FINAL CLOSE-OUT REPORT

CONSTRUCTION OF A SOIL VAPOR EXTRACTION/ AIR SPARGING SYSTEM at THE NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE, NEW YORK

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1.0 INTRODUCTION

Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) was contracted by the Northern Division, Naval Facilities Engineering Command to construct and operate a soil-vapor extraction/air sparging (SVE/AS). The SVE/AS system was intended to address volatile organic compounds (VOCs) in soil at the project site, located at the Naval Weapons Industrial Reserve Plant (NWIRP) in Bethpage, New York. This Close-out Report describes the field activities performed during the period of March 9, 1998 through December 20, 2000, and has been prepared to satisfy the requirements of Remedial Action Contract (RAC) #N62472-94-D-0398, Delivery Order (DO) No. 0004.

1.1 SITE DESCRIPTION

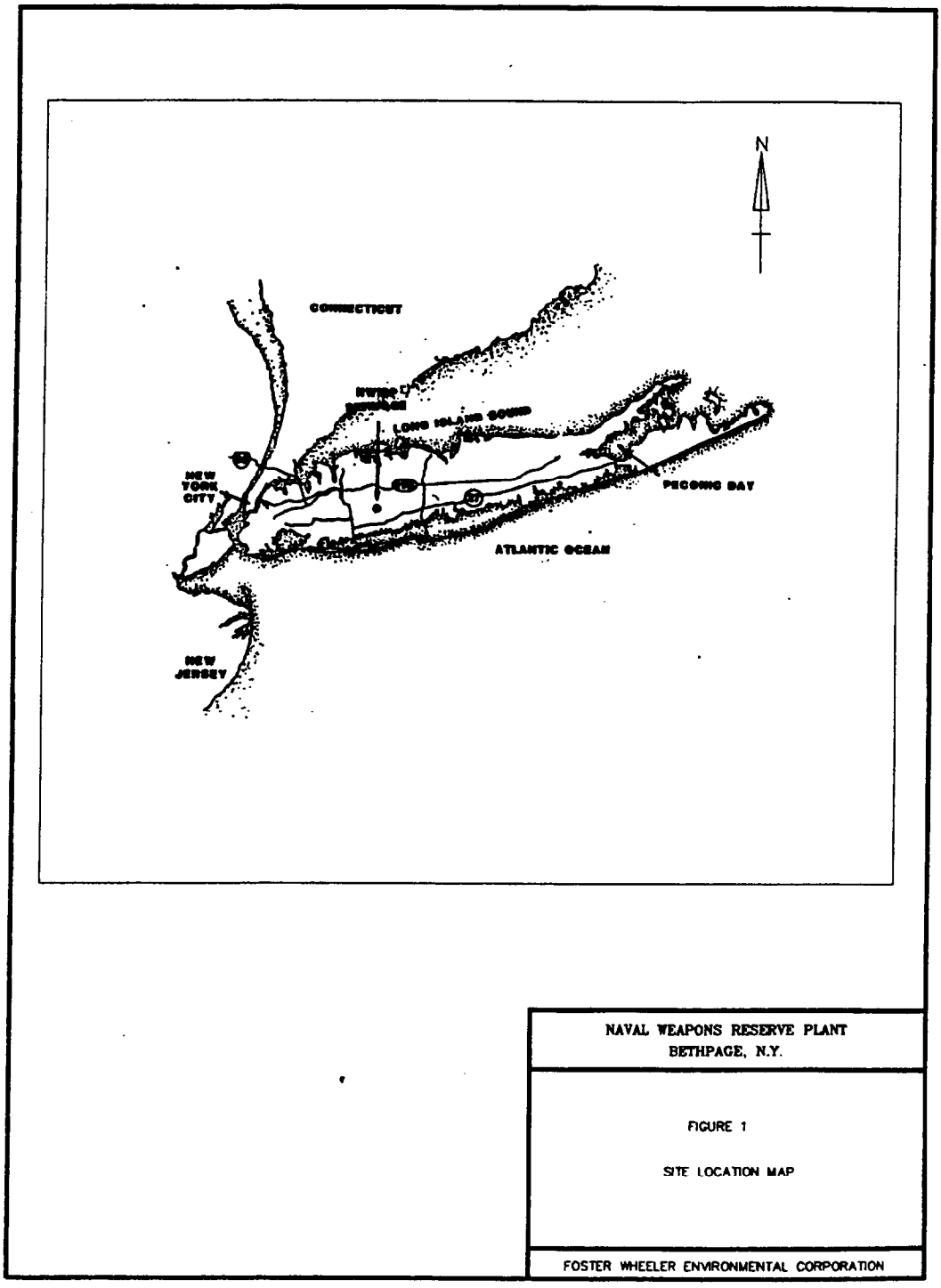
NWIRP-Bethpage is located in Nassau County on Long Island, New York, approximately 30 miles east of New York City. Figure 1 provides the site location map for the NWIRP Bethpage facility. This 108-acre facility is bordered on the north, west, and south by the former Northrup Grumman facilities that cover approximately 605 acres, and on the east by a residential neighborhood. NWIRP-Bethpage is listed by the New York State Department of Environmental Conservation (NYSDEC) as an "inactive hazardous waste site" (#1-30-003B), as is the Northrup Grumman Corporation (#1-30-300A) and the Hooker/Ruco site (#1-30-004), located less than 1/2 mile west of NWIRP-Bethpage.

The NWIRP was established in 1933 and is no longer active. Since its inception, the primary mission for the facility has been the research, prototyping, testing, design, engineering, fabrication, and primary assembly of military aircraft. The facilities at NWIRP included four plants (Nos. 3, 5, and 20, used for assembly and prototype testing; and No. 10, which contained a group of quality control laboratories), two warehouse complexes (north and south), a salvage storage area, water recharge basins, an industrial wastewater treatment plant, and several smaller support buildings.

1.1.1 Site 1 - Former Drum Marshaling Area

This site is located in the middle third of the NWIRP facility and east of Plant No. 3. It consists of two concrete drum storage pads (no longer active) and an abandoned cesspool leach field. In addition, this area has been used as a storage area for various types of equipment and heavy materials, including transformers.

Hazardous waste management practices for Northrup Grumman facilities on Long Island included the staging of drummed wastes on the NWIRP-Bethpage property. This storage first took place on a gravel surface over the cesspool field, east of Plant No. 3. In 1978, the collection and marshaling point was moved a few yards south of the original site, to an area on a concrete pad. In 1982, drummed waste storage was relocated to the present Drum Marshaling facility located in the Salvage Storage Area.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NAVAL WEAPONS RESERVE PLANT
BETHPAGE, N.Y.
FIGURE 1
SITE LOCATION MAP
FOSTER WHEELER ENVIRONMENTAL CORPORATION

The remediation performed under DO No. 0004 involved contaminated soil at Site 1, the Former Drum Marshaling Area. Site 1 occupies approximately four acres, and contains a concrete storage pad and an abandoned cesspool leach field. It is surrounded on three sides by a fence and on the fourth side by Plant No. 3. The site is relatively flat, with the eastern portion covered with bare sandy soils, gravel, grass, and one concrete pad. The western portion of the site is predominantly covered with concrete. A vegetated wind row (pine) and fence are present along the eastern edge of the site to reduce community visibility. Figure 2 provides the site layout map for Site 1.

1.2 PURPOSE AND OBJECTIVES

The purpose of this project was to reduce the VOC contamination in soil at Site 1 in the most cost-effective manner. The soil was remediated by *in situ* soil vapor extraction and air sparging. During the soil remediation, it was anticipated the air sparging would also partially remediate groundwater contamination under the site.

1.2.1 Objectives - Site 1 – Former Drum Marshaling Area

The remedial actions for Site 1 included:

- Mobilize and perform site preparation;
- Installation of SVE/AS system wells;
- Installation of SVE/AS system piping;
- Installation of equipment area fencing;
- Installation of system equipment;
- Implementation of the monitoring, sampling, testing and analysis program;
- System start-up and prove-out;
- Operation and Maintenance – 24 months; and
- Transportation and disposal of waste material.

It should be noted that the SVE/AS system was not intended to treat metals or polychlorinated biphenyls (PCBs) that were present in the site soils. Additionally, Foster Wheeler Environmental's original Work Plan, dated November 7, 1997, called for operation of the facility until December 1999. The system was shut down on December 28, 1999. As directed by NorthDiv, Foster Wheeler Environmental extended operations for an additional 9-month period, from April 2000 to December 2000.

2.0 REMEDIAL ACTION

2.1 PERMANENT INSTALLATIONS

The system was housed within an existing metal pre-fabricated building. The treatment facility included an area that was used for office space and storage. The building is equipped with functional unit heaters and louvers, which provide heating and ventilation. The facility was not manned 24 hours per day, and was not operated during the winter months. The existing Heating, Ventilation, an Air Conditioning (HVAC) system was sufficient in protecting the process equipment. Potable water usage was minimal for this system. The facility did not include provisions for process water drainage; therefore, process water (condensate, etc.) was collected in drums, staged on site in a dedicated staging area and disposed of properly.

The existing building did not include phone service. Phone service was provided by the local telephone company (Bell Atlantic/AT&T/Verizon.) Three phone service lines were installed; two for the facility phone and fax, and one dedicated to the autodialer system that was installed as part of the system design. The alarm panel included a provision to accommodate the line to Grumman's main alarm. Figure 3 provides the system layout map. As-built drawings, O&M equipment cut sheets, and warranties are provided in the O&M Manual.

2.1.1 Subcontractors

The following major subcontractors were involved in the project:

- The installation and development of the system wells was performed by Delta Well and Pump Co., Inc. 97 Union Avenue, P.O. Box 1309, Ronkonkoma, NY, 11779, (516) 981-2255.
- The installation of electrical service for the treatment system was performed by Mc Dowell Electric Corporation, 7 Old Dock Road, Yaphank, New York 11980.
- The survey activities were performed by American Geotech, Inc., 1801 Penn Avenue, Wyomissing Hills, PA 19609, (610) 670-9055.
- The installation of the security fence at the site was performed by Residential Fence Corporation, 1760 Route 25 P.O. Box 430, Ridge, NY 11961, (516) 924-3011.
- The waste management activities were performed by Eco-Tron New Jersey, Inc., P.O. Box 67, Moorestown, NJ 08057, (609) 893-7873.

2.1.2 Disposal Facilities

The following disposal facilities were contracted for receipt of the waste material generated during the remedial activities at Site 1:

- EQ – The Environmental Quality Company, Michigan Disposal Waste Treatment Plant, 49350 North I-94 Service Drive, Belleville, Michigan 48111.

- Model City Landfill operated by Chemical Waste Management, Chemical Services, Inc., 1550 Balmer Road, Model City, NY, 14107, (716) 754-8231.
- Envirotrol, Inc., 432 Green Street, P.O. Box 61, Sewickley, Pennsylvania 15143-0061, (412)-741-2030 was contracted to perform the regeneration of the spent carbon.

2.1.3 Analytical Laboratory

The following subcontractors provided analytical services:

- Recra Environmental, Inc., 208 Welsh Pool Road, Lionville, PA 19341-1333, (610) 280-3000.
- Toxikon Environmental Science, 15 Wiggins Avenue, Bedford, Massachusetts 01730, (781) 276-0120.
- Air Toxics Limited, 180 Blue Ravine Road, Suite B, Folsom, California 95630-4719, (916) 985-1000.
- On-Site Environmental Laboratories, Inc., 5500 Boscell Common, Fremont, California 94538, (510) 490-8571; and
- Chemtech/Analab, 205 Campus Plaza 1, Edison, NJ 08837, (732) 225-4111.

2.1.4 Project Schedule

Key dates in the performance of the remedial actions at NWIRP-Bethpage are provided in Table 2-1.

Table 2-1
Key Dates

TASK	DATE
Mobilization & Site Preparation	3/2/98
Commencement of Construction	3/19/98
Installation of SVE/AS wells	3/20/98
Installation of SVPM well clusters	4/28/98
Installation of Groundwater Monitoring Wells	5/12/98
Development of System Wells	3/31/98
Commencement of Baseline Sampling	4/22/00
Installation of SVE/AS Piping Network	4/27/98
Pre-Start System Check	6/9/98
Start-up and Prove-out	6/9/98
Commencement of first period of O&M	6/23/98
Winter Shutdown	12/15/98
Commencement of second period of O&M	3/17/99
Commencement of Additional Soil Investigation	9/8/99
Winter Shutdown	12/28/99
Submittal of Final Additional Soil Investigation Report	4/15/00
Commencement of third period of O & M	4/6/00
System Shutdown	12/8/00

2.1.5 Reporting Requirements

Weekly telephone conferences or site meetings between the Foster Wheeler Environmental Project Manager (PM) and Navy Technical Representative (NTR)/Resident Officer in Charge of Construction (ROICC) addressed short-term issues such as site personnel, activities schedule, and other issues relevant to the status and forecast of site activities. When necessary, key team members and/or subcontractors participated in site meetings. The Contracting Officers Technical Representative (COTR), PM and DO staff, and other NorthDiv representatives attended these meetings. The occurrence of new developments in the project were verbally communicated to the NTR/ROICC COTR as information was made available. This allowed for efficient decision-making consistent with project objectives.

Monthly operation summary reports that provided details of project progress were submitted to NorthDiv for the duration of the project.

2.2 REMEDIATION OF SITE

2.2.1 Remediation Quantities

Table 2-2 provides pertinent remediation quantities.

Table 2-2
Remediation Quantities

Item	Unit	Quantity
Initial O&M 18 of 24 months – VOCs removed	Pound	2,254.20
Additional O&M 9 months – VOCs removed	Pound	693.51
Transportation of TSCA/RCRA Soil to Disposal Facility	Drum	54
Disposal of TSCA/RCRA Soil	Drum	54
Transportation and Disposal of TSCA/RCRA Condensate and well development water	Drum	19
Disposal of RCRA Spent Activated Carbon	Pound	6,000

Notes:
RCRA = Resource Conservation and Recovery Act
TSCA = Toxic Substances Control Act

Details regarding monthly operations and the quality of VOCs removed were provided in the monthly operations summary previously submitted to NorthDiv and the NYSDEC.

Copies of the transportation manifests indicating the disposal quantities from the site are on file at the Naval Station New York ROICC Office.

An additional 900 pounds of VOCs were removed during the operation of the Pilot-Scale AS/SVE System in 1997 according to the Results Letter Report for the AS/SVE Extraction System, Former Drum Marshaling Area, CF Braun, October 1997.

2.2.2 Sampling and Analysis

2.2.2.1 Extracted Vapor Sampling

VOC concentrations in the extracted vapor were collected to estimate the efficiency of the extraction process. Samples were collected bi-weekly for the first quarter, and once a month for the balance of the project. Each vapor sample was collected and submitted for laboratory analysis of VOCs. Each vapor sample was collected at a dedicated sample port after the extraction blower and prior to the lead carbon unit.

Vapor samples employed T-14 sampling and analytical methodology using summa canisters and dedicated vacuum gauges. Detailed procedures for vapor sample collection are contained in the Foster Wheeler Environmental Standard Operating Procedure (SOP) entitled "Air Sampling." This SOP was followed during all vapor sampling activities, and a copy is provided in the O&M Manual. Appendix A presents a summary of the analytical results for the extracted vapor samples for the effectiveness monitoring of the remediation.

2.2.2.2 Groundwater Sampling

Fourteen groundwater samples were collected before the start of the remediation to establish baseline conditions. Groundwater from each of the 13 new extraction wells and the existing groundwater monitoring well (CFBMW01) were sampled and analyzed for VOCs. Appendix B presents the analytical results for the baseline groundwater samples.

These data were used to confirm the location of groundwater contamination at baseline. Based on these results, three new groundwater monitoring wells were installed at the southern edge of the site, to monitor the downgradient groundwater.

Samples from the three perimeter and one center-of-site shallow monitoring wells were collected in accordance with the Work Plan. Groundwater monitoring was performed monthly for the first six months and quarterly for the balance of the remediation. Detailed procedures for groundwater sample collection are contained in the Foster Wheeler Environmental SOP entitled "Groundwater Sampling," provided in the O&M Manual. This SOP was followed during all groundwater sampling activities.

2.2.2.3 Geoprobe™ Soil Sampling

Ten soil borings were installed in locations exhibiting moderate, (3 to 10 times the preliminary remediation goals (PRGs)), and high, (greater than 10 times the PRGs), VOC concentrations. Soil sample locations and depths were predetermined based on the CF

Braun Design Analysis Report, October 1997. Ten subsurface soil samples were collected before the start of the remediation activities to establish baseline conditions. The environmental samples were collected throughout the area of VOC contaminated soils, and one sample was selected from within a cesspool of known VOC contamination.

Once a soil sample location was selected, the same general location was used for later sampling events the first year of operation. This allowed the effectiveness of the remediation to be monitored and determinations concerning the completeness of the soil remediation to be made. Each soil sample was analyzed for Target Compound List (TCL) VOCs, and were collected in accordance with Foster Wheeler Environmental's SOP for "Soil Sampling", provided in the O&M Manual. Appendix C presents a summary of the analytical results for the soil samples used to monitor the effectiveness of the remediation.

2.2.2.4 Additional Soil Sampling

To further delineate subsurface soil contamination in the area of the SVE/AS treatment system, an additional soil investigation was conducted in 1999. It should be noted that this additional soil investigation was designed to address the known areas of significant VOC concentrations previously identified in other investigations. In addition, the additional soil investigation only addressed these areas at the northern central and eastern portions of the site, and was not representative of potential concentrations in all leachate pits or in soil underlying the remainder of the site. This effort was documented in a report entitled Additional Soil Investigation to Assess the Performance of the Soil Vapor Extraction/Air Sparging System, April 2000. Figure 5 provides the soil boring locations for the additional soil investigation.

Analysis of the additional soil investigation samples indicates that VOCs above the PRGs were present in four of the soil boring locations. Appendix C provides a summary of VOCs detected in the soil samples at concentrations above the PRGs. These VOCs were present at depths ranging from 3 to 50 feet. This indicated the contaminated soil vapor in several areas of the site was not being captured by the existing soil vapor extraction wells.

Four of the 26 soil borings contained VOCs at concentrations exceeding the PRGs established for this site. These soil boring locations, SB-06, SB-08, SB-17, and SB-24, correspond to leachate pits MH-25, MH-49, MH-71, and MH-74, respectively. The depths of VOC contamination exceeding the PRGs in these locations ranged from 3 to 50 feet below ground surface (bgs). The presence of VOCs at shallow depths indicated the inability of the vapor extraction wells to effeciently remove more surficial VOCs.

There were several areas where VOCs were not detected in soil during the additional soil investigation, although other site contaminants, such as polyaromatic hydrocarbons (PAHs), PCBs, and metals were present in these locations. These soil boring locations are associated with the following leachate pit locations: MH-72, MH-78, MH-79, and MH-80.

2.2.2.5 Waste Characterization Sampling

Well Development Water Sampling

All well development water generated was containerized in 55-gallon drums. A total of 122 drums were used for well development water. Following the completion of the well development activities, three composite samples were collected from the drums and analyzed for Toxicity Characteristic Leachate Procedure (TCLP) VOCs, TCLP semi-volatile organic compounds (SVOCs), TCLP metals, total organic halides (TOX), PCBs, ignitability, corrosivity, reactivity, and percent moisture. The water samples were collected in accordance with Foster Wheeler Environmentals SOP for "Container Sampling," provided in the O&M Manual.

Activated Carbon Sampling

Prior to off-site disposal, the spent activated carbon was sampled for characterization purposes. A grab sample was collected from the carbon vessel and analyzed for TCLP VOCs, TCLP SVOCs, TCLP pesticides/herbicides, TCLP metals, PCBs, ignitability, reactivity and corrosivity. This sample fulfilled the pre-acceptance requirements of the carbon regeneration facility. A total of four carbon vessels were used during this project. The activated carbon samples were collected in accordance with Foster Wheeler Environmental's SOP for "Container Sampling," provided in the O&M Manual.

Condensate Sampling

The condensate generated by the SVE/AS system was containerized in a 1,000-gallon tank. When the water level in this tank reached 75 percent of the tank's capacity, the condensate was transferred in 55-gallon DOT-approved steel drums for on-site storage. A composite waste classification sample was prepared by combining grab samples from the condensate drums in storage for characterization prior to disposal. The water samples were analyzed for TCLP VOCs, TCLP SVOCs, TCLP metals, TOX, PCBs, ignitability, corrosivity, reactivity, and percent moisture, and were collected in accordance with Foster Wheeler Environmental's SOP for "Container Sampling," provided in the O&M Manual.

Soil Cuttings Sampling

Waste characterization soil sampling was conducted upon completion of the drilling activities. Soil samples, one per 250 cubic yards of soil, were collected from the drill cuttings, and analyzed for the complete TCLP, TOX, PCBs, density, ignitability, corrosivity, reactivity, and the paint filter test for free liquids. The analytical laboratory performed the waste characterization analyses on a two-week turnaround. The soil samples were collected in accordance with Foster Wheeler Environmental's SOP entitled "Soil Sampling," provided in the O&M Manual.

Equipment Decontamination Water Sampling

All decontamination water generated was containerized in 55-gallon drums, and a total of eight drums were used for decontamination fluids. Following the completion of decontamination activities, one composite sample was collected from the drums containing decontamination fluids, and was analyzed for TCL VOCs, TCL SVOCs, Target Analyte List (TAL) metals, TOX, specific gravity, PCBs, ignitability, reactivity, and corrosivity. The water samples were collected in accordance with Foster Wheeler Environmental's SOP for "Container Sampling," provided in the O&M Manual.

3.0 ENGINEERING EVALUATION

Analytical data from the NWIRP-Bethpage site were reviewed to determine the effectiveness of the SVE/AS system. Soil, vapor, and groundwater results were analyzed and mapped to determine possible data trends. All samples were collected by Foster Wheeler Environmental personnel, unless otherwise noted.

3.1 SVE/AS SYSTEM PERFORMANCE EVALUATION

The designed radius of influence was originally estimated to be approximately 75 feet, resulting in a well spacing of 100 feet including a 50 percent overlap. The design vacuum used was 8.4 inches of water (in.H_2O) at an extraction flow rate of 30 cfm. The Design Analysis Report prepared by CF Braun provided the design parameters based upon the Pilot Study conducted from March to July 1997. Figure 4 provides the designed capture zones for the SVE/AS system.

Between June 1998 and December 1999 it was noted that vacuums were lower than expected in several locations, most notably extraction wells EW-05, and EW-09. Vacuums at 12 of the SVE wells decreased between the 1998 and 1999 periods of operation. The vacuum at one of the SVE wells, EW-06, increased during the same period. Appendix D provides the operational data tables for the system.

Only three of the extraction wells, EW-03, EW-05, and EW-07, produced average vacuums greater than 8.4 in. H_2O during system operation in 1998. The average vacuum of the 13 extraction wells was approximately 7.0 in. H_2O during that period of operation. None of the extraction wells produced average vacuums greater than 5.0 in. H_2O during 1999.

Five of the SVE wells used during the CF Braun pilot study were incorporated into the treatment system during 1999 to expedite the removal process in the central portion of the site. The average vacuum of the five additional extraction wells was approximately 2.5 in. H_2O during 1999. The average vacuum of the 13 original extraction wells was approximately 4.0 in. H_2O during system operation in 1999. The average vacuum of all 18 extraction wells was approximately 3.5 in. H_2O during 2000.

This decrease of vacuum during system operation in 1999 may have been, in part, be because of the addition of the five pilot study soil vapor extraction wells, two of which were shallow, thereby reducing the vacuum at individual wells. An additional potential contributing factor may be the development of stagnant conditions between adjacent extraction wells. This factor may have been compounded because of the lower than designed flow rates, vacuums, and radii of influence at soil vapor and air injection well locations. In addition, the incorporation of two shallow pilot study soil vapor extraction wells, EW-17 and EW-18, in 1999 may have induced preferentially surficial flow in the central portion of the site.

Between June 1998 and December 1999 flow rates were lower than expected in several locations, most notably in extraction wells EW-05 and EW-09. Average flow rates at 10 of the SVE wells decreased between the 1998 and 1999 periods of operation. Flow rates at three of the SVE wells increased during the same period. These lower flow rates resulted in reduced radii of influence at these locations.

The lower than anticipated vacuums reduced the system's ability to produce uniform flow throughout the soil column, particularly the shallow unconsolidated deposits. This reduced ability was more pronounced in locations in the east and central portions of the site where a significant clay lens is present. The screened interval in 16 of the 18 SVE wells is 45 to 60 feet bgs, and approximately 10 feet of well screen is exposed to the soil column and vadose zone. The clay lens is located above the top of the screened interval and precludes uniform flow patterns.

3.2 SVE/AS SYSTEM EFFECTIVENESS

To determine the environmental effectiveness of the system, soil sampling data and extracted vapor data were evaluated. The soil data reviewed included 10 soil borings drilled by Halliburton in May 1992; 56 TCLP samples and three soil samples collected in March and April 1996 from leachate pits; and the two rounds of 10 Geoprobe™ samples collected in June and December 1998.

The vapor sampling of the extraction wells included a baseline laboratory analysis and three sets of field samples using a photoionization detector (PID). The baseline analysis was performed in June 1998. Elevated concentrations of VOCs were detected in the southern portion of the site and just north of the middle portion of the site. The July 1998 sampling occurred when only the extraction system was operational, and the results indicated a significant decline in concentrations from the baseline sampling, and the most elevated readings were present along the eastern portion of the site. The October 1998 sampling was performed when both the extraction and sparging systems were in operation. In general, the extraction well vapor concentrations increased from July 1998, with most well readings between 10 and 20 ppm. These results, however, were still less than the baseline analysis performed in June. The January 1999 round of vapor headspace samples was performed after the system had been shut down for approximately one month. A majority of the vapor readings were below 10 ppm. The sample data indicated that VOCs in vapor had been reduced from the initial concentrations. In addition, VOC vapor concentrations in the extraction wells were generally greater when the sparging system was operating in conjunction with the extraction system, indicating the potential contribution of VOCs from groundwater and/or increased effeciency due to sparging.

Groundwater data evaluated included baseline sampling results of the 13 extraction wells, monthly monitoring of three wells along the southern portion of the site, and groundwater headspace vapor sampling of the 11 sparging wells. The baseline sampling of the vapor

extraction wells indicated that two wells, EW-1 and EW-7, had VOC concentrations greater than 1,000 parts per billion (ppb). Eight additional wells had readings above 100 ppb. The concentrations detected during the monthly monitoring of the three wells on the southern portion of the site fluctuated significantly.

VOC vapor readings from the AS wells were collected before the start-up of the AS system in July 1998. Ten of the 11 wells had concentrations above 100 ppm. In October 1998, after the system was in operation for approximately three months, the vapor readings were significantly lower, with most of the concentrations less than 20 ppb. Two wells, IW-6 and IW-7, had higher readings than the previous baseline event; however, these two wells were not in operation at the time of the sampling due to a lack of confirmed vacuum capture at SVPM-11. As indicated by the decrease in contaminant concentrations, it appears that the air sparging system assisted in the removal of VOCs from the groundwater.

The sampling data was not conclusive for all aspects of system effectiveness. The vapor samples collected at the extraction wells and the sparging wells generally showed a decrease in VOC concentrations, especially in comparison to baseline analyses.

In October 1999, to further evaluate VOC concentrations in the soil, it was determined that additional soil borings should be drilled at the site, in locations that would best indicate the presence of VOCs in the soil. Several of the borings were installed in leachate pits that had previously shown elevated VOC contamination. In addition, borings were located adjacent to the leachate pits in the "path" to the extraction wells to determine if VOCs were being captured by the SVE/AS system.

Analytical data from this additional soil investigation was compared to available historical data from previous investigations conducted in 1992, 1995, and 1996. The data indicated that preliminary remedial action goals have been achieved in all but three locations. This field effort was documented in a report entitled Additional Soil Investigation to Assess the Performance of the Soil Vapor Extraction/Air Sparging System, April 2000.

3.3 ENGINEERING EVALUATION AND OPTIMIZATION

Based on data evaluated during the 1999 operational period, it was determined that the extraction wells were not performing as designed. The extraction wells were designed with a 75-foot radius of influence based on operating parameters at each wellhead of 30 SCFM at 8 inches of water. At the time the vapor samples were collected, the extraction wells were operating on an average of 20 SCFM at 4 inches of water. With the reduced operating conditions, it was likely that the radius of influence of each extraction well had been reduced and would likely result in pockets of soil to be outside the capture zones of the wells. The probable causes of the reduced operating conditions of the system are the tie-in of an additional five extraction wells and the establishment of preferential flow

paths through the soil. An additional engineering evaluation and optimization were performed during the extended period of operation in 2000.

To evaluate the extraction wells, 18 soil vapor samples were collected, one from each extraction well. Prior to collection, the vapor extraction system was operated for over two weeks to remove any built-up vapors that may have collected in the piping. The air sparge system was started a week later after vacuum had been observed at the soil vapor pressure monitors (SVPMs). The vapor samples were collected with the isolation valves to all the wells fully open with the exception of EW-17 and EW-18, the two shallow screened wells. These two wells had the isolation valves set at 50 percent open due to previous observation of "short-circuiting" of the system with the valves open fully. The air flow rate and pressure at each well was recorded at the time of the vapor sampling.

The results of the soil vapor sampling along with the pressure and flow rate at each well are presented in Table 3-1. Based on the results of the vapor sampling of the wellheads, some wells were turned off because VOCs were not detected. These wells, extraction wells EW-3 and EW-5, were turned off on May 11^{th,} 2000 along with the nearby injection wells, IW-4 and IW-5.

Additional system adjustments were made on an ongoing basis throughout 2000 operations. The adjustments are presented in Table 3-2 along with the operational results and a justification of the adjustment. A majority of the adjustments were beneficial to the system in increasing both flow and vacuum at each wellhead.

As of September 8, 2000, the system was operating at increased efficiency compared to the beginning of the year. When the system was restarted in April 2000, the wellheads were operating at 20.4 SCFM @ 3.74" H_2O on average. In September the operational wellheads were operating on average at 25.26 SCFM @ 4.14" H_2O, an improvement of 4.86 SCFM and 0.40" H_2O. Table 3-3 summarizes the 2000 operating conditions. There were five wells operating over the design flow rate of 30 SCFM compared to three wells at the beginning of the year.

TABLE 3-1

Extraction Well Operating Conditions and Contaminant Concentrations

Well	Flow (SCFM)	Vacuum (inches H_2O	1,1-DCA (ppm)	TCE (ppm)	1,1,1-TCA (ppm)	PCE (ppm)
EW-1	21.80	4.00	-	1.513	0.205	0.146
EW-2	27.27	4.75	-	1.362	0.362	0.277
EW-3	30.54	4.50	-	-	-	-
EW-4	13.09	4.00	-	0.155	0.212	0.816
EW-5	0.436	4.00	-	-	-	-
EW-6	32.72	5.00	-	-	-	0.225
EW-7	27.27	4.50	-	0.232	0.627	0.556
EW-8	32.72	5.00	-	1.374	-	2.101
EW-9	15.27	3.00	-	1.934	-	20.931
EW-10	28.36	3.50	-	0.175	2.908	1.486
EW-11	24.00	4.00	-	1.127	0.518	6.737
EW-12	21.80	3.50	-	0.383	-	0.344
EW-13	21.80	3.50	-	-	-	-
EW-14	16.36	3.00	0.874	4.962	4.766	47.993
EW-15	21.80	3.50	-	0.750	0.350	8.892
EW-16	5.45	4.50	0.313	1.934	1.631	20.391
EW-17	13.36	1.00	-	0.204	0.185	1.197
EW-18	16.36[1]	2.00	-	-	-	1.745

Notes:

1. Flow meter did not function correctly due to moisture in pipe. Reading taken from April 26, 2000.
2. "-" indicates a non detection for that compound.

TABLE 3-2

System Adjustments

Date	Adjustment	Justification	Operational Result	Reason of Result
5/5/00	EW-17 & EW-18 opened to 100% from 50%	Opened full to try and get more airflow into the system	Vacuum and flow drops in all extraction wells	EW-17 and EW-18 are shallow wells which causes air pathways of least resistance
5/11/00	EW-3 & EW-5 closed from 100% to 0%	Summa samples of both wells showed a non detect	Vacuum increased in most extraction wells	Reduced number of extraction wells in system
6/2/00	EW-12 & EW-13 closed from 100% to 50%	Summa samples showed a non detect in EW-13 and very low levels in EW-12	Flow and vacuum dropped at most wells	Unsure of why flow and vacuum dropped. Should have been opposite result.
7/6/00	EW-17& EW-18 closed from 100% to 25%	Closed wells because they are shallow and reduced short circuiting of system	Vacuum increased in all wells and flow increase between 100 to 350 ft/min in each well	Reduced short circuiting of shallow wells
7/19/00	EW-12 & EW-13 closed from 50% to 0%	Summa samples showed non detect and low levels plus flow and pressure low at the wellheads	Vacuum and flow up slightly in most wells	Reduced number of wells in extraction system

TABLE 3-3

Extraction Well Operating Conditions Comparison

Well	April 17, 2000		September 8, 2000		Operating Differentials	
	Flow (SCFM)	Vacuum (inches H_2O)	Flow (SCFM)	Vacuum (inches H_2O	Flow Differential (SCFM)	Vacuum Differential (inches H_2O)
EW-1	21.80	4.00	27.25	4.00	+5.45	0.00
EW-2	27.27	4.75	34.88	4.75	+7.61	0.00
EW-3	30.54	4.50	-	-	-[2]	-.
EW-4	13.09	4.00	34.88	5.00	+21.79	+1.00
EW-5	0.436	4.00	-	-	-	-
EW-6	32.72	5.00	35.97	5.75	+3.25	+0.75
EW-7	27.27	4.50	32.16	5.50	+4.89	+1.00
EW-8	32.72	5.00	37.06	5.50	+4.34	+0.50
EW-9	15.27	3.00	19.62	4.50	+4.35	+1.50
EW-10	28.36	3.50	27.25	4.75	-1.11	+1.25
EW-11	24.00	4.00	27.25	3.75	-3.25	-0.25
EW-12	21.80	3.50	-	-	-	-
EW-13	21.80	3.50	-	-	-	-
EW-14	16.36	3.00	16.35	3.50	0.00	+0.50
EW-15	21.80	3.50	26.12	3.50	+4.32	0.00
EW-16	5.45	4.50	4.36	5.00	-1.09	+0.50
EW-17	13.36	1.00	15.26	1.00	+1.90	0.00
EW-18	16.36[1]	2.00	15.26	1.50	-1.1	-0.50

Notes:

1. Moisture in pipe caused incorrect reading. Reading taken from April 26, 2000.
2. "-" indicates well shut off in differential column.

Additional system adjustments and improvements involved throttling of extraction wells valves to spike the system, potentially liberating additional contamination. The spiking involved turning off selected extraction wells for a period of time and then opening the valve to tie the well back into the system. This allowed for any preferential pathways that had developed to be closed off and cause the well to pull vapor from other areas around the wellhead. These adjustments were ongoing until the system was shutdown.

In addition, the air sparge portion of the system was shutdown during October 2000 while only operating the vapor extraction system. It is believed that the sparge system may have caused volatile organics to be released from the groundwater, travel through the soil matrix, and captured by the extraction system. By shutting down the air sparge system, a better indication of volatile organic contamination in the soil could be determined. Vapor samples were collected via summa canister after the extraction blower before, during, and after the air sparge system is shutdown. The decrease in extracted vapors during this period indicated that air sparging of contaminated groundwater contributed to the VOCs in extracted soil vapors.

The system adjustments were targeted at removing wells from the system that were no longer indicating the presence of contaminants or wells that due to their physical condition (i.e. infiltration) were reducing overall system performance. Based on laboratory vapor sample results, several perimeter wells showing low or no contamination were removed from operation. Due to high air infiltration, the flow rate of the shallow wells was also reduced. The result was increased overall system vacuum resulting in higher vacuum application at wells indicating levels of contamination.

3.4 PRELIMINARY REMEDIATON ACTION GOALS

The PRGs for the site soils are provided in the CF Braun Design Analysis Report, October 1997. The PRGs are presented in Table 3-4.

TABLE 3-4
Preliminary Remediation Goals
SVE/AS System

Compound	**Preliminary Remediation Goals for Soil**
1,1,1-Trichloroethane	10 ug/kg
Trichloroethene	10 ug/kg
Tetrachloroethene	27 ug/kg

Based on the October 1999 additional soil investigation program, these PRGs had been attained in all but three locations, SB-06, SB-17 and SB-24. These locations correspond to leachate pits MH-25, MH-49 and MH-74, respectively. The VOCs were present at depths ranging from 3 to 50 feet bgs.

The system operation in 2000 was specifically adjusted to target VOC removal at these hot spots. VOCs were identified at surficial depths in two of the three locations, SB06 and SB24 at depths ranging from 3 to 20 feet bgs. The spatial distribution of VOCs remaining in soil suggests that the existing treatment system may not be capable of extracting significant vapor from shallow depths. This inability results from a combination of the following factors:

- The lower than anticipated vacuums reduced the systems ability to produce uniform flow throughout the soil column. This was particularly evident in the more shallow unconsolidated deposits, principally comprised of gravelly sands and sands; and
- The screened interval of the majority of the extraction wells is from 45 to 60 feet bgs. Approximately 10 feet of well screen is exposed to the soil column and vadose zone. The predominant clay lens, and the majority of micro lenses are within or above the screened intervals, and precluded uniform flow patterns.

Additionally, VOCs at these three locations, SB06, SB17 and SB24, were identified just above the present water table. The spatial distribution of VOCs remaining in soil at depth suggests probable results from a combination of the following factors:

- In 16 of the 18 extraction wells, the screened interval extends approximately 5 feet into the water column. It is likely the local groundwater contamination was contributing VOCs to the treatment system via migration and volatilization;
- The water table had been approximately 10 feet higher in elevation prior to the cessation of the retention basin operation. This drop would have resulted in a smear zone extending from approximately 43 to 55 feet bgs; and
- The predominant clay lens and the majority of micro lenses are within or above the screened intervals, and precluded uniform flow patterns. In each location where VOCs are present in the smear zone at concentrations above the PRGs, there are clay lenses within 5 feet of the water table. The extraction of VOCs present at this depth were likely constrained by these clay lenses.

Although confirmatory soil samples have not been collected in these three targeted areas, operational data did indicate an increase in VOC removal during the final year of operation. The vapor monitoring results indicated a similar decrease of VOCs at the system wellheads. The average influent VOC level at the end of the 1999 operation period was 8.94 ppm. By the end of the additional period of operation in 2000, the average influent VOC level had decreased to 2.0 ppm.

Further, at several locations such as EW-10, where no VOCs were detected in soil during the 1999 soil boring program, VOCs did appear in extracted vapor, indicating that groundwater was the source of VOCs in the system influent.

The original intent of the SVE/AS system was to reduce VOCs in soil as an interim remedial measure. Based on the significant decline in VOCs in the average influent and on the 1999 soil boring results, Foster Wheeler Environmental recommends that this interim remedial action has met the project objectives.

Based on subsequent discussions between North Div, NYSDEC, and Foster Wheeler Environmental on April 26, 2001, the following actions will be pursued.

- Sampling and analysis of groundwater using existing extraction and monitoring wells.
- Additional operation of the SVE/AS system for one season.
- Additional groundwater and soil sampling to be conducted after extended operation.

APPENDIX A

ANALYTICAL DATA RESULTS
EXTRACTED VAPOR SAMPLES

HEADSPACE READINGS - PID
SOIL VAPOR EXTRACTION SAMPLES
SVE/AS SYSTEM
BETHPAGE-NWIRP

Well	Date Sample Taken			
	June 1998 (ppm)	July 28, 1998 (ppm)	October 13, 1998 (ppm)	January 19, 1999 (ppm)
EW-1	57.1	14.6	15.8	5.2
EW-2	5.7	9.2	16.1	10.7
EW-3	29.4	4.4	12.2	6.5
EW-4	31.4	6	12	5.6
EW-5	4	12.2	3.2	2.4
EW-6	26.3	10.8	18.4	6.6
EW-7	14.2	9.3	10.4	8.1
EW-8	10	2.4	9.2	2.8
EW-9	37.8	17.2	16.6	8.4
EW-10	20.25	9.3	20	3.1
EW-11	29.6	5.4	10.8	5.7
EW-12	1.8	7.4	6.8	6.1
EW-13	3.8	4.8	5.8	6

Notes:
1) PPM indicates parts per million.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event							
	EV11 08/03/1998	EV12 08/05/1998	EV13 08/11/1998	EV14 08/13/1998	EV15 08/18/1998	EV16 08/20/1998	EV17 08/24/1998	EV18 08/27/1998
Freon 12								
Freon 114								
Chloromethane	13 J						16	
Vinyl Chloride								
Bromomethane								
Chloroethane								
Freon 11	7 J		6.2 J			7.9 J	7.4 J	8.0 J
1,1-Dichloroethene	34		30		170	30	27	25
Freon 113	100		84	85	88	98	92	74
Methylene Chloride			6.6 J		22 J	7.2 J	8.4 J	5.5 J
1,1-Dichloroethane	150		110	100	100	110	130	100
cis-1,2-Dichloroethene	350		280	260	280	280	330	260
Chloroform								5.4 J
1,1,1-Trichloroethane	2200		2200	2000	3000	2000	1300	1500
Carbon Tetrachloride								
Benzene	7.9 J	22 J	5.9 J		22 J			
1,2-Dichloroethane								
Trichloroethene	1400		1200	1200	1200	1300	1300	1200
1,2-Dichloropropane								
cis-1,3-Dichloropropene								
Toluene	6.5 J				12 J			
trans-1,3-Dichloropropene								
1,1,2-Trichloroethane								
Tetrachloroethene	4600		4200	4200	4400	4100	4200	3700
Ethylene Dibromide								
Chlorobenzene								
Ethyl Benzene								
m+p-Xylene					12 J			
o-Xylene								
Styrene								
1,1,1,2-Tetrachloroethane								
1,3,5-Trimethylbenzene								
1,2,4-Trimethylbenzene								
1,3-Dichlorobenzene								
1,4-Dichlorobenzene								
Chlorotoluene								
1,2-Dichlorobenzene								
1,2,4-Trichlorobenzene								
Hexachlorobutadiene								
Propylene			15 J		50 J		33 J	
1,3-Butadiene								
Acetone	63	41 J			73 J	26 J	34 J	
Carbon Disulfide								
2-Propanol								
Trans-1,2-Dichloroethene								
Vinyl Acetate								
2-Butanone (Methyl Ethyl Ketone)	2300		590	470			2800	
Hexane								
Tetrahydrofuran	2000		500	390	110		2700	
Cyclohexane								
1,4-Dioxane					46 J			
Bromodichloromethane								
4-Methyl-2-pentanone								
2-Hexanone								
Dibromochloromethane								
Bromoform								
4-Ethyltoluene								
Ethanol		39 J						
Methyl tertiary butyl ether	14 J		14 J					
Heptane								

Notes:
1) All results are expressed in parts per billion volume (ppmv).
2) A blank indicates that the compound was not detected.
3) "J" indicates an estimated concentration.
4) * indicates that data has not been received from these samples.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event						
	EV-19 09/01/1998	EV-20 09/03/1998	EV-21 09/22/1998	EV-22 09/25/1998	EV-23 09/29/1998	EV-24* 10/13/1998	EV-25* 10/27/1998
Freon 12							
Freon 114							
Chloromethane							
Vinyl Chloride							
Bromomethane							
Chloroethane							
Freon 11							
1,1-Dichloroethene			33 J	36 J	31 J		
Freon 113	81	84 J	160	110 J	120		
Methylene Chloride							
1,1-Dichloroethane	190	170	130	180	150		
cis-1,2-Dichloroethene	340	320	280	270	290		
Chloroform							
1,1,1-Trichloroethane	2400	2600	4100	3400	3400		
Carbon Tetrachloride							
Benzene							
1,2-Dichloroethane							
Trichloroethene	1300	1300	1500	1300	1200		
1,2-Dichloropropane							
cis-1,3-Dichloropropene							
Toluene							
trans-1,3-Dichloropropene							
1,1,2-Trichloroethane							
Tetrachloroethene	4600	4100	4800	4100	4000		
Ethylene Dibromide							
Chlorobenzene							
Ethyl Benzene							
m+p-Xylene							
o-Xylene							
Styrene							
1,1,1,2-Tetrachloroethane							
1,3,5-Trimethylbenzene							
1,2,4-Trimethylbenzene							
1,3-Dichlorobenzene							
1,4-Dichlorobenzene							
Chlorotoluene							
1,2-Dichlorobenzene							
1,2,4-Trichlorobenzene							
Hexachlorobutadiene							
Propylene							
1,3-Butadiene							
Acetone							
Carbon Disulfide							
2-Propanol							
Trans-1,2-Dichloroethene							
Vinyl Acetate							

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event						
	EV-19 09/01/1998	EV-20 09/03/1998	EV-21 09/22/1998	EV-22 09/25/1998	EV-23 09/29/1998	EV-24* 10/13/1998	EV-25* 10/27/1998
2-Butanone (Methyl Ethyl Ketone)		1400	140		150		
Hexane							
Tetrahydrofuran		1400	120 J		130		
Cyclohexane							
1,4-Dioxane							
Bromodichloromethane							
4-Methyl-2-pentanone							
2-Hexanone							
Dibromochloromethane							
Bromoform							
4-Ethyltoluene							
Ethanol							
Methyl tertiary butyl ether							
Heptane							

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.
3) * indicates that data has not been received from these samples.
4) A "J" indicates an estimated quantity.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event					
	EV-25 10/13/1998	EV-26 10/27/1998	EV-27 11/12/1998	EV-28 11/24/1998	EV-29 12/08/1998	TV-30 12/08/1998
						1.2 J
Freon 12						
Freon 114						0.72 J
Chloromethane						
Vinyl Chloride						
Bromomethane						
Chloroethane						
Freon 11						
1,1-Dichloroethene	61		560	44 J	28 J	
Freon 113	130	170	220	13	220	
Methylene Chloride						1.2 JB
1,1-Dichloroethane	120	180	160	130	170	
cis-1,2-Dichloroethene	230	320	480	280	360	
Chloroform			60			
1,1,1-Trichloroethane	3200	4200	4900	3800	5900	0.8 J
Carbon Tetrachloride						
Benzene						
1,2-Dichloroethane			130			
Trichloroethene	1200	1700	1800	1400	1800	
1,2-Dichloropropane						
cis-1,3-Dichloropropene						
Toluene			80			
trans-1,3-Dichloropropene						
1,1,2-Trichloroethane						
Tetrachloroethene	4200	5900	6400	4300	5800	0.9 J
Ethylene Dibromide						
Chlorobenzene						
Ethyl Benzene			21			
m+p-Xylene				30 J		
o-Xylene						
Styrene			58			
1,1,1,2-Tetrachloroethane						
1,3,5-Trimethylbenzene						
1,2,4-Trimethylbenzene						
1,3-Dichlorobenzene						
1,4-Dichlorobenzene						
Chlorotoluene						
1,2-Dichlorobenzene						
1,2,4-Trichlorobenzene						
Hexachlorobutadiene						
Propylene						
1,3-Butadiene						
Acetone						3.5 J
Carbon Disulfide						
2-Propanol						
Trans-1,2-Dichloroethene						
Vinyl Acetate						

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event					
	EV-25 10/13/1998	EV-26 10/27/1998	EV-27 11/12/1998	EV-28 11/24/1998	EV-29 12/08/1998	TV-30 12/08/1998
2-Butanone (Methyl Ethyl Ketone)				100 J		
Hexane						
Tetrahydrofuran						
Cyclohexane						
1,4-Dioxane						
Bromodichloromethane						
4-Methyl-2-pentanone						
2-Hexanone						
Dibromochloromethane						
Bromoform						
4-Ethyltoluene						
Ethanol				220		
Methyl tertiary butyl ether						
Heptane						
Total VOCs	9,141	12,470	14,869	10,317	14,278	8

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.
3) * indicates that data has not been received from these samples.
4) A "J" indicates an estimated quantity.
5) "TV" sample was taken from the effluent sample tap after the carbon.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event			
	03/22/1999 EV01	03/22/1999 EV01D	03/31/1999 EV02	04/07/1999 EV03
Freon 12				
Freon 114				
Chloromethane				
Vinyl Chloride				
Bromomethane				
Chloroethane				
Freon 11				
1,1-Dichloroethene				
Freon 113	150	140	53 J	36 J
Methylene Chloride				
1,1-Dichloroethane	170	160	56 J	47 J
cis-1,2-Dichloroethene	980	940	400	250
Chloroform				
1,1,1-Trichloroethane	2200	2100	1300	1500
Carbon Tetrachloride				
Benzene				
1,2-Dichloroethane				
Trichloroethene	1200	1200	990	950
1,2-Dichloropropane				
cis-1,3-Dichloropropene				
Toluene				
trans-1,3-Dichloropropene				
1,1,2-Trichloroethane				
Tetrachloroethene	6800	6600	5700	2600
Ethylene Dibromide				
Chlorobenzene				
Ethyl Benzene				
m+p-Xylene				
o-Xylene				
Styrene				
1,1,1,2-Tetrachloroethane				
1,3,5-Trimethylbenzene				
1,2,4-Trimethylbenzene				
1,3-Dichlorobenzene				
1,4-Dichlorobenzene				
Chlorotoluene				
1,2-Dichlorobenzene				
1,2,4-Trichlorobenzene				
Hexachlorobutadiene				
Propylene				
1,3-Butadiene				
Acetone				56 JB
Carbon Disulfide				
2-Propanol				
Trans-1,2-Dichloroethene				
Vinyl Acetate				

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event			
	03/22/1999 EV01	03/22/1999 EV01D	03/31/1999 EV02	04/07/1999 EV03
2-Butanone (Methyl Ethyl Ketone)			210 J	120 J
Hexane				
Tetrahydrofuran			230 J	120
Cyclohexane				
1,4-Dioxane				
Bromodichloromethane				
4-Methyl-2-pentanone				
2-Hexanone				
Dibromochloromethane				
Bromoform				
4-Ethyltoluene				
Ethanol				
Methyl tertiary butyl ether				
Heptane				
Total VOCs	11,500	11,140	8,939	5,623

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.
3) "B" indicates that the compound was also detected in the blank sample.
4) A "J" indicates an estimated quantity.
5) The "D" after the second EV01 indicates a duplicate sample.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event			
	EV-04 04/20/1999	EV-05 05/07/1999	EV-06 05/19/1999	EV-07 06/09/1999
Freon 12				
Freon 114				
Chloromethane				
Vinyl Chloride				
Bromomethane				
Chloroethane				
Freon 11				
1,1-Dichloroethene		6.9 J		14.7
Freon 113	36 J	25	1.4 J	81.3
Methylene Chloride				
1,1-Dichloroethane	42 J	32	1.8 J	69.8
cis-1,2-Dichloroethene	180	120	8.1	260
Chloroform				
1,1,1-Trichloroethane	1300	840	40	1080
Carbon Tetrachloride				
Benzene				
1,2-Dichloroethane				
Trichloroethene	730	530	33	837
1,2-Dichloropropane				
cis-1,3-Dichloropropene				
Toluene				
trans-1,3-Dichloropropene				
1,1,2-Trichloroethane				
Tetrachloroethene	2300	1700	130	3120
Ethylene Dibromide				
Chlorobenzene				
Ethyl Benzene	21 J			
m+p-Xylene	140			
o-Xylene	45 J			
Styrene				
1,1,1,2-Tetrachloroethane				
1,3,5-Trimethylbenzene				
1,2,4-Trimethylbenzene	24 J			
1,3-Dichlorobenzene				
1,4-Dichlorobenzene				
Chlorotoluene				
1,2-Dichlorobenzene				
1,2,4-Trichlorobenzene				
Hexachlorobutadiene				
Propylene				
1,3-Butadiene				
Acetone				
Carbon Disulfide				
2-Propanol				
Trans-1,2-Dichloroethene				
Vinyl Acetate				

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event			
	EV-04 04/20/1999	EV-05 05/07/1999	EV-06 05/19/1999	EV-07 06/09/1999
2-Butanone (Methyl Ethyl Ketone)	66 J	78		
Hexane				
Tetrahydrofuran		76		
Cyclohexane				
1,4-Dioxane				
Bromodichloromethane				
4-Methyl-2-pentanone				
2-Hexanone				
Dibromochloromethane				
Bromoform				
4-Ethyltoluene				
Ethanol				
Methyl tertiary buryl ether				
Heptane				
Total VOCs				

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.
3) A "J" indicates an estimated quantity.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	EV-07 06/09/1999	EV-08 06/21/1999
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene	14.7	13.7
Freon 113	81.3	68.2
Methylene Chloride		
1,1-Dichloroethane	69.8	68.4
cis-1,2-Dichloroethene	260	225
Chloroform		
1,1,1-Trichloroethane	1080	1150
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	837	791
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	3120	2780
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	EV-07 06/09/1999	EV-08 06/21/1999
2-Butanone (Methyl Ethyl Ketone)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	5,462.8	5,096.3

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.
3) A "J" indicates an estimated quantity.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	06/29/1999 EV09	07/13/1999 EV10	07/30/1999 EV11
Freon 12			
Freon 114			
Chloromethane			
Vinyl Chloride			
Bromomethane			
Chloroethane			
Freon 11			
1,1-Dichloroethene			
Freon 113			
Methylene Chloride			
1,1-Dichloroethane		43	
cis-1,2-Dichloroethene			
Chloroform			
1,1,1-Trichloroethane	934	664 D	1,160 D
Carbon Tetrachloride			
Benzene			
1,2-Dichloroethane			
Trichloroethene	921	691 D	1,070 D
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
Toluene			
trans-1,3-Dichloropropene			
1,1,2-Trichloroethane			
Tetrachloroethene	3050	2,070 D	3,010 D
Ethylene Dibromide			
Chlorobenzene			
Ethyl Benzene			
m+p-Xylene			
o-Xylene			
Styrene			
1,1,1,2-Tetrachloroethane			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			
Chlorotoluene			
1,2-Dichlorobenzene			
1,2,4-Trichlorobenzene			
Hexachlorobutadiene			
Propylene			
1,3-Butadiene			
Acetone			
Carbon Disulfide			
2-Propanol			
Trans-1,2-Dichloroethene			
Vinyl Acetate			

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	06/29/1999 EV09	07/13/1999 EV10	07/30/1999 EV11
2-Butanone (Methyl Ethyl Ketone)			
Hexane			
Tetrahydrofuran			
Cyclohexane			
1,4-Dioxane			
Bromodichloromethane			
4-Methyl-2-pentanone			
2-Hexanone			
Dibromochloromethane			
Bromoform			
4-Ethyltoluene			
Ethanol			
Methyl tertiary butyl ether			
Heptane			
Total VOCs	4,905	3,468	5,240

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.
3) "D" indicates values taken from dilution run.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	EV-11 07/31/1999	EV-12 08/10/1999	EV-13 08/26/1999
Freon 12			
Freon 114			
Chloromethane			
Vinyl Chloride			
Bromomethane			
Chloroethane			
Freon 11			
1,1-Dichloroethene			
Freon 113			
Methylene Chloride		63.8	
1,1-Dichloroethane		41	
cis-1,2-Dichloroethene			
Chloroform			
1,1,1-Trichloroethane	1,160	814	714
Carbon Tetrachloride			
Benzene			
1,2-Dichloroethane			
Trichloroethene	1,070	637	526
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
Toluene			
trans-1,3-Dichloropropene			
1,1,2-Trichloroethane			
Tetrachloroethene	3,010	1,330	1,010
Ethylene Dibromide			
Chlorobenzene			
Ethyl Benzene			
m+p-Xylene			
o-Xylene			
Styrene			
1,1,1,2-Tetrachloroethane			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			
Chlorotoluene			
1,2-Dichlorobenzene			
1,2,4-Trichlorobenzene			
Hexachlorobutadiene			
Propylene			
1,3-Butadiene			
Acetone			
Carbon Disulfide			
2-Propanol			
Trans-1,2-Dichloroethene			
Vinyl Acetate			

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	EV-11 07/31/1999	EV-12 08/10/1999	EV-13 08/26/1999
2-Butanone (Methyl Ethyl Ketone)			
Hexane			
Tetrahydrofuran			
Cyclohexane			
1,4-Dioxane			
Bromodichloromethane			
4-Methyl-2-pentanone			
2-Hexanone			
Dibromochloromethane			
Bromoform			
4-Ethyltoluene			
Ethanol			
Methyl tertiary butyl ether			
Heptane			
Total VOCs	5,240.0	2,885.8	2,250.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	EV-13 08/26/1999	EV-14 09/08/1999	EV-15 09/20/1999
Freon 12			
Freon 114			
Chloromethane			
Vinyl Chloride			
Bromomethane			
Chloroethane			
Freon 11			
1,1-Dichloroethene			
Freon 113			
Methylene Chloride			
1,1-Dichloroethane			
cis-1,2-Dichloroethene			
Chloroform			
1,1,1-Trichloroethane	714	1,134	51
Carbon Tetrachloride			
Benzene			
1,2-Dichloroethane			
Trichloroethene	526	977	94
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
Toluene			
trans-1,3-Dichloropropene			
1,1,2-Trichloroethane			
Tetrachloroethene	1,010	1,989	191
Ethylene Dibromide			
Chlorobenzene			
Ethyl Benzene			
m+p-Xylene			
o-Xylene			
Styrene			
1,1,1,2-Tetrachloroethane			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			
Chlorotoluene			
1,2-Dichlorobenzene			
1,2,4-Trichlorobenzene			
Hexachlorobutadiene			
Propylene			
1,3-Butadiene			
Acetone			
Carbon Disulfide			
2-Propanol			
Trans-1,2-Dichloroethene			
Vinyl Acetate			

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	EV-13 08/26/1999	EV-14 09/08/1999	EV-15 09/20/1999
2-Butanone (Methyl Ethyl Ketone)			
Hexane			
Tetrahydrofuran			
Cyclohexane			
1,4-Dioxane			
Bromodichloromethane			
4-Methyl-2-pentanone			
2-Hexanone			
Dibromochloromethane			
Bromoform			
4-Ethyltoluene			
Ethanol			
Methyl tertiary butyl ether			
Heptane			
Total VOCs	2,250.0	4,100.0	336.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).

2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event			
	EV-16 10/06/1999	EV-17 10/19/1999	EV-18 11/03/1999	EV-19 11/16/1999
Freon 12				
Freon 114				
Chloromethane				
Vinyl Chloride				
Bromomethane				
Chloroethane				
Freon 11				
1,1-Dichloroethene				
Freon 113				
Methylene Chloride				
1,1-Dichloroethane				
cis-1,2-Dichloroethene				
Chloroform				
1,1,1-Trichloroethane		802	1,161	725
Carbon Tetrachloride				
Benzene				
1,2-Dichloroethane				
Trichloroethene	30	1,146	1,573	691
1,2-Dichloropropane				
cis-1,3-Dichloropropene				
Toluene				
trans-1,3-Dichloropropene				
1,1,2-Trichloroethane				
Tetrachloroethene	58	2,952	4,753	2,823
Ethylene Dibromide				
Chlorobenzene				
Ethyl Benzene				
m+p-Xylene				
o-Xylene				
Styrene				
1,1,1,2-Tetrachloroethane				
1,3,5-Trimethylbenzene				
1,2,4-Trimethylbenzene				494
1,3-Dichlorobenzene				703
1,4-Dichlorobenzene				918
Chlorotoluene				
1,2-Dichlorobenzene				1,337
1,2,4-Trichlorobenzene				
Hexachlorobutadiene				
Propylene				
1,3-Butadiene				
Acetone				
Carbon Disulfide				
2-Propanol				
Trans-1,2-Dichloroethene				
Vinyl Acetate				

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event			
	EV-16 10/06/1999	EV-17 10/19/1999	EV-18 11/03/1999	EV-19 11/16/1999
2-Butanone (Methyl Ethyl Ketone)				
Hexane				
Tetrahydrofuran				
Cyclohexane				
1,4-Dioxane				
Bromodichloromethane				
4-Methyl-2-pentanone				
2-Hexanone				
Dibromochloromethane				
Bromoform				
4-Ethyltoluene				
Ethanol				
Methyl tertiary butyl ether				
Heptane				
Total VOCs	88	4,900	7,487	7,691

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.
3) "D" indicates values taken from dilution run.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event (ppm/v)			
	EV-20 12/03/1999	EV-21 12/16/1999	EV-22 12/28/1999	BLD-18-041800 04/18/2000
Freon 12				
Freon 114				
Chloromethane				
Vinyl Chloride				
Bromomethane				
Chloroethane				
Freon 11				
1,1-Dichloroethene				
Freon 113				
Methylene Chloride				
1,1-Dichloroethane				
cis-1,2-Dichloroethene				616
Chloroform				
1,1,1-Trichloroethane	575	441	323	818
Carbon Tetrachloride				
Benzene				
1,2-Dichloroethane				
Trichloroethene	617	742	456	1,459
1,2-Dichloropropane				
cis-1,3-Dichloropropene				
Toluene				
trans-1,3-Dichloropropene				
1,1,2-Trichloroethane				
Tetrachloroethene	2,188	2,424	2,108	4,362
Ethylene Dibromide				
Chlorobenzene				
Ethyl Benzene				
m+p-Xylene				
o-Xylene				
Styrene				
1,1,1,2-Tetrachloroethane				
1,3,5-Trimethylbenzene				
1,2,4-Trimethylbenzene				
1,3-Dichlorobenzene				
1,4-Dichlorobenzene				
Chlorotoluene				
1,2-Dichlorobenzene				
1,2,4-Trichlorobenzene				
Hexachlorobutadiene				
Propylene				
1,3-Butadiene				
Acetone				
Carbon Disulfide				
2-Propanol				
Trans-1,2-Dichloroethene				

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event (ppm/v)			
	EV-20 12/03/1999	EV-21 12/16/1999	EV-22 12/28/1999	BLD-18-041800 04/18/2000
Vinyl Acetate				
2-Butanone (Methyl Ethyl Ketone)				
Hexane				
Tetrahydrofuran				
Cyclohexane				
1,4-Dioxane				
Bromodichloromethane				
4-Methyl-2-pentanone				
2-Hexanone				
Dibromochloromethane				
Bromoform				
4-Ethyltoluene				
Ethanol				
Methyl tertiary butyl ether				
Heptane				
Total VOCs	3,380.0	3,607.0	2,887.0	7,255.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	BLDG-18-050500 05/05/2000	EV-03051900 05/19/2000	
Freon 12			
Freon 114			
Chloromethane			
Vinyl Chloride			
Bromomethane			
Chloroethane			
Freon 11			
1,1-Dichloroethene			
Freon 113			
Methylene Chloride			
1,1-Dichloroethane			
cis-1,2-Dichloroethene	335	329	
Chloroform			
1,1,1-Trichloroethane	350	730	
Carbon Tetrachloride			
Benzene			
1,2-Dichloroethane			
Trichloroethene	691	934	
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
Toluene			
trans-1,3-Dichloropropene			
1,1,2-Trichloroethane			
Tetrachloroethene	2,116	2,675	
Ethylene Dibromide			
Chlorobenzene			
Ethyl Benzene			
m+p-Xylene			
o-Xylene			
Styrene			
1,1,1,2-Tetrachloroethane			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			
Chlorotoluene			
1,2-Dichlorobenzene			
1,2,4-Trichlorobenzene			
Hexachlorobutadiene			
Propylene			
1,3-Butadiene			
Acetone			
Carbon Disulfide			
2-Propanol			
Trans-1,2-Dichloroethene			
Vinyl Acetate			

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	BLDG-18-050500 05/05/2000	EV-03051900 05/19/2000	
2-Butanone (Methyl Ethyl Ketone)			
Hexane			
Tetrahydrofuran			
Cyclohexane			
1,4-Dioxane			
Bromodichloromethane			
4-Methyl-2-pentanone			
2-Hexanone			
Dibromochloromethane			
Bromoform			
4-Ethyltoluene			
Ethanol			
Methyl tertiary butyl ether			
Heptane			
Total VOCs	3,492.0	4,668.0	0.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	EV-04-060200 06/02/2000	EV-05-061600 06/16/2000	EV-06-062800 06/28/2000
Freon 12			
Freon 114			
Chloromethane			
Vinyl Chloride			
Bromomethane			
Chloroethane			
Freon 11			
1,1-Dichloroethene			
Freon 113			
Methylene Chloride			
1,1-Dichloroethane			
cis-1,2-Dichloroethene		250	228
Chloroform			
1,1,1-Trichloroethane		613	916
Carbon Tetrachloride			
Benzene			
1,2-Dichloroethane			
Trichloroethene	985	628	922
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
Toluene	802		
trans-1,3-Dichloropropene			
1,1,2-Trichloroethane			
Tetrachloroethene	2,224	1,628	2,106
Ethylene Dibromide			
Chlorobenzene			
Ethyl Benzene	91		
m+p-Xylene	350		
o-Xylene			
Styrene			
1,1,1,2-Tetrachloroethane			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			
Chlorotoluene			
1,2-Dichlorobenzene			
1,2,4-Trichlorobenzene			
Hexachlorobutadiene			
Propylene			
1,3-Butadiene			
Acetone			
Carbon Disulfide			
2-Propanol			
Trans-1,2-Dichloroethene			
Vinyl Acetate			

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	EV-04-060200 06/02/2000	EV-05-061600 06/16/2000	EV-06-062800 06/28/2000
2-Butanone (Methyl Ethyl Ketone)			
Hexane			
Tetrahydrofuran			
Cyclohexane			
1,4-Dioxane			
Bromodichloromethane			
4-Methyl-2-pentanone			
2-Hexanone			
Dibromochloromethane			
Bromoform			
4-Ethyltoluene			
Ethanol			
Methyl tertiary butyl ether			
Heptane			
Sec-Butylbenzene	714		
Total VOCs	5,166.0	3,119.0	4,172.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	EV07071100 07/11/2000	EV-08-072800 07/28/2000
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113		
Methylene Chloride		
1,1-Dichloroethane		
cis-1,2-Dichloroethene	103	167
Chloroform		
1,1,1-Trichloroethane	614	540
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	1,010	936
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	1,251	1,913
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	EV07071100 07/11/2000	EV-08-072800 07/28/2000
Vinyl Acetate		
2-Butanone (Methyl Ethyl Ketone)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2.978.0	3.556.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	08/10/2000 EV09-0810000	08/25/2000 EV10-082500
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113		
Methylene Chloride		
1,1-Dichloroethane		
cis-1,2-Dichloroethene	251	285
Chloroform		
1,1,1-Trichloroethane	473	459
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	992	1,087
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	2,158	2,501
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	08/10/2000 EV09-0810000	08/25/2000 EV10-082500
Vinyl Acetate		
2-Butanone (Methyl Ethyl Ketone)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	3.874.0	4.332.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	09/08/2000 EV11-11090800	09/19/2000 EV-12-091900
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113		
Methylene Chloride		
1,1-Dichloroethane		
cis-1,2-Dichloroethene	286	304
Chloroform		
1,1,1-Trichloroethane	499	490
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	1,012	1,230
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	2,932	2,571
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	09/08/2000 EV11-11090800	09/19/2000 EV-12-091900
Vinyl Acetate		
2-Butanone (Methyl Ethyl Ketone)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	4,729.0	4,595.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event		
	10/06/2000 EV-12100600	10/20/2000 EV-13-102000	
Freon 12			
Freon 114			
Chloromethane			
Vinyl Chloride			
Bromomethane			
Chloroethane			
Freon 11			
1,1-Dichloroethene			
Freon 113			
Methylene Chloride			
1,1-Dichloroethane	57		28.5
cis-1,2-Dichloroethene	367	488	
Chloroform			
1,1,1-Trichloroethane	688	633	660.5
Carbon Tetrachloride			
Benzene			
1,2-Dichloroethane			
Trichloroethene	1,487	1,273	1380
1,2-Dichloropropane			
cis-1,3-Dichloropropene			
Toluene			
trans-1,3-Dichloropropene			
1,1,2-Trichloroethane			
Tetrachloroethene	2,794	1,915	2354.5
Ethylene Dibromide			
Chlorobenzene			
Ethyl Benzene			
m+p-Xylene			
o-Xylene			
Styrene			
1,1,1,2-Tetrachloroethane			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			
Chlorotoluene			
1,2-Dichlorobenzene			
1,2,4-Trichlorobenzene			
Hexachlorobutadiene			
Propylene			
1,3-Butadiene			
Acetone			
Carbon Disulfide			
2-Propanol			
Trans-1,2-Dichloroethene			

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	10/06/2000 EV-12100600	10/20/2000 EV-13-102000
Vinyl Acetate		
2-Butanone (Methyl Ethyl Ketone)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	5,393.0	4,309.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	11/03/2000 EV-14110300	11/17/2000 EV-15111700
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113		
Methylene Chloride		
1,1-Dichloroethane	63	
cis-1,2-Dichloroethene	482	344
Chloroform		
1,1,1-Trichloroethane	580	522
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	910	944
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	1,949	1,601
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		

NWIRP-BETHPAGE
Monthly Monitoring Data
Vapor Monitoring

Parameter	Sampling Event	
	11/03/2000 EV-14110300	11/17/2000 EV-15111700
Vinyl Acetate		
2-Butanone (Methyl Ethyl Ketone)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	3,984.0	3,411.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

APPENDIX B

ANALYTICAL DATA RESULTS
GROUNDWATER

SOIL VAPOR EXTRACTION WELLS SAMPLES
GROUNDWATER VOC CONCENTRATIONS
ANALYTICAL RESULTS
SVE/AS SYSTEM
BETHPAGE-NWIRP

Well	Date Sample Taken
	May 1, 1998 (ppb)
EW-1	5349
EW-2	436
EW-3	956
EW-4	332
EW-5	155
EW-6	0
EW-7	3337
EW-8	408
EW-9	101
EW-10	284
EW-11	152
EW-12	6
EW-13	10

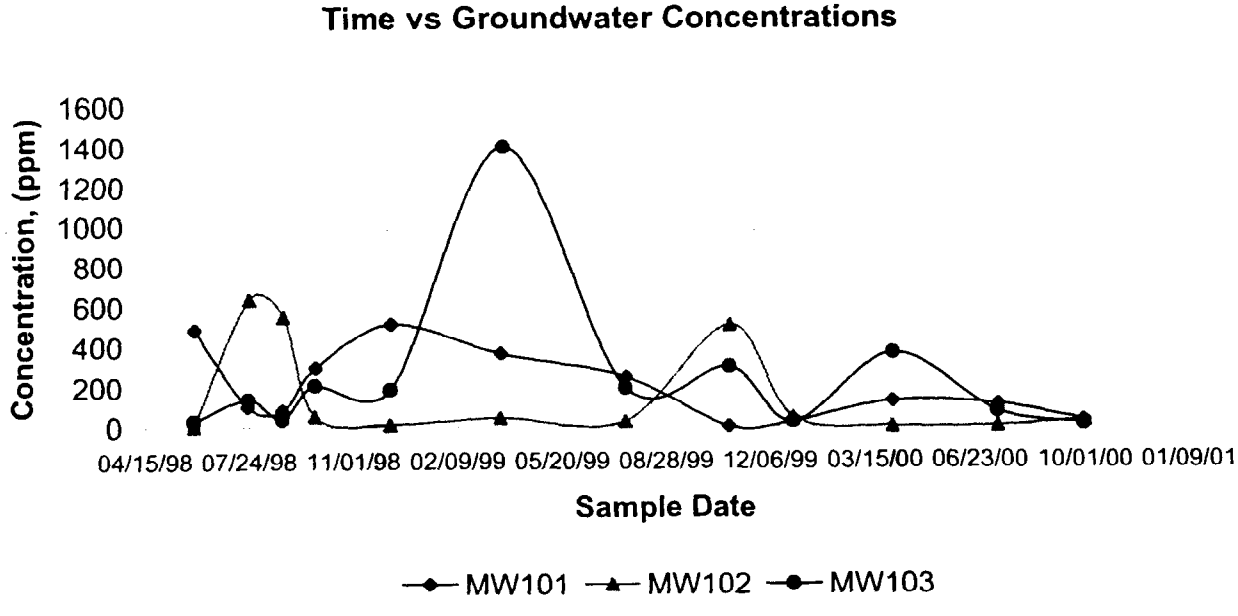
Notes:

1) PPB indicates parts per billion.

NWIRP-BETHPAGE
Monthly Monitoring Data
Groundwater Sampling History

Sample Date	MW101	MW102	MW103	Description
06/01/1998	487	5	27	Baseline
07/23/1998	101	635.5	137.2	Extraction Only
08/25/1998	81	550.8	38.2	Extraction and Injection
09/25/1998	296.1	54.8	208.3	Extraction and Injection
12/07/1998	513.8	10.6	186.4	Extraction and Injection
03/22/1999	365.4	45	1398.4	Extraction Only
07/20/1999	249	26.4	195.3	Extraction and Injection
10/28/1999	0	509.5	298	Extraction and Injection
12/29/1999	24.3	46.6	24.3	Extraction and Injection
04/01/2000	126	0	365	Extraction and Injection
07/10/2000	109	0	71.3	Extraction and Injection
09/30/2000	28.5	28.5	8.9	Extraction and Injection

Notes:
1) Concentrations listed are for total VOCs.
2) All Concentrations are in ug/L.



APPENDIX C

ANALYTICAL DATA RESULTS
SOIL

GEOPROBE SOIL SAMPLES
ANALYTICAL RESULTS
SVE/AS SYSTEM
BETHPAGE-NWIRP

Parameter	GP01-01	GP01-02	GP01-03	GP01-04	GP01-05	GP01-06	GP01-07	GP01-08	GP01-09	GP01-10	GP01-11
Chloromethane											
Bromomethane											
Vinyl Chloride											
Chloroethane											
Methylene Chloride											
1,1-Dichloroethene											
Trichlorofluoromethane											
1,1-Dichloroethane											
Trans-1,2-Dichloroethene											
Chloroform											
1,2-Dichloroethane											
1,1,1-Trichloroethane			8,530								
Carbon Tetrachloride											
Bromodichloromethane											
1,2-Dichloropropane											
Trichloroethene											
Dibromochloromethane											
1,1,2-Trichloroethane											
Benzene											
1,1-Dichloropropene											
2-2-Dichloropropane											
Bromoform											
Hexachlorobutadiene											
Isopropylbenzene											
Tetrachloroethene											
Methyl tertiary butyl ether											
Toluene			2,670								
Chlorobenzene											
Ethylbenzene											
p-Isopropyltoluene											
o-Xylene			2,440								
m+p-Xylene			4,450								
1,2-Dichlorobenzene											
1,3-Dichlorobenzene											
1,4-Dichlorobenzene											
Naphthalene											
n-Propylbenzene			2,080								
Bromobenzene											
Bromochloromethane											
n-Butylbenzene			2,360								
sec-Butylbenzene											
tert-Butylbenzene											
2-Chlorotoluene											
4-Chlorotoluene											
1,2-Dibromo-3-chloropropane											
1,2-Dibromomethane											
Dibromomethane											
Dichlorodifluoromethane											
cis-1,2-Dichloroethene											
1,3-Dichloropropane											
1,1,1,2-Tetrachloroethane											
1,2,3-Trichlorobenzene											
1,1,2,2-Tetrachloroethane											
1,2,4-Trichlorobenzene											
1,2,3-Trichloropropane											
1,2,4-Trimethylbenzene			14,400								
1,3,5-Trimethylbenzene			5,630								
cis-1,3-Dichloropropene											
trans-1,3-Dichloropropene											
Styrene											
Total VOCs	**0**	**0**	**42,560**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Notes:

1) All results are expressed in parts per billion (ppb, or ug/kg).

2) A blank indicates that the compound was not detected.

GEOPROBE SOIL SAMPLES
ANALYTICAL RESULTS
SVE/AS SYSTEM
BETHPAGE-NWIRP

Parameter	GPBL-01	GPBL-02	GPBL-03	GPBL-04	GPBL-05	GPBL-06	GPBL-07	GPBL-08	GPBL-09	GPBL-10	GPBL-11
Chloromethane											
Bromomethane											
Vinyl Chloride											
Chloroethane											
Methylene Chloride											
1,1-Dichloroethene											
Trichlorofluoromethane											
1,1-Dichloroethane											
Trans-1,2-Dichloroethene											
Chloroform											
1,2-Dichloroethane											
1,1,1-Trichloroethane			2,500								
Carbon Tetrachloride											
Bromodichloromethane											
1,2-Dichloropropane											
Trichloroethene			2,200								
Dibromochloromethane											
1,1,2-Trichloroethane											
Benzene											
1,1-Dichloropropene											
2-2-Dichloropropane											
Bromoform											
Hexachlorobutadiene											
Isopropylbenzene											
Tetrachloroethene											
Methyl tertiary butyl ether											
Toluene											
Chlorobenzene											
Ethylbenzene			980								
p-Isopropyltoluene											
Xylene (total)			5,800								
1,2-Dichlorobenzene											
1,3-Dichlorobenzene											
1,4-Dichlorobenzene											
Naphthalene											
n-Propylbenzene											
Bromobenzene											
Bromochloromethane											
n-Butylbenzene											
sec-Butylbenzene											
tert-Butylbenzene											
2-Chlorotoluene											
4-Chlorotoluene											
1,2-Dibromo-3-chloropropane											
1,2-Dibromomethane											
Dibromomethane											
Dichlorodifluoromethane											
cis-1,2-Dichloroethene											
1,3-Dichloropropane											
1,1,1,2-Tetrachloroethane											
1,2,3-Trichlorobenzene											
1,1,2,2-Tetrachloroethane											
1,2,4-Trichlorobenzene											
1,2,3-Trichloropropane											
1,2,4-Trimethylbenzene											
1,3,5-Trimethylbenzene											
cis-1,3-Dichloropropene											
trans-1,3-Dichloropropene											
Styrene											
Total VOCs	**0**	**0**	**11,480**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Notes:

1) All results are expressed in parts per billion (ppb, or ug/kg).

2) A blank cell indicates that the compound was either not detected or not analyzed.

ADDITIONAL SOIL SAMPLES
ANALYTICAL RESULTS
SVE/AS SYSTEM
BETHPAGE-NWIRP

COMPOUND	Preliminary Remediation Goals for Soil	SB06-03-0999	SB06-10-0999	SB06-50-0999	SB17-50-1099	SB24-14-0999	SB24-20-0999
1,1,1-Trichloroethane	10 ug/kg			17		4400	
Trichloroethene	10 ug/kg	18				73000	
Tetrachloroethene	27 ug/kg	120	89	260	2200	460000	88

APPENDIX D

OPERATIONAL DATA TABLES

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum (" Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
08/11/1998	0	-	0	25	12	13	0	1	0	20.3
08/13/1998	0	250		25	14.5	4.5	4.5	1	0	20.2
08/18/1998		280		0	17.5	5	5	5	0	20
08/20/1998	0	260	0	28	18	4	3	3	0	21
08/25/1998	3	260	0	30	-	-	-	-	0	20
08/27/1998	0	210	0	25	11	NA	NA	2	0	20.3

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum (" Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
09/01/1998	-	280	-	30	4	0.8	1	1.6		
09/03/1998	21		-	30	7	-	-	1.6		
09/22/1998	22	280	off	off	9.5	3	3.5	4.5		
09/25/1998	19	260	0	40	8	0.5	0.5	1	0	21
09/29/1998	19	260	-	45	14.2	1	0.7	2		

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum (" Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
10/06/1998	20	260	0	40	5	5	5	5	-	-
10/13/1998	19.75	270	0.05	40	17	4	5.4	1.7	-	-
10/20/1998	20	280	14	40	19.5	4	0.4	1.8	-	-
10/27/1998	20	280	14	45	5	0.6	0.6	1	0	20.3

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum (" H2O)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
11/04/1998	21	270	14	40	5	1	1	1	0	20.8
11/12/1998	19.5	280	12	55	20	0.6	0.7	1.9	0	21
11/18/1998	21	270	14	50	9	1.7	1.4	1.4	0	20.8
11/24/1998	19.5		13.9	49	5.4	0	0	0.8	0	20.1
12/01/1998	20.5		13.9	42.5	5.4	0.8	1	1	0	20
12/08/1998	20		14	40	*	*	*	*	1	20.1

* HNu was not operating correctly and was in the process of being returned during this day.

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
03/23/1999	16.5 "w.c.	280	SYSTEM OFF		6	0	0	0	0	21.4
03/31/1999	0" Hg	280	15	80	7.8	0.9	0.4	0.4	2	20.8
04/07/1999	0" Hg	270	15	100	4.5	0.7	0.2	0.5	0	20.8
04/14/1999	0" Hg	270	15	100	-	-	-	-	0	20.8
04/20/1999	0" Hg	280	15	100	3.6	0	0.2	1	0	20.7
04/23/1999	0" Hg	270	15.25	100	No Hnu on site				-	-
04/28/1999	0.75 " Hg	280	15.5	100	5	1.7	0.6	0.6	-	-

* HNu was not operating correctly and was in the process of being returned during this day.

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
05/07/1999	1.0	280	15.0	100	4.0	0.0	0.0	0.0	0.0	20.8
05/12/1999	1.5	260	15.0	100	4.0	1.2	1.1	1.2	0.0	20.8
05/19/1999	1.0	280	15.0	100	4.0	0.0	0.0	1.0	0.0	20.7
05/26/1999	1.0	270	15.0	100	4.0	0.5	1.0	0.5	0.0	20.6

* HNu was not operating correctly and was in the process of being returned during this day.

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
06/02/1999	3.0	260	15.0	100	3.0	0.0	0.0	0.0	0.0	20.8
06/09/1999	1.5	260	15.0	100	4.0	0.0	0.0	0.0	0.0	20.7
06/21/1999	1.0	280	15.0	105	2.5	0.0	0.0	0.0	0.0	20.6
06/29/1999	1.5	280	15.0	100	5.1	0.0	0.0	0.6	0.0	20.6

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
07/08/1999	2.5	280	15	100	7.5		3	3	0	20.6
07/13/1999	1.5	280	15	100	8	8	0	0	0	28
07/20/1999	1.5	280	15.2	100	6		0	0	0	28
07/26/1999	2.2	270	14.5	100	4	0	0	0	0	20.4

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
08/03/1999	1.3	270	14.3	110	3.2	0.7	0.6	0.7	0.0	0
08/10/1999	1.0	280	14.5	110	2.5	1.5	0.0	0.0	20.7	0
08/17/1999	1.0	270	14.5	110	3.0	0.0	0.0	0.0	20.4	0
08/26/1999	1.0	270	14.0	110	3.6	0.8	0.0	0.2	0.0	0

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
09/01/1999	2.0	270	14.0	110	5.2	0.4	0.2	0.2	0.0	20.1
09/08/1999	1.5	260	13.0	110	2.8	0.5	ND	0.2	-	-
09/14/1999	1.8	270	14.0	105	4.0	ND	ND	ND	0.0	20.2
09/23/1999	1.0	260	14.5	105	1.2	ND	ND	ND	0.0	20.2
09/30/1999	1.5	290	14.5	105	2	ND	ND	ND	0.0	20.7

Notes:
ND - Non-detected

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
10/06/1999	0	290	14.5	110					0	20.1
10/19/1999	0.5	280	14.25	110	13.8	2.1	1.6	0.6	0	20.8
11/03/1999	1.25	270	-	-	4	2.8	2.2	1.4	0	20.7
11/09/1999	1	280	14	110	3.2	2.3	0.7	0.1	0	20.3
11/16/1999	0.5	280	15	110	11	2.4	0.1	-	0	20.4
11/22/1999	0.5	280	15	-	12.7	5.5	0	0	0	20.3

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
12/03/1999	1.0	270	14.5	110	8.7	0.9	0.0	0.0	0.0	21.3
12/08/1999	0.0	280	14.0	120	12.5	4.2	0.0	0.0	0.0	20.2
12/16/1999	1.25	275	14	105	10.6	0	0	0	0	20.8
12/22/1999	0.75	2880	14.2	100	6.9	0.6	0	0	-	-
12/28/1999	0.5	275	13.8	750	18.4	2.1	0.5	0.0	0.0	20.8
04/17/2000	-	280	4.7	100	10.1	3.6	1.9	0.4	-	-
04/26/2000	-	280	4.6	110	2.4	ND	ND	ND	2.0	20.8

Notes:
ND - Non-detected

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
05/05/2000	-	270	4.6	105	3.0	1.0	0.4	0.8	0.0	20.8
05/11/2000	1.5	270	4.0	90	3.5	0.5	0.0	0.0	0.0	20.5
05/18/2000	2.0	280	1.2	130	2.5	0.0	0.0	0.0	0.0	20.5
05/23/2000	1.5	270	1.2	130	2.0	0.0	0.5	0.5	0.0	20.5

Notes:
ND - Non-detected

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
06/02/2000	0.9	270	3.9	110	2.0	0.0	0.0	0.0	0.0	20.9
06/09/2000	2.0	270	3.8	110	2.2	0.2	0.0	0.0	0.0	20.4
06/16/2000	2.0	260	3.9	110	3.0	1.9	1.0	2.4	0.0	20.5
06/23/2000	1.8	270	3.9	110	4.9	2.1	2.8	3.4	0.0	20.5
06/28/2000	1.5	260	3.6	110	1.5	0.2	0.0	0.4	0.0	20.25

Notes:
ND - Non-detected

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
07/06/2000	1.5	260	3.5	110	2.6	0.4	0.2	0.6	2.0	20.8
07/11/2000	1.8	260	3.6	112	3.1	1.2	0.9	1.0	1.0	20.25
07/19/2000	1.75	265	3.7	110	2.7	0.2	0.4	0.4	1.0	20.75
07/25/2000	1	260	3.5	110	1.7	0.3	0	0	1.5	21.0

Notes:
ND - Non-detected

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
08/02/2000	2.0	260	3.6	110	-	-	-	-	1.0	20.5
08/10/2000	2.9	260	3.7	110	2.4	0.0	0.0	0.0	0.0	20.9
08/18/2000	1.3	260	3.7	110	4	0	0	0.5	0.0	20.9
08/24/2000	1.6	260	36	110	3.2	0	0	0	0	20.9
08/30/2000	1.3	265	3.6	110	4.9	2.8	1.2	1.0	2.0	21.0

Notes:
ND - Non-detected

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
09/08/2000	1.50	265	x	110	-	-	-	-	-	-
09/12/2000	1.25	255	3.5	110	-	-	-	-	2.0	21
09/19/2000	1.50	260	3.5	110	2.6	0	0	0	-	-

Notes:
ND - Non-detected
"-" indicates that Hnu was not working correctly. The old unit was sent back and replaced.
"x" indicates that pressure was not taken

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

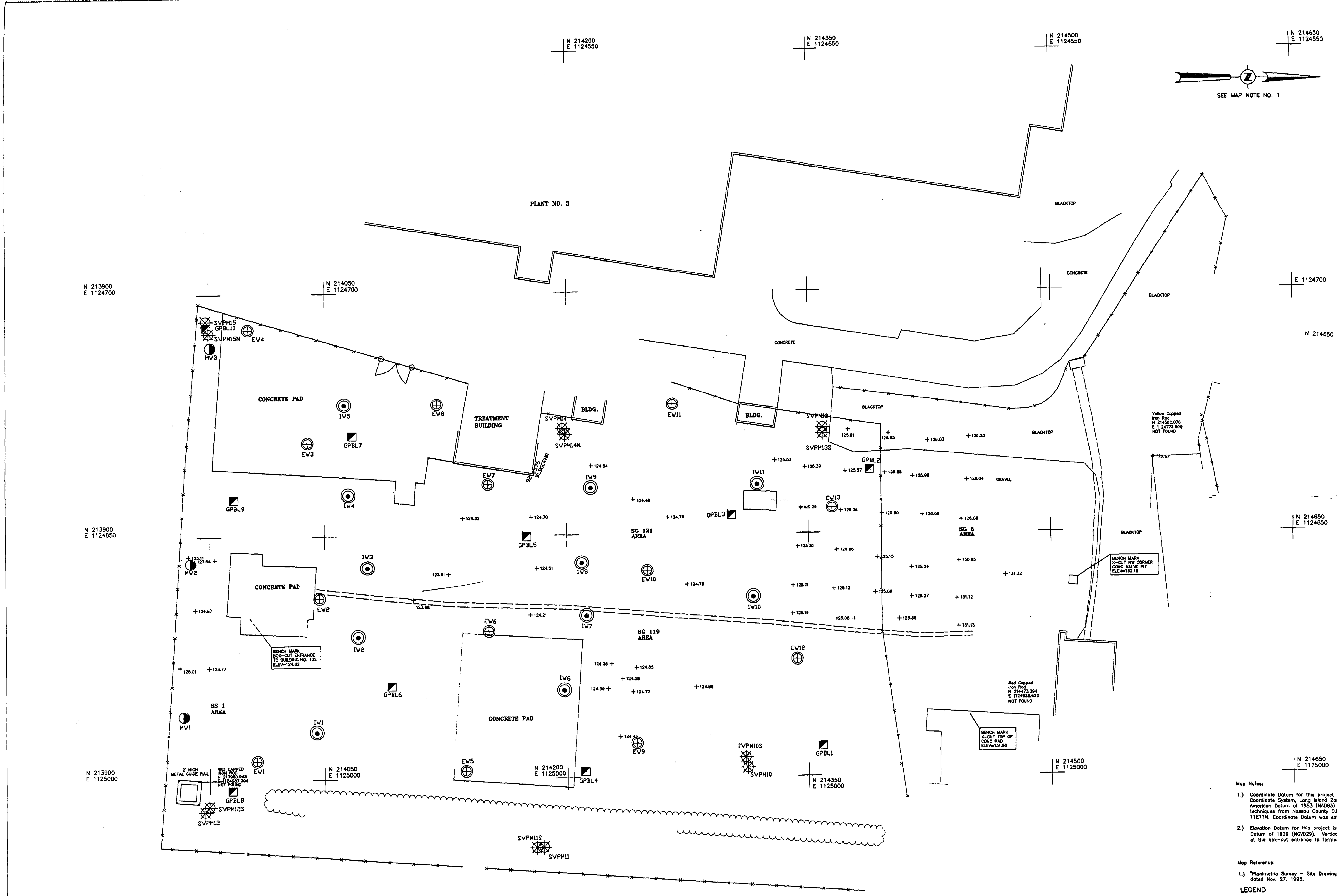
Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
10/03/2000	1.3	270	3.2	110	3.0	0.0	0.0	0.0	0.0	20.9
10/06/2000	1.8	180	System Off		1.7	0.0	0.0	0.0	0.0	20.9
10/13/2000	1	260	System Off		2	0	0	0	0.0	20.9
10/20/2000	1.7	270	System Off		2	0	0	0	0	20.9
10/26/2000	2.0	160	System Off		No monitoring equipment located on site					

Notes:
ND - Non-detected

NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

Date	B-01		B-02		VOC				LEL%	O_2%
	Vacuum ("Hg)	Flow (SCFM)	Pressure (psig)	Flow (SCFM)	Influent BV-18 (ppm)	Middle BV-32 (ppm)	Effluent BV-19 (ppm)	Background (ppm)		
11/03/2000	1.0	265	System off		2.0	0.3	0.2	0.5	0.0	21
11/10/2000	1.5	260	3.2	110.0	-	0.2	0.4	0.4	-	-
11/17/2000	1.5	265	3.3	112.0	-	-	-	-	-	-
11/21/2000	0.8	265	3.2	105.0	-	-	-	-	-	-

Notes:
"-" Monitoring equipment was not working properly and no readings could be taken.



Map Notes:

1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N. Coordinate Datum was established by C.T. Male Associates in 1995.

2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Vertical Control is based at the box-cut entrance to former Building No. 132 (Elev=124.82) on the Bench Mark

Map Reference:

1.) "Planimetric Survey - Site Drawing No. 95 - 525" by C.T. Male Associates, P.C. dated Nov. 27, 1995.

LEGEND

GPBL	GEOPROBE BORING LOCATION	SURVEYED BY AMERICAN GEOTECH, 8/25/98
AI	AIR INJECTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
EW	EXTRACTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
SVPM	SOIL VAPOR PRESSURE MONITOR	SURVEYED BY AMERICAN GEOTECH, 8/25/98
MW	MONITORING WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
	C.T. MALE SURVEY BASELINE	
124.34 +	ELEVATION POINTS	
SB01	BORINGS FROM GROUND SURFACE	

FOSTER WHEELER ENVIRONMENTAL

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
NORTHERN DIVISION — PENNSYLVANIA, PA
NAVAL BASE NWIRP — BETHPAGE, NEW YORK

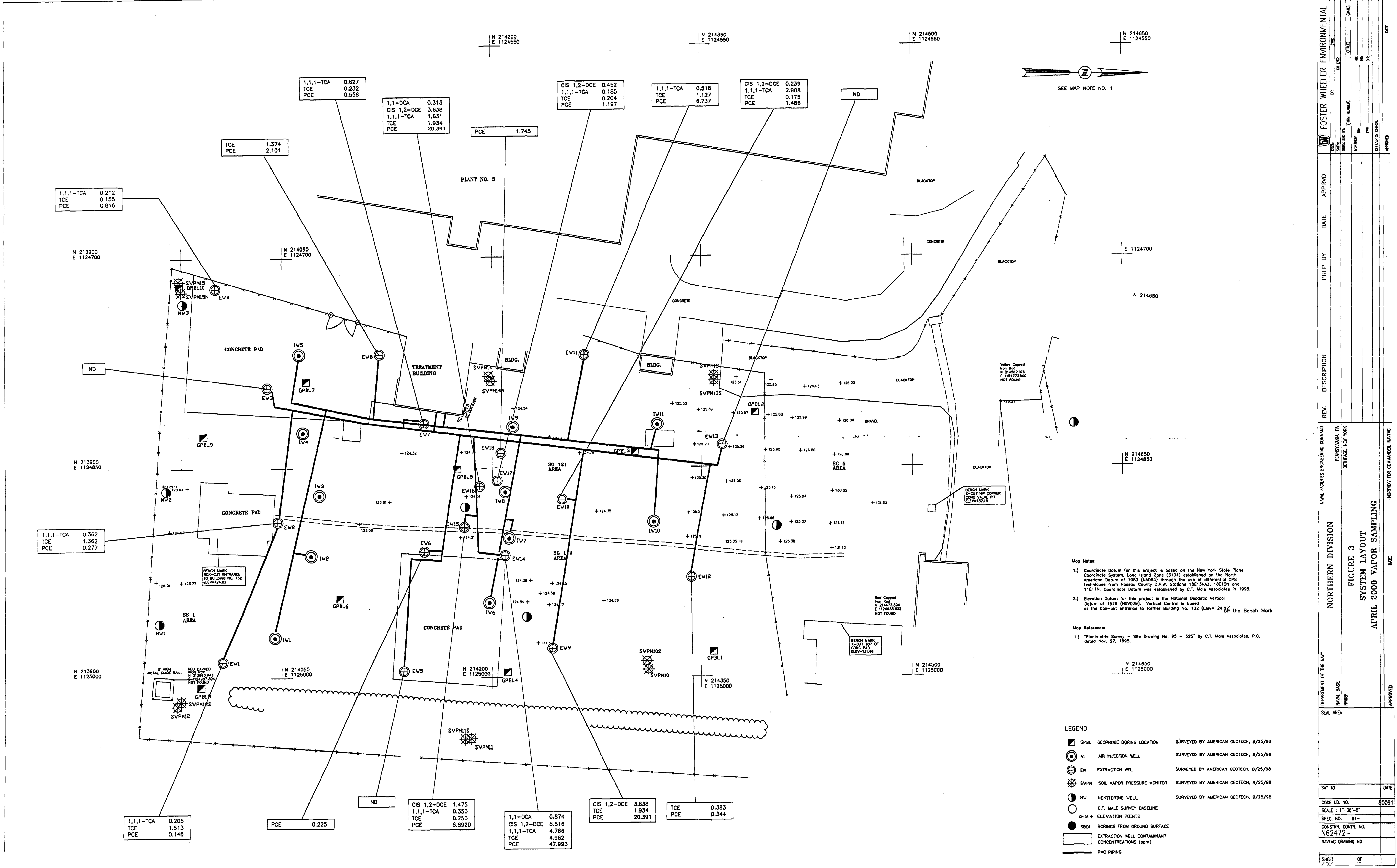
FIGURE 2
SITE LAYOUT MAP
SITE 1 - FORMER DRUM MARSHALLING AREA

REV.	DESCRIPTION	PREP BY	DATE	APPRVD

CODE I.D. NO. 80091
SCALE: 1"=30'-0"
SPEC. NO. 04-
CONSTRN. CONTR. NO. N62472-
NAVFAC DRAWING NO.
SIZE: D

DATE CREATED
LATEST CHANGE
CHANGED BY:

CAD FILENAME: BP31501.DWG DATE: 03/15/01
PLOT SCALE: 1=30 TIME: 10:08 AM



PLANT NO. 3
TREATMENT BUILDING
BLDG.
CONCRETE PAD
SG 121 AREA
SG 5 AREA
SG 119 AREA
SS 1 AREA
BLACKTOP
CONCRETE
GRAVEL
SEE MAP NOTE NO. 1
1,1,1-TCA 0.627 TCE 0.232 PCE 0.556
1,1-DCA 0.313 CIS 1,2-DCE 3.638 1,1,1-TCA 1.631 TCE 1.934 PCE 20.391
TCE 1.374 PCE 2.101
PCE 1.745
CIS 1,2-DCE 0.452 1,1,1-TCA 0.185 TCE 0.204 PCE 1.197
1,1,1-TCA 0.518 TCE 1.127 PCE 6.737
CIS 1,2-DCE 0.239 1,1,1-TCA 2.908 TCE 0.175 PCE 1.486
ND
1,1,1-TCA 0.212 TCE 0.155 PCE 0.816
1,1,1-TCA 0.362 TCE 1.362 PCE 0.277
1,1,1-TCA 0.205 TCE 1.513 PCE 0.146
PCE 0.225
CIS 1,2-DCE 1.475 1,1,1-TCA 0.350 TCE 0.750 PCE 8.8920
1,1-DCA 0.874 CIS 1,2-DCE 8.516 1,1,1-TCA 4.766 TCE 4.962 PCE 47.993
CIS 1,2-DCE 3.638 TCE 1.934 PCE 20.391
TCE 0.383 PCE 0.344
BENCH MARK BOX-CUT ENTRANCE TO BUILDING NO. 132 ELEV=124.82
BENCH MARK X-CUT NW CORNER CONC VALVE PIT ELEV=132.18
BENCH MARK X-CUT TOP OF CONC PAD ELEV=131.96
2' HIGH METAL GUIDE RAIL
Map Notes:
1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N. Coordinate Datum was established by C.T. Male Associates in 1995.
2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Vertical Control is based at the box-cut entrance to former Building No. 132 (Elev=124.82) on the Bench Mark
Map Reference:
1.) "Planimetric Survey – Site Drawing No. 95 – 525" by C.T. Male Associates, P.C. dated Nov. 27, 1995.
LEGEND
GPBL GEOPROBE BORING LOCATION SURVEYED BY AMERICAN GEOTECH, 8/25/98
AI AIR INJECTION WELL SURVEYED BY AMERICAN GEOTECH, 8/25/98
EW EXTRACTION WELL SURVEYED BY AMERICAN GEOTECH, 8/25/98
SVPM SOIL VAPOR PRESSURE MONITOR SURVEYED BY AMERICAN GEOTECH, 8/25/98
MW MONITORING WELL SURVEYED BY AMERICAN GEOTECH, 8/25/98
C.T. MALE SURVEY BASELINE
ELEVATION POINTS
SB01 BORINGS FROM GROUND SURFACE
EXTRACTION WELL CONTAMINANT CONCENTRATIONS (ppm)
PVC PIPING
FOSTER WHEELER ENVIRONMENTAL
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NORTHERN DIVISION
NAVAL BASE NWIRP
BETHPAGE, NEW YORK
FIGURE 3
SYSTEM LAYOUT
APRIL 2000 VAPOR SAMPLING
SCALE : 1"=30'-0"
CONSTR. CONTR. NO. N62472-

Map Notes:

1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N.

2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Differential GPS Observations in conjunction with standard leveling techniques were employed to establish and verify elevations shown hereon.

3.) The limited underground structures shown hereon have been scaled from record plans provided to C.T. Male by Foster-Wheeler. C.T. Male does not guarentee that all underground structures or utilities have been shown as this was not part of the scope of work. Prior to any excavation or digging, the appropriate officals should be contacted to verify the existence of such facilities.

4.) All information shown hereon is the result of an actual "on-the-ground" field survey conducted by C.T. Male Associates, P.C. during the week of November 6, 1995, and on April 25, 1996.

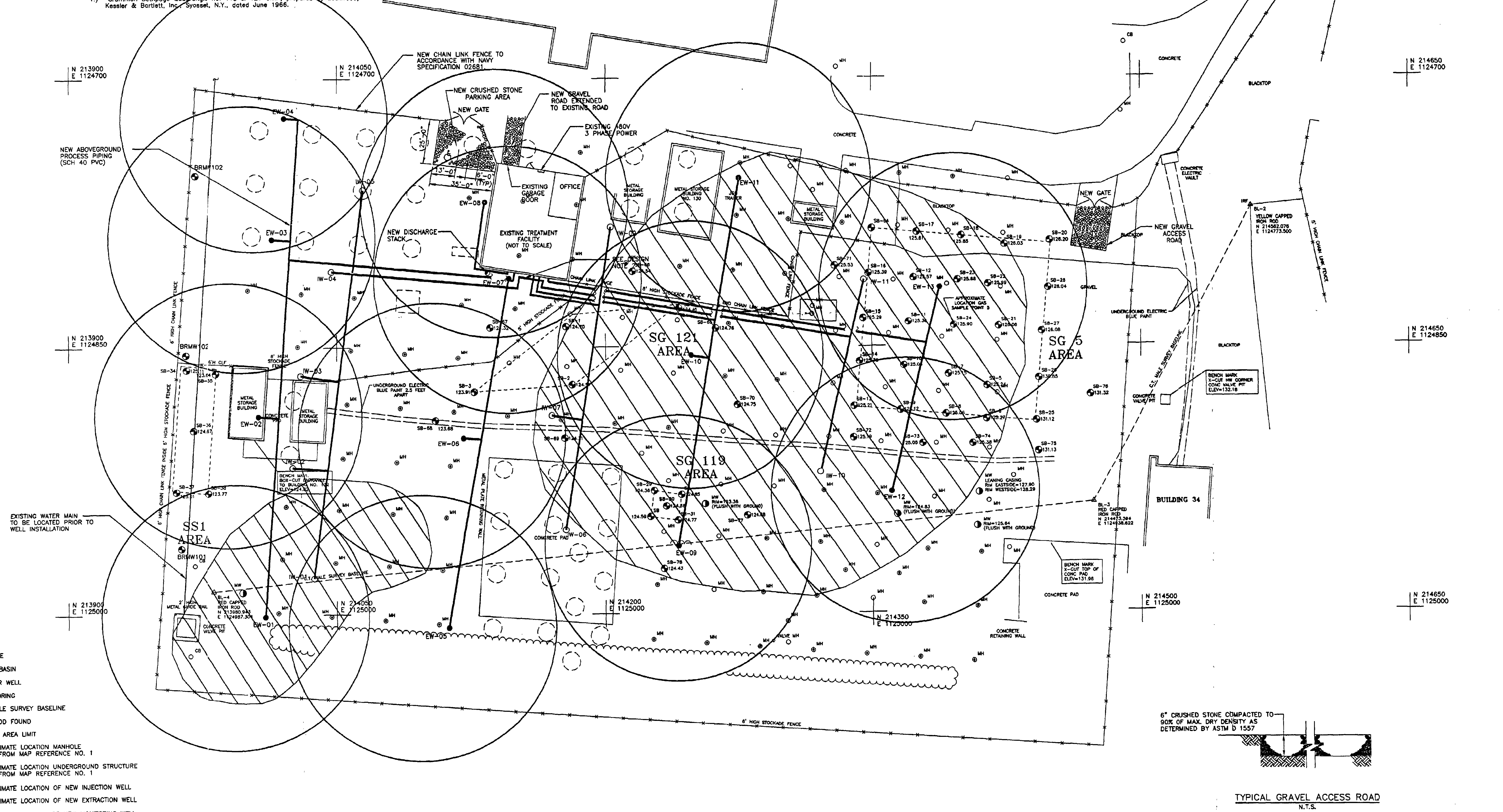
Map Reference:

1.) "Grumman Bethpage Quadrangle no. 115 & 121 Civil", prepared by Lockwood, Kessler & Bartlett, Inc., Syosset, N.Y., dated June 1966.

Design Notes:

1.) Some existing underground utilities have been locate using information provided by company and are shown for the purpose of assisting the contractor locating said utilities in the field. The contractor should be aware that additional utilities may be present which are not shown on these plans. Prior construction the contractor shall verify the locations of all existing utilities within the limits of construction.

2.) For building penetration details, see drawing BTH-06.



LEGEND

- MH MANHOLE
- CB CATCH BASIN
- MW MONITOR WELL
- SB SOIL BORING
- BL-1 C.T. MALE SURVEY BASELINE
- IRF IRON ROD FOUND
- SAMPLE AREA LIMIT
- MH APPROXIMATE LOCATION MANHOLE TAKEN FROM MAP REFERENCE NO. 1
- APPROXIMATE LOCATION UNDERGROUND STRUCTURE TAKEN FROM MAP REFERENCE NO. 1
- IW-01 APPROXIMATE LOCATION OF NEW INJECTION WELL
- EW-01 APPROXIMATE LOCATION OF NEW EXTRACTION WELL
- BRMW101 APPROXIMATE LOCATION OF NEW MONITORING WELL
- EXTRACTION RADIUS OF INFLUENCE
- CONTAMINATED AREA

FOSTER WHEELER ENVIRONMENTAL CORPORATION
DSGN: DEGIORGIO DR: J.R.

DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
PHILADELPHIA, PA.
NWIRP BETHPAGE, NEW YORK

FIGURE 4
SITE 1 – FORMER DRUM MARSHALLING AREA
AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM

NORTHDIV FOR COMMANDER, NAVFAC

SCALE : 1"=30'-0"
SPEC. NO. 04-
SHEET 2 OF 6
SIZE: D
DIS. SH. NO. BTH-02

CAD FILE NAME: BP3151-2.DWG DATE: 03/15/01
PLOT SCALE: 1=30 TIME: 9:54 AM

N 214200
E 1124550

N 214350
E 1124550

N 214500
E 1124550

N 214650
E 1124550

SEE MAP NOTE NO. 1

PLANT NO. 3

BLACKTOP

CONCRETE

E 1124700

N 213900
E 1124700

N 214050
E 1124700

CONCRETE PAD

TREATMENT BUILDING

BLDG.

BLDG.

GRAVEL

N 214650

SVPM15
GPBL10
SVPM15N
EW4
MW3
IW5
EW8
EW3
GPBL7
SVPM14
SVPM14N
EW11
SVPM13
SVPM13S
GPBL2
SB07
SB02
SB08
SB04
SB03
SB10
SB01
IW11
EW7
IW9
GPBL9
IW4
SB23
SB11
SB17
SB16
SB12
SG 121
AREA
SB22
GPBL5
SB15
SB13
SB18
IW8
SB21
EW10
SB20
SB19
IW10
EW13
SB06
GPBL3
SB09
SG 5
AREA
BLACKTOP
Yellow Capped
Iron Rod
N 214562.078
E 1124733.500
NOT FOUND
BENCH MARK
X-CUT NW CORNER
CONC VALVE PIT
ELEV=132.18

N 213900
E 1124850

N 214650
E 1124850

IW3
MW2
CONCRETE PAD
EW2
IW2
BENCH MARK
BOX-CUT ENTRANCE
TO BUILDING NO. 32
ELEV=124.82
EW6
SG 119
AREA
SB25
SB24
IW6
SB27
SB26
GPBL6
CONCRETE PAD
IW10
EW12
Red Capped
Iron Rod
N 214473.384
E 1124636.622
NOT FOUND
BENCH MARK
X-CUT TOP OF
CONC PAD
ELEV=131.98
SS 1
AREA
MW1
IW1
EW9
SVPM10S
SVPM10
GPBL1
N 214500
E 1125000
N 214650
E 1125000
N 213900
E 1125000
N 214050
E 1125000
N 214200
E 1125000
N 214350
E 1125000
EW1
EW5
GPBL4
GPBL8
SVPM12S
SVPM12
SVPM11S
SVPM11

Map Notes:

1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N. Coordinate Datum was established by C.T. Male Associates in 1995.

2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Vertical Control is based at the box-cut entrance to former Building No. 132 (Elev=124.82) on the Bench Mark

Map Reference:

1.) "Planimetric Survey - Site Drawing No. 95 - 525" by C.T. Male Associates, P.C. dated Nov. 27, 1995.

LEGEND

GPBL	GEOPROBE BORING LOCATION	SURVEYED BY AMERICAN GEOTECH, 8/25/98
SB01	BORINGS FROM GROUND SURFACE	SURVEYED BY AMERICAN GEOTECH, 8/25/98
AI	AIR INJECTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
EW	EXTRACTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
SVPM	SOIL VAPOR PRESSURE MONITOR	SURVEYED BY AMERICAN GEOTECH, 8/25/98
MW	MONITORING WELL	
	C.T. MALE SURVEY BASELINE	
124.36 +	ELEVATION POINTS	

FOSTER WHEELER ENVIRONMENTAL

REV.	DESCRIPTION	PREP BY	DATE	APPRVD

NAVAL FACILITIES ENGINEERING COMMAND
PHILADELPHIA, PA
BETHPAGE, NEW YORK

DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL BASE
NORFOLK

FIGURE 5
SOIL BORING LOCATION MAP
SITE 1 - FORMER DRUM MARSHALLING AREA
NORTHERN FOR COMMANDER, NAVFAC

SEAL AREA

SAT TO	DATE
CODE I.D. NO.	80091
SCALE : 1"=30'-0"	
SPEC. NO. 04-	
CONSTRN. CONTR. NO. N62472-	
NAVFAC DRAWING NO.	
SHEET	OF
SIZE: D	DRS. SM. NO.

DATE CREATED
LATEST CHANGE
CHANGED BY:

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PLOT SCALE: 1=30

DATE: 01/15/01
TIME: 10:52 AM