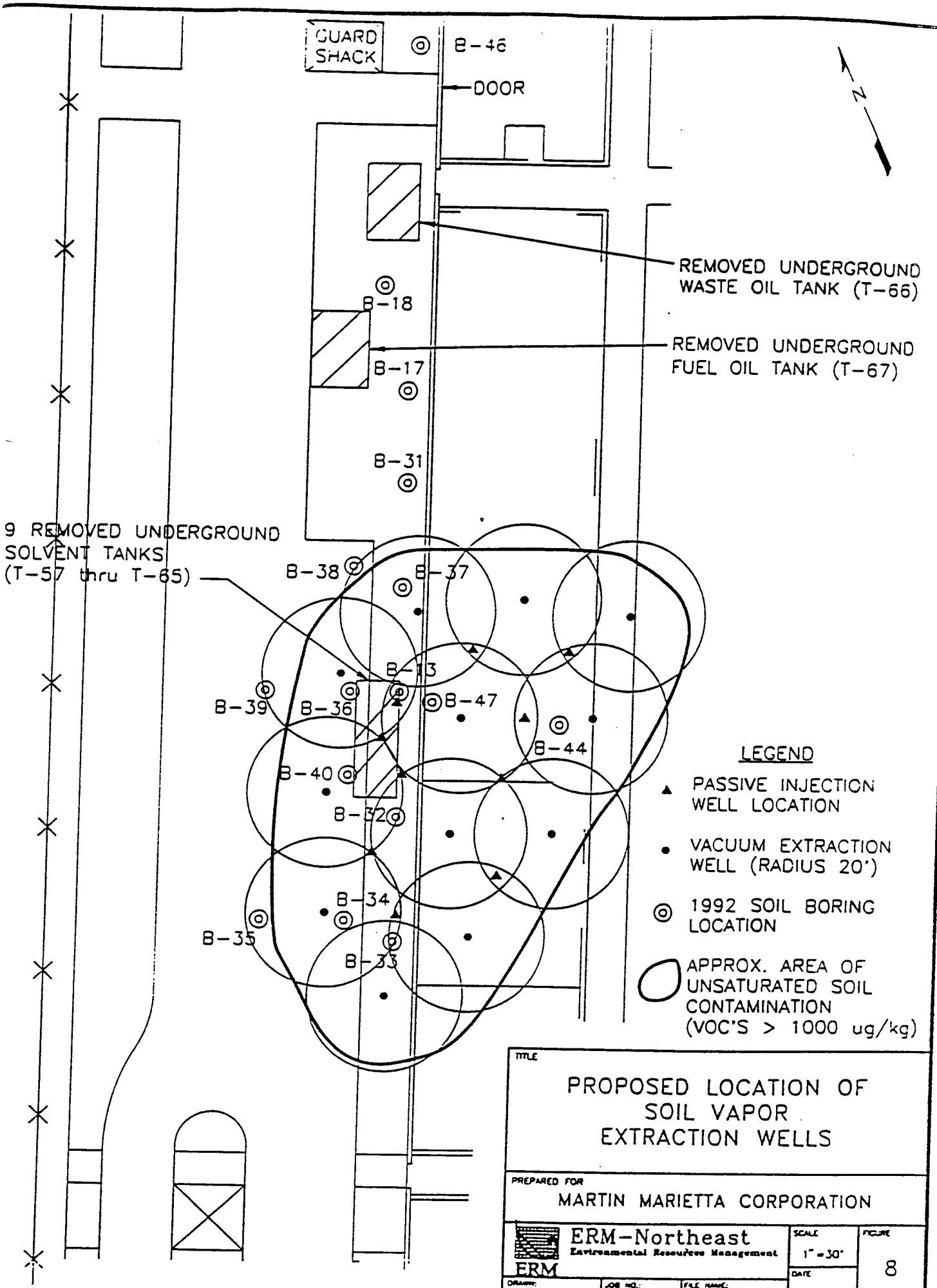
Notes:
1. * Data with dilution factors accounted for.
2. The average design condition is based on condition 1 (MMCS2), condition 2 (MMCS3) and condition 3 (MMCS4A) data.
3. ND (Non-detectable) indicates that the contaminant was below the detection limit of the analytical method.
4. The numbers included in the total line indicate the total for contaminants that were detected.

CONDITION	DILUTION FACTOR
1	61
2	34
3	70
2	34

To effectively remediate the unsaturated contaminated soil near the old solvent storage tank, the extraction wells must be spaced such that the EROI of the extraction wells completely encompass the contaminated area. To do this, a total of twelve extraction wells are needed as shown on Figure 8, which shows the proposed locations of these extraction wells. A 20 foot EROI has been drawn around each extraction well and the EROI of the twelve wells completely encompass the contaminated soils. Seven passive injection wells are also proposed, as shown on Figure 8, to prevent a dead space in between the extraction wells. The results of the pilot study indicate a consistent pneumatic response with the surface seal in place. It is therefore recommended that a surface seal be used in the full scale design.

At a design flow of 10 cfm per well, the total soil vapor flow rate is 100 cfm. The required vacuum at the extraction wells is 50 inches W.C. To account for pressure drops across piping, valves, fittings, the moisture knockout drum and particulate filter, and necessity for dilution air, it is recommended that the vacuum blower be sized for a minimum of 200 cfm at 50 inches W.C. vacuum.

The design soil vapor characteristics are shown in Table 4. This table includes the pounds per hour of each contaminant in the extracted soil vapor at a flow rate of 100 cfm. The total VOC mass removal rate is 8.29 pounds per hour, for a monthly mass removal of 6000 lbs. The use of carbon for emission controls is not feasible due to a high carbon usage rate. For air emission controls, a thermal oxidizer is recommended.


GUARD SHACK
B-46
DOOR
N
REMOVED UNDERGROUND WASTE OIL TANK (T-66)
REMOVED UNDERGROUND FUEL OIL TANK (T-67)
B-18
B-17
B-31
9 REMOVED UNDERGROUND SOLVENT TANKS (T-57 thru T-65)
B-38
B-37
B-13
B-39
B-36
B-47
B-44
B-40
B-32
B-34
B-35
B-33
LEGEND
PASSIVE INJECTION WELL LOCATION
VACUUM EXTRACTION WELL (RADIUS 20')
1992 SOIL BORING LOCATION
APPROX. AREA OF UNSATURATED SOIL CONTAMINATION (VOC'S > 1000 ug/kg)
TITLE
PROPOSED LOCATION OF SOIL VAPOR EXTRACTION WELLS
PREPARED FOR
MARTIN MARIETTA CORPORATION
ERM-Northeast
Environmental Resources Management
ERM
SCALE
1" = 30'
FIGURE
8
DRAWN:
E.M /M.M
JOB NO.:
557 028
FILE NAME:
MTN8
DATE
9/21/93

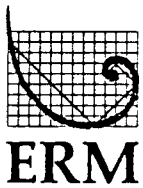
A MEMBER OF THE ENVIRONMENTAL RESOURCES MANAGEMENT GROUP

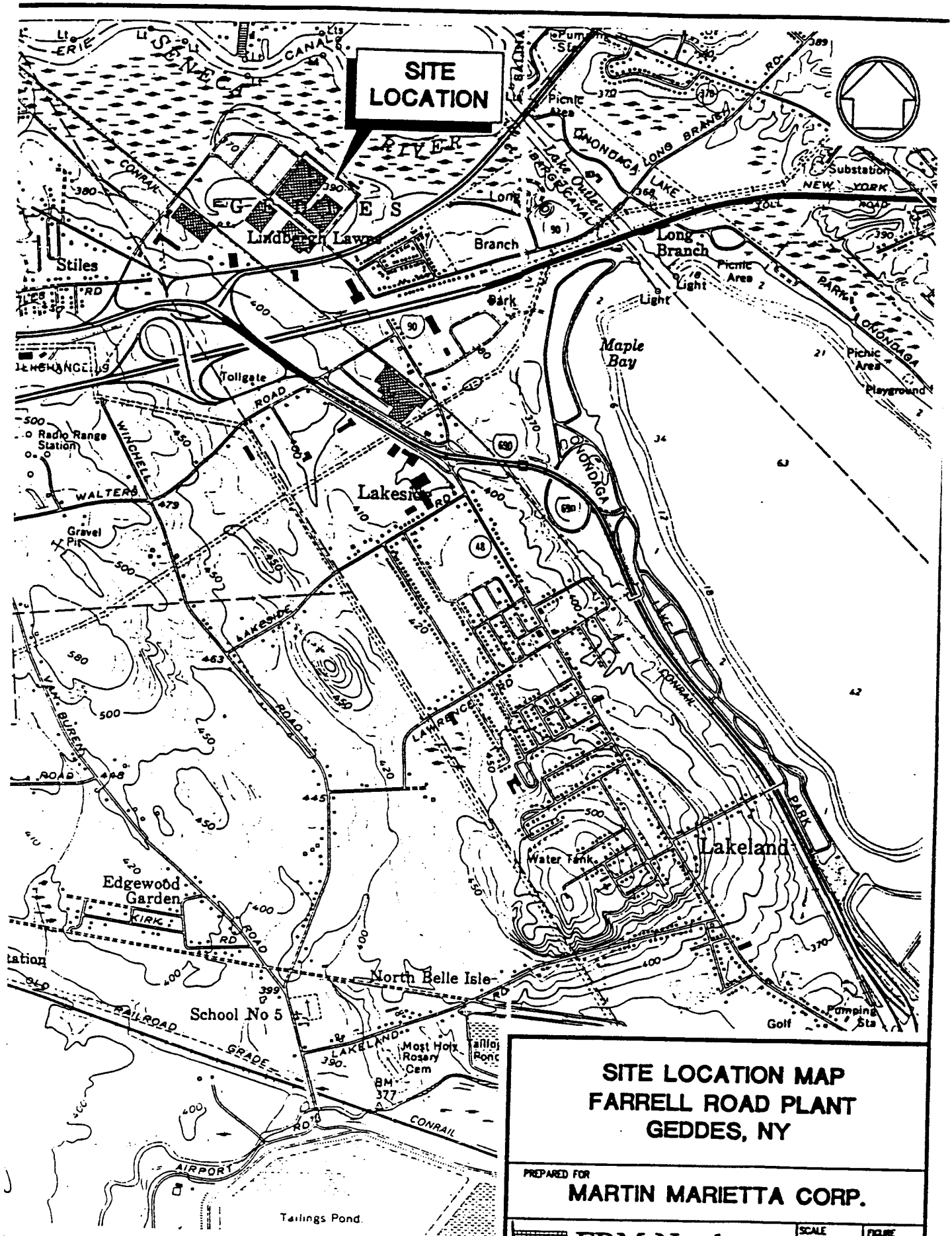
MARTIN MARIETTA CORPORATION

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLAN
MARTIN MARIETTA CORPORATION
FARRELL ROAD PLANT
GEDDES, NEW YORK

January, 1994

ERM-NORTHEAST, INC.
5788 Widewaters Parkway
Dewitt, New York 13214





SOURCE: USGS 7.5 MINUTE QUADRANGLES CAMILLUS AND SYRACUSE WEST, NY

SITE LOCATION MAP
FARRELL ROAD PLANT
GEDDES, NY

PREPARED FOR

MARTIN MARIETTA CORP.

ERM-Northeast
Environmental Resources Management
5700 Kirkville Rd. Suite H, East Syracuse, NY 13057
Tel (315)437-0677 Fax(315)437-2025

SCALE 1"=2000'

FIGURE 3-1

DATE 9/83

3.0 BACKGROUND

3.1 SITE DESCRIPTION/HISTORY

FRP is located northeast of the intersections of Routes 690 and 90 and south of the Seneca River (Figure 3-1). The property was developed in the early 1960's by General Electric Aerospace (GE) as a manufacturing center, and has been used as a design, manufacturing and assembly center for radar and sonar equipment. By December 1992, GE had moved all operations from FRP to other locations. GE sold the western portion of FRP (FRP-2), which includes Building No. 2 and the maintenance garage, to MMC in April 1993. Ownership of FRP-2 was transferred to Syroco, Inc. in December of 1993. MMC leases the eastern portion of the site (FRP-1) which includes Building No. 1 and the Test Building.

The 156-acre site includes four buildings (see Work Plan Document 1, Plate 1): Building No. 1 was used as a design center; Building No. 2 was used as a manufacturing and assembly plant; the Test Building was used to test radar products; and the maintenance garage was used to service and house plant support vehicles.

Building No. 1 is approximately 175,000 square feet and Building No. 2 is approximately 300,000 square feet; the buildings are connected by a ground level walkway. The maintenance garage is approximately 6,500 square feet and is located at the northwest corner of the site. The Test Building is approximately 9,000 square feet and is located at the northeast corner of the site.

The four buildings are enclosed by a perimeter fence which is bordered by large paved parking areas on the east and west. The Site is bordered on the south by Farrell Road, on the north and west by the Seneca River and on the east by John Glenn Boulevard.

3.2 *PHYSICAL SETTING*

The site is located within the Ontario Lowland geological province of New York State. The lowlands are characterized by large areas of low relief interrupted by streamlined hills called drumlins. Surficial geology at the site is composed of modern and glacial-aged lake sediments (Muller and Cadwell, 1986) underlain by Silurian (>400 million years old) shales and evaporates (Rickard and Fisher, 1970).

A shallow unconfined aquifer was mapped in the area by Kantrowitz (1970) and Winkley (1989). The shallow aquifer is composed of glacial sand and gravels and has been reported to produce usable quantities of water. Shallow ground water is between two feet and seven feet beneath the ground surface, and flows to the north. Bedrock beneath the site is likely to produce low-yielding wells with salty water (Kantrowitz, 1970).

3.3 *PREVIOUS INVESTIGATIONS*

ERM conducted a preliminary hydrogeologic investigation in June 1991. The investigation was designed to determine site-wide ground water flow direction, to estimate the extent of petroleum residuals near an underground storage tank (UST) T-51 east of Building No. 2, and to determine the potential effects of a septic leach field near the maintenance garage. Results indicated that ground water generally flows in a north/northwest direction across the site; and ground water adjacent to UST T-51 has been affected by petroleum residuals and volatile organic compounds (VOCs).

As a follow-up investigation, ERM conducted a Phase II Hydrogeologic Investigation in November 1991. The purpose of the investigation was to estimate the extent of petroleum residuals and VOCs in the soil and ground water near the UST (T-51). The investigation determined that petroleum residuals were limited to the area proximal to the removed UST, and anomalous VOCs (predominantly freon) were present in ground

water east of Building No. 2. ERM recommended further ground water investigation.

Concurrent with the ground water investigations at the site, ERM conducted a Phase I Environmental Site Assessment. The site assessment included a review of all available site records with environmental implications, examination of site manufacturing processes, storage and disposal procedures and interviews with current and past employees.

Based on the Phase I reports, ERM identified 16 areas of FRP that needed further investigations. The areas requiring investigation are listed on Table 3-1 and illustrated on Plate 1, Work Plan Document I.

Each of these areas of concern was investigated in 1992. Results of the 1992 investigations are presented in reports entitled:

1) Phase I Environmental Assessment of GE Farrell Road Plant One (FRP-1), Town of Geddes, New York;

2) 1992 Environmental Investigation, GE Farrell Road Plant One (FRP-1), Syracuse, New York;

3) Phase I Environmental Assessment of GE Farrell Road Plant Two (FRP-2), Syracuse, New York;

4) 1992 Environmental Investigation, GE Farrell Road Plant Two (FRP-2), Syracuse, New York;

5) A letter report dated 15 September 1992; Re: PCB Sampling at Farrell Road Plant Two;

TABLE 3-1
AREAS OF CONCERN IDENTIFIED IN PREVIOUS INVESTIGATIONS
MARTIN MARIETTA CORPORATION
FARRELL ROAD PLANT

1.	Debris Pile North of FRP-2.
2.	Septic Leach Field North of Test Building.
3.	Former Above Ground Solvent Tanks in FRP-2.
4.	Removed Above Ground Tanks East Side of FRP-2.
5.	Removed USTs and Drywell West Side of FRP-2.
6.	Printed Wire Board (PWB) Assembly.
7.	Removed UST T-51.
8.	Area of Freon Residuals.
9.	Removed UST T-50.
10.	Temporary Hazardous Material Storage Area.
11.	Radar Test Area.
12.	Paint Booth Area.
13.	Chemical Laboratory and Associated Underground Septic Tank.
14.	Septic and Storm Drainage Headwall West of the Garage.
15.	USTs Near Old Metal Finishing Room.
16.	Removed Gasoline UST Near the Garage.

6) A letter report dated 15 September 1992, Re: Soil Remediation at Farrell Road Plant Two;

7) Garage Area Investigation, GE Farrell Road Plant Two, Addendum to the 1992 Environmental Investigation;

8) Debris Pile Excavation, GE Farrell Road Plant Two; Addendum to the 1992 Environmental Investigation; and

9) A letter report dated 23 October 1992; Re: Ground Water Sampling North of the Farrell Road Plant.

The 1992 environmental investigations assessed each area of concern and included IRMs at two locations (Area 1 and Area 5). IRMs have been conducted at Areas 1, 5 and 11; however, analytes of concern remain at these locations. The areas that will require additional investigation and are addressed in this Work Plan are:

- debris pile north of FRP (Area 1);
- septic leach field north of Test Building (Area 2);
- former above ground solvent tanks in FRP-2 (Area 3);
- removed above ground storage tanks, east side of FRP-2 (Area 4);
- removed USTs and drywell, west side of Building No. 2 (Area 5);
- removed UST T-51 (Area 7/Area 8 combined);
- removed UST T-50 (Area 9);
- temporary hazardous material storage area (Area 10);
- radar test area (Area 11);
- paint booth area (Area 12);
- septic and storm drainage headwall west of the garage (Area 14); and
- removed gasoline UST near the garage (Area 16).

In addition to these specific areas to be investigated, several other site-wide investigative and evaluative tasks will be performed:

- investigation of the site's storm sewer system;
- additional wetland hydrogeologic investigation;
- a bedrock aquifer investigation;
- a round of ground water sampling and analysis;
- performance of a qualitative Human Health Evaluation (HHE);
- performance of an Ecological Survey (ES); and
- performance of a Feasibility Study.

4.3 *AREA 3 - FORMER ABOVE GROUND SOLVENT TANKS*

Two above grade 275-gallon trichloroethene (TCE) tanks and one above grade 275-gallon waste oil tank previously existed beneath an elevated steel floor in FRP-2. A soil sample and a ground water sample were collected from beneath this area and analyzed for VOCs. The soil did not contain any VOCs while the ground water contained 99 $\mu g/\ell$ of TCE, probably derived from a source upgradient of this area based on the absence of this compound in the soil underlying the tanks.

4.4 *AREA 4 - REMOVED ABOVE GROUND TANKS EAST SIDE OF FRP-2*

Interviews with plant personnel revealed that tanks or trailers, possibly containing solvent, were previously located on the east side of FRP-2 (Area 4, Plate 1). Two borings advanced to ground water in this area did not encounter any evidence of the presence of VOCs and samples were not collected for analysis.

4.5 *AREA 5 - REMOVED USTs AND DRYWELL WEST SIDE OF FRP-2*

A review of building plans and plant personnel interviews indicated that up to nine solvent USTs and a drywell were located along the west wall of FRP-2 (Area 5, Plate 1). A soil gas survey of the area revealed elevated concentrations of VOCs in the soil and a GPR survey revealed buried pipes and a large area of disturbed soil, apparently at the location of the former tanks.

ERM conducted a soil boring program in the area in and around the removed tanks and throughout the interior of FRP-2 to determine the extent of affected soil and ground water beneath the building. The area of affected soil, for the most part, is limited to the area around the solvent tanks and drywell. There is very little affected soil away from this area. The suite of compounds detected included three chlorinated solvents (1,1-

dichloroethene (1,1-DCE); 1,1-dichloroethane (1,1-DCA); and 1,1,1-trichloroethane (1,1,1-TCA)) and three non-chlorinated solvents (toluene, ethylbenzene and xylenes).

During the investigation, an abandoned "paint drippings" drywell was identified near the solvent tanks. The drywell was excavated under a source control action. The contents of the drywell were sampled and found to contain the same suite of VOCs as had been discovered in the soil in the solvent tank area.

Ground water samples were collected from upgradient (west of the building) and downgradient (beneath the building) directions. Upgradient samples contained only trace amounts of solvents. Downgradient samples contained a suite of compounds similar to the compounds detected in the solvent tanks and drywell area. The area of affected ground water extends eastward from the solvent tank area to approximately the center of the building (220 linear feet). From the center of the building it extends northward approximately two-thirds the length of the building (350 linear feet).

Various remedial alternatives have been evaluated for this area and soil vapor extraction has been preliminarily identified as the most appropriate soil remediation. A soil vapor extraction pilot test was performed by ERM in August 1993.

4.6 *AREA 6 - PRINTED WIRE BOARD (PWB) ASSEMBLY*

GE operated a printed wire board (PWB) assembly area in the southwest corner of FRP-2 (Area 6, Plate 1). A plating facility, as well as etching and soldering baths, were active and used in the assembly process. Four USTs were also associated with the PWB: 1) T-53, an acid storage tank; 2) T-54, cupric chloride tank; 3) T-55, sewer settling tank, and 4) T-56, spill containment tank. To determine the environmental effect from these

MARTIN MARIETTA CORPORATION

WORK PLAN DOCUMENT I

DESCRIPTION OF INTERIM REMEDIAL MEASURE FOR AREA OF CONCERN # 5

MARTIN MARIETTA CORPORATION
FARRELL ROAD PLANT
GEDDES, NEW YORK

April 18, 1994

ERM-NORTHEAST, INC.
5788 Widewaters Parkway
Dewitt, New York 13214

1.0 INTRODUCTION

Martin Marietta Corporation (MMC), is a corporation doing business in the State of New York which previously owned a property known as Farrell Road Plant 2 (FRP-2) and leased an adjacent property known as Farrell Road Plant 1 (FRP-1), on Farrell Road in the Town of Geddes, New York. Portions of these properties comprise the "GE Farrell Road Site" and are referred to as "FRP" or the "site". The site is located northeast of Routes 690 and 90, south of the Seneca River and approximately one mile to the west of Onondaga Lake. The site (FRP-1 and FRP-2) consists of approximately 130 acres of which approximately 81 acres have been classified as a Class One wetland by the New York State Department of Environmental Conservation (NYSDEC).

Previous environmental investigations conducted at the site have determined that soil and ground water have been affected by past activities at FRP. As a result, the FRP site was listed by NYSDEC on the Registry of Inactive Hazardous Waste Disposal Sites (Site No. 734055).

In April 1993, MMC purchased the FRP-2 portion of the site from General Electric Company (GE). In December 1993, MMC transferred title for that portion of the site to Syroco, Inc., an unrelated corporation. MMC has entered into an Order on Consent (the "Order") with NYSDEC (Index #A7-0308-93-10), dated 21 March 1994, to conduct Interim Remedial Measures (IRMs), on its own behalf as prior owner and as successor in interest to GE.

MMC has also entered into an Order on Consent with NYSDEC (Index #A7-0307-93-10), dated 15 December 1993, for the performance of a Remedial Investigation and Feasibility Study ("RI/FS") at the site.

The goal of the Order is to develop and implement three IRMs at FRP-2 in three Areas of Concern (AOCs). This IRM Work Plan will describe the remedial objectives of the IRM program for AOC #5 (as identified in Attachment C to the Order), and the methods and procedures to be implemented to achieve the remedial objectives.

1.1 PURPOSE AND ORGANIZATION OF THE IRM WORK PLAN

Martin Marietta's consultant, ERM-Northeast, Inc. (ERM), has prepared this IRM Work Plan (Work Plan) in accordance with the details outlined in Section II of the Order. This Work Plan focuses on the methods and procedures to be implemented in performing the IRM, including background information related to the AOC (Document I - Section 2.0), a description of IRM activities (Document I - Section 3.0), a detailed Engineering Contingency Plan (Document I - Section 4.0), a Sampling and Analysis Plan (Document II), and a Health and Safety Plan (Document III).

This Work Plan consists of three sections as follows:

1) **Description of Interim Remedial Measure** - This section is designated Work Plan Document I and introduces the Work Plan, summarizes all background information related to the AOC, provides a description of IRM activities, identifies the selected treatment technology, defines remediation goals, details an AOC specific sampling program, outlines the schedule of IRM activities, and provides a detailed engineering contingency plan.

2) **Sampling and Analysis Plan (SAP)** - This section is designated Work Plan Document II and describes the sampling and analysis to be performed during the IRM including data quality objectives and

a Quality Assurance Project Plan (QAPP). The QAPP describes the procedures to be followed to provide quality assurance and maintain quality control while conducting activities described in the IRM field sampling plan.

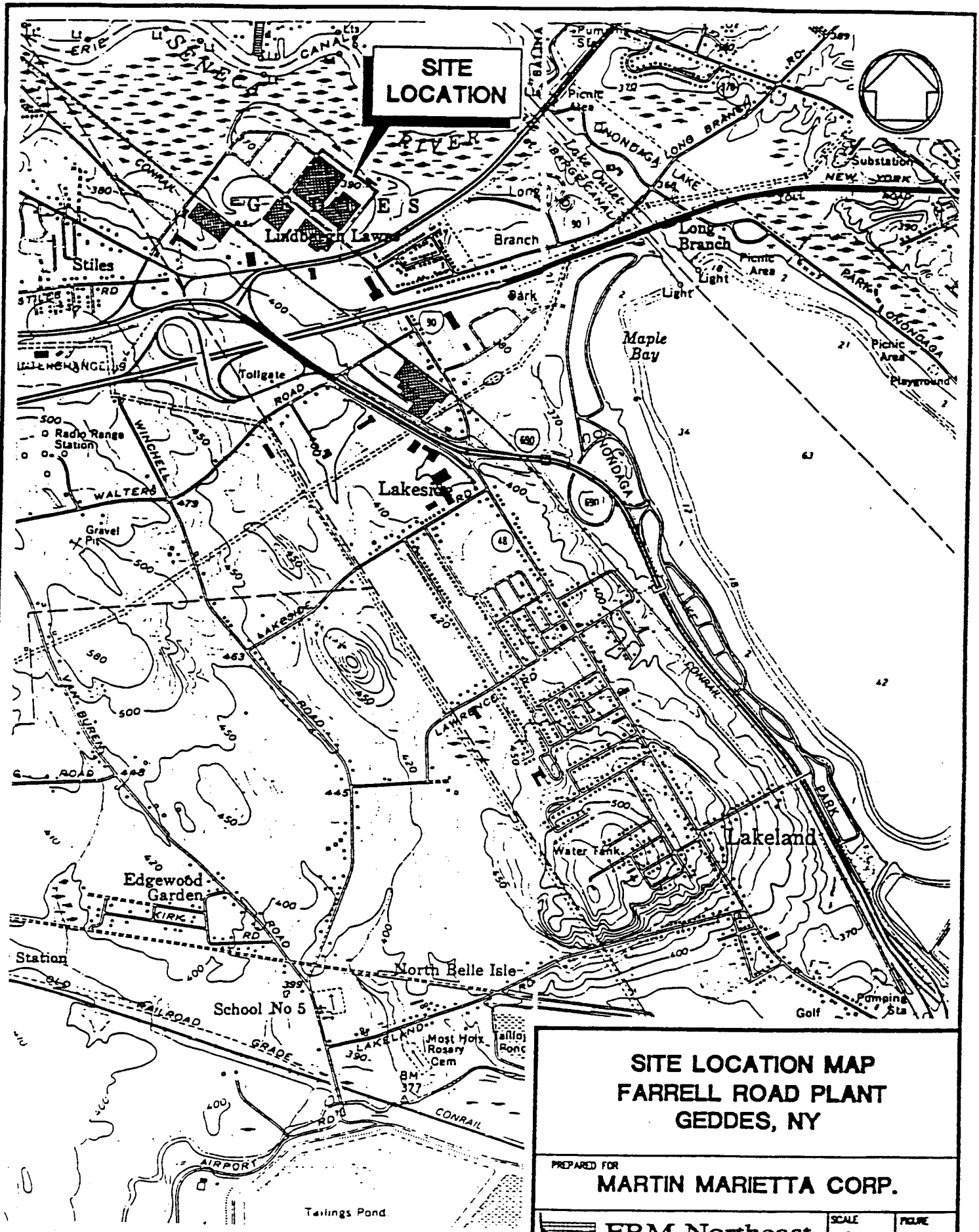
3) **Health and Safety Plan (HASP)** - This section is designated Work Plan Document III and describes the health and safety procedures to which all persons involved in implementation of the IRM shall adhere.

1.2 SITE BACKGROUND

The site is located northeast of the intersections of Routes 690 and 90, south of the Seneca River and approximately one mile to the west of Onondaga Lake as indicated on Figure 1-1. The property was developed in the early 1960s by General Electric Aerospace (GEA) as a manufacturing center, and was used as a design, manufacturing and assembly center for radar and sonar equipment. By December 1992, GEA had moved all operations from FRP to other locations. GEA sold FRP-2 to MMC in April 1993. Ownership of FRP-2 was transferred by MMC to Syroco, Inc. in December 1993. In February 1994, MMC assigned its lease for the FRP-1 property to Syroco, Inc.

The 130-acre site includes four buildings: Building No. 1 was used as a design center; Building No. 2 was used as a manufacturing and assembly plant; the Test Building was used to test radar products; and the Maintenance Garage was used to service and house plant vehicles.

Building No. 1 contains approximately 175,000 square feet of floor space and Building No. 2 contains approximately 300,000 square feet of floor



SOURCE: USGS 7.5 MINUTE QUADRANGLES CAMILLUS AND SYRACUSE WEST, NY

SITE LOCATION MAP
FARRELL ROAD PLANT
GEDDES, NY

PREPARED FOR
MARTIN MARIETTA CORP.

ERM-Northeast
Environmental Resources Management
6700 Fairville Rd. Suite H, East Syracuse, NY 13057
Tel.(315)437-0677 Fax(315)437-2025

SCALE	FIGURE
1"=2000'	1-1
DATE 9/93	

space; the buildings are connected by a ground level walkway. The Maintenance Garage contains approximately 6,500 square feet of floor space and is located at the northwest corner of the site. The Test Building contains approximately 9,000 square feet of floor space and is located at the northeast corner of the site. The location of these buildings is depicted on the Site Map included as Plate 1.

The four buildings are enclosed by a perimeter fence which is bordered by large paved parking areas on the east and west. The site is bordered on the south by Farrell Road, on the north and west by the Seneca River and on the east by John Glenn Boulevard.

The site is located within the Ontario Lowland geological province of New York State. The lowlands are characterized by large areas of low relief interrupted by streamlined hills called drumlins. Surficial geology at the site is composed of modern and glacial-aged lake sediments (Muller and Cadwell, 1986) underlain by Silurian (greater than 400 million years old) shales and evaporates (Rickard and Fisher, 1970).

A shallow unconfined aquifer was mapped in the area by Kantrowitz (1970) and Winkley (1989). The shallow aquifer is composed of glacial sand and gravels and has been reported to produce usable quantities of water. Shallow ground water is between two feet and seven feet beneath the ground surface, and flows to the north. Bedrock beneath the site is likely to produce low-yielding wells with salty water (Kantrowitz, 1970).

1.3 PREVIOUS INVESTIGATIONS/REPORTS

ERM conducted a preliminary hydrogeologic investigation in June 1991. The investigation was designed to determine site-wide ground water flow direction, to estimate the extent of petroleum residuals near an

underground storage tank (UST) T-51 east of Building No. 2, and to determine the potential effects of a septic leach field near the maintenance garage. Results indicated that ground water generally flows in a north/northwest direction across the site; and ground water adjacent to UST T-51 has been affected by petroleum residuals and volatile organic compounds (VOCs).

As a follow-up investigation, ERM conducted a Phase II Hydrogeologic Investigation in November 1991. The purpose of the investigation was to estimate the extent of petroleum residuals and VOCs in the soil and ground water near UST T-51. The investigation determined that petroleum residuals were limited to the area proximal to UST T-51, and anomalous VOCs (predominantly freon) were present in ground water east of Building No. 2. ERM recommended further ground water investigation.

Concurrent with the ground water investigations at the site, ERM conducted a Phase I Environmental Site Assessment of FRP. The site assessment included a review of all available site records with environmental implications, examination of site manufacturing processes, storage and disposal procedures and interviews with current and past employees.

Based on the Phase I reports, ERM identified 16 areas of FRP that needed further investigations. Three of the areas requiring investigation are AOCs covered within the Order including:

- AOC #5 - removed USTs and drywell on the west side of Building No. 2;

- AOC #7 - removed UST T-51 on the east side of Building No. 2; and

- AOC #16 - removed gasoline UST near the Maintenance Garage.

Results of previous investigations are presented in the following documents prepared by ERM unless otherwise noted:

1) *Preliminary Hydrogeologic Investigation of the GE Aerospace Farrell Road Plant*. 27 June 1991;

2) *A Letter Report Regarding: Investigation of Trichloromethane Sources Farrell Road Plant*. 23 September 1991;

3) *Phase II Hydrogeologic Investigation of GE Aerospace, Farrell Road Plant*. 15 November 1991;

4) *A Letter Report Regarding: Summary of Gasoline Underground Storage Tank and Soil Removal*. 18 June 1992; prepared by Blasland & Bouck Engineers, P.C.;

5) *Phase I Environmental Assessment of GE Farrell Road Plant Two (FRP-2), Syracuse, New York*. 31 December 1992 (Amended 2 July 1992);

6) *Phase I Environmental Assessment of GE Farrell Road Plant One (FRP-1), Town of Geddes, New York*. 31 December 1991 (Amended 10 July 1992);

7) *1992 Environmental Investigation, GE Farrell Road Plant Two (FRP-2), Syracuse, New York*. 10 July 1992;

8) *1992 Environmental Investigation, GE Farrell Road Plant One (FRP-1), Syracuse, New York*. 16 July 1992;

9) *A Letter Report Regarding: PCB Sampling at Farrell Road Plant Two.* 15 September 1992;

10) *Debris Pile Excavation, GE Farrell Road Plant Two; Addendum to the 1992 Environmental Investigation.* 29 July 1992;

11) *A Letter Report Regarding: Soil Remediation at Farrell Road Plant Two.* 15 September 1992;

12) *Garage Area Investigation, GE Farrell Road Plant Two, Addendum to the 1992 Environmental Investigation.* (issued in draft form 17 September 1992; reissued 14 October 1992);

13) *A Letter Report Regarding: Ground Water Sampling North of the Farrell Road Plant.* 23 October 1992;

14) *A Letter Report Regarding: Farrell Road Plant; Storm and Sanitary Sewer Survey* . 15 June 1993;

15) *Soil Vapor Extraction Pilot Test Results.* August 1993;

16) *A Letter Report Regarding: MMC Farrell Road Site; 10 Soil Borings at Proposed Loading Dock.* 2 September 1993;

17) *Soil Remediation Design Report; Soil Vapor Extraction Pilot Study - Former Solvent Storage Tank Area (Area 5).* October 1993.

18) *Remedial Investigation/Feasibility Study Work Plan; Farrell Road Plant.* January 1994;

19) *Accelerated RI/FS Tasks; Farrell Road Plant Field Summary Data Report*. March 1994.

1.4 *IDENTIFY AOC*

This IRM Work Plan will describe the IRM program for the soil remediation in the area of the removed USTs and drywell located on the west side of Building No. 2. This area has been designated as AOC #5 (former solvent storage tank area) and its location is indicated on the Site Plan and Areas of Concern included as Plate 2.

2.0 BACKGROUND OF AOC #5

This section of the Work Plan discusses the history, geology, previous remedial investigations, and contaminant characterization specific to AOC #5.

2.1 DESCRIPTION

AOC #5 is located on the west side of Building No. 2 within the FRP-2 portion of the site and consists of approximately 3,300 cubic yards (cy) of affected soil. Approximately 2,300 cy of soil are located beneath Building No. 2 and 1,000 cy are located beneath grass/asphalt areas west of FRP-2.

2.2 HISTORY

A review of buildings plans and plant personnel interviews indicate that up to nine solvent USTs and a drywell were located along the west wall of Building No. 2. A soil gas survey of the area revealed elevated concentrations of VOCs in the soil and a Ground Penetrating Radar (GPR) survey revealed buried pipes and an area of disturbed soil, indicating the location of the former tanks.

During the investigation, an abandoned "paint drippings" drywell was discovered near the solvent storage tanks. The drywell was excavated under a source control action. The drywell contents were sampled and shown to contain the same suite of VOCs discovered in the solvent tank area soils.

ERM conducted a soil boring program in the vicinity of the removed tanks and throughout the interior of Building No. 2 to determine the extent of affected soil and ground water beneath the building. The zone of affected

soil is limited mainly to the area around the former solvent storage tanks and former drywell. The suite of compounds detected included six chlorinated solvents and three non-chlorinated solvents.

Ground water samples were collected from ground water monitoring wells located both upgradient and downgradient of the affected zone. Upgradient samples contained only trace concentrations of VOCs. Downgradient samples contained a suite of compounds similar to those detected in the former solvent storage tank and former drywell area. The area of affected ground water extends eastward from the former solvent storage tank area to approximately the center of Building No. 2. From the center of Building No. 2 it extends northward approximately two-thirds of the building length. The area of affected ground water is indicated on Plate P-8 in the 1992 Environmental Investigation, GE Farrell Road Plant Two (FRP-2); July 1992 report.

2.3 *GEOLOGY*

The soil at AOC #5 is composed of medium to fine sand with silt partings. Ground water is located between seven and nine feet below ground. A dense red silt and clay "till" is located between seven and twelve feet below grade. The clay till acts as a lower ground water flow boundary which perches from one to three feet of ground water.

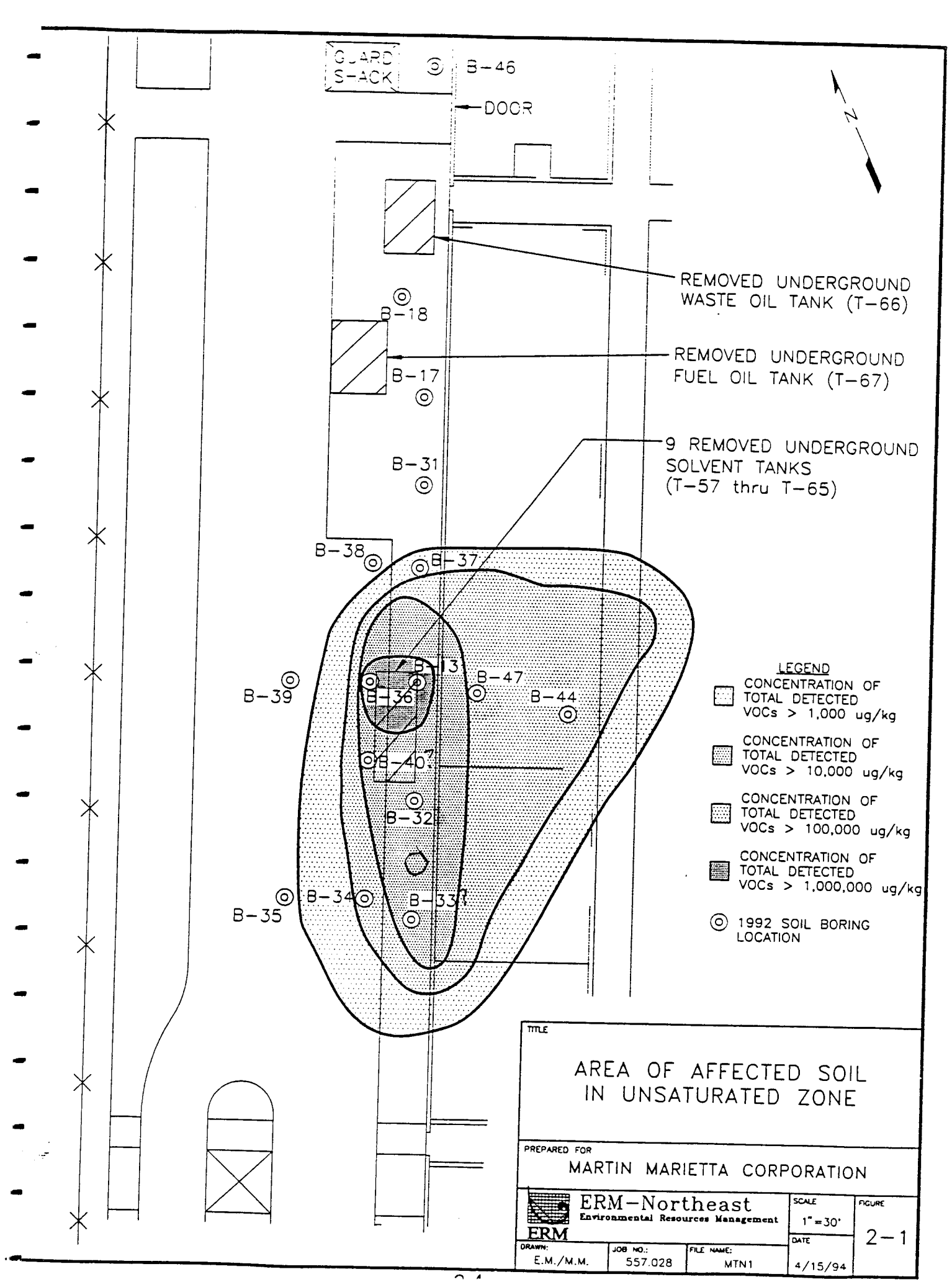
Although general ground water flow is from south to the north/northwest across the site, buried ridges on the red clay till surface [see Figure P-6, 1992 Environmental Investigation, GE Farrell Road Plant Two (FRP-2)] create a localized perturbation of flow to the east. Flow continues through a buried topographic low on the clay surface where it rejoins the generalized flow to the north.

The approximate extent of VOCs in unsaturated soil near the former solvent storage tank location has been delineated in a previous report entitled 1992 Environmental Investigation, GE Farrell Road Plant Two (FRP-2) dated 10 July 1992. The extent of affected soil in the unsaturated zone is indicated in Figure 2-1 which shows the locations of the soil borings used to delineate the area. VOCs in unsaturated soil were found in six borings B-13, B-33, B-36, B-40, B-44 and B-47. The highest concentration of VOCs was found in B-13, where the concentration of total VOCs was 7,580,000 ppb. Affected soil was found in soil borings taken at depths of approximately five feet below grade down to perched water which is approximately nine feet below grade.

In addition, a soil vapor extraction pilot test was performed, in July 1993, in the area where VOC-affected soil has been found. The pilot test was conducted to determine the technical feasibility of employing the soil venting technology and to collect the necessary data to design a full-scale system. Specifically, the goals of the pilot test were to establish: 1) the effective "radius of influence" in order to determine appropriate vapor extraction well spacing and the number of wells needed for full-scale operation; 2) the soil vapor extraction flow rate; 3) the required vacuum to be applied to the extraction wells; and 4) the air quality of the extracted soil vapor to determine the appropriate vapor treatment alternative.

2.5 CONTAMINANT CHARACTERIZATION

The compounds found in the soil at AOC #5 include: 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1-DCA), 1,2-dichloroethene (1,2-DCE), trichloroethene (TCE), 4 methyl 2-pentanone (MIBK), toluene, ethylbenzene and xylene.



TITLE

AREA OF AFFECTED SOIL IN UNSATURATED ZONE

PREPARED FOR

MARTIN MARIETTA CORPORATION

ERM-Northeast
Environmental Resources Management

SCALE	FIGURE
1" = 30'	2-1

DRAWN:	JOB NO.:	FILE NAME:	DATE
E.M./M.M.	557.028	MTN1	4/15/94

A summary of the VOC analytical data from soil borings obtained near the removed solvent storage tanks is presented in Table 2-1.

The analytical data obtained during the soil venting pilot test is presented in Table 2-2. The table indicates actual soil vapor concentrations. This information was used to determine the applicability of the soil venting technology and the appropriate vapor treatment technology.

Although the 1992 Environmental Investigation and soil venting pilot test adequately characterized the concentrations of VOCs in and around AOC #5, the presence or absence of other constituents in the soils due to possible past releases from the drywell will be investigated in accordance with the Remedial Investigation/Feasibility Study (RI/FS) Work Plan dated January 1994. One soil boring will be drilled to the red clay layer and sampled at two depths as described in the RI/FS Work Plan. The soil boring (designated as B-120) will be completed in the approximate location as shown on Figure 2-2. The two samples collected for laboratory analysis will be analyzed for the full target analyte list (TAL) and target compound list (TCL) parameters. The boring will be backfilled with auger cuttings upon completion.

TABLE 2-1
MARTIN MARIETTA CORPORATION
IRM WORK PLAN FOR AOC #5
FARRELL ROAD PLANT

VOC ANALYTICAL DATA FROM PREVIOUS INVESTIGATION
SOIL NEAR REMOVED SOLVENT STORAGE TANKS

ANALYTE	B-12 (5)	B-13 (6)	B-17 (10)	B-18 (6-8)	B-31	B-32	B-33	B-34	B-35	B-36	B-37	B-38	B-39	B-40	B-44 (6)	B-44 (10)	B-45 (6)	B-46 (6)	B-47 (9)	B-47a (9)
1,1 DCE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	210	25
1,2 DCE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	350	—	—	—	—
1,1 DCA	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	—	—	—	140	28
1,1,1-TCA	—	650,000	—	—	30	NS	17,000	NS	—	140,000	NS	14	—	34,000	23	1,300	80	—	12,000	40
TCE	—	—	—	—	—	NS	—	NS	—	—	NS	—	—	1,600	—	—	—	—	—	—
Benzene	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	—	2,100,000	—	—	—	NS	60,000	NS	10	740,000	NS	5	9	220,000	—	11,000	—	—	5,600	—
Ethylbenzene	—	630,000	—	6	—	NS	2,400	NS	—	220,000	NS	—	—	16,000	—	760	—	—	3,800	160
MIBK	—	2,000,000	—	—	—	—	—	—	—	—	—	—	—	—	—	21,000	—	—	—	—
Xylenes	—	4,200,000	—		—	NS	15,0000	NS	—	1,200,000	NS	—	—	100,000	—	4,600	—	—	28,000	570
TOTAL	0	7,580,000	0		30		144.400		10	2,300,000		19	9	371,600	35	38,030	80	0	49,750	923

NOTES:

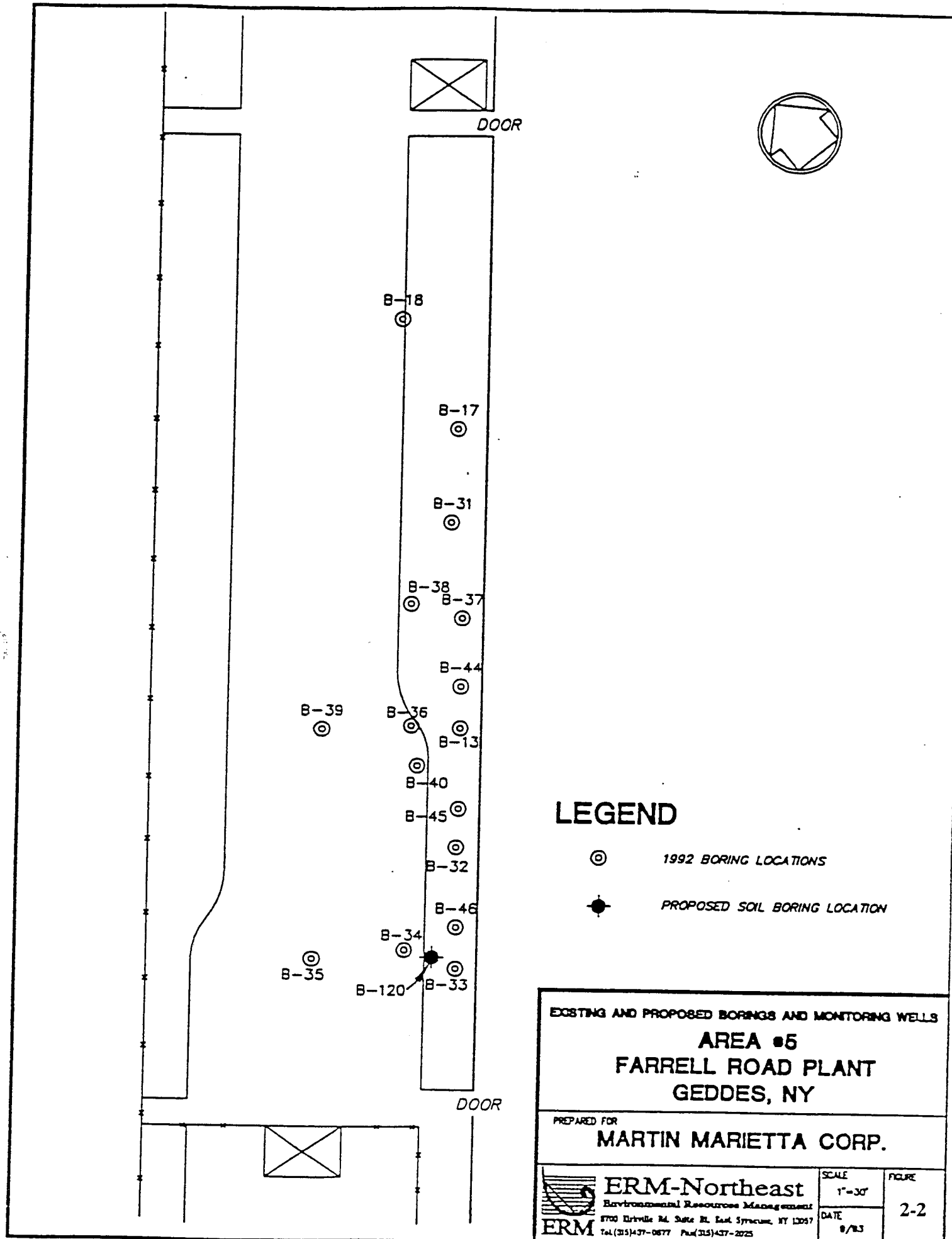
All values are in ug/kg (ppb).
NS = No sample (field screening only) for this boring.
--- = Compound not detected in this sample but present in another.
All Samples analyzed for priority pollutant volatile organic compound; compounds not listed were not detected in any sample.

TABLE 2-2
MARTIN MARIETTA CORPORATION
IRM WORK PLAN FOR AOC #5
FARRELL ROAD PLANT
SOIL VAPOR EXTRACTION ANALYTICAL RESULTS

			CONDITION									
		Background	1	1*	2	2*	3	3*	2	2*		
Code	Compound	MMCS1 (ppm)	MMCS2 (ppm)	(ppm)	MMCS3 (ppm)	(ppm)	MMCS4A (ppm)	(ppm)	SUMMA 0002 (ppm)	(ppm)	Average Design Condition (ppm)	lbs/hr
0856	n-octane	7.2	ND<0.92	56	ND<0.92	31	ND<0.86	60	ND	0	49	0.08
0859	toluene	2100.	41.	2501	65.	2210	29.	2030	15.	510	2247	3.53
0860	ethylbenzene	140.	3.3	201	6.2	211	2.9	203	1.5	51	205	0.32
0861	xylenes	730.	15.	915	32.	1088	14.	980	6.8	231	994	1.56
0869	methylethylketone	10.	ND<1.6	98	ND<1.6	54	ND<1.5	105	ND	0	86	0.14
0883	1,1-dichloroethane	19.	ND<1.2	73	ND<1.2	41	ND<1.1	77	ND	0	64	0.10
0885	1,1,1-trichloroethane	1700.	32.	1952	45.	1530	20.	1400	25.	850	1627	2.56
	Total	76,976.20	91.3	5796	148.2	5165	65.9	4855	48.3	1642	5272	8.29

Notes:
1. * Data corrected with dilution factors.
2. The average design condition is based on condition 1 (MMCS2), condition 2 (MMCS3) and condition 3 (MMCS4A) data.
3. ND (Non-detectable) indicates that the contaminant was below the detection limit of the analytical method.
4. The numbers included in the total line indicate the total for contaminants that were detected.

CONDITION	DILUTION FACTOR
1	61
2	34
3	70
2	34



EXISTING AND PROPOSED BORINGS AND MONITORING WELLS

AREA #5
FARRELL ROAD PLANT
GEDDES, NY

PREPARED FOR
MARTIN MARIETTA CORP.

ERM-Northeast
Environmental Resource Management
8700 Ellisville Rd. Suite H, East Syracuse, NY 13057
Tel (315)437-0877 Fax (315)437-2025

SCALE 1"=30'
DATE 9/93
FIGURE 2-2

C:\ARCHIVE\FARRELL\SOLTNKS 09/03/93 14:08

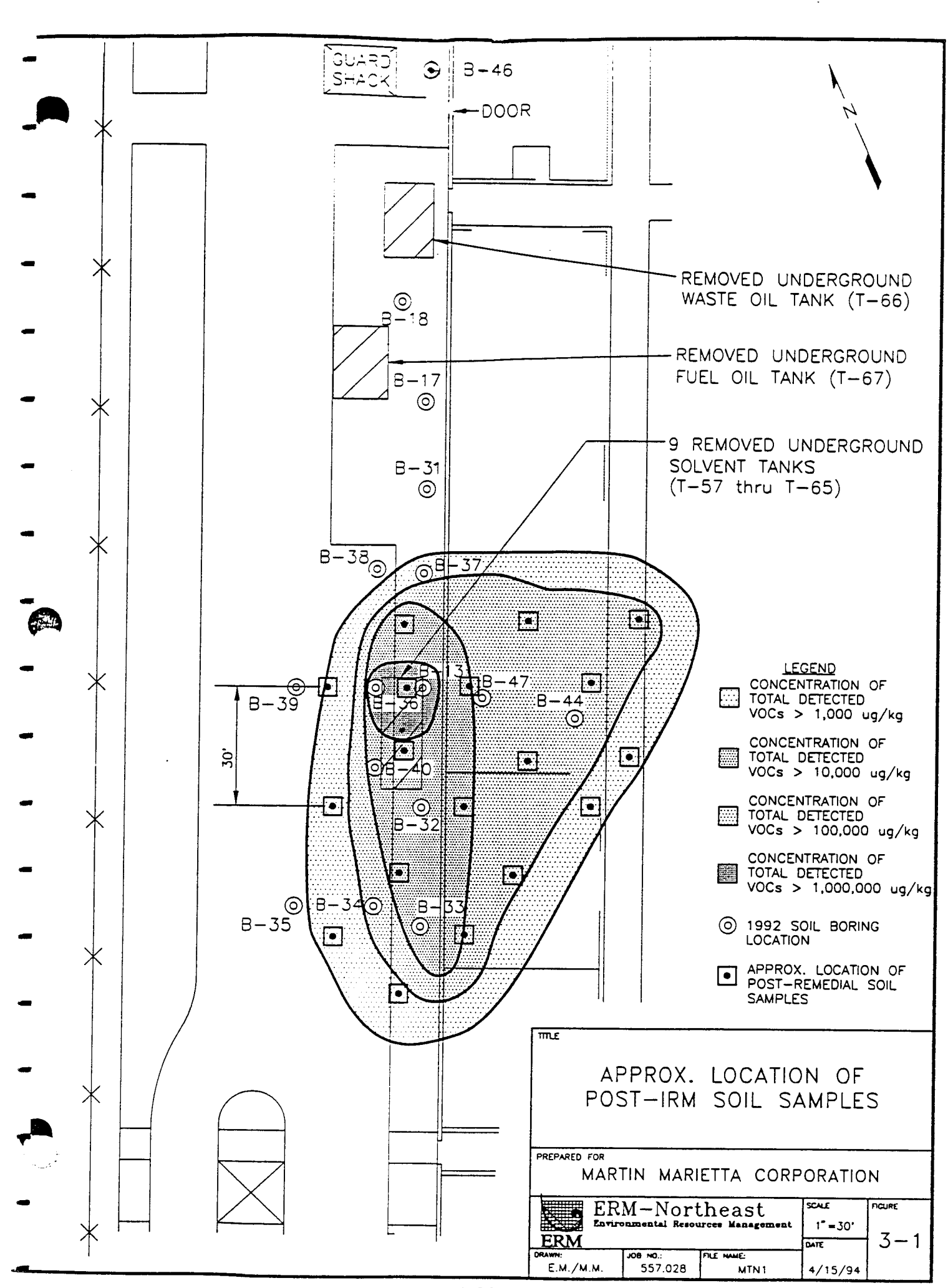
TABLE 3-1
MARTIN MARIETTA CORPORATION
FARRELL ROAD PLANT
IRM WORK PLAN FOR AOC #5
PROPOSED SOIL CLEANUP GOALS

Contaminant	Maximum Concentration Found in Soil (ppm)	Cleanup Goal Anticipated Soil Concentration at 90% Removal (ppm)	Maximum Concentrations Found in Soil Vapors (ppm)	Cleanup Goal Anticipated Soil Vapor Concentrations at 95% Removal (ppm)
1,1,1-TCA	650	65	1952	98
1,1-DCE	0.21	0.021	N/A	N/A
1,1-DCA	0.14	0.014	77	4
1,2-DCE	0.35	0.035	N/A	N/A
Toluene	2,100	210	2,501	125
MIBK	2,000	200	N/A	N/A
Ethylbenzene	630	63	211	11
Xylene (Isomers)	4,200	420	1,088	54
TCE	1.6	0.16	N/A	N/A

NOTES:

ppm Parts per million.
N/A Contaminant not analyzed.

Initial soil vapor concentrations will be based on average concentrations measured during the two week startup period. If these concentrations are deemed to be significantly different than the maximum concentrations identified on this table the anticipated concentrations for 95% reductions in soil vapor will be recalculated.


GUARD SHACK
B-46
DOOR
N
REMOVED UNDERGROUND WASTE OIL TANK (T-66)
B-18
REMOVED UNDERGROUND FUEL OIL TANK (T-67)
B-17
9 REMOVED UNDERGROUND SOLVENT TANKS (T-57 thru T-65)
B-31
B-38
B-37
B-39
B-36
B-47
B-44
30'
B-40
B-32
B-34
B-33
B-35
LEGEND
CONCENTRATION OF TOTAL DETECTED VOCs > 1,000 ug/kg
CONCENTRATION OF TOTAL DETECTED VOCs > 10,000 ug/kg
CONCENTRATION OF TOTAL DETECTED VOCs > 100,000 ug/kg
CONCENTRATION OF TOTAL DETECTED VOCs > 1,000,000 ug/kg
1992 SOIL BORING LOCATION
APPROX. LOCATION OF POST-REMEDIAL SOIL SAMPLES
TITLE
APPROX. LOCATION OF POST-IRM SOIL SAMPLES
PREPARED FOR
MARTIN MARIETTA CORPORATION
ERM-Northeast
Environmental Resources Management
ERM
SCALE
1" = 30'
FIGURE
3-1
DRAWN:
E.M./M.M.
JOB NO.:
557.028
FILE NAME:
MTN1
DATE
4/15/94

AOC #5

Data Collected During

SVE System Installation

MARTIN MARIETTA CORPORATION
FARRELL ROAD FACILITY
VAPOR RECOVERY/AIR INJECTION WELL PRODUCT/WATER LEVEL DATA AOC #5

Date	Parameter	Vapor Recovery Well ID											
		VRW-201	VRW-202	VRW-203	VRW-204	VRW-205	VRW-206	VRW-207	VRW-208	VRW-209	VRW-210	VRW-211	VRW-212
12/22/94	Product Level	NP	NP	NP	NP	NP	NP	10.38	NP	NP	NP	NP	NP
	Water Level	10.62	13.34	13.85	10.70	10.51	10.75	11.62	10.81	10.81	13.90	13.28	13.71
12/23/94	Product Level	ND	ND	ND	ND	ND	ND	**	ND	ND	ND	ND	ND
	Water Level	ND	ND	ND	ND	ND	ND	**	ND	ND	ND	ND	ND
12/27/94	Product Level	ND	ND	ND	ND	ND	ND	10.57	ND	ND	ND	ND	ND
	Water Level	ND	ND	ND	ND	ND	ND	10.86	ND	ND	ND	ND	ND
12/28/94	Product Level	ND	ND	ND	ND	ND	ND	10.60	ND	ND	ND	ND	ND
	Water Level	ND	ND	ND	ND	ND	ND	10.93	ND	ND	ND	ND	ND
12/29/94	Product Level	NP	NP	NP	NP	NP	NP	10.68	NP	NP	NP	NP	NP
	Water Level	10.89	13.66	14.23	11.02	10.75	10.92	11.04	10.91	10.92	14.06	13.41	13.97
1/6/95	Product Level	NP	NP	NP	NP	NP	NP	10.76	NP	NP	NP	NP	NP
	Water Level	11.00	13.85	14.44	11.16	10.85	11.01	11.54	11.00	10.94 *	14.21	13.56	14.15

Date	Parameter	Air Injection Well ID										
		AIW-201	AIW-202	AIW-203	AIW-204	AIW-205	AIW-206	AIW-207	AIW-208	AIW-209	AIW-210	
12/22/94	Product Level	NP	NP	NP	NP	NP	13.31	NP	13.28	NP	NP	
	Water Level	13.49	10.79	13.37	13.49	10.82	13.42	10.82	13.3	14.35	10.85	
12/23/94	Product Level	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	Water Level	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
12/27/94	Product Level	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	Water Level	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
12/28/94	Product Level	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	Water Level	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
12/29/94	Product Level	NP	NP	NP	NP	NP	13.52	NP	13.48	14.46	NP	
	Water Level	13.82	11.08	13.68	13.72	11.04	13.75	11.00	13.55	14.56	11.97	
1/6/95	Product Level	NP	NP	NP	NP	NP	13.70	NP	13.64	14.62	NP	
	Water Level	14.01	11.20	13.86	13.91	11.13	13.96	11.12	13.73	14.72	11.06	

ND = No data collected
NP = No product detected
* = Well casing cut down approximately 1.5 inches prior to this measurement
** = Approximately 3 liters of product removed (believed to be toluene/xylenes)

IRM Certification Report

April 1995

RUST Environment & Infrastructure

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-201 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 380.52 FT. Page 1 of 1

Depth Feet	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
						T.O.C. Elev. 383.70
0 Ground Surface	FEET				0	
	Sandy Silt: Dark brown (7.5YR 4/4), trace clay, fine grained sand, slightly moist (0-14.5').	0				8" Diameter Boring
		0				Concrete collar Bentonite seal from 1.5'-2.5' Schedule 80 PVC riser pipe from 0-3'
5					5	
		50				Morie #2 sand pack from 2.5'-15'
10		885			10	Schedule 80 PVC screen from 3'-15'
	Water at 13.5 ft, no free phase product encountered.	536				
15	Till: Dark red (10R 3/6), clayey, weathered, moist (14.5'-15'). TD= 15 feet.				15	Bottom cap
20					20	
25					25	
30					30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 2" Dia. 0' to 3'	Filter Pack Qty. 250 lbs
Drilling Started 10/7/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #2 sand pack
Drilling Completed 10/7/94	Well Screen 2" Dia. 3' to 15'	Static Water Level 367.02 MSL
Construction Completed 10/7/94	Screen Type Schedule 80 PVC	Date 10/7/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 13.5'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-202 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 381.01 FT.

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 380.82
0	Ground Surface	FEET					0	
			Concrete(0-0.5')	0				8" Diameter Boring
			Gravel Subbase(0.5'-0.75')	0				Concrete collar
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, several large erratics, slightly moist (0.75'-15').	1				Bentonite seal from 1.5'-2.5'
				2				Schedule 80 PVC riser pipe from 0-3'
5				8			5	
				24				Morie #2 sand pack from 2.5'-15'
				7				
10				76			10	
				272				Schedule 80 PVC screen from 3'-15'
				677				
			Water at 12.5 ft, no free phase product encountered.	37				
				10				
15			No till was encountered during drilling. TD= 15 feet.	30			15	Bottom cap
				15				
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.

Logged By B.STAHL

Drilling Started 10/11/94

Drilling Completed 10/12/94

Construction Completed 10/12/94

Development Completed N/A

Water Bearing Zones 12.5'-15'

Blown/Bailed Yield N/A

Well Casing 2" Dia. 0' to 3'

Casing Type Schedule 80 PVC

Well Screen 2" Dia. 3' to 15'

Screen Type Schedule 80 PVC

Slot Size 0.020"

Drilling Mud N/A

Grout Type N/A

Bentonite Seal Pellets

Filter Pack Qty. 400 lbs

Filter Pack Type Morie #2 sand pack

Static Water Level 368.51 MSL

Date 10/12/94

Notes: AIW-202 was installed using hand augering methods.

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-203 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 380.39 FT.

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 383.64
0	Ground Surface	FEET					0	
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, root fibers to 2 ft, some small round pebbles, slightly moist (0-15').	0				8" Diameter Boring Concrete collar Bentonite seal from 1.5'-2.5' Schedule 80 PVC riser pipe from 0-3'
5				0			5	
				920 730				Morie #2 sand pack from 2.5'-15'
10			Strong solvent odor.	1657 2165			10	Schedule 80 PVC screen from 3'-15'
			Water at 12 ft, no free phase product encountered.	>2500 1990				
15			No till was encountered during drilling. TD= 15 feet.	1298			15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 2" Dia. 0' to 3'	Filter Pack Qty. 250 lbs
Drilling Started 10/10/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #2 sand pack
Drilling Completed 10/10/94	Well Screen 2" Dia. 3' to 15'	Static Water Level 368.39 MSL
Construction Completed 10/10/94	Screen Type Schedule 80 PVC	Date 10/10/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 12'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-204 Piezometer No.

Location AOC #5 FARRELL ROAD-SYRACUSE, NY

Surface Elev. 380.36 FT.

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 383.74
0	Ground Surface	FEET					0	
			Sandy Silt: Dark brown (7.5YR 4/4), trace clay, fine grained sand, root fibers to 1 ft, slightly moist (0-14').	13				8" Diameter Boring
				17				Concrete collar
								Bentonite seal from 1.5'-2.5'
5							5	Schedule 80 PVC riser pipe from 0-3'
				15				
				18				Morie #2 sand pack from 2.5'-15'
10							10	
				220				Schedule 80 PVC screen from 3'-15'
				132				
			Water at 12 ft, no free phase product encountered.	215				
			Till: Dark red (10R 3/6), clayey, weathered, moist (14'-15'). TD= 15 feet.					
15				159			15	Bottom cap
20							20	
25							25	
30							30	

Driller	PARRATT-WOLFF, INC.	Blown/Bailed Yield	N/A	Bentonite Seal	Pellets
Logged By	B.STAHL	Well Casing	2" Dia. 0' to 3'	Filter Pack Qty.	350 lbs
Drilling Started	10/7/94	Casing Type	Schedule 80 PVC	Filter Pack Type	Morie #2 sand pack
Drilling Completed	10/7/94	Well Screen	2" Dia. 3' to 15'	Static Water Level	368.36 MSL
Construction Completed	10/7/94	Screen Type	Schedule 80 PVC	Date	10/7/94
Development Completed	N/A	Slot Size	0.020"	Notes:	
Water Bearing Zones	12'-15'	Drilling Mud	N/A		
		Grout Type	N/A		

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-205 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 381.05 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 380.89
0	Ground Surface	FEET					0	
			Concrete(0-0.5')					8" Diameter Boring
			Gravel Subbase(0.5'-0.75')					Concrete collar
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, some small round pebbles, slightly moist (0.75'-15').	0				Bentonite seal from 1.5'-2.5'
				1				Schedule 80 PVC riser pipe from 0-3'
5				0			5	
								Morie #2 sand pack from 2.5'-15'
10				149			10	Schedule 80 PVC screen from 3'-15'
				246				
15			Water at 13.5 ft, no free phase product encountered. No till was encountered during drilling. TD= 15 feet.	345			15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 2" Dia. 0' to 3'	Filter Pack Qty. 300 lbs
Drilling Started 10/11/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #2 sand pack
Drilling Completed 10/11/94	Well Screen 2" Dia. 3' to 15'	Static Water Level 367.55 MSL
Construction Completed 10/11/94	Screen Type Schedule 80 PVC	Date 10/11/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 13.5'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-206 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 380.31 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 383.52
0	Ground Surface	FEET					0	
			Sandy Silt: Dark brown (7.5YR 4/4), trace clay, fine grained sand, root fibers to 1 ft, slightly moist (0-13.5').	0				8" Diameter Boring
								Concrete collar
								Bentonite seal from 1.5'-2.5'
				235				Schedule 80 PVC riser pipe from 0-3'
5							5	
				14				
				48				Morie #2 sand pack from 2.5'-15'
10							10	
				131				Schedule 80 PVC screen from 3'-15'
				1013				
			Water at 12.5 ft, no free phase product encountered.	1350				
			Till: Dark red (10R 3/6), clayey, weathered, moist (13.5'-15').	185				
15			TD= 15 feet.	331			15	Bottom cap
20							20	
25							25	
30							30	

Driller	PARRATT-WOLFF, INC.	Blown/Bailed Yield	N/A	Bentonite Seal	Pellets
Logged By	B.STAHL	Well Casing	2" Dia. 0" to 3'	Filter Pack Qty.	400 lbs
Drilling Started	10/7/94	Casing Type	Schedule 80 PVC	Filter Pack Type	Morie #2 sand pack
Drilling Completed	10/7/94	Well Screen	2" Dia. 3' to 15'	Static Water Level	367.81 MSL
Construction Completed	10/7/94	Screen Type	Schedule 80 PVC	Date	10/7/94
Development Completed	N/A	Slot Size	0.020"	Notes:	
Water Bearing Zones	12.5'-15'	Drilling Mud	N/A		
		Grout Type	N/A		

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-207 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 381.04 FT. Page 1 of 1

Depth Feet	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
						T.O.C. Elev. 380.85
0 Ground Surface	FEET				0	
	Concrete(0-0.75')					8" Diameter Boring
	Gravel Subbase(0.75'-1')					Concrete collar
	Sandy Silt: Dark brown (7.5YR 4/4), trace clay, fine grained sand, root fibers to 1 ft, slightly moist (1'-14').	12				Bentonite seal from 1.5'-2.5'
		19				Schedule 80 PVC riser pipe from 0-3'
5		21			5	
		17				Morie #2 sand pack from 2.5'-15'
10		112			10	Schedule 80 PVC screen from 3'-15'
	Water at 13.5 ft, no free phase product encountered.					
15	Till: Dark red (10R 3/6), clayey, weathered, moist (14'-15'). TD= 15 feet.	186			15	Bottom cap
20					20	
25					25	
30					30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 2" Dia. 0" to 3'	Filter Pack Qty. 300 lbs
Drilling Started 10/11/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #2 sand pack
Drilling Completed 10/11/94	Well Screen 2" Dia. 3" to 15'	Static Water Level 367.54 MSL
Construction Completed 10/11/94	Screen Type Schedule 80 PVC	Date 10/11/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 13.5'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-208 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. ~~383.47 FT.~~ 381.47 Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 383.47
0	Ground Surface	FEET					0	
			Sandy Silt: Dark brown (7.5YR 4/4), trace clay, fine grained sand, root fibers to 1 ft, slightly moist (0-14').	0				8" Diameter Boring
								Concrete collar
								Bentonite seal from 1.5'-2.5'
								Schedule 80 PVC riser pipe from 0-3'
5				2			5	
								Morie #2 sand pack from 2.5'-15'
				91				
10				1169			10	Schedule 80 PVC screen from 3'-15'
			Water at 12.5 ft, no free phase product encountered.	1384				
15			Till: Dark red (10R 3/6), clayey, weathered, moist (14'-15'). TD= 15 feet.	2466			15	Bottom cap
20							20	
25							25	
30							30	

Driller	PARRATT-WOLFF, INC.	Blown/Bailed Yield	N/A	Bentonite Seal	Pellets
Logged By	B.STAHL	Well Casing	2" Dia. 0" to 3'	Filter Pack Qty.	350 lbs
Drilling Started	10/7/94	Casing Type	Schedule 80 PVC	Filter Pack Type	Morie #2 sand pack
Drilling Completed	10/7/94	Well Screen	2" Dia. 3" to 15'	Static Water Level	370.97 MSL
Construction Completed	10/7/94	Screen Type	Schedule 80 PVC	Date	10/7/94
Development Completed	N/A	Slot Size	0.020"	Notes:	
Water Bearing Zones	12.5'-15'	Drilling Mud	N/A		
		Grout Type	N/A		

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-209 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 381.06 FT.

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 384.56
0	Ground Surface	FEET					0	
			Concrete(0-0.5')					8" Diameter Boring
			Gravel Subbase(0.5'-0.75')					Concrete collar Bentonite seal from 1'-2'
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, slightly moist (0.75'-14.5').	0 0 0				Schedule 80 PVC riser pipe from 0-2.5'
5				0 37 39 54			5	Morie #2 sand pack from 2'-15'
10				587 1196			10	Schedule 80 PVC screen from 2.5'-14.5'
			Water at 12.5 ft, no free phase product encountered.					
15			No till was encountered during drilling. TD= 14.5 feet.	125			15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 2" Dia. 0" to 2.5'	Filter Pack Qty. 450 lbs
Drilling Started 10/12/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #2 sand pack
Drilling Completed 10/12/94	Well Screen 2" Dia. 2.5' to 14.5'	Static Water Level 368.56 MSL
Construction Completed 10/12/94	Screen Type Schedule 80 PVC	Date 10/12/94
Development Completed N/A	Slot Size 0.020"	Notes: AIW-209 WAS INSTALLED USING
Water Bearing Zones 12.5'-14.5'	Drilling Mud N/A	HAND AUGERING METHODS.
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. AIW-210 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 380.99 FT.

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 380.78
0	Ground Surface	FEET					0	
			Concrete(0-0.5')					8" Diameter Boring
			Gravel Subbase(0.5'-0.75')					Concrete collar
			Sandy Silt: Dark brown (7.5YR 4/4), fine grained sand, slightly moist (0.75'-14').	0				Bentonite seal from 1.5'-2.5'
				0				Schedule 80 PVC riser pipe from 0-3'
5				4			5	
				0				Morie #2 sand pack from 2.5'-15'
				0				
10				6			10	Schedule 80 PVC screen from 3'-15'
			Water at 13 ft, no free phase product encountered.	0				
15			Till: Dark red (10R 3/6), clayey, weathered, moist (14'-15'). TD= 15 feet.	0			15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 2" Dia. 0' to 3'	Filter Pack Qty. 300 lbs
Drilling Started 10/6/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #2 sand pack
Drilling Completed 10/6/94	Well Screen 2" Dia. 3' to 15'	Static Water Level 367.99 MSL
Construction Completed 10/6/94	Screen Type Schedule 80 PVC	Date 10/6/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 13'-15'	Drilling Mud N/A	
	Grout Type N/A	

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-201 Piezometer No.

Location AOC #5 FARRELL ROAD-SYRACUSE, NY

Surface Elev. 381.02 FT.

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 380.70
0	Ground Surface	FEET					0	
			Concrete(0-0.5')					8" Diameter Boring
			Gravel Subbase(0.5'-0.9')					Concrete collar
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, slightly moist (0.9'-15').	9				Bentonite seal from 1'-2'
				7				Schedule 80 PVC riser pipe from 1-3'
5				6			5	
				11				
				20				Morie #1 sand pack from 2'-15'
10				136			10	
				279				Schedule 80 PVC screen from 3'-15'
				724				
				989				
			Water at 13.5 ft, no free phase product encountered.	500				
15			No till was encountered during drilling. TD= 15 feet.	1136			15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 4" Dia. 1" to 3"	Filter Pack Qty. 350 lbs
Drilling Started 10/11/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #1 sand pack
Drilling Completed 10/11/94	Well Screen 4" Dia. 3' to 15'	Static Water Level 367.52 MSL
Construction Completed 10/11/94	Screen Type Schedule 80 PVC	Date 10/11/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 13.5'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-202 Piezometer No.

Location AOC #5 FARRELL ROAD-SYRACUSE, NY

Surface Elev. 379.59 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 383.54
0	Ground Surface	FEET	Asphalt(0-0.5') Gravel Subbase(0.5'-0.75') Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, slightly moist (0.75'-15').				0	8" Diameter Boring Concrete collar Bentonite seal from 1'-2'
				147				Schedule 80 PVC riser pipe from 0.5-3'
5				49 29 45			5	
				49				Morie #1 sand pack from 2'-15'
10				339			10	Schedule 80 PVC screen from 3'-15'
			Water at 13.5 ft, no free phase product encountered. No till was encountered during drilling. TD= 15 feet.	87				
15							15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 4" Dia. 0.5' to 3'	Filter Pack Qty. 300 lbs
Drilling Started 10/10/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #1 sand pack
Drilling Completed 10/10/94	Well Screen 4" Dia. 3' to 15'	Static Water Level 366.09 MSL
Construction Completed 10/10/94	Screen Type Schedule 80 PVC	Date 10/10/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 13.5'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-203 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 380.17 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 384.05
0	Ground Surface	FEET					0	
			Sandy Silt: Dark brown (7.5YR 4/4), root fibers to ~2 feet, some small round pebbles, fine to medium grained sand, slightly moist (0-15').	459				8" Diameter Boring
								Concrete collar
								Bentonite seal from 1'-2'
				45				Schedule 80 PVC riser pipe from 0.5-3'
5							5	
				58				
				35				
				68				Morie #1 sand pack from 2'-15'
				85				
10							10	
				22				Schedule 80 PVC screen from 3'-15'
				11				
			Water at 13.5 ft, no free phase product encountered.					
15			No till was encountered during drilling. TD= 15 feet.				15	
				466				Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 4" Dia. 0.5' to 3'	Filter Pack Qty. 350 lbs
Drilling Started 10/10/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #1 sand pack
Drilling Completed 10/10/94	Well Screen 4" Dia. 3' to 15'	Static Water Level 366.67 MSL
Construction Completed 10/10/94	Screen Type Schedule 80 PVC	Date 10/10/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 13.5'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-204 Piezometer No.

Location AOC #5 FARRELL ROAD-SYRACUSE, NY

Surface Elev. 381.04 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 380.80
0	Ground Surface	FEET					0	
			Concrete(0-0.5')					8" Diameter Boring
			Gravel Subbase(0.5'-0.75')					Concrete collar
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, slightly moist (0.75'-15').	57				Bentonite seal from 1'-2'
				12				Schedule 80 PVC riser pipe from 1'-3'
5				6			5	
				238				Morie #1 sand pack from 2'-15'
				114				
10							10	Schedule 80 PVC screen from 3'-15'
				158				
			Water at 12.5 ft, no free phase product encountered.					
				225				
15			No till was encountered during drilling. TD= 15 feet.				15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 4" Dia. 1' to 3'	Filter Pack Qty. 500 lbs
Drilling Started 10/12/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #1 sand pack
Drilling Completed 10/12/94	Well Screen 4" Dia. 3' to 15'	Static Water Level 368.54 MSL
Construction Completed 10/12/94	Screen Type Schedule 80 PVC	Date 10/12/94
Development Completed N/A	Slot Size 0.020"	Notes: VRW-204 was installed using hand
Water Bearing Zones 12.5'-15'	Drilling Mud N/A	augering methods.
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-205 Piezometer No.

Location AOC #5 FARRELL ROAD-SYRACUSE, NY

Surface Elev. 380.99 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 380.52
0	Ground Surface	FEET					0	
			Concrete(0-0.5')					8" Diameter Boring
			Gravel Subbase(0.5'-0.75')					Concrete collar
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, some small rounded pebbles, slightly moist (0.75'-15').	3				Bentonite seal from 1'-2'
				2				Schedule 80 PVC riser pipe from 1'-3'
5							5	
				2				Morie #1 sand pack from 2'-15'
10				89			10	Schedule 80 PVC screen from 3'-15'
				27				
			Water at 13.5 ft, no free phase product encountered.					
15			No till was encountered during drilling. TD= 15 feet.	90			15	Bottom cap
20							20	
25							25	
30							30	

Driller	PARRATT-WOLFF, INC.	Blown/Bailed Yield	N/A	Bentonite Seal	Pellets
Logged By	B.STAHL	Well Casing	4" Dia. 1' to 3'	Filter Pack Qty.	300 lbs
Drilling Started	10/11/94	Casing Type	Schedule 80 PVC	Filter Pack Type	Morie #1 sand pack
Drilling Completed	10/11/94	Well Screen	4" Dia. 3' to 15'	Static Water Level	367.49 MSL
Construction Completed	10/11/94	Screen Type	Schedule 80 PVC	Date	10/11/94
Development Completed	N/A	Slot Size	0.020"	Notes:	
Water Bearing Zones	13.5'-15'	Drilling Mud	N/A		
		Grout Type	N/A		

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-206 Piezometer No.

Location AOC #5 FARRELL ROAD-SYRACUSE, NY

Surface Elev. 380.99 FT. Page 1 of 1

Depth Feet	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
						T.O.C. Elev. 380.69
0 Ground Surface	FEET				0	
	Concrete(0-0.5')					8" Diameter Boring
	Gravel Subbase(0.5'-0.75')					Concrete collar
	Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, some small rounded pebbles, slightly moist (0.75'-14.5').	6				Bentonite seal from 1'-2'
		8				Schedule 80 PVC riser pipe from 1'-3'
5		8			5	
		8				Morie #1 sand pack from 2'-15'
10		6			10	
						Schedule 80 PVC screen from 3'-15'
		81				
	Water at 13.5 ft, no free phase product encountered.					
15	Till: Dark red (10R 3/6), clayey, weathered, moist (14.5'-15'). TD= 15 feet.	122			15	Bottom cap
20					20	
25					25	
30					30	

Driller	PARRATT-WOLFF, INC.	Blown/Bailed Yield	N/A	Bentonite Seal	Pellets
Logged By	B.STAHL	Well Casing	4" Dia. 1' to 3'	Filter Pack Qty.	400 lbs
Drilling Started	10/11/94	Casing Type	Schedule 80 PVC	Filter Pack Type	Morie #1 sand pack
Drilling Completed	10/11/94	Well Screen	4" Dia. 3' to 15'	Static Water Level	367.49 MSL
Construction Completed	10/11/94	Screen Type	Schedule 80 PVC	Date	10/11/94
Development Completed	N/A	Slot Size	0.020"	Notes:	
Water Bearing Zones	13.5'-15'	Drilling Mud	N/A		
		Grout Type	N/A		

Form #wi-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-207 Piezometer No.

Location AOC #5 FARRELL ROAD-SYRACUSE, NY

Surface Elev. 381.03 FT.

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 380.63
0	Ground Surface	FEET					0	
			Concrete(0-0.75')					8" Diameter Boring
			Gravel Subbase(0.75'-1')					Concrete collar
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, slightly moist (1'-15').	4				Bentonite seal from 1'-2'
				21				Schedule 80 PVC riser pipe from 1'-3'
5				10			5	
				10				
				16				Morie #1 sand pack from 2'-15'
				11				
				13				
10				25			10	Schedule 80 PVC screen from 3'-15'
				99				
			Water at 12 ft, no free phase product encountered.	233				
				2073				
15			TD= 15 feet.	>2500			15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 4" Dia. 1' to 3'	Filter Pack Qty. 450 lbs
Drilling Started 10/10/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #1 sand pack
Drilling Completed 10/10/94	Well Screen 4" Dia. 3' to 15'	Static Water Level 369.03 MSL
Construction Completed 10/10/94	Screen Type Schedule 80 PVC	Date 10/10/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 12'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-208 Piezometer No.

Location AOC #5 FARRELL ROAD-SYRACUSE, NY

Surface Elev. 381.04 FT.

Depth Feet	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
						T.O.C. Elev. 380.67
0 Ground Surface	FEET				0	
	Concrete(0-0.5')					8" Diameter Boring
	Gravel Subbase(0.5'-0.75')	0				Concrete collar Bentonite seal from 1'-2'
	Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, slightly moist (0.75'-14.5').	3				Schedule 80 PVC riser pipe from 1'-3'
5		3			5	
		3				Morie #1 sand pack from 2'-15'
10		4			10	Schedule 80 PVC screen from 3'-15'
	Water at 13.5 ft, no free phase product encountered.					
15	Till: Dark red (10R 3/6), clayey, weathered, moist (14.5'-15'). TD= 15 feet.	0			15	Bottom cap
20					20	
25					25	
30					30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 4" Dia. 1' to 3'	Filter Pack Qty. 400 lbs
Drilling Started 10/6/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #1 sand pack
Drilling Completed 10/6/94	Well Screen 4" Dia. 3' to 15'	Static Water Level 367.54 MSL
Construction Completed 10/6/94	Screen Type Schedule 80 PVC	Date 10/6/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 13.5'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-209 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 381.01 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 380.65
0	Ground Surface	FEET					0	
			Concrete(0-0.5')					8" Diameter Boring
			Gravel Subbase(0.5'-0.75')					Concrete collar Bentonite seal from 1'-2'
			Sandy Silt: Dark brown (7.5YR 4/4), fine grained sand, slightly moist (0.75'-14.5').					Schedule 80 PVC riser pipe from 1'-3'
5				3			5	
				3				Morie #1 sand pack from 2'-15'
10							10	Schedule 80 PVC screen from 3'-15'
				3				
			Water at 13.5 ft, no free phase product encountered.					
15			Till: Dark red (10R 3/6), clayey, weathered, moist (14.5'-15'). TD= 15 feet.				15	Bottom cap
20							20	
25							25	
30							30	

Driller	PARRATT-WOLFF, INC.	Blown/Bailed Yield	N/A	Bentonite Seal	Pellets
Logged By	B.STAHL	Well Casing	4" Dia. 1' to 3'	Filter Pack Qty.	300 lbs
Drilling Started	10/6/94	Casing Type	Schedule 80 PVC	Filter Pack Type	Morie #1 sand pack
Drilling Completed	10/6/94	Well Screen	4" Dia. 3' to 15'	Static Water Level	367.51 MSL
Construction Completed	10/6/94	Screen Type	Schedule 80 PVC	Date	10/6/94
Development Completed	N/A	Slot Size	0.020"	Notes:	
Water Bearing Zones	13.5'-15'	Drilling Mud	N/A		
		Grout Type	N/A		

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-210 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 380.31 FT.

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 384.10
0	Ground Surface	FEET					0	
			Sandy Silt: Dark brown (7.5YR 4/4), trace clay, root fibers to ~1 feet, some small round pebbles, fine grained, slightly moist (0-14.5').					8" Diameter Boring Concrete collar Bentonite seal from 1'-2'
				3				Schedule 80 PVC riser pipe from 0.5'-3'
5				4			5	
								Morie #1 sand pack from 2'-15'
				10				
10				15			10	Schedule 80 PVC screen from 3'-15'
			Water at 12.5 ft, no free phase product encountered.					
				987				
15			Till: Dark red (10R 3/6), clayey, weathered, moist (14.5'-15'). TD= 15 feet.				15	Bottom cap
20							20	
25							25	
30							30	

Driller	PARRATT-WOLFF, INC.	Blown/Bailed Yield	N/A	Bentonite Seal	Pellets
Logged By	B.STAHL	Well Casing	4" Dia. 0.5' to 3'	Filter Pack Qty.	350 lbs
Drilling Started	10/7/94	Casing Type	Schedule 80 PVC	Filter Pack Type	Morie #1 sand pack
Drilling Completed	10/7/94	Well Screen	4" Dia. 3' to 15'	Static Water Level	367.81 MSL
Construction Completed	10/7/94	Screen Type	Schedule 80 PVC	Date	10/7/94
Development Completed	N/A	Slot Size	0.020"	Notes:	
Water Bearing Zones	12.5'-15'	Drilling Mud	N/A		
		Grout Type	N/A		

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-211 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 379.55 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 383.43
0	Ground Surface	FEET					0	
			Asphalt(0-0.5')					8" Diameter Boring
			Gravel Subbase(0.5'-0.75')					Concrete collar
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, slightly moist (0.75'-15').	0				Bentonite seal from 1'-2'
				0				Schedule 80 PVC riser pipe from 0.5'-3'
5							5	
				4				Morie #1 sand pack from 2'-15'
10				2396			10	Schedule 80 PVC screen from 3'-15'
			Water at 11 ft, no free phase product encountered.	846				
				1246				
15			TD= 15 feet.	140			15	Bottom cap
20							20	
25							25	
30							30	

Driller PARRATT-WOLFF, INC.	Blown/Bailed Yield N/A	Bentonite Seal Pellets
Logged By B.STAHL	Well Casing 4" Dia. 0.5' to 3'	Filter Pack Qty. 350 lbs
Drilling Started 10/10/94	Casing Type Schedule 80 PVC	Filter Pack Type Morie #1 sand pack
Drilling Completed 10/10/94	Well Screen 4" Dia. 3' to 15'	Static Water Level 368.55 MSL
Construction Completed 10/10/94	Screen Type Schedule 80 PVC	Date 10/10/94
Development Completed N/A	Slot Size 0.020"	Notes:
Water Bearing Zones 11'-15'	Drilling Mud N/A	
	Grout Type N/A	

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

SOIL BORING LOG

Client: MARTIN MARIETTA CORPORATION

Project No: 95424 Phase Task

Boring No. VRW-212 Piezometer No.

Location AOC #5 FARRELL ROAD- SYRACUSE, NY

Surface Elev. 379.54 FT. Page 1 of 1

Depth Feet			Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
								T.O.C. Elev. 383.93
0	Ground Surface	FEET					0	
			Asphalt(0-0.75')					8" Diameter Boring
			Gravel Subbase(0.75'-1')	0				Concrete collar Bentonite seal from 1'-2'
			Sandy Silt: Dark brown (7.5YR 4/4), fine to medium grained sand, slightly moist (1'-14.5').	0				Schedule 80 PVC riser pipe from 0.5'-3'
5				0			5	
								Morie #1 sand pack from 2'-15'
10				17			10	Schedule 80 PVC screen from 3'-15'
			Water at 13.5 ft, no free phase product encountered.					
15				16			15	Bottom cap
			Till: Dark red (10R 3/6), clayey, weathered, moist (14.5'-15'). TD= 15 feet.					
20							20	
25							25	
30							30	

Driller	PARRATT-WOLFF, INC.	Blown/Bailed Yield	N/A	Bentonite Seal	Pellets
Logged By	B.STAHL	Well Casing	4" Dia. 0.5' to 3'	Filter Pack Qty.	325 lbs
Drilling Started	10/10/94	Casing Type	Schedule 80 PVC	Filter Pack Type	Morie #1 sand pack
Drilling Completed	10/10/94	Well Screen	4" Dia. 3' to 15'	Static Water Level	366.04 MSL
Construction Completed	10/10/94	Screen Type	Schedule 80 PVC	Date	10/10/94
Development Completed	N/A	Slot Size	0.020"	Notes:	
Water Bearing Zones	13.5'-15'	Drilling Mud	N/A		
		Grout Type	N/A		

Form #wl-sc-1 (02/90)

r.e. wright environmental, inc.

AOC #5

February 1995

Full-Scale Pilot Test Results

Martin Marietta
Ocean, Radar & Sensor Systems
Post Office Box 4840 Syracuse, NY 13221-4840

LOCKHEED MARTIN

May 8, 1995

Mr. Robert W. Schick, PE
Section Chief, Remedial Section
Bureau of Western Remedial Action
Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

RE: Farrell Road Plant
Town of Geddes, Onondaga County, New York
Site No. 7-34-055
Full Scale Pilot Test Results - AOC #5

Dear Mr. Schick:

Please find enclosed a report describing the full-scale pilot test conducted between February 6 - 11, 1995 in Area of Concern (AOC) #5 at the Farrell Road Plant.

The enclosed report contains discussion on project background, pilot test implementation, sampling and analysis, system inspection and testing, data analysis, and air emission assessment.

The results of the full-scale pilot test indicate that actual air emissions are lower than those initially modeled with theoretical data. During the pilot test, the Soil Vapor Extraction (SVE) system was operated at full capacity. The loading rate after 5 days of operation was in full compliance with Air Guide-1 Annual Guideline Concentrations (AGC's) and Short Term Guideline Concentrations (SGC's).

Based on this information, Martin Marietta requests approval for removal of the air emission controls (vapor phase carbon) from the SVE system. Martin Marietta is prepared to start the system upon receipt of the Department's approval to operate without air emission controls. Please find enclosed a completed application to Certificate to Operate the treatment system. This application includes all contaminants detected in the air stream during the full-scale pilot test.

We would be available to meet with you at your convenience to discuss the pilot test results in more detail. Martin Marietta looks forward to start-up of the IRM treatment system in AOC #5. Please contact either Pat Salvador (315) 456-3199 or me (315) 456-6976 with any questions or if additional information is required.

Sincerely,

Brian A. Kent, Manager
Environment, Safety and Health

Attachment

c: Charles Branaugh, NYSDEC
Director, Bureau of Environmental Exposure Investigations, NYSDEC
Henriette Hamel - NYSDOH
Michael Lesser - NYSDEC
Ralph Manna - NYSDEC
Virginia Robbins - Bond, Schoeneck & King

RUST ENVIRONMENT & INFRASTRUCTURE

RUST Environment & Infrastructure Inc.
12 Metro Park Road
Albany, NY 12205
Tel. (518) 458-1313 • FAX (518) 458-2472

May 4, 1995

Patrick Salvador, P.E.
Martin Marietta Corporation - EHS
Electronics Park
Building EP-5 Room H6
Syracuse, New York 13221

Re: Farrell Road Plant - AOC #5 Full-Scale Pilot Test Results
Town of Geddes, Onondaga County, New York

Dear Mr. Salvador:

Rust Environment & Infrastructure, of New York (Rust) is pleased to provide this summary report on full scale pilot testing of the soil vapor extraction (SVE) system at the Former Solvent Storage Tank Area, which has been designated as Area of Concern (AOC) # 5 at the Farrell Road Plant Site. The purpose of this letter is to document the operation, monitoring, and analytical data collected during the five day pilot test which was conducted between February 6 - 11, 1995. The principal objective of this pilot test was to assess the operating air emission rates from the SVE system. The testing determined that, during the initial 5-days of operation, the total volatile organic compound (VOC) concentrations ranged from approximately 349 parts per million (ppm) to 1,386 ppm. Extraction rates from soil were typically 80 standard cubic feet per minute (SCFM) at a vacuum of 5 inches mercury (in-Hg). The SVE system operated under maximum conditions according to design specifications.

PROJECT BACKGROUND

The SVE system on which the pilot test was conducted was installed as an Interim Remedial Measure (IRM) for AOC #5 at the Farrell Road Plant in accordance with a New York State Department of Environmental Conservation (NYSDEC)-approved IRM Work Plan. The SVE system was constructed by R.E. Wright Associates (REW) between October and December, 1994. To obtain data useful for evaluating air emissions from full-scale operation of the system, Martin Marietta Corporation (MMC) proposed performance of a five day pilot test, during which time the system would be operated at its maximum capacity with temporary air emission controls. The pilot test was performed in accordance with a December 28, 1994 scope of work submitted to the NYSDEC by MMC and the subsequent approval letter dated January 9, 1995 from the NYSDEC (Appendix A).

The SVE system layout is shown on Figure 1, and consists of the following components:

- 12 vapor recovery wells (VRW) which are designated as VRW-1 through VRW-12;
- 10 passive air injection wells (AIW) which are designated as AIW-1 through AIW-10;
- piping manifold connecting the VRW wells to a SVE module located in a heated treatment building; and
- an SVE Module which consists of a Dilution Air Inlet valve, a Moisture Separator, an Air Filter, a positive displacement Blower, and an outlet silencer.

For the purpose of the pilot test, temporary emission controls were installed which consisted of two 1800-pound vapor phase granular activated carbon (GAC) adsorbers connected in series. The GAC adsorbers were placed outside the treatment building, and connected between the SVE discharge pipe and the existing 25-foot discharge stack.

PILOT TEST IMPLEMENTATION

Prior to initiation of the pilot test, the temporary air emission controls described above were installed and an on-site lab was set up to perform analysis of air samples. The temporary air emission control equipment is illustrated in Appendix B. The on-site lab equipment and procedures are described in Appendix C. The compounds of concern for the pilot test were identified as those found either in the previous pre-design pilot test conducted on one well or found in soil samples from AOC #5, and are summarized in Appendix D, Table D-1. These compounds are:

1,1-dichloroethene	1,1-dichloroethane	1,2-dichloroethene
ethylbenzene	methyl ethyl ketone (MEK)	methyl isobutyl ketone (MIBK)
n-octane	toluene	1,1,1-trichloroethane
trichloroethene	xylenes (total)	

The AOC #5 pilot test was initiated on February 6, 1995. During all or part of the pilot test, personnel were present on-site from MMC, NYSDEC, Rust, REW, and Environmental Restoration Services (ERS). Start-up work began at 12:00 noon on February 6, 1995, 1995. Initially the SVE Blower was turned on with all VRW valves closed and the Dilution Air Intake open. Minor piping and equipment complications were resolved during this system check. At approximately 3:00 pm all VRW valves, with the exception of VRW-207, were opened and SVE operation began. VRW-207 contained a layer of light non-aqueous phase liquid (LNAPL) and, as approved of by NYSDEC, this

well was not placed on-line until later in the test. The SVE was operated and monitored through February 11, 1995, when the system was shut down and secured.

Air emission monitoring and data collection for the SVE system was performed continuously for the first 30 hours of operation and during daytime periods (typically 7:00 am to 7:00 pm) throughout the pilot test. Operating data was summarized on daily field log tables. The operating data routinely collected on the SVE system airstream included flow rate, vacuum, temperature, relative humidity and photoionization detector (PID) readings from each vapor extraction lateral as well as from the combined SVE airstream before the GAC units. PID data was collected from the combined SVE ("Pre-GAC"), from between the GAC adsorbers ("Intermediate-GAC") and after the secondary GAC adsorber ("Post-GAC"). Monitoring of the air at the GAC adsorbers was performed to evaluate GAC usage and to identify breakthrough. Typical operating and monitoring data tables for the SVE are summarized in Appendix D, Tables D-2 through D-4.

SAMPLING AND ANALYSIS

Sampling and analysis was performed in accordance with the NYSDEC-approved pilot test plan. Samples were collected in accordance with the Standard Operating Procedures (SOP) for field sampling of SVE systems (Appendix C). The sampling and analysis was performed for three purposes.

1. *Air Emissions Assessment* - Samples were submitted to a commercial laboratory for VOC analysis. This data was used for calculation of air emission rates and potential impacts.

2. *Operations Monitoring and Assessment* - Samples were analyzed in an on-site lab to obtain operating and emissions data during the test period.

3. *GAC Performance Monitoring* - Samples were collected and analyzed in the on-site lab to monitor for VOC breakthrough between and after the GAC adsorbers and to assess GAC usage rates.

Air Emissions Assessment

Samples were collected and submitted to Performance Analytical (referred to herein as the "commercial lab") for analysis by Modified USEPA Method TO-14. The modification of this method, which was detailed in the approved pilot test plan, consisted of collecting samples in Tedlar bags rather than Summa canisters. Air samples were collected for commercial lab analysis from the Pre-GAC sample port of the SVE airstream after 1, 8, and 24 hours of operation. Additionally, between February 7 through 11, 1995 one air sample was collected each day from the pre-GAC airstream for

VOC commercial laboratory analysis. Commercial laboratory analytical results for the pre-GAC airstream are summarized in Table 2.

Individual vapor extraction well air samples were collected throughout the pilot test and analyzed by the on-site lab and screened by PID. Results of monitoring of the individual laterals are summarized in Appendix D, Table D-5. A comparison of commercial lab, on-site lab, and PID data for Pre-GAC air samples from the SVE is presented in Appendix D, Table D-6.

Operations Monitoring and Assessment

Samples were analyzed in an on-site lab using a portable Photovac Model 10S-70 Gas Chromatograph which was calibrated to the pilot test chemicals of concern as listed in Appendix D, Table D-1. The instrument was operated in accordance with procedures described in the SOP (Appendix C). Data from the on-site lab was used during the pilot test to provide data on GAC performance and to aid in system adjustment to maximize VOC removal rates.

During pilot testing of the SVE system, air sampling for on-site lab analysis focused on the Pre-GAC airstream. During the first 24 hours of operation of the SVE system, Pre-GAC air samples were collected and analyzed in the on-site lab on an hourly basis. For the remainder of SVE operations, Pre-GAC samples were collected three to five times daily for analysis by the on-site lab. In order to assess variations in vapor concentrations between individual VE wells and to provide a basis for balancing and optimizing VOC removal by the SVE system, samples from the individual VE wells were collected for analysis by the on-site lab and screened with the PID on February 8 and 10, 1995.

On February 6 and 7, 1995, vapor extraction well VRW-7 remained entirely closed as approved by NYSDEC in order to prevent extraction from this well due the presence LNAPL. VRW-207 was gradually opened on February 8, 1995 and no significant increase in vapor concentrations was observed in the Pre-GAC airstream.

GAC Performance Monitoring

During the first 24 hours of operation of the SVE system, samples were collected periodically from the Intermediate-GAC and Post-GAC sample ports and analyzed in the on-site lab. For the remainder of the pilot test, samples were collected on at least a daily basis from the Intermediate-GAC and Post-GAC sample ports and analyzed in the on-site lab.

The sampling results for GAC indicated in excess of 99% VOC removal by the primary GAC adsorber. At the conclusion of the pilot test, removal rates by the primary GAC adsorber had begun to decline slightly, but remained in excess of 95%.

SYSTEM INSPECTION AND TESTING

In addition to the sampling and chemical analysis performed on the SVE airstream, components of the system were inspected and wellhead data was collected. The SVE system was found to be sealed with the exception of two vacuum leaks at wells, which were repaired on February 9, 1995. The individual extraction and air injection wells were also tested for vacuum. The vacuums observed at the VRW wellheads were equal to that indicated by gages on the manifold. The air injection wells all exhibited a vacuum, which indicates positive flow of air into the soil. Although a rigorous assessment of the connection of vacuum between the wells was beyond the scope of this project, the data strongly suggest that the extraction/injection well system maintained a vacuum throughout the entire area of soils being treated. Vacuum readings measured at individual wells on February 9, 1995 are shown on Figure 1.

The SVE system was balanced on February 9, 1995. Balancing was completed in accordance with the SOP for SVE balancing (Appendix C). The purpose of balancing the system is to maximize the VOC removal from the system. This is accomplished by reducing the extraction rate from wells which exhibit lower concentrations of VOCs and increasing extraction rates from those wells which exhibit higher VOC concentrations. The data calculated for the February 9, 1995 balancing of the SVE is summarized in Appendix D, Table D-7.

One additional subject which was investigated during the course of the field work was the performance of the blower in this application. From the start of the test, it was necessary to leave the air dilution valve open, such that dilution air was brought in at a nominal 2:1 ratio with soil vapor. Attempting to extract additional soil vapor beyond approximately 80 SCFM resulted in excess vacuum on the blower inlet, which in turn tripped the high vacuum switch and shut down the blower. Based on a review of the blower and motor specifications and on consultation with the blower supplier, it was determined that it would eventually be appropriate to adjust the blower drive to reduce its speed. The net result would be lower intake of dilution air and a better ability to fine tune the extraction rate. This change would not however increase the soil vapor extraction rate, it would merely reduce the dilution air flow. The extraction rate is limited by the soil conditions, groundwater levels, and well construction and placement rather than any above-ground piping or mechanical components.

DATA ANALYSIS

The SVE system was operated 24 hours a day between February 6 and 11, 1995 and no mechanical or equipment malfunctions occurred. As indicated on the O&M data summary tables (Appendix D, Tables D-2, D-3, and D-4), the system effectively recovered soil vapor from each vapor extraction well. Condensate water was observed in several vapor extraction well laterals located within the

treatment building. While water was encountered in these laterals, no water was collected within the moisture separator tank throughout the pilot test.

Pre-GAC samples from the SVE system airstream were collected and analyzed by the on-site and the commercial lab and were screened by PID. The PID was observed to consistently underestimate the VOC level in the airstream. This discrepancy resulted from two factors. First, the VOCs in the airstream varied in their response factor from the isobutylene gas used to calibrate the PID. Second, the on-site and commercial lab analysis measured specific VOCs only, whereas the PID responded to all VOCs in the air which have an ionization potential below approximately 10.2 electron volts. Comparison of the data is presented in Appendix D, Tables D - 5, and is summarized as follows:

	Average	Range
PID	240 ppm	195 - 280 ppm
On-site lab	527 ppm	230 - 1,600 ppm
Commercial lab	762 ppm	349 - 1,386 ppm

Individual soil vapor extraction wells were simultaneously screened with the PID and sampled for analysis by the on-site lab. Results from the simultaneous sampling are shown in Appendix D, Table D-5. The discrepancy between VOC concentration indicated by PID and the on-site lab is due to the two factors discussed in the preceding paragraph.

The SVE system was balanced on February 9, 1995. Balancing was completed in accordance with the SOP for SVE balancing (Appendix C). The purpose of balancing the system was to maximize VOC removal from the system. Balancing was accomplished by reducing the extraction rate from wells which exhibited lower concentrations of VOCs and increasing extraction rates from those wells which exhibited higher VOC concentrations. The data calculated for the February 9, 1995 balancing of the SVE is summarized in Appendix D, Table D - 7. Preliminary on-site laboratory analytical results, average air flow rates, and system operation data collected on February 8, 1995 from individual wells were utilized to calculate the desired recovery rates from the individual soil vapor extraction wells. Air flow rates on individual wells were then throttled as indicated by the calculations to a balance which would maximize the VOC extraction rate. Due to the presence of water in several extraction wells, concentrations varied significantly before and after balancing. Additionally, air velocity readings varied and were sometimes difficult to obtain due to the presence of water in the laterals.

Pre-GAC samples were collected for commercial laboratory analysis by modified EPA Method TO-14 at 1, 8, and 24 hours after start-up and on each subsequent day of the pilot test. Commercial laboratory analysis of these samples (Table 2) indicated that the highest concentration was observed after 1 hour of continuous SVE operation. VOC concentrations decreased with continuing SVE

operation. The on-site laboratory analytical results correlated well with the commercial laboratory samples collected simultaneously. The first and second samples collected for laboratory analysis (1 hour and 8 hour, respectively) were significantly higher than the corresponding on-site laboratory analytical samples. The presence of high concentrations of VOC compounds such as 1,1,1-TCA and toluene were typically above the linear range of the detector employed with the on-site laboratory and were therefore estimated. Similarly, very low concentrations of VOC compounds such as trichloroethene, 1,1-dichloroethene, and dichloroethane were typically below the linear range of the on-site laboratory and were also estimated. The commercial laboratory is capable of lower detection limits and is more accurate at higher concentrations than the on-site lab since the GC used in a commercial laboratory contains a larger column than the GC used in the on-site lab. The commercial lab is also better able to positively identify some compounds since the commercial lab uses a GC coupled to a mass spectroscope (GC/MS).

AIR EMISSION ASSESSMENT

Analytical data on operating emission rates for the SVE were obtained throughout the course of the pilot test. The data allow assessment of operating emission rates once the system is placed on-line for long term operation. From the pilot test data, the combined SVE concentration of total VOCs and selected individual compounds were plotted versus operating time (Appendix E). Based on trends observed in Appendix E, Figure 2, air concentrations upon reactivation of the system were projected. These projected operating air concentrations are expected to occur shortly after the system equilibrates, and, therefore provide a worst-case basis for air emission assessment. Ground level air quality concentrations which would result from projected operating air emissions were estimated by O'Brien & Gere Engineers, Inc. using the Industrial Source Complex-Short Term, Version 2 (ISCST2) model for all compounds detected during this pilot test. Projected operating air emission rates for the compounds detected during this pilot study are summarized in Table 1 A description of the ISCST2 model including results are attached as Appendix F to this report.

As a conservative first approach, the projected operating emissions obtained from the pilot test were used as the ISCST2 model input in order to estimate 1-hour and annual average impact concentrations. In the event these projected emissions resulted in annual average impact concentrations of a chemical above its corresponding AGC, then the projected emission rate obtained from the pilot test was "annualized", to reflect the orderly decay of emissions that are expected from the SVE system over time. For example, using the experimental rate constant for emissions decay observed during the pilot test, the annual rate of decay of 1, 2-dichloroethene (1,2-DCE) was extrapolated, and the total quantity of 1,2-DCE expected to be removed in 1 year was estimated. This quantity of 1, 2-DCE was then "annualized", by dividing the quantity by 24 hours per day and 365 days per year. This "annualized" hourly emission rate was then re-entered into the model and revised annual impact concentrations estimated.

Based on the ISCST2 model analysis, the maximum short term and annual impact for each compound detected in the off-gas during this pilot test was less than its corresponding NYSDEC Short Term Guideline Concentration (SGC) and Annual Guideline Concentration (AGC) as listed in *Air Guide 1 - Appendix C (1991)*. Air emission rates as well as corresponding SGC and AGC values are summarized on Table 1.

CONCLUSIONS

The SVE system effectively extracts soil vapors from the former Solvent Storage Tank Area in general accordance with the IRM objective. The soil vapor flow rate is limited by soil permeability to approximately 80 SCFM. Analytical samples collected from the pre-GAC airstream during the five day pilot test indicate that average total VOC concentrations were approximately 780 ppm. The highest compounds detected were toluene and 1,1,1-TCA at average concentrations of 330 and 360 ppm, respectively.

The maximum 1-hour and annual impact concentrations for the 9 chemicals observed to be present in the air discharge during the pilot test are summarized in Table 1. As shown in Table 1, the maximum 1-hour and annual off-site ambient air quality impacts for all 9 compounds are below their corresponding SGCs and AGCs, respectively. Since the SVE air emissions at AOC#5 demonstrate compliance with Air Guide-1 air quality criteria, air emission controls will not be necessary for the treatment of SVE off-gas.

Please call me at (518) 458-1313 if you have any questions.

Sincerely,

Alan Tavenner

Alan W. Tavenner, P.E.
Senior Environmental Engineer

ATTACHMENTS

FIGURES

1. Area 5 Pilot Test Soil Vapor Extraction System
2. VOC Removal Projections

TABLES

1. Emission Rate Calculations
2. Pre-GAC Laboratory Analytical Summary

APPENDIX

A. Correspondence
B. Temporary Air Emission Controls
C. Standard Operating Procedures
   - on-site GC laboratory
   - field monitoring for Soil Vapor Extraction Systems
   - Soil Vapor Extraction System balancing
D. Operating Data Tables
   - D-1 Compounds of Concern AOC #5.
   - D-2 Operating Data-February 8, 1995 (A.M.)
   - D-3 Operating Data-February 8, 1995 (P.M.)
   - D-4 Operating Data-February 10, 1995
   - D-5 Individual Vapor Extraction Well Air Analytical Summary
   - D-6 Pre-GAC Commercial vs On-Site Laboratory Analytical Summary
   - D-7 SVE Balancing - February 9, 1995
E. Compound Concentration vs. Time Plots
F. ISCST2 Modeling Data
G. Commercial Laboratory Data

Attachment 2

Chemical Data Summary Report for NAPL (VOCs)

1A

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

AIW204

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW204

Sample wt/vol: .005 (g/mL) mL Lab File ID: D2939

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 1000.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10000.	U
74-83-9	Bromomethane	10000.	U
75-01-4	Vinyl Chloride	10000.	U
75-00-3	Chloroethane	10000.	U
75-09-2	Methylene Chloride	5000.	U
75-69-4	Trichlorofluoromethane	5000.	U
75-35-4	1,1-Dichloroethene	5000.	U
75-34-3	1,1-Dichloroethane	5000.	U
156-60-5	1,2-Dichloroethene-trans	5000.	U
156-59-2	1,2-Dichloroethene-cis	5000.	U
74-97-5	Bromochloromethane	5000.	U
67-66-3	Chloroform	5000.	U
107-06-2	1,2-Dichloroethane	5000.	U
71-55-6	1,1,1-Trichloroethane	77000.	
56-23-5	Carbon Tetrachloride	5000.	U
75-27-4	Bromodichloromethane	5000.	U
78-87-5	1,2-Dichloropropane	5000.	U
10061-01-5	cis-1,3-Dichloropropene	5000.	U
74-95-3	Dibromomethane	5000.	U
79-01-6	Trichloroethene	5000.	U
124-48-1	Dibromochloromethane	5000.	U
79-00-5	1,1,2-Trichloroethane	5000.	U
71-43-2	Benzene	5000.	U
10061-02-6	trans-1,3-Dichloropropene	5000.	U
75-25-2	Bromoform	5000.	U
127-18-4	Tetrachloroethene	5000.	U
79-34-5	1,1,2,2-Tetrachloroethane	5000.	U
108-88-3	Toluene	97000.	
108-90-7	Chlorobenzene	5000.	U
630-20-6	1,1,1,2-tetrachloroethane	5000.	U
100-41-4	Ethylbenzene	19000.	
100-42-5	Styrene	5000.	U
1330-20-7	Xylenes (total)	120000.	B
106-46-7	1,4-Dichlorobenzene	5000.	U
95-50-1	1,2-Dichlorobenzene	5000.	U
75-71-8	Dichlorodifluoromethane	10000.	U
594-20-7	2,2-Dichloropropane	5000.	U
563-58-6	1,1-Dichloro-1-propene	5000.	U

1A

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

AIW204

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW204

Sample wt/vol: .005 (g/mL) uL Lab File ID: D2939

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 1000.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
96-18-4	1,2,3-Trichloropropane	5000.	U
142-28-9	1,3-Dichloropropane	5000.	U
106-93-4	Ethylene Dibromide (EDB)	5000.	U
98-82-8	Isopropylbenzene	5000.	U
103-65-1	n-Propylbenzene	5000.	U
108-86-1	Bromobenzene	5000.	U
108-67-8	1,3,5-Trimethylbenzene	5000.	U
95-49-8	2-Chlorotoluene	5000.	U
106-43-4	4-Chlorotoluene	5000.	U
98-06-6	tert-Butylbenzene	5000.	U
95-63-6	1,2,4-Trimethylbenzene	5000.	U
135-98-8	sec-Butylbenzene	5000.	U
99-87-6	p-Cymene	5000.	U
541-73-1	1,3-Dichlorobenzene	5000.	U
104-51-8	n-Butylbenzene	5000.	U
120-82-1	1,2,4-Trichlorobenzene	20000.	U
91-20-3	Naphthalene	5000.	U
87-61-6	1,2,3-Trichlorobenzene	20000.	U
96-12-8	1,2-dibromo-3-chloro-Propane	50000.	U
87-68-3	Hexachlorobutadiene	20000.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

AIW204

Lab Name: AES Contract:

Lab Code: AES Case No.: EBLG506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW204

Sample wt/vol: .005 (g/mL) µL Lab File ID: D2939

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 1000.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

AIW206

Lab Name: AES Contract:

Lab Code: AES Case No.: BEL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW206

Sample wt/vol: .005 (g/mL) uL Lab File ID: D2986

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 1000.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
74-87-3	Chloromethane	10000.	U
74-83-9	Bromomethane	10000.	U
75-01-4	Vinyl Chloride	10000.	U
75-00-3	Chloroethane	10000.	U
75-09-2	Methylene Chloride	5000.	U
75-69-4	Trichlorofluoromethane	5000.	U
75-35-4	1,1-Dichloroethene	5000.	U
75-34-3	1,1-Dichloroethane	5000.	U
156-60-5	1,2-Dichloroethene-trans	5000.	U
156-59-2	1,2-Dichloroethene-cis	5000.	U
74-97-5	Bromochloromethane	5000.	U
67-66-3	Chloroform	5000.	U
107-06-2	1,2-Dichloroethane	5000.	U
71-55-6	1,1,1-Trichloroethane	98000.	
56-23-5	Carbon Tetrachloride	5000.	U
75-27-4	Bromodichloromethane	5000.	U
78-87-5	1,2-Dichloropropane	5000.	U
10061-01-5	cis-1,3-Dichloropropene	5000.	U
74-95-3	Dibromomethane	5000.	U
79-01-6	Trichloroethene	5000.	U
124-48-1	Dibromochloromethane	5000.	U
79-00-5	1,1,2-Trichloroethane	5000.	U
71-43-2	Benzene	5000.	U
10061-02-6	trans-1,3-Dichloropropene	5000.	U
75-25-2	Bromoform	5000.	U
127-18-4	Tetrachloroethene	5000.	U
79-34-5	1,1,2,2-Tetrachloroethane	5000.	U
108-88-3	Toluene	230000.	E
108-90-7	Chlorobenzene	5000.	U
630-20-6	1,1,1,2-tetrachloroethane	5000.	U
100-41-4	Ethylbenzene	64000.	
100-42-5	Styrene	5000.	U
1330-20-7	Xylenes (total)	390000.	
106-46-7	1,4-Dichlorobenzene	5000.	U
95-50-1	1,2-Dichlorobenzene	5000.	U
75-71-8	Dichlorodifluoromethane	10000.	U
594-20-7	2,2-Dichloropropane	5000.	U
563-58-6	1,1-Dichloro-1-propene	5000.	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

AIW206

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW206

Sample wt/vol: .005 (g/mL) uL Lab File ID: D2986

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 1000.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
96-18-4	1,2,3-Trichloropropane	5000.	U
142-28-9	1,3-Dichloropropane	5000.	U
106-93-4	Ethylene Dibromide (EDB)	5000.	U
98-82-8	Isopropylbenzene	5000.	U
103-65-1	n-Propylbenzene	5000.	U
108-86-1	Bromobenzene	5000.	U
108-67-8	1,3,5-Trimethylbenzene	5000.	U
95-49-8	2-Chlorotoluene	5000.	U
106-43-4	4-Chlorotoluene	5000.	U
98-06-6	tert-Butylbenzene	5000.	U
95-63-6	1,2,4-Trimethylbenzene	5000.	U
135-98-8	sec-Butylbenzene	5000.	U
99-87-6	p-Cymene	5000.	U
541-73-1	1,3-Dichlorobenzene	5000.	U
104-51-8	n-Butylbenzene	5000.	U
120-82-1	1,2,4-Trichlorobenzene	20000.	U
91-20-3	Naphthalene	5000.	U
87-61-6	1,2,3-Trichlorobenzene	20000.	U
96-12-8	1,2-dibromo-3-chloro-Propane	50000.	U
87-68-3	Hexachlorobutadiene	20000.	U

000040

1E

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

AIW206

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW206

Sample wt/vol: .005 (g/mL) ML Lab File ID: D2986

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 1000.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

AIW206DL

Lab Name: RES Contract:

Lab Code: RES Case No.: RBL9606 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW206 DL

Sample wt/vol: .002 (g/mL) uL Lab File ID: D2940

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
74-87-3	Chloromethane	25000.	U
74-83-9	Bromomethane	25000.	U
75-01-4	Vinyl Chloride	25000.	U
75-00-3	Chloroethane	25000.	U
75-09-2	Methylene Chloride	12000.	U
75-69-4	Trichlorofluoromethane	12000.	U
75-35-4	1,1-Dichloroethene	12000.	U
75-34-3	1,1-Dichloroethane	12000.	U
156-60-5	1,2-Dichloroethene-trans	12000.	U
156-59-2	1,2-Dichloroethene-cis	12000.	U
74-97-5	Bromochloromethane	12000.	U
67-66-3	Chloroform	12000.	U
107-06-2	1,2-Dichloroethane	12000.	U
71-55-6	1,1,1-Trichloroethane	98000.	
56-23-5	Carbon Tetrachloride	12000.	U
75-27-4	Bromodichloromethane	12000.	U
78-87-5	1,2-Dichloropropane	12000.	U
10061-01-5	cis-1,3-Dichloropropene	12000.	U
74-95-3	Dibromomethane	12000.	U
79-01-6	Trichloroethene	12000.	U
124-48-1	Dibromochloromethane	12000.	U
79-00-5	1,1,2-Trichloroethane	12000.	U
71-43-2	Benzene	12000.	U
10061-02-6	trans-1,3-Dichloropropene	12000.	U
75-25-2	Bromoform	12000.	U
127-18-4	Tetrachloroethene	12000.	U
79-34-5	1,1,2,2-Tetrachloroethane	12000.	U
108-88-3	Toluene	250000.	
108-90-7	Chlorobenzene	12000.	U
630-20-6	1,1,1,2-tetrachloroethane	12000.	U
100-41-4	Ethylbenzene	70000.	
100-42-5	Styrene	12000.	U
1330-20-7	Xylenes (total)	400000.	B
106-46-7	1,4-Dichlorobenzene	12000.	U
95-50-1	1,2-Dichlorobenzene	12000.	U
75-71-8	Dichlorodifluoromethane	25000.	U
594-20-7	2,2-Dichloropropane	12000.	U
563-58-6	1,1-Dichloro-1-propene	12000.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

AIW206DL

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW206 DL

Sample wt/vol: .002 (g/mL) uL Lab File ID: D2940

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
96-18-4	1,2,3-Trichloropropane	12000.	U
142-28-9	1,3-Dichloropropane	12000.	U
106-93-4	Ethylene Dibromide (EDB)	12000.	U
98-82-8	Isopropylbenzene	12000.	U
103-65-1	n-Propylbenzene	12000.	U
108-86-1	Bromobenzene	12000.	U
108-67-8	1,3,5-Trimethylbenzene	12000.	U
95-49-8	2-Chlorotoluene	12000.	U
106-43-4	4-Chlorotoluene	12000.	U
98-06-6	tert-Butylbenzene	12000.	U
95-63-6	1,2,4-Trimethylbenzene	12000.	U
135-98-8	sec-Butylbenzene	12000.	U
99-87-6	p-Cymene	12000.	U
541-73-1	1,3-Dichlorobenzene	12000.	U
104-51-8	n-Butylbenzene	12000.	U
120-82-1	1,2,4-Trichlorobenzene	50000.	U
91-20-3	Naphthalene	12000.	U
87-61-6	1,2,3-Trichlorobenzene	50000.	U
96-12-8	1,2-dibromo-3-chloro-Propane	100000.	U
87-68-3	Hexachlorobutadiene	50000.	U

000216

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

AIW206DL

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: AIW206 DL

Sample wt/vol: .002 (g/mL) µL Lab File ID: D2940

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

VRW203

Lab Name: AES Contract:

Lab Code: AES Case No.: SBL0506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW203

Sample wt/vol: .002 (g/mL) uL Lab File ID: D2941

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
74-87-3	Chloromethane	25000.	U
74-83-9	Bromomethane	25000.	U
75-01-4	Vinyl Chloride	25000.	U
75-00-3	Chloroethane	25000.	U
75-09-2	Methylene Chloride	12000.	U
75-69-4	Trichlorofluoromethane	12000.	U
75-35-4	1,1-Dichloroethene	12000.	U
75-34-3	1,1-Dichloroethane	12000.	U
156-60-5	1,2-Dichloroethene-trans	12000.	U
156-59-2	1,2-Dichloroethene-cis	12000.	U
74-97-5	Bromochloromethane	12000.	U
67-66-3	Chloroform	12000.	U
107-06-2	1,2-Dichloroethane	12000.	U
71-55-6	1,1,1-Trichloroethane	460000.	
56-23-5	Carbon Tetrachloride	12000.	U
75-27-4	Bromodichloromethane	12000.	U
78-87-5	1,2-Dichloropropane	12000.	U
10061-01-5	cis-1,3-Dichloropropene	12000.	U
74-95-3	Dibromomethane	12000.	U
79-01-6	Trichloroethene	12000.	U
124-48-1	Dibromochloromethane	12000.	U
79-00-5	1,1,2-Trichloroethane	12000.	U
71-43-2	Benzene	12000.	U
10061-02-6	trans-1,3-Dichloropropene	12000.	U
75-25-2	Bromoform	12000.	U
127-18-4	Tetrachloroethene	12000.	U
79-34-5	1,1,2,2-Tetrachloroethane	12000.	U
108-88-3	Toluene	490000.	
108-90-7	Chlorobenzene	12000.	U
630-20-6	1,1,1,2-tetrachloroethane	12000.	U
100-41-4	Ethylbenzene	18000.	
100-42-5	Styrene	12000.	U
1330-20-7	Xylenes (total)	98000.	B
106-46-7	1,4-Dichlorobenzene	12000.	U
95-50-1	1,2-Dichlorobenzene	12000.	U
75-71-8	Dichlorodifluoromethane	25000.	U
594-20-7	2,2-Dichloropropane	12000.	U
563-58-6	1,1-Dichloro-1-propene	12000.	U

LA

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VRW203

Lab Name: AES Contract:

Lab Code: AES Case No.: BFL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW203

Sample wt/vol: .002 (g/mL) uL Lab File ID: D2941

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
96-18-4	1,2,3-Trichloropropane	12000.	U
142-28-9	1,3-Dichloropropane	12000.	U
106-93-4	Ethylene Dibromide (EDB)	12000.	U
98-82-8	Isopropylbenzene	12000.	U
103-65-1	n-Propylbenzene	12000.	U
108-86-1	Bromobenzene	12000.	U
108-67-8	1,3,5-Trimethylbenzene	12000.	U
95-49-8	2-Chlorotoluene	12000.	U
106-43-4	4-Chlorotoluene	12000.	U
98-06-6	tert-Butylbenzene	12000.	U
95-63-6	1,2,4-Trimethylbenzene	12000.	U
135-98-8	sec-Butylbenzene	12000.	U
99-87-6	p-Cymene	12000.	U
541-73-1	1,3-Dichlorobenzene	12000.	U
104-51-8	n-Butylbenzene	12000.	U
120-82-1	1,2,4-Trichlorobenzene	50000.	U
91-20-3	Naphthalene	12000.	U
87-61-6	1,2,3-Trichlorobenzene	50000.	U
96-12-8	1,2-dibromo-3-chloro-Propane	100000.	U
87-68-3	Hexachlorobutadiene	50000.	U

1E

EPA SAMPLE NO.

VRW203

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: AES Contract:

Lab Code: AES Case No.: SBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW203

Sample wt/vol: .002 (g/mL) mL Lab File ID: D2941

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/ 7/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VRW207

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW207

Sample wt/vol: .002 (g/mL) uL Lab File ID: D2989

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
74-87-3	Chloromethane	25000.	U
74-83-9	Bromomethane	25000.	U
75-01-4	Vinyl Chloride	25000.	U
75-00-3	Chloroethane	25000.	U
75-09-2	Methylene Chloride	12000.	U
75-69-4	Trichlorofluoromethane	12000.	U
75-35-4	1,1-Dichloroethene	12000.	U
75-34-3	1,1-Dichloroethane	12000.	U
156-60-5	1,2-Dichloroethene-trans	12000.	U
156-59-2	1,2-Dichloroethene-cis	12000.	U
74-97-5	Bromochloromethane	12000.	U
67-66-3	Chloroform	12000.	U
107-06-2	1,2-Dichloroethane	12000.	U
71-55-6	1,1,1-Trichloroethane	47000.	
56-23-5	Carbon Tetrachloride	12000.	U
75-27-4	Bromodichloromethane	12000.	U
78-87-5	1,2-Dichloropropane	12000.	U
10061-01-5	cis-1,3-Dichloropropene	12000.	U
74-95-3	Dibromomethane	12000.	U
79-01-6	Trichloroethene	12000.	U
124-48-1	Dibromochloromethane	12000.	U
79-00-5	1,1,2-Trichloroethane	12000.	U
71-43-2	Benzene	12000.	U
10061-02-6	trans-1,3-Dichloropropene	12000.	U
75-25-2	Bromoform	12000.	U
127-18-4	Tetrachloroethene	12000.	U
79-34-5	1,1,2,2-Tetrachloroethane	12000.	U
108-88-3	Toluene	190000.	
108-90-7	Chlorobenzene	12000.	U
630-20-6	1,1,1,2-tetrachloroethane	12000.	U
100-41-4	Ethylbenzene	48000.	
100-42-5	Styrene	12000.	U
1330-20-7	Xylenes (total)	280000.	
106-46-7	1,4-Dichlorobenzene	12000.	U
95-50-1	1,2-Dichlorobenzene	12000.	U
75-71-8	Dichlorodifluoromethane	25000.	U
594-20-7	2,2-Dichloropropane	12000.	U
563-58-6	1,1-Dichloro-1-propene	12000.	U

1A.

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VRW207

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW207

Sample wt/vol: .002 (g/mL) uL Lab File ID: D2989

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
96-18-4	1,2,3-Trichloropropane	12000.	U
142-28-9	1,3-Dichloropropane	12000.	U
106-93-4	Ethylene Dibromide (EDB)	12000.	U
98-82-8	Isopropylbenzene	12000.	U
103-65-1	n-Propylbenzene	12000.	U
108-86-1	Bromobenzene	12000.	U
108-67-8	1,3,5-Trimethylbenzene	12000.	U
95-49-8	2-Chlorotoluene	12000.	U
106-43-4	4-Chlorotoluene	12000.	U
98-06-6	tert-Butylbenzene	12000.	U
95-63-6	1,2,4-Trimethylbenzene	12000.	U
135-98-8	sec-Butylbenzene	12000.	U
99-87-6	p-Cymene	12000.	U
541-73-1	1,3-Dichlorobenzene	12000.	U
104-51-8	n-Butylbenzene	12000.	U
120-82-1	1,2,4-Trichlorobenzene	50000.	U
91-20-3	Naphthalene	12000.	U
87-61-6	1,2,3-Trichlorobenzene	50000.	U
96-12-8	1,2-dibromo-3-chloro-Propane	100000.	U
87-68-3	Hexachlorobutadiene	50000.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VRW207

Lab Name: AES Contract:

Lab Code: AES Case No.: BBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW207

Sample wt/vol: .002 (g/mL) µL Lab File ID: D2989

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VRW1203

Lab Name: AES Contract:

Lab Code: AES Case No.: EBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW1203

Sample wt/vol: .002 (g/mL) uL Lab File ID: D2988

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
74-87-3	Chloromethane	25000.	U
74-83-9	Bromomethane	25000.	U
75-01-4	Vinyl Chloride	25000.	U
75-00-3	Chloroethane	25000.	U
75-09-2	Methylene Chloride	12000.	U
75-69-4	Trichlorofluoromethane	12000.	U
75-35-4	1,1-Dichloroethene	12000.	U
75-34-3	1,1-Dichloroethane	12000.	U
156-60-5	1,2-Dichloroethene-trans	12000.	U
156-59-2	1,2-Dichloroethene-cis	12000.	U
74-97-5	Bromochloromethane	12000.	U
67-66-3	Chloroform	12000.	U
107-06-2	1,2-Dichloroethane	12000.	U
71-55-6	1,1,1-Trichloroethane	230000.	
56-23-5	Carbon Tetrachloride	12000.	U
75-27-4	Bromodichloromethane	12000.	U
78-87-5	1,2-Dichloropropane	12000.	U
10061-01-5	cis-1,3-Dichloropropene	12000.	U
74-95-3	Dibromomethane	12000.	U
79-01-6	Trichloroethene	7800.	J
124-48-1	Dibromochloromethane	12000.	U
79-00-5	1,1,2-Trichloroethane	12000.	U
71-43-2	Benzene	12000.	U
10061-02-6	trans-1,3-Dichloropropene	12000.	U
75-25-2	Bromoform	12000.	U
127-18-4	Tetrachloroethene	12000.	U
79-34-5	1,1,2,2-Tetrachloroethane	12000.	U
108-88-3	Toluene	220000.	
108-90-7	Chlorobenzene	12000.	U
630-20-6	1,1,1,2-Tetrachloroethane	12000.	U
100-41-4	Ethylbenzene	12000.	J
100-42-5	Styrene	12000.	U
1330-20-7	Xylenes (total)	55000.	
106-46-7	1,4-Dichlorobenzene	12000.	U
95-50-1	1,2-Dichlorobenzene	12000.	U
75-71-8	Dichlorodifluoromethane	25000.	U
594-20-7	2,2-Dichloropropane	12000.	U
563-58-6	1,1-Dichloro-1-propene	12000.	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VRW1203

Lab Name: AES Contract:

Lab Code: AES Case No.: BEL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW1203

Sample wt/vol: .002 (g/mL) ML Lab File ID: D2988

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 100. Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L	Q
96-18-4	1,2,3-Trichloropropane	12000.	U
142-28-9	1,3-Dichloropropane	12000.	U
106-93-4	Ethylene Dibromide (EDB)	12000.	U
98-82-8	Isopropylbenzene	12000.	U
103-65-1	n-Propylbenzene	12000.	U
108-86-1	Bromobenzene	12000.	U
108-67-8	1,3,5-Trimethylbenzene	12000.	U
95-49-8	2-Chlorotoluene	12000.	U
106-43-4	4-Chlorotoluene	12000.	U
98-06-6	tert-Butylbenzene	12000.	U
95-63-6	1,2,4-Trimethylbenzene	12000.	U
135-98-8	sec-Butylbenzene	12000.	U
99-87-6	p-Cymene	12000.	U
541-73-1	1,3-Dichlorobenzene	12000.	U
104-51-8	n-Butylbenzene	12000.	U
120-82-1	1,2,4-Trichlorobenzene	50000.	U
91-20-3	Naphthalene	12000.	U
87-61-6	1,2,3-Trichlorobenzene	50000.	U
96-12-8	1,2-dibromo-3-chloro-Propane	100000.	U
87-68-3	Hexachlorobutadiene	50000.	U

1E

SPA SAMPLE NO.

VRW1203

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: AES Contract:

Lab Code: AES Case No.: SBL9506 SAS No.: SDG No.: AIW204

Matrix: (soil/water) WATER Lab Sample ID: VRW1203

Sample wt/vol: .002 (g/mL) µL Lab File ID: D2988

Level: (low/med) LOW Date Received: 9/27/95

% Moisture: not dec. 10% Date Analyzed: 10/11/95

Column: (pack/cap) CAP Dilution Factor: 2500.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) MG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

Attachment 3

Physical Data for NAPL Samples (Density, Viscosity, and Interfacial Tension)

SAYBOLT - HEINRICI, INC.
3111 Red Bluff
P.O. Box 1659
Pasadena, TX 77501-1659
PHONE: 713-477-2705
FAX: 713-477-4831

REPORT OF ANALYSIS

Job No.: L9509.201B

SAYBOLT

TO WHOM IT MAY CONCERN:

Various samples were tendered to Saybolt-Heinrici, Inc., Pasadena, Texas via representative of Blasland, Bouck & Lee, Inc., Syracuse, New York on September 27, 1995.

ANALYSIS:

1.) Sample Marked: VRW-203
Lockheed Martin
9-25-95 @09:05

2.) Sample Marked: VRW-207
Lockheed Martin
9-25-95 @09:45

RESULTS OF ANALYSIS:		1.	2.	METHOD
Viscosity @5°C	cSt	0.98	0.95	ASTM D-445
Density @10°C	g/cm3	1.0263	0.8959	ASTM D-4052
Interfacial Tension @20°C	dynes/cm	3	16	ASTM D-971

The above mentioned samples will be at your disposal for 90 days.

Original Signed By
Victor Martinez
October 02, 1995
SAYBOLT - HEINRICI, INC.
Pasadena, Texas

Please Refer to Terms, Conditions and Limitations as per our Tariff

Attachment 4

Chemical Data Summary Report for Soils (VOCs and TOC)

CONVENTIONAL WET CHEMISTRY ANALYSES

Client Sample ID	Lab Sample ID	Matrix	Lab Rcd. Date	Lab Anal. Date	Parameter	Result	Flag	Units
BBL-1 (8-10)	950927 F01	SO	09/25/95	10/04/95	CLP-TOC	7090		mg/kg
BBL-1 (13-14)	950927 F02	SO	09/27/95	10/04/95	CLP-TOC	20100		mg/kg
BBL-1 (4-6)	950927 F03	SO	09/27/95	10/04/95	CLP-TOC	463		mg/kg
BBL-1 (16-18)	950927 F06	SO	09/27/95	10/04/95	CLP-TOC	2130		mg/kg
BBL-1 (20-20.8)	950927 F07	SO	09/27/95	10/04/95	CLP-TOC	39900		mg/kg
BBL-1 (10-12)	950927 F09	SO	09/27/95	10/04/95	CLP-TOC	10560		mg/kg
BBL Duplicate	950927 F10	SO	09/27/95	10/04/95	CLP-TOC	10590		mg/kg
BBL-FB	950929 S08	WA	09/29/95	10/04/95	CLP-TOC	100	U	ug/l

CONVENTIONAL WET CHEMISTRY ANALYSES

Client Sample ID	Lab Sample ID	Matrix	Lab Rcd. Date	Lab Anal. Date	Parameter	Result	Flag	Units
BBL-1 (6-8)	950927 F04	SO	09/27/95	10/04/95	CLP-TOC	1420		mg/kg

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL1(8-10

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL1(8-10)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2861

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 18. Date Analyzed: 10/03/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12.	U
74-83-9	Bromomethane	12.	U
75-01-4	Vinyl Chloride	12.	U
75-00-3	Chloroethane	12.	U
75-09-2	Methylene Chloride	12.	U
67-64-1	Acetone	12.	U
75-15-0	Carbon Disulfide	12.	U
75-35-4	1,1-Dichloroethene	12.	U
75-34-3	1,1-Dichloroethane	12.	U
156-60-5	1,2-Dichloroethene-trans	12.	U
67-66-3	Chloroform	12.	U
107-06-2	1,2-Dichloroethane	12.	U
78-93-3	2-Butanone	12.	U
71-55-6	1,1,1-Trichloroethane	12.	U
56-23-5	Carbon Tetrachloride	12.	U
75-27-4	Bromodichloromethane	12.	U
78-87-5	1,2-Dichloropropane	12.	U
10061-01-5	cis-1,3-Dichloropropene	12.	U
79-01-6	Trichloroethene	12.	U
124-48-1	Dibromochloromethane	12.	U
79-00-5	1,1,2-Trichloroethane	12.	U
71-43-2	Benzene	12.	U
10061-02-6	trans-1,3-Dichloropropene	12.	U
75-25-2	Bromoform	12.	U
108-10-1	4-Methyl-2-Pentanone	12.	U
591-78-6	2-Hexanone	12.	U
127-18-4	Tetrachloroethene	12.	U
79-34-5	1,1,2,2-Tetrachloroethane	12.	U
108-88-3	Toluene	12.	U
108-90-7	Chlorobenzene	12.	U
100-41-4	Ethylbenzene	12.	U
100-42-5	Styrene	12.	U
1330-20-7	Xylenes (total)	12.	U
156-59-2	1,2-Dichloroethene-cis	12.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL1(8-10

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL1(8-10)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2861

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 18. Date Analyzed: 10/03/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL1(16-16.4

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL1(16-16.4)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2846

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 10. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11.	U
74-83-9	Bromomethane	11.	U
75-01-4	Vinyl Chloride	11.	U
75-00-3	Chloroethane	11.	U
75-09-2	Methylene Chloride	11.	U
67-64-1	Acetone	11.	U
75-15-0	Carbon Disulfide	11.	U
75-35-4	1,1-Dichloroethene	11.	U
75-34-3	1,1-Dichloroethane	11.	U
156-60-5	1,2-Dichloroethene-trans	11.	U
67-66-3	Chloroform	11.	U
107-06-2	1,2-Dichloroethane	11.	U
78-93-3	2-Butanone	11.	U
71-55-6	1,1,1-Trichloroethane	11.	U
56-23-5	Carbon Tetrachloride	11.	U
75-27-4	Bromodichloromethane	11.	U
78-87-5	1,2-Dichloropropane	11.	U
10061-01-5	cis-1,3-Dichloropropene	11.	U
79-01-6	Trichloroethene	11.	U
124-48-1	Dibromochloromethane	11.	U
79-00-5	1,1,2-Trichloroethane	11.	U
71-43-2	Benzene	11.	U
10061-02-6	trans-1,3-Dichloropropene	11.	U
75-25-2	Bromoform	11.	U
108-10-1	4-Methyl-2-Pentanone	11.	U
591-78-6	2-Hexanone	11.	U
127-18-4	Tetrachloroethene	11.	U
79-34-5	1,1,2,2-Tetrachloroethane	11.	U
108-88-3	Toluene	1.	J
108-90-7	Chlorobenzene	11.	U
100-41-4	Ethylbenzene	11.	U
100-42-5	Styrene	11.	U
1330-20-7	Xylenes (total)	11.	U
156-59-2	1,2-Dichloroethene-cis	11.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL1(16-16.4)

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL1(16-16.4)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2846

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 10. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL1(22-24

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL1(22-24)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2847

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 8. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11.	U
74-83-9	Bromomethane	11.	U
75-01-4	Vinyl Chloride	11.	U
75-00-3	Chloroethane	11.	U
75-09-2	Methylene Chloride	11.	U
67-64-1	Acetone	11.	U
75-15-0	Carbon Disulfide	11.	U
75-35-4	1,1-Dichloroethene	11.	U
75-34-3	1,1-Dichloroethane	11.	U
156-60-5	1,2-Dichloroethene-trans	11.	U
67-66-3	Chloroform	11.	U
107-06-2	1,2-Dichloroethane	11.	U
78-93-3	2-Butanone	11.	U
71-55-6	1,1,1-Trichloroethane	11.	U
56-23-5	Carbon Tetrachloride	11.	U
75-27-4	Bromodichloromethane	11.	U
78-87-5	1,2-Dichloropropane	11.	U
10061-01-5	cis-1,3-Dichloropropene	11.	U
79-01-6	Trichloroethene	11.	U
124-48-1	Dibromochloromethane	11.	U
79-00-5	1,1,2-Trichloroethane	11.	U
71-43-2	Benzene	11.	U
10061-02-6	trans-1,3-Dichloropropene	11.	U
75-25-2	Bromoform	11.	U
108-10-1	4-Methyl-2-Pentanone	11.	U
591-78-6	2-Hexanone	11.	U
127-18-4	Tetrachloroethene	11.	U
79-34-5	1,1,2,2-Tetrachloroethane	11.	U
108-88-3	Toluene	2.	J
108-90-7	Chlorobenzene	11.	U
100-41-4	Ethylbenzene	11.	U
100-42-5	Styrene	11.	U
1330-20-7	Xylenes (total)	11.	U
156-59-2	1,2-Dichloroethene-cis	11.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL1(22-24

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL1(22-24)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2847

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 8. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN SILOXANE	21.68	10.	J
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL2(8-10

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL2(8-10)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2877

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 19. Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12.	U
74-83-9	Bromomethane	12.	U
75-01-4	Vinyl Chloride	12.	U
75-00-3	Chloroethane	12.	U
75-09-2	Methylene Chloride	7.	J
67-64-1	Acetone	12.	U
75-15-0	Carbon Disulfide	12.	U
75-35-4	1,1-Dichloroethene	12.	U
75-34-3	1,1-Dichloroethane	12.	U
156-60-5	1,2-Dichloroethene-trans	12.	U
67-66-3	Chloroform	12.	U
107-06-2	1,2-Dichloroethane	12.	U
78-93-3	2-Butanone	12.	U
71-55-6	1,1,1-Trichloroethane	3.	J
56-23-5	Carbon Tetrachloride	12.	U
75-27-4	Bromodichloromethane	12.	U
78-87-5	1,2-Dichloropropane	12.	U
10061-01-5	cis-1,3-Dichloropropene	12.	U
79-01-6	Trichloroethene	12.	U
124-48-1	Dibromochloromethane	12.	U
79-00-5	1,1,2-Trichloroethane	12.	U
71-43-2	Benzene	12.	U
10061-02-6	trans-1,3-Dichloropropene	12.	U
75-25-2	Bromoform	12.	U
108-10-1	4-Methyl-2-Pentanone	12.	U
591-78-6	2-Hexanone	12.	U
127-18-4	Tetrachloroethene	12.	U
79-34-5	1,1,2,2-Tetrachloroethane	12.	U
108-88-3	Toluene	12.	U
108-90-7	Chlorobenzene	12.	U
100-41-4	Ethylbenzene	12.	U
100-42-5	Styrene	12.	U
1330-20-7	Xylenes (total)	12.	U
156-59-2	1,2-Dichloroethene-cis	12.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL2(8-1

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL2(8-10)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2877

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 19. Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL2(14-16

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL2(14-16)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2878

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 12. Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11.	U
74-83-9	Bromomethane	11.	U
75-01-4	Vinyl Chloride	11.	U
75-00-3	Chloroethane	11.	U
75-09-2	Methylene Chloride	8.	J
67-64-1	Acetone	25.	B
75-15-0	Carbon Disulfide	11.	U
75-35-4	1,1-Dichloroethene	11.	U
75-34-3	1,1-Dichloroethane	11.	U
156-60-5	1,2-Dichloroethene-trans	11.	U
67-66-3	Chloroform	11.	U
107-06-2	1,2-Dichloroethane	11.	U
78-93-3	2-Butanone	11.	U
71-55-6	1,1,1-Trichloroethane	11.	U
56-23-5	Carbon Tetrachloride	11.	U
75-27-4	Bromodichloromethane	11.	U
78-87-5	1,2-Dichloropropane	11.	U
10061-01-5	cis-1,3-Dichloropropene	11.	U
79-01-6	Trichloroethene	11.	U
124-48-1	Dibromochloromethane	11.	U
79-00-5	1,1,2-Trichloroethane	11.	U
71-43-2	Benzene	11.	U
10061-02-6	trans-1,3-Dichloropropene	11.	U
75-25-2	Bromoform	11.	U
108-10-1	4-Methyl-2-Pentanone	11.	U
591-78-6	2-Hexanone	11.	U
127-18-4	Tetrachloroethene	11.	U
79-34-5	1,1,2,2-Tetrachloroethane	11.	U
108-88-3	Toluene	11.	U
108-90-7	Chlorobenzene	11.	U
100-41-4	Ethylbenzene	11.	U
100-42-5	Styrene	11.	U
1330-20-7	Xylenes (total)	11.	U
156-59-2	1,2-Dichloroethene-cis	11.	U

1E 000013

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL2(14-16

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL2(14-16)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2878

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 12. Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL3(8-10

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL3(8-10)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2848

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 23. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	13.	U
74-83-9	Bromomethane	13.	U
75-01-4	Vinyl Chloride	13.	U
75-00-3	Chloroethane	13.	U
75-09-2	Methylene Chloride	13.	U
67-64-1	Acetone	13.	U
75-15-0	Carbon Disulfide	13.	U
75-35-4	1,1-Dichloroethene	13.	U
75-34-3	1,1-Dichloroethane	13.	U
156-60-5	1,2-Dichloroethene-trans	13.	U
67-66-3	Chloroform	13.	U
107-06-2	1,2-Dichloroethane	13.	U
78-93-3	2-Butanone	13.	U
71-55-6	1,1,1-Trichloroethane	13.	U
56-23-5	Carbon Tetrachloride	13.	U
75-27-4	Bromodichloromethane	13.	U
78-87-5	1,2-Dichloropropane	13.	U
10061-01-5	cis-1,3-Dichloropropene	13.	U
79-01-6	Trichloroethene	13.	U
124-48-1	Dibromochloromethane	13.	U
79-00-5	1,1,2-Trichloroethane	13.	U
71-43-2	Benzene	13.	U
10061-02-6	trans-1,3-Dichloropropene	13.	U
75-25-2	Bromoform	13.	U
108-10-1	4-Methyl-2-Pentanone	13.	U
591-78-6	2-Hexanone	13.	U
127-18-4	Tetrachloroethene	13.	U
79-34-5	1,1,2,2-Tetrachloroethane	13.	U
108-88-3	Toluene	13.	U
108-90-7	Chlorobenzene	13.	U
100-41-4	Ethylbenzene	13.	U
100-42-5	Styrene	13.	U
1330-20-7	Xylenes (total)	13.	U
156-59-2	1,2-Dichloroethene-cis	13.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL3(8-10

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL3(8-10)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2848

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 23. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
BBL3(12-14

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL3(12-14)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2849

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 17. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12.	U
74-83-9	Bromomethane	12.	U
75-01-4	Vinyl Chloride	12.	U
75-00-3	Chloroethane	12.	U
75-09-2	Methylene Chloride	12.	U
67-64-1	Acetone	12.	U
75-15-0	Carbon Disulfide	12.	U
75-35-4	1,1-Dichloroethene	12.	U
75-34-3	1,1-Dichloroethane	12.	U
156-60-5	1,2-Dichloroethene-trans	12.	U
67-66-3	Chloroform	12.	U
107-06-2	1,2-Dichloroethane	12.	U
78-93-3	2-Butanone	12.	U
71-55-6	1,1,1-Trichloroethane	12.	U
56-23-5	Carbon Tetrachloride	12.	U
75-27-4	Bromodichloromethane	12.	U
78-87-5	1,2-Dichloropropane	12.	U
10061-01-5	cis-1,3-Dichloropropene	12.	U
79-01-6	Trichloroethene	12.	U
124-48-1	Dibromochloromethane	12.	U
79-00-5	1,1,2-Trichloroethane	12.	U
71-43-2	Benzene	12.	U
10061-02-6	trans-1,3-Dichloropropene	12.	U
75-25-2	Bromoform	12.	U
108-10-1	4-Methyl-2-Pentanone	12.	U
591-78-6	2-Hexanone	12.	U
127-18-4	Tetrachloroethene	12.	U
79-34-5	1,1,2,2-Tetrachloroethane	12.	U
108-88-3	Toluene	2.	J
108-90-7	Chlorobenzene	12.	U
100-41-4	Ethylbenzene	12.	U
100-42-5	Styrene	12.	U
1330-20-7	Xylenes (total)	12.	U
156-59-2	1,2-Dichloroethene-cis	12.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL3(12-14)

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL3(12-14)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2849

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 17. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

OCCL18

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL3(22-24

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL3(22-24)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2850

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 10. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11.	U
74-83-9	Bromomethane	11.	U
75-01-4	Vinyl Chloride	11.	U
75-00-3	Chloroethane	11.	U
75-09-2	Methylene Chloride	11.	U
67-64-1	Acetone	11.	U
75-15-0	Carbon Disulfide	11.	U
75-35-4	1,1-Dichloroethene	11.	U
75-34-3	1,1-Dichloroethane	11.	U
156-60-5	1,2-Dichloroethene-trans	11.	U
67-66-3	Chloroform	11.	U
107-06-2	1,2-Dichloroethane	11.	U
78-93-3	2-Butanone	11.	U
71-55-6	1,1,1-Trichloroethane	11.	U
56-23-5	Carbon Tetrachloride	11.	U
75-27-4	Bromodichloromethane	11.	U
78-87-5	1,2-Dichloropropane	11.	U
10061-01-5	cis-1,3-Dichloropropene	11.	U
79-01-6	Trichloroethene	11.	U
124-48-1	Dibromochloromethane	11.	U
79-00-5	1,1,2-Trichloroethane	11.	U
71-43-2	Benzene	11.	U
10061-02-6	trans-1,3-Dichloropropene	11.	U
75-25-2	Bromoform	11.	U
108-10-1	4-Methyl-2-Pentanone	11.	U
591-78-6	2-Hexanone	11.	U
127-18-4	Tetrachloroethene	11.	U
79-34-5	1,1,2,2-Tetrachloroethane	11.	U
108-88-3	Toluene	6.	J
108-90-7	Chlorobenzene	11.	U
100-41-4	Ethylbenzene	11.	U
100-42-5	Styrene	11.	U
1330-20-7	Xylenes (total)	11.	U
156-59-2	1,2-Dichloroethene-cis	11.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL3(22-24)

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL3(22-24)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2850

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec. 10. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN SILOXANE	21.68	10.	J
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

000020

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL4(12-14)

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL4(12-14)

Sample wt/vol: 2.000 (g/mL) G Lab File ID: D2912

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 17. Date Analyzed: 10/05/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	30.	U
74-83-9	Bromomethane	30.	U
75-01-4	Vinyl Chloride	30.	U
75-00-3	Chloroethane	30.	U
75-09-2	Methylene Chloride	30.	U
67-64-1	Acetone	24.	J
75-15-0	Carbon Disulfide	30.	U
75-35-4	1,1-Dichloroethene	30.	U
75-34-3	1,1-Dichloroethane	30.	U
156-60-5	1,2-Dichloroethene-trans	30.	U
67-66-3	Chloroform	30.	U
107-06-2	1,2-Dichloroethane	30.	U
78-93-3	2-Butanone	30.	U
71-55-6	1,1,1-Trichloroethane	30.	U
56-23-5	Carbon Tetrachloride	30.	U
75-27-4	Bromodichloromethane	30.	U
78-87-5	1,2-Dichloropropane	30.	U
10061-01-5	cis-1,3-Dichloropropene	30.	U
79-01-6	Trichloroethene	30.	U
124-48-1	Dibromochloromethane	30.	U
79-00-5	1,1,2-Trichloroethane	30.	U
71-43-2	Benzene	30.	U
10061-02-6	trans-1,3-Dichloropropene	30.	U
75-25-2	Bromoform	30.	U
108-10-1	4-Methyl-2-Pentanone	30.	U
591-78-6	2-Hexanone	30.	U
127-18-4	Tetrachloroethene	86.	
79-34-5	1,1,2,2-Tetrachloroethane	30.	U
108-88-3	Toluene	30.	U
108-90-7	Chlorobenzene	30.	U
100-41-4	Ethylbenzene	79.	
100-42-5	Styrene	30.	U
1330-20-7	Xylenes (total)	810.	
156-59-2	1,2-Dichloroethene-cis	30.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: BBL4(12-

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL4(12-14)

Sample wt/vol: 2.000 (g/mL) G Lab File ID: D2912

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 17. Date Analyzed: 10/05/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 10 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN ALKANE	12.92	5000.	J
2.	- -	UNKNOWN ALKANE	13.21	3000.	J
3.	- -	UNKNOWN ALKANE	13.95	8000.	J
4.	- -	UNKNOWN ISOMER DIMETHYLCYCLO	14.69	200.	J
5.	- -	UNKNOWN ISOMER DIMETHYLCYCLO	14.92	60.	J
6.	- -	UNKNOWN ALKANE	14.96	200.	J
7.	- -	UNKNOWN	15.45	90.	J
8.	- -	UNKNOWN ALKANE	16.07	200.	J
9.	- -	UNKNOWN ALKANE	16.83	200.	J
10.	- -	UNKNOWN	19.45	70.	J
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

000022

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL4(21-22

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL4(21-22)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2854

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 14. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12.	U
74-83-9	Bromomethane	12.	U
75-01-4	Vinyl Chloride	12.	U
75-00-3	Chloroethane	12.	U
75-09-2	Methylene Chloride	12.	U
67-64-1	Acetone	12.	U
75-15-0	Carbon Disulfide	12.	U
75-35-4	1,1-Dichloroethene	9.	J
75-34-3	1,1-Dichloroethane	12.	
156-60-5	1,2-Dichloroethene-trans	12.	U
67-66-3	Chloroform	12.	U
107-06-2	1,2-Dichloroethane	12.	U
78-93-3	2-Butanone	12.	U
71-55-6	1,1,1-Trichloroethane	8.	J
56-23-5	Carbon Tetrachloride	12.	U
75-27-4	Bromodichloromethane	12.	U
78-87-5	1,2-Dichloropropane	12.	U
10061-01-5	cis-1,3-Dichloropropene	12.	U
79-01-6	Trichloroethene	12.	U
124-48-1	Dibromochloromethane	12.	U
79-00-5	1,1,2-Trichloroethane	12.	U
71-43-2	Benzene	12.	U
10061-02-6	trans-1,3-Dichloropropene	12.	U
75-25-2	Bromoform	12.	U
108-10-1	4-Methyl-2-Pentanone	12.	U
591-78-6	2-Hexanone	12.	U
127-18-4	Tetrachloroethene	12.	U
79-34-5	1,1,2,2-Tetrachloroethane	12.	U
108-88-3	Toluene	4.	J
108-90-7	Chlorobenzene	12.	U
100-41-4	Ethylbenzene	12.	U
100-42-5	Styrene	12.	U
1330-20-7	Xylenes (total)	8.	J
156-59-2	1,2-Dichloroethene-cis	12.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL4(21-22

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL4(21-22)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2854

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 14. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 4 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN ALKANE	13.19	6.	J
2.	- -	UNKNOWN HYDROCARBON	13.95	20.	J
3.	- -	UNKNOWN HYDROCARBON	15.79	20.	J
4.	- -	UNKNOWN ALKANE	19.42	6.	J
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
BBL5(12-14

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL5(12-14)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2856

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 17. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12.	U
74-83-9	Bromomethane	12.	U
75-01-4	Vinyl Chloride	12.	U
75-00-3	Chloroethane	12.	U
75-09-2	Methylene Chloride	12.	U
67-64-1	Acetone	9.	J
75-15-0	Carbon Disulfide	12.	U
75-35-4	1,1-Dichloroethene	12.	U
75-34-3	1,1-Dichloroethane	12.	U
156-60-5	1,2-Dichloroethene-trans	12.	U
67-66-3	Chloroform	12.	U
107-06-2	1,2-Dichloroethane	12.	U
78-93-3	2-Butanone	12.	U
71-55-6	1,1,1-Trichloroethane	12.	U
56-23-5	Carbon Tetrachloride	12.	U
75-27-4	Bromodichloromethane	12.	U
78-87-5	1,2-Dichloropropane	12.	U
10061-01-5	cis-1,3-Dichloropropene	12.	U
79-01-6	Trichloroethene	12.	U
124-48-1	Dibromochloromethane	12.	U
79-00-5	1,1,2-Trichloroethane	12.	U
71-43-2	Benzene	12.	U
10061-02-6	trans-1,3-Dichloropropene	12.	U
75-25-2	Bromoform	12.	U
108-10-1	4-Methyl-2-Pentanone	12.	U
591-78-6	2-Hexanone	12.	U
127-18-4	Tetrachloroethene	12.	U
79-34-5	1,1,2,2-Tetrachloroethane	12.	U
108-88-3	Toluene	12.	U
108-90-7	Chlorobenzene	12.	U
100-41-4	Ethylbenzene	12.	U
100-42-5	Styrene	12.	U
1330-20-7	Xylenes (total)	10.	J
156-59-2	1,2-Dichloroethene-cis	12.	U

000035

EPA SAMPLE NO.

BBL5(12-14

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL5(12-14)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2856

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 17. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 2 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN HYDROCARBON	13.95	20.	J
2.	- -	UNKNOWN HYDROCARBON	15.79	20.	J
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
BBL5(24-26

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL5(24-26)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2858

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 11. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11.	U
74-83-9	Bromomethane	11.	U
75-01-4	Vinyl Chloride	11.	U
75-00-3	Chloroethane	11.	U
75-09-2	Methylene Chloride	11.	U
67-64-1	Acetone	11.	U
75-15-0	Carbon Disulfide	11.	U
75-35-4	1,1-Dichloroethene	11.	U
75-34-3	1,1-Dichloroethane	3.	J
156-60-5	1,2-Dichloroethene-trans	11.	U
67-66-3	Chloroform	11.	U
107-06-2	1,2-Dichloroethane	11.	U
78-93-3	2-Butanone	11.	U
71-55-6	1,1,1-Trichloroethane	10.	J
56-23-5	Carbon Tetrachloride	11.	U
75-27-4	Bromodichloromethane	11.	U
78-87-5	1,2-Dichloropropane	11.	U
10061-01-5	cis-1,3-Dichloropropene	11.	U
79-01-6	Trichloroethene	11.	U
124-48-1	Dibromochloromethane	11.	U
79-00-5	1,1,2-Trichloroethane	11.	U
71-43-2	Benzene	11.	U
10061-02-6	trans-1,3-Dichloropropene	11.	U
75-25-2	Bromoform	11.	U
108-10-1	4-Methyl-2-Pentanone	11.	U
591-78-6	2-Hexanone	11.	U
127-18-4	Tetrachloroethene	11.	U
79-34-5	1,1,2,2-Tetrachloroethane	11.	U
108-88-3	Toluene	1.	J
108-90-7	Chlorobenzene	11.	U
100-41-4	Ethylbenzene	11.	U
100-42-5	Styrene	11.	U
1330-20-7	Xylenes (total)	11.	U
156-59-2	1,2-Dichloroethene-cis	11.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL5(24-26)

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL5(24-26)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2858

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 11. Date Analyzed: 10/02/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBL5(28-30)

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL5(28-30)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2907

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 17. Date Analyzed: 10/05/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12.	U
74-83-9	Bromomethane	12.	U
75-01-4	Vinyl Chloride	12.	U
75-00-3	Chloroethane	12.	U
75-09-2	Methylene Chloride	12.	U
67-64-1	Acetone	12.	U
75-15-0	Carbon Disulfide	12.	U
75-35-4	1,1-Dichloroethene	12.	U
75-34-3	1,1-Dichloroethane	12.	U
156-60-5	1,2-Dichloroethene-trans	12.	U
67-66-3	Chloroform	12.	U
107-06-2	1,2-Dichloroethane	12.	U
78-93-3	2-Butanone	12.	U
71-55-6	1,1,1-Trichloroethane	12.	U
56-23-5	Carbon Tetrachloride	12.	U
75-27-4	Bromodichloromethane	12.	U
78-87-5	1,2-Dichloropropane	12.	U
10061-01-5	cis-1,3-Dichloropropene	12.	U
79-01-6	Trichloroethene	12.	U
124-48-1	Dibromochloromethane	12.	U
79-00-5	1,1,2-Trichloroethane	12.	U
71-43-2	Benzene	12.	U
10061-02-6	trans-1,3-Dichloropropene	12.	U
75-25-2	Bromoform	12.	U
108-10-1	4-Methyl-2-Pentanone	12.	U
591-78-6	2-Hexanone	12.	U
127-18-4	Tetrachloroethene	12.	U
79-34-5	1,1,2,2-Tetrachloroethane	12.	U
108-88-3	Toluene	2.	J
108-90-7	Chlorobenzene	12.	U
100-41-4	Ethylbenzene	12.	U
100-42-5	Styrene	12.	U
1330-20-7	Xylenes (total)	12.	U
156-59-2	1,2-Dichloroethene-cis	12.	U

000029

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBL5(28-30

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: BBL5(28-30)

Sample wt/vol: 5.000 (g/mL) G Lab File ID: D2907

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 17. Date Analyzed: 10/05/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

000020

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

DUP

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: DUP

Sample wt/vol: 2.000 (g/mL) G Lab File ID: D2908

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 17. Date Analyzed: 10/05/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	30.	U
74-83-9	Bromomethane	30.	U
75-01-4	Vinyl Chloride	30.	U
75-00-3	Chloroethane	30.	U
75-09-2	Methylene Chloride	30.	U
67-64-1	Acetone	30.	U
75-15-0	Carbon Disulfide	30.	U
75-35-4	1,1-Dichloroethene	30.	U
75-34-3	1,1-Dichloroethane	30.	U
156-60-5	1,2-Dichloroethene-trans	30.	U
67-66-3	Chloroform	30.	U
107-06-2	1,2-Dichloroethane	30.	U
78-93-3	2-Butanone	30.	U
71-55-6	1,1,1-Trichloroethane	30.	U
56-23-5	Carbon Tetrachloride	30.	U
75-27-4	Bromodichloromethane	30.	U
78-87-5	1,2-Dichloropropane	30.	U
10061-01-5	cis-1,3-Dichloropropene	30.	U
79-01-6	Trichloroethene	30.	U
124-48-1	Dibromochloromethane	30.	U
79-00-5	1,1,2-Trichloroethane	30.	U
71-43-2	Benzene	30.	U
10061-02-6	trans-1,3-Dichloropropene	30.	U
75-25-2	Bromoform	30.	U
108-10-1	4-Methyl-2-Pentanone	30.	U
591-78-6	2-Hexanone	30.	U
127-18-4	Tetrachloroethene	130.	
79-34-5	1,1,2,2-Tetrachloroethane	30.	U
108-88-3	Toluene	30.	U
108-90-7	Chlorobenzene	30.	U
100-41-4	Ethylbenzene	30.	U
100-42-5	Styrene	30.	U
1330-20-7	Xylenes (total)	950.	
156-59-2	1,2-Dichloroethene-cis	30.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DUP

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) SOIL Lab Sample ID: DUP

Sample wt/vol: 2.000 (g/mL) G Lab File ID: D2908

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec. 17. Date Analyzed: 10/05/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 10 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN ALKANE	12.91	5000.	J
2.	- -	UNKNOWN ALKANE	13.23	3000.	J
3.	- -	UNKNOWN ALKANE	13.97	8000.	J
4.	- -	UNKNOWN ISOMER DIMETHYL CYCL	14.70	300.	J
5.	- -	UNKNOWN ISOMER DIMETHYLCYCLO	14.91	400.	J
6.	- -	UNKNOWN	15.46	100.	J
7.	- -	UNKNOWN ALKANE	16.08	200.	J
8.	- -	UNKNOWN ALKANE	16.82	200.	J
9.	- -	UNKNOWN AROMATIC	20.02	100.	J
10.	- -	UNKNOWN AROMATIC	20.96	100.	J
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BBLFB

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) WATER Lab Sample ID: BBLFB

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: D2885

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec._____ Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	9.	BJ
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
156-60-5	1,2-Dichloroethene-trans	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U
156-59-2	1,2-Dichloroethene-cis	10.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BBLFB

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) WATER Lab Sample ID: BBLFB

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: D2885

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec._____ Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB1

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) WATER Lab Sample ID: TB1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: D2879

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec._____ Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
156-60-5	1,2-Dichloroethene-trans	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U
156-59-2	1,2-Dichloroethene-cis	10.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

TB1

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) WATER Lab Sample ID: TB1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: D2879

Level: (low/med) LOW Date Received: 09/27/95

% Moisture: not dec._____ Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB2

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) WATER Lab Sample ID: TB2

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: D2884

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec._____ Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	12.	B
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
156-60-5	1,2-Dichloroethene-trans	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U
156-59-2	1,2-Dichloroethene-cis	10.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

TB2

Lab Name: AES, Inc. Contract:

Lab Code: AES Case No.: BBL9501 SAS No.: SDG No.: BBL1(4

Matrix: (soil/water) WATER Lab Sample ID: TB2

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: D2884

Level: (low/med) LOW Date Received: 09/29/95

% Moisture: not dec._____ Date Analyzed: 10/04/95

GC Column: RTX502.2 ID: .25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

Attachment 5

Physical Data for Soils

parratt wolff inc

October 9, 1995

Mr. Mike Gefell
Blasland, Bouck & Lee, Inc.
6723 Towpath Road
Box 66
Syracuse, New York 13214-0066

Re: L-95110
Laboratory Testing
Lockheed-Martin
Farrell Road
Project No. 380.81.01

Dear Mr. Gefell:

Enclosed are the results of laboratory testing performed at your request on one bulk and ten jar soil samples delivered to our laboratory on September 25 and 29, 1995 for the above referenced project. Results include:

1.	Natural Moisture Content ASTM D2216	5 each
2.	Sieve Analysis ASTM D422 & D1140	2 each
3.	Hydrometer Analysis ASTM D422	1 each
4.	Specific Grvity ASTM D854	1 each
5.	Bulk (Natural) Soil Density Corps of Engineers EM-1110-2-1906 Appendix II	1 each
6.	Porosity Corps of Engineers EM-1110-2-1906 Appendix II	1 each

All requested tests have been completed on the previously received sample(s) for the above project. All sample remains are scheduled to be disposed of on November 9, 1995. Please notify Parratt-Wolff, Inc. by letter or telephone prior to November 9, 1995 if you would prefer to pick up the sample(s) or that the sample(s) be retained by Parratt-Wolff, Inc. for an additional period of time.

☑ Fisher Road, East Syracuse NY 13057-0056 Telephone 315-437-1429 or 800-782-7260 FAX 315-437-1770
☐ One Copley Parkway, Suite 309, Raleigh, North Carolina 27623 Telephone 919-469-2953 FAX 919-469-8280

Re: L-95110
Laboratory Testing
Lockheed-Martin
Farrell Road
Project No. 380.81.01

Thank you for this opportunity to work with you.

Very truly yours,

PARRATT - WOLFF, INC.

David L. Elliott, ET
Manager - Field Inspection Services
DLE/lms
encs:

October 9, 1995

L-95110
Laboratory Testing
Lockheed-Martin
Farrell Road
Project No. 380.81.01

NATURAL MOISTURE CONTENT ASTM D2216

Lab ID#	Sample #	Depth (feet)	Moisture Content as a Percent of Dry Weight
7822	BBL-1	13.0'-16.0'	9.1
7823	BBL-1	17.0'-17.3' Composite	5.6
		17.3'-17.6'	
		17.6'-18.0'	5.9
7825	BBL-1	29.2'-29.8'	13.5
7866	BBL-4	16.0'-18.0'	20.1

(1)Natural Moisture Content obtained from Bulk (Natural) Density sample.

SIEVE AI .YSIS OF
SOIL/AGGREGATE

PROJECT TITLE Laboratory Testing, Lockheed-Martin, Farrell Road, Project No. 380.81.01

PROJECT # L-95110
TEST METHOD ASTM D422 & D1140

REPORT # 1
REPORT DATE October 9, 1995

			Sieve Size - Percent Passing Sieve																	
Lab ID#	Sample ID #	Depth (feet)		3/4"	1/2"	3/8"	1/4"	#4	#10	#30	#40	#60	#100	#200						
7822	BBL-1	13.0-16.0		100	96.5	96.5	94.9	93.4	90.3	84.4	82.4	77.4	67.9	47.8						
7866	BBL-4	16.0-18.0		--	--	--	--	--	--	--	--	100	98.8	55.1						

Sample mass, as received, meets minimum requirements of test method: Yes ____ No X

Prewashed: Yes X No ____

Remarks: ____

Performed By FC

Checked By VJT

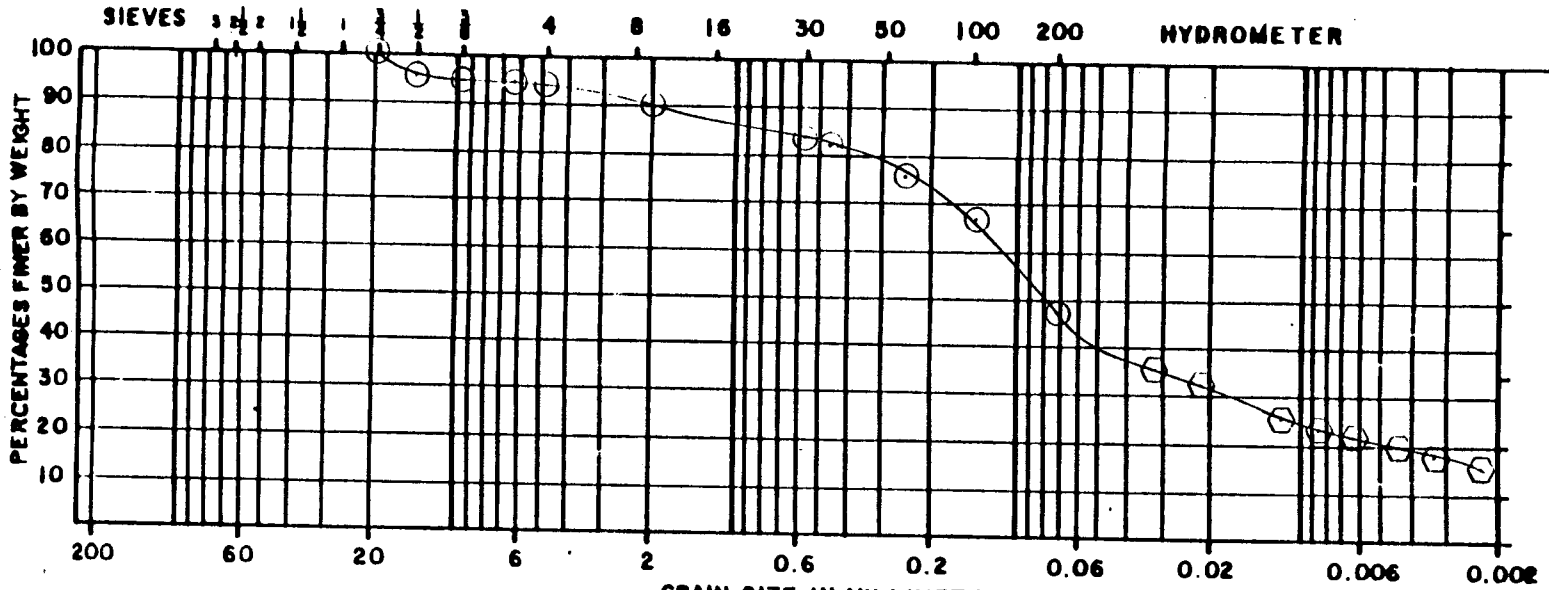
October 9, 1995

L-95110
Laboratory Testing
Lockheed-Martin
Farrell Road
Project No. 380.81.01

BULK (NATURAL) SOIL DENSITY
CORP OF ENGINEERS EM-1110-2-1906
APPENDIX, II, DISPLACEMENT METHOD

Lab ID#	Sample #	Depth	Bulk (Natural) Soil Density (PCF) Dry Density	Moist Density
7823	BBL-1	17.6'-18.0'	136.7	144.8

GRAIN SIZE ANALYSIS



BOULDERS COBBLES	GRAVEL C	GRAVEL M	GRAVEL F	SAND C	SAND M	SAND F	SILT-CLAY SOIL
228	76.2	25.4	9.52	2.0	0.59	0.25	0.074 MM. OPENING
9 in.	3 in.	1 in.	3/8 in.	Nos. 10	30	60	200 SIEVE

L-95110

Laboratory Testing

Lockheed-Martin

Farrell Road

Project No. 380.81.01

Lab ID #: 7822

Sample ID #: BBL-1

Depth: 13.0'-16.0'

⊙ Sieve Analysis ASTM D422 & D1140

⊙ Hydrometer Analysis ASTM D422

parratt wolff inc

FISHER RD. EAST SYRACUSE N.Y. 13057

TELEPHONE AREA CODE 315/437-1429

JOB NO. L-95110

REPORT NO. 1

October 9, 1995

October 9, 1995

L-95110
Laboratory Testing
Lockheed-Martin
Farrell Road
Project No. 380.81.01

SPECIFIC GRAVITY OF SOILS ASTM D854

Lab ID#	Sample	Depth	Specific Gravity of Solids(G)
7823	BBL-1	17.0'-18.0'	2.73

Porosity
Corps of Engineers EM-1110-2-1906
Appendix II

Lab ID#	Sample	Depth	Porosity (%)
7823	BBL-1	17.0'-18.0'	19.8

Attachment 6

Threshold Concentration Calculations

THRESHOLD CONCENTRATION CALCULATIONS

CALCULATE EFFECTIVE SOLUBILITY, BASED ON MOLE FRACTION

	LNAPL Mole Fraction Xi	Pure Phase Solubility mg/L	LNAPL Effective Solubility mg/L	DNAPL Mole Fraction Xi	DNAPL Effective Solubility mg/L
TCA	0.1	1360	136	0.35	476
Toluene	0.36	515	185.4	0.53	272.95
Ethylbenzene	0.08	152	12.16	0.02	3.04
Total Xylenes	0.46	170	78.2	0.1	17
TCE	0	1100	0	0.004	4.4
PCE			0		0

CALCULATE Kd, BASED ON TOC RESULTS

Kd=Koc*foc, using average foc for overburden silty sand

	Kd	Koc ml/g
TCA	0.79326	100
Toluene	2.37978	300
Ethylbenzene	8.72586	1100
Total Xylenes	2.37978	300
TCE	0.9995076	126
PCE	2.3956452	302

BBL-1	toc mg/kg	foc= oc/1000000 mg/mg
4-6	463	0.000463
6-8	1420	0.00142
8-10	7090	0.00709
10-12	10590	0.01059
13-14	20100	0.0201
average	7932.6	0.0079326
16-18	2130	0.00213
20-20.8	39900	0.0399

Koc from Korfiatis, George, P. and Talimcioglu, Nazmi M.; A Model for Calculation of Soil Cleanup Levels; Remediation, Spring 1994

CALCULATE THRESHOLD

Threshold Concentrations	DNAPL mg/Kg	DNAPL ug/Kg	LNAPL mg/Kg	LNAPL ug/Kg
TCA	483.37	483,369.54	138.11	138,105.58
Toluene	710.22	710,216.51	482.41	482,411.21
Ethylbenzene	27.20	27,202.17	108.81	108,808.68
Total Xylenes	44.23	44,234.04	203.48	203,476.57
TCE	5.38	5,375.61	0.00	0.00
PCE	0.00	0.00	0.00	0.00

Notes:

Threshold Conc. Formula

Ct = (((Kd*p)+n)*Si)/p

Ct = Threshold Concentration

Kd = Partition coefficient between pore water and soil

n = water-filled porosity

p = dry bulk density of the soil

Si = Effective solubility

Attachment 7

DNAPL Pool Height Calculation Summary

POOL HEIGHT CALCULATION

POOLHITE.WK3
By M.J. Gefell, November 28, 1995

Based on Pankow and Cherry, 1995, Dense Chlorinated Solvents and other DNAPLs in Groundwater, Waterloo Press, Portland, Oregon.

CALCULATIONOF MAXIMUMSTABLE DNAPL POOL HEIGHT

	BBL–1 (17–18') Till	K–Estimate 1 BBL–4 (16–18') Silt & f Sand	K–Estimate 2 BBL–4 (16–18') Silt & f Sand	K–Estimate 3 BBL–4 (16–18') Silt & f Sand
K (cm/sec)	3.0E–06	1.0E–06	1.0E–05	1.0E–04
n (vol/vol)	0.2	0.4	0.4	0.3
P, dnapl (g/cc)	1.03	1.03	1.03	1.03
IT, dnapl (dynes/cm)	3	3	3	3
Maximum Pool Height (cm)	1298	2673	1057	372
Maximum Pool Height (ft)	42.6	87.7	34.7	12.2

K = hydraulic conductivity of stratum beneath pool
n = porosity of stratum beneath pool
P, dnapl = DNAPL density
IT, DNAPL = DNAPL–water interfacial tension