September 18, 2013

SITE MANAGEMENT PLAN

157 Charles Coleman Boulevard
Pawling, New York

Prepared for

PAWLING ENGINEERED PRODUCTS, INC.
157 Charles Coleman Boulevard
Pawling, New York 12564

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

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1.0 INTRODUCTION

This Site Management Plan ("SMP") was prepared for the Pawling Engineered Products, Inc. ("Pawling") facility located at 157 Charles Coleman Boulevard in Pawling, New York (the "Site") at the request of the New York State Department of Environmental Conservation ("NYSDEC") in order to proceed with a reclassification of the Site (Site #314002) from a Class 2 Inactive Hazardous Waste Site to a Class 4 Inactive Hazardous Waste Site (Figure 1).

Pawling operated several remedial systems at the Site from March 1992 to March 2009 to address an area of impacted soil and groundwater that resulted from historic releases associated with a waste burning trench at the Site. Following completion of the remedial work, some contamination was left in the subsurface at this Site, which is hereafter referred to as "residual contamination." This SMP was prepared to manage residual contamination at the Site until the Declaration of Covenants and Restrictions (Appendix A) is extinguished and defines Site-specific implementation procedures as required by the Declaration of Covenants and Restrictions.

This Site Management Plan was prepared on behalf of Pawling, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010 and the guidelines provided by NYSDEC. This SMP addresses the means for implementation of Institutional Controls ("ICs") and Engineering Controls ("ECs") that are required by the Declaration of Covenants and Restrictions for the Site.

<u>Purpose</u>

The Site contains contamination left following completion of the remedial action. ECs have been incorporated into the Site remedy to monitor remaining contamination to ensure protection of public health and the environment. A Declaration of Covenants and Restrictions recorded with the Dutchess County Clerk will require compliance with this SMP and all ECs and ICs placed on the Site. The ICs place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary to ensure compliance with all ECs and ICs required by the Declaration of Covenants and Restrictions for contamination that remains at the site. This SMP has been approved by the NYSDEC, and compliance with this SMP is required by the grantor of the Declaration of

Covenants and Restrictions and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

The SMP provides a detailed description of all procedures required to manage residual contamination at the Site following the completion of the Remedial Action. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) submittal of Periodic Review Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (4) defining criteria for termination of monitoring and reporting obligations. To address these needs, this SMP includes three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; and (3) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC

Site Management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be once every three years. Important notes regarding this SMP are as follows:

- This SMP defines site-specific implementation procedures as required by the Declaration of Covenants and Restrictions.
- At the time this report was prepared, the SMP and all Site documents related to remedial investigation and remedial action are maintained at the NYSDEC Region 3 offices in New Paltz.

1.1 Site Description

The "Site" is the Pawling Engineered Products facility located at 157 Charles Coleman Boulevard, Pawling, Dutchess County, New York (Figure 1). As reported in previous Site investigation documents, Pawling Engineered Products has been at this location since 1946 producing rubber products and fabricated plastics. There are three buildings running north to south along the eastern property boundary with parking on the west side of the Site. The Swamp River is located on the far west and north limits of the Site. The area is a mix of commercial and residential properties with railroad tracks and playing fields for the Trinity Pawling School directly to the east of the Site and the Swamp River directly to the west and north (Figure 1).

1.2 Site History

The NYSDEC alleged that from on or about June 2, 1987 the discharges of cooling water from the Site to the Swamp River contained several metals and organic solvents. Subsequent investigations related to this allegation identified solvents in the area of a former waste burning trench located at the northern end of the facility's parking lot. This area became the focus of Remedial Investigation ("RI") and Remedial Action ("RA") at the Site. A more complete description of the Site's history, RI findings, and RA are presented in the following documents:

- *Groundwater Investigation*, September 2, 1988. Groundwater Technology, Inc.
- *Groundwater Investigation and Remedial Design Report,* August 28, 1990. Groundwater Technology, Inc.
- *Limited Feasibility Study,* December 27, 1990. Groundwater Technology, Inc.
- *Remedial System Design,* February 26, 1991. Groundwater Technology, Inc.
- *Record of Decision,* March 1992. New York State Department of Environmental Conservation.
- *Groundwater and Soil Remedial System Start-Up and First Quarterly Report,* August 26, 1992. Groundwater Technology, Inc.
- *Project Update,* December 2004. Pawling Corporation.
- *Status Report, April 2003 through March 2004,* March 7, 2005. Shaw Environmental.
- *Status Report,* February 27, 2007. Roux Associates, Inc.
- *Summary of Investigation – Soil Vapor Intrusion Study,* December 3, 2009. Roux Associates, Inc.
- *Groundwater Sampling Results*, June 28, 2011. Roux Associates, Inc.

Electronic copies of these documents are presented in Appendix B. In addition, at the time this SMP was prepared; all Site documents related to the RI and RA are maintained at the NYSDEC Region 3 offices in New Paltz, New York.

1.3 Geological Conditions

Based on a review of the RI results, the area of the Site near the former waste burning trench contained 4 to 8 feet of fill material (fine sand, stones, and pieces of rubber) overlying stratified alluvium ranging from silt to gravel. Bedrock in the areas of investigation ranged from 4.5 to

18.5 feet below land surface. Groundwater flows north to northwest at a variable depth of approximately 6 feet below land surface (Groundwater Technology, Inc 1988, 1990a, 1991)

1.4 Remedial Investigation Findings

The following is a summary of the Remedial Investigation Findings.

1.4.1 Air

A soil vapor intrusion investigation was conducted in March 2009 (Roux Associates, 2009). Analytical data suggested that VOC impacted groundwater beneath the Site contributed a de minimus amount of VOCs to soil vapor. As an example, PCE was detected in groundwater in May 2009 at a concentration of 2.6 micrograms per liter ("µg/L") and in soil vapor in March 2009 at a concentration of 8.1 $\mu g/m^3$. No other VOCs were detected in both groundwater and soil vapor. There were no VOCs in indoor air that exceeded the New York State Department of Health ("NYSDOH") Air Guidance Values.

1.4.2 Soil

The August 28, 1990 Groundwater Investigation and Remedial Design Report collected several soil samples for laboratory analysis (Groundwater Technologies, Inc., 1990b). That report indicates that there were no volatile, semi-volatile, or priority pollutant metals contamination in the soil at the locations sampled. The August 1992 Groundwater and Soil Remedial System Start-up and First Quarterly Report reported that VOCs in soils analyzed ranged from non-detect to 8,284 parts per billion ("ppb") in NVP-1 at the 8-10 foot interval (in the saturated zone)(Groundwater Technologies, Inc., 1992).

1.4.3 Groundwater

Pre-remedial action groundwater samples were collected between 1988 and 1992. These data were reported in the various Site investigation reports listed in Section 1.2 above, and indicate that the major portion of the groundwater plume was situated between GT-7S and RW-1S (Figure 2) where, in 1992, detected concentrations of total VOCs were 299,000 to 526,000 µg/L, respectively (Groundwater Technology, Inc., 1992). At that time, the downgradient edge of the plume located at GT-4S and GT-5S had concentrations of total VOCs of 21 and 31 µg/L, respectively (Groundwater Technology, Inc., 1992).

1.5 Summary of Remedial Action

Pawling began remediation at the Site in 1992 and since that time has implemented a very effective and costly program. All remedial work was done with constant oversight, understanding, and direction from the NYSDEC. The groundwater treatment system began operation on March 11, 1992. Initially the system consisted of groundwater extraction wells, a low-profile air stripper followed by liquid phase granular activated carbon, air sparging, soil vapor extraction ("SVE"), and vapor phase granular activated carbon for off-gas treatment (Groundwater Technology, Inc., 1992). More specifically, the groundwater treatment system consisted of the following components:

- One air sparge point (SP-1);
- Five combined air sparge/SVE points (VP-1 through VP-5) plus one existing monitoring well (GT-2/VP-6);
- Two overburden recovery wells (RW-1S and RW-2S);
- One bedrock recovery well (RW-1D);
- Two bedrock monitoring wells (MW-2D1 and MW-2D2);
- Two overburden monitoring wells (GT-6S and GT-7S);
- One nested vapor probe (NVP-1); and
- Several previously installed onsite and offsite, overburden and bedrock monitoring wells.

Since its installation, the remedial system has undergone various changes and improvements. One of the most significant additions was the installation of a dual phase extraction ("DPE") system at monitoring well GT-7S in August of 1995. The DPE system consisted of a high-vacuum blower connected to GT-7S. The high-vacuum blower pulled groundwater into a knockout tank. The groundwater was then pumped from the knockout tank to the existing low profile air stripper for treatment.

The SVE system was permanently shutdown in June 2003 with NYSDEC approval (Shaw Environmental, 2005). The total amount of volatile organic compounds ("VOCs") removed by the SVE system was approximately 215 pounds. In October 2006, the groundwater treatment system stopped pumping from the two overburden recovery wells RW-1S and RW-2S due to mechanical issues with the air compressor. The total amount of VOCs removed by the groundwater treatment system at that time was approximately 240 pounds. Historical performance monitoring data included in the attachments to this SMP indicate that the groundwater treatment system was very effective in removing the majority of VOCs from the groundwater and groundwater monitoring showed that concentrations of VOCs in the majority of monitoring wells were below the NYSDEC Ambient Water-Quality Standards and Guidance Values (“AWQSGVs”).

In June 2007, a pump was installed in RW-1D and began pumping approximately 12 gallons per minute to the existing air stripper for treatment. Approximately 245,000 gallons of groundwater was extracted from RW-1D. By the end of 2007 VOCs had been detected at concentrations above AWQSGVs in only one well at the Site since 2006 (RW-1D).

The groundwater treatment system was shut down in March 2009 and groundwater samples were collected in May, July, and October 2009. Analytical results indicated that the only detection of VOCs above AWQSGVs was found in GT-7S. These concentrations were relatively low and appeared to have reached a steady state, asymptotic level. Concentrations of VOCs in downgradient wells indicated no exceedances of AWQSGVs demonstrating that contaminants are not migrating from the Site and natural attenuation of residual contamination is occurring.

1.5.1 Remaining Contamination

In May 2011, groundwater samples were collected from three monitoring wells, GT-6S, GT-7S, and RW-lD using low flow sampling procedures (Roux Associates, 2011). Each sample was analyzed for the following volatile organic compounds (“VOCs”): toluene; trichloroethene; tetrachloroethene; 1,l,l-trichloroethane; vinyl chloride; cis-1,2-dichloroethene, and trans-1,2-dichloroethene.

Trichloroethene and cis-1,2-dichloroethene were detected in monitoring well GT-7S at concentrations above their respective NYSDEC AWQSGVs. The total concentration of these VOCs was 32.2 µg/L. Two degradation products, vinyl chloride and cis-1,2-dichloroethene, were detected in monitoring well RW-1D above their respective NYSDEC AWQSGV at a total concentration of 78.1 µg/L indicating natural attenuation of residual contamination is occurring.

1.5.2 Engineering and Institutional Controls

Since contaminated groundwater remains beneath the Site, Engineering and Institutional Controls (ECs and ICs) are required to protect human health and the environment. Long-term management of EC/ICs and of residual contamination will be executed under this Site specific SMP.

The Site has one EC as follows:

- Monitored Natural Attenuation.

A series of ICs are required to implement, maintain and monitor this EC. The Declaration of Covenants and Restrictions requires compliance with these ICs. The ICs consist of the following:

- The Grantor and the Grantor's successors must comply with the Declaration of Covenants and Restrictions and with all elements of this SMP.

- Groundwater monitoring must be performed and reported as defined in this SMP (Sections 3.0 and 5.0).

- On-site environmental monitoring devices, including groundwater monitor wells must be protected and replaced as necessary to ensure continued functioning in the manner specified in this SMP.

- ECs may not be discontinued without an amendment or the extinguishment of the Declaration of Covenants and Restrictions for the Site.

The Site has certain ICs in the form of Site restrictions. Adherence to these ICs is required under the Declaration of Covenants and Restrictions. ICs that apply to the Site are:

- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for the intended use.

- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Site at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This statement must be certified by an expert that the NYSDEC finds acceptable.

The objective of the identified EC/ICs is to:

- Prevent future exposure to contaminated groundwater.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved work plans. The remedial goals included attainment of drinking water standards to the extent practicable for onsite groundwater. Since residual contaminated groundwater exists beneath a portion of the Site, EC/ICs are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the Site.

The purpose of this Plan is to provide:

- a description of all EC/ICs on the Site;
- the basic operation and intended role of each implemented EC/IC;
- a description of the key components of the ICs created as stated in the Declaration of Covenants and Restrictions;
- a description of the features that should be evaluated during each inspection and compliance certification period;
- a description of plans and procedures to be followed for implementation of EC/ICs; and
- any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the Site remedy, as determined by the NYSDEC.

2.1 Engineering Control ("EC") Components

The ECs include: (1) monitoring natural attenuation of groundwater on the Site.

2.1.1 Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. The monitoring activities are outlined in the Monitoring Plan included in Section 3 of this SMP.

2.2 Institutional Controls ("ICs") Components

The ICs are required by the NYSDEC to: (1) implement, maintain and monitor ECs; and (2) prevent future exposure to residual contamination by controlling groundwater use.

Adherence to these ICs on the Site is required under the Declaration of Covenants and Restrictions and will be implemented under this SMP. A copy of the Declaration of Covenants and Restrictions is presented as Appendix A.

The following are the ICs for the Site:

1. The Grantor and the Grantor's successors must comply with the Declaration of Covenants and Restrictions and with all elements of this SMP.

2. Groundwater monitoring must be performed as defined in this SMP (Section 3.0).

3. On-site environmental monitoring devices, including groundwater monitor wells must be protected and replaced as necessary to ensure continued functioning in the manner specified in this SMP.

4. Data and information pertinent to the ECs must be reported at the frequency and in a manner defined in this SMP (Section 5.0).

5. ECs may not be discontinued without an amendment or the extinguishment of the Declaration of Covenants and Restrictions for the Site.

6. The following Site Restrictions apply to the Site:

    - Use of groundwater underlying the Site is prohibited without treatment rendering it safe for the intended use.

    - The Site owner will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Site at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This statement must be certified by an expert that the NYSDEC finds acceptable.

3.0 MONITORING PLAN

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the implemented ECs in reducing or mitigating contamination at the Site. Monitoring of the performance of the remedy and overall reduction in contamination on-site will be determined by NYSDEC based upon trends in contaminant levels in groundwater in the affected areas and an assessment whether the remedy continues to be effective in achieving remedial goals. Monitoring programs are summarized in the embedded table below and outlined in detail in Section 3.1

Monitoring / Inspection Schedule

Monitoring Program	Frequency *	Matrix	Analysis
Groundwater	Once every Five Quarters	Groundwater	VOCs

* The frequency of events will be conducted as specified and will be determined by the NYSDEC thereafter.

3.1 Engineering Control System Monitoring

3.1.1 Monitored Natural Attenuation

Natural attenuation monitoring for groundwater will begin no more than 60 days following approval of this SMP and will be conducted once every five quarters. Groundwater samples will be collected from monitoring wells GT-7S, RW-lD and GT-6S (Figure 2) using low flow purging and sampling procedures. Each sample will be analyzed for the following constituents: toluene; TCE; PCE; 1,l,l-TCA; vinyl chloride; and cis 1,2-dichloroethylene. Following three sampling events, Pawling and the NYSDEC will reevaluate the need for continued groundwater monitoring.

Groundwater monitoring data will be submitted following each sampling event and will be incorporated into the Periodic Review Report as discussed in Section 5.0.

3.2 Groundwater Monitoring Well Maintenance

If biofouling or silt accumulation has occurred in the on-site monitoring wells, as determined by significant changes in well production or depth to bottom measurements, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced in kind, if an event renders the wells unusable. Well decommissioning, for the purpose of replacement, should be reported to NYSDEC prior to performance and in the Periodic Review Report. Well decommissioning without replacement in kind must receive prior approval by NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC and NYSDOH.

3.3 Inspections

Inspections of all systems installed on the Site will be conducted at the frequency specified in SMP Monitoring Plan schedule in Schedule 3.0. A comprehensive Site inspection will be conducted once every three years. Site-wide inspection should also be performed after all severe weather conditions that may affect Engineering Controls or monitoring devices. During these inspections, an inspection form will be completed (Appendix C). The form will compile sufficient information to assess the following:

- compliance with all ICs;
- an evaluation of the condition and continued effectiveness of ECs;
- general Site conditions at the time of the inspection;
- confirm that any Site records are up to date; and
- changes, or needed changes, to the monitoring system.

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Site Management Reporting Plan (Section 5).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site will be conducted to verify the effectiveness of the EC/ICs implemented at the Site by a qualified environmental professional as determined by NYSDEC.

3.4 Monitoring Reporting Requirements

Forms and any other information generated during regular monitoring events and inspections will be kept on file. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by the NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Site Management Reporting Plan of the SMP. An Annual Groundwater Report will be prepared for submission, subsequent to each groundwater sampling event and submitted to the NYSDEC within 30 days of the receipt of the laboratory data. The report will include, at a minimum:

- date of event;
- personnel conducting sampling;
- description of the activities performed;
- type of samples collected (e.g., groundwater, outdoor air, etc.);
- copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- sampling results in comparison to appropriate standards/criteria;
- a figure illustrating sample type and sampling locations;
- copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (also to be submitted electronically in the NYSDEC-identified format);
- a copy of the laboratory certification;
- any observations, conclusions, or recommendations; and
- a determination as to whether plume conditions have changed since the last reporting event.

Data will be reported to the NYSDEC and NYSDOH in electronic format. A summary of the monitoring program deliverables are summarized in the table below.

Monitoring / Inspection Deliverables

Task	Frequency	Quarterly Reporting Requirement	Annual Reporting Requirements
Groundwater Monitoring	Once every 5 quarters	No	Every 5 quarters
Site Inspection	Once every 3 years	No	Every 3 years

A summary of all monitoring data collected will be reported to NYSDEC once every three years in the Periodic Review Report. Further information on the reporting requirements is outlined in the Site Management Reporting Plan of the SMP.

3.5 Notifications

The following information is presented as an Electronic Database in Appendix D in an electronic database format:

- a Site summary;
- the name of the current Site owner and/or the remedial party implementing the SMP for the Site;
- the location of the Site;
- the current status of Site remedial activity;
- a copy of the Declaration of Covenants and Restrictions; and
- a contact name and phone number of a person knowledgeable about the Declaration of Covenants and Restrictions' requirements, in order for NYSDEC to obtain additional information, as necessary.

This information should be: 1) modified as conditions change; (2) revised in Appendix D of this document; and, (3) submitted to NYSDEC in the Site Management Monitoring Report. Should the Declaration of Covenants and Restrictions be modified or terminated, the copy of the revised Declaration of Covenants and Restrictions will also be updated in this manner.

3.5.1 Non-Routine Notifications

Non-routine notifications are to be submitted by the property owner(s) to the NYSDEC on an as-needed basis for the following reasons:

- notice within 48 hours of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the

Site, including a summary of action taken and the impact to the environment and the public.

Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days of the date of the emergency and shall describe and document actions taken to restore the effectiveness of the ECs.

3.6 Certification

Site inspections and sampling activities will take place as outlined above. Frequency of inspection is subject to change by NYSDEC. Inspection certification for all ICs and ECs will be submitted to NYSDEC once every three years as part of the Periodic Review Report. A qualified environmental professional, as determined by NYSDEC, will perform inspection and certification. Further information on the certification requirements are outlined in the Site Management Reporting Plan.

4.0 OPERATION AND MAINTENANCE PLAN

The Site remedy does not rely on any mechanical systems, such as sub-slab depressurization systems or air sparge/ soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

5.0 SITE MANAGEMENT REPORTING PLAN

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan of this SMP. A comprehensive Site-wide inspection will be conducted once every three years. The inspections will determine and document the following:

- compliance with all ICs, including Site usage;
- an evaluation of the condition and continued effectiveness of ECs;
- general Site conditions at the time of the inspection;
- confirm that any Site records are up to date; and
- changes, or needed changes, to the remedial or monitoring system.

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site will be conducted to verify the effectiveness of the EC/ICs implemented at the Site by a qualified environmental professional as determined by NYSDEC.

In case of an emergency, the Site owner, Pawling Engineered Products, Inc., can be contacted at (800) 431-3456 and the NYSDEC can be contacted at (518) 402-9662.

5.1 Reporting

An Annual Groundwater Report will be submitted to NYSDEC approximately two months following each groundwater sampling event (no later than 30 days after the data has been received). Groundwater monitoring reports will be submitted following sample collection and as part of the Periodic Review Report, which will be submitted once every three years. The Periodic Review Report will be prepared in accordance with Section 6 of the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation requirements. The first Periodic Review Report will be due 18 months from the date of the approval of this SMP. This Site Management Reporting Plan and its requirements are subject to revision by NYSDEC. The Periodic Review Report will include the following:

- identification of all required EC/ICs;
- an evaluation of the EC/IC Plan and the Monitoring Plan for adequacy in meeting remedial goals;
- assessment of the continued effectiveness of all EC/ICs;

- certification of the EC/ICs;
- results of the required periodic Site Inspection;
- all deliverables generated during the reporting period;
- all applicable inspection forms and other records generated for the Site during the reporting period;
- cumulative data summary tables and/or graphical representations of contaminants of concern by media (groundwater) which include a listing of all compounds analyzed along with the applicable standards, with all exceedances highlighted;
- results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables required for all points sampled during the calendar year (also to be submitted electronically in the NYSDEC-specified format);
- a Site evaluation, which will address the following:
  - the performance and effectiveness of the remedy;
  - the operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
  - any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored; and
  - recommendations regarding any necessary changes to the remedy and/or Monitoring Plan, including decommissioning of the ECs/ICs.
- a figure showing sampling and well locations, and significant analytical values at sampling locations; and
- comments, conclusions, and recommendations, based on an evaluation of the information included in the report, regarding EC/ICs at the Site.

The Periodic Review Report will be submitted in electronic format to the Region 3 NYSDEC offices, located in New Paltz, New York, and to the NYSDOH.

5.2 Certification of EC/ICs

A Professional Engineer licensed to practice in New York State will sign and certify in the Periodic Review Report that:

- On-Site EC/ICs are unchanged from the previous certification.

- The EC/ICs remain in place and effective.

- Nothing has occurred that would impair the ability of the controls to protect the public health and environment.

- Access is available to the Site by NYSDEC and NYSDOH to evaluate continued maintenance of the EC/ICs.

6.0 REFERENCES

Groundwater Technology, Inc. *Groundwater Investigation*, September 2, 1988.

Groundwater Technology, Inc. *Groundwater Investigation and Remedial Design Report,* August 28, 1990.

Groundwater Technology, Inc. *Limited Feasibility Study,* December 27, 1990.

Groundwater Technology, Inc. *Remedial System Design*, February 26, 1991.

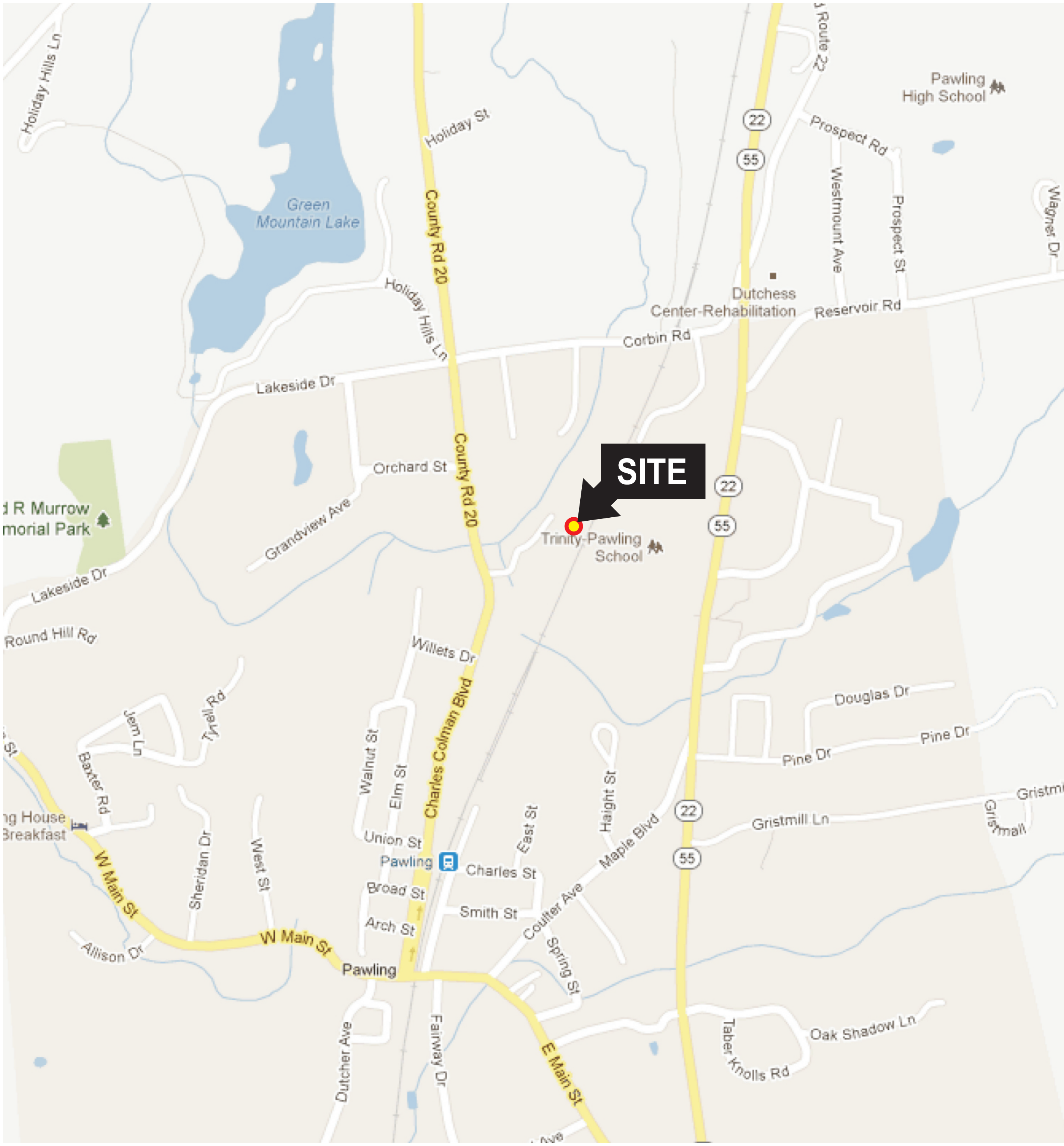
Groundwater Technology, Inc. *Groundwater and Soil Remedial System Start-Up and First Quarterly Report,* August 26, 1992.

Roux Associates, Inc. *Summary of Investigation – Soil Vapor Intrusion Study,* December 3, 2009.

Roux Associates, Inc. *Groundwater Sampling Results*, June 28, 2011.

Shaw Environmental. *Status Report, April 2003 through March 2004,* March 7, 2005.

FIGURES



SOURCE:
GOOGLE MAPS 2012

Title:

SITE LOCATION MAP

Prepared for:

PAWLING ENGINEERED PRODUCTS

ROUX

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 04JUNE12	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	1
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File: 1303.0001Y113.01.CDR		

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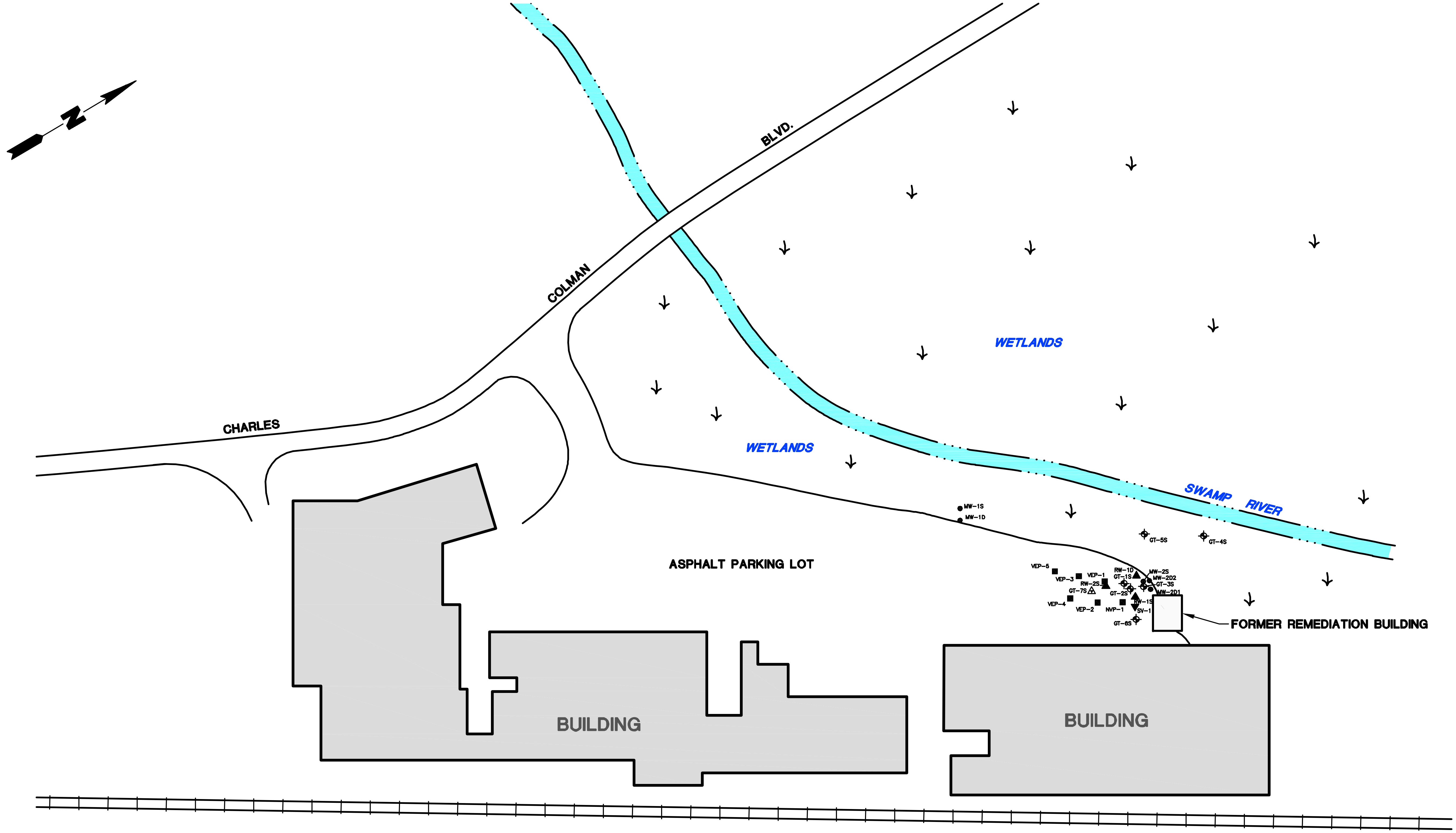

LEGEND

Symbol	Description	Symbol	Description
GT-7S △	LOCATION AND DESIGNATION OF DUAL-PHASE EXTRACTION WELL	RW-1D ▲	LOCATION AND DESIGNATION OF OVERBURDEN RECOVERY WELL
VEP-2 ■	LOCATION AND DESIGNATION OF VAPOR EXTRACTION POINT	SV-1 ▼	LOCATION AND DESIGNATION OF SPARGE POINT
GT-2S ⊕	LOCATION AND DESIGNATION OF OVERBURDEN MONITORING WELL	MW-2D1 ●	LOCATION AND DESIGNATION OF BEDROCK MONITORING WELL

Title:

SITE PLAN

Prepared For:

PAWLING ENGINEERED PRODUCTS

ROUX

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 04JUNE12	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	2
Project Mgr: M.R.	Project: 1303.0001Y000	
File: 1303.0001Y113.02.DWG		

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APPENDICES

APPENDIX A

Copy of Declaration of Covenants and Restrictions

DECLARATION OF COVENANTS AND RESTRICTIONS

THIS COVENANT is made the 6th day of December, 2013, by Pawling Engineered Products, Inc., a corporation organized and existing under the laws of the State of Delaware and having an office for the transaction of business at 157 Charles Colman Boulevard, Pawling, New York 12564.

WHEREAS, Pawling Rubber Company Site is the subject of an Order on Consent (dated June 6, 2013), executed by Pawling Engineered Products, Inc. as part of the New York State Department of Environmental Conservation's (the "Department") State Superfund Program, namely that parcel of real property located on 157 Charles Coleman Boulevard in the Town of Pawling, County of Dutchess, State of New York, which is part of lands conveyed by Pawling Corporation to Pawling Engineered Products, Inc. by deed dated June 29, 2011 and recorded in the Dutchess County Clerk's Office on July 6, 2011 in Instrument No. 02-201102950, and being more particularly described in Appendix "A", attached to this declaration and made a part hereof, and hereinafter referred to as "the property"; and

WHEREAS, the Department approved a remedy to eliminate or mitigate all significant threats to the environment presented by contamination at the Property and such remedy requires that the Property be subject to restrictive covenants.

NOW, THEREFORE, Pawling Engineered Products, Inc., for itself and its successors and/or assigns, covenants that:

First, the Property subject to this Declaration of Covenants and Restrictions is as shown on a map attached to this declaration as Appendix "B" and made a part hereof.

Second, unless prior written approval by the Department or, if the Department shall no longer exist, any New York State agency or agencies subsequently created to protect the environment of the State and the health of the State's citizens, hereinafter referred to as "the Relevant Agency," is first obtained, where contamination remains at the Property subject to the provisions of the Site Management Plan ("SMP"), there shall be no construction, use or occupancy of the Property that results in the disturbance or excavation of the Property which threatens the integrity of any engineering controls or which results in unacceptable human exposure to contaminated soils.

Third, the owner of the Property shall not disturb, remove, or otherwise interfere with the installation, use, operation, and maintenance of engineering controls required for the Remedy, if any, which are described in the SMP, unless in each instance the owner first obtains a written waiver of such prohibition from the Department or Relevant Agency.

Fourth, the owner of the Property shall prohibit the use of the groundwater underlying the Property without treatment rendering it safe for drinking water or industrial purposes, as appropriate, unless the user first obtains permission to do so from the Department or Relevant Agency.

Fifth, the owner of the Property shall provide a periodic certification, prepared and submitted by a professional engineer or environmental professional acceptable to the Department or Relevant Agency, which will certify that any institutional and engineering controls put in place are unchanged from the previous certification, comply with the SMP, and have not been impaired.

Sixth, the owner of the Property shall continue in full force and effect any institutional and engineering controls required for the Remedy and maintain such controls, unless the owner first obtains permission to discontinue such controls from the Department or Relevant Agency, in compliance with the approved SMP, which is incorporated and made enforceable hereto, subject to modifications as approved by the Department or Relevant Agency.

Seventh, this Declaration is and shall be deemed a covenant that shall run with the land and shall be binding upon all future owners of the Property, and shall provide that the owner and its successors and assigns consent to enforcement by the Department or Relevant Agency of the prohibitions and restrictions that the Order on Consent requires to be recorded, and hereby covenant not to contest the authority of the Department or Relevant Agency to seek enforcement.

Eight, any deed of conveyance of the Property, or any portion thereof, shall recite, unless the Department or Relevant Agency has consented to the termination of such covenants and restrictions, that said conveyance is subject to this Declaration of Covenants and Restrictions.

IN WITNESS WHEREOF, the undersigned has executed this instrument the day written below.

By:______________________________

Print Name: John Rickert

Title: Chief Operating Officer Date: 12-6-13

STATE OF NEW YORK)
):ss:
COUNTY OF Dutchess)

On the 6th day of December, in the year 2013, before me, the undersigned, personally appeared JOHN RICKERT, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Catherine F. Webb
Notary Public – State of New York

CATHERINE F. WEBB
NOTARY PUBLIC, STATE OF NEW YORK
REGISTRATION # 01WE6040439
QUALIFIED IN PUTNAM COUNTY
MY COMMISSION EXPIRES APRIL 24, 2014

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APPENDIX B

Electronic Copy of Project Documents

GROUND WATER INVESTIGATION
PAWLING CORPORATION
PAWLING, NEW YORK

SEPTEMBER 2, 1988

Submitted to:

SUSAN R. THOMPSON
PAWLING CORPORATION
157 CHARLES COLMAN BOULEVARD
PAWLING, NEW YORK 12564-1188

Submitted by:

GROUNDWATER TECHNOLOGY, INC.
12 Walker Way
Albany, New York 11205

Prepared by:

Wendy C. Leonard

Wendy C. Leonard
Hydrogeologist

Reviewed by:

Todd G. Schwendeman
District Manager

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APPENDICES

1.0 INTRODUCTION

1.1 Background

Pawling Corporation, a commercial fabricator of plastics and rubber products, operates a facility at 157 Charles Colman Boulevard in the City of Pawling, Dutchess County, New York (Figure 1). The facility is authorized to discharge non-contact cooling water to the Swamp River through a SPDES permit, number NY-000-4616, effective January 1, 1985.

The Department of Environmental Conservation (DEC) alleges that from on or about June 2, 1987 the discharges of the cooling water to the Swamp River contained Copper, Zinc and organic solvents. In addition, the DEC alleges that stormwater runoff from the Pawling property discharged to the ground water via a storm grate and dry well, and beginning on approximately the same date, contained Copper, Lead and Iron in concentrations exceeding State ground water discharge limits.

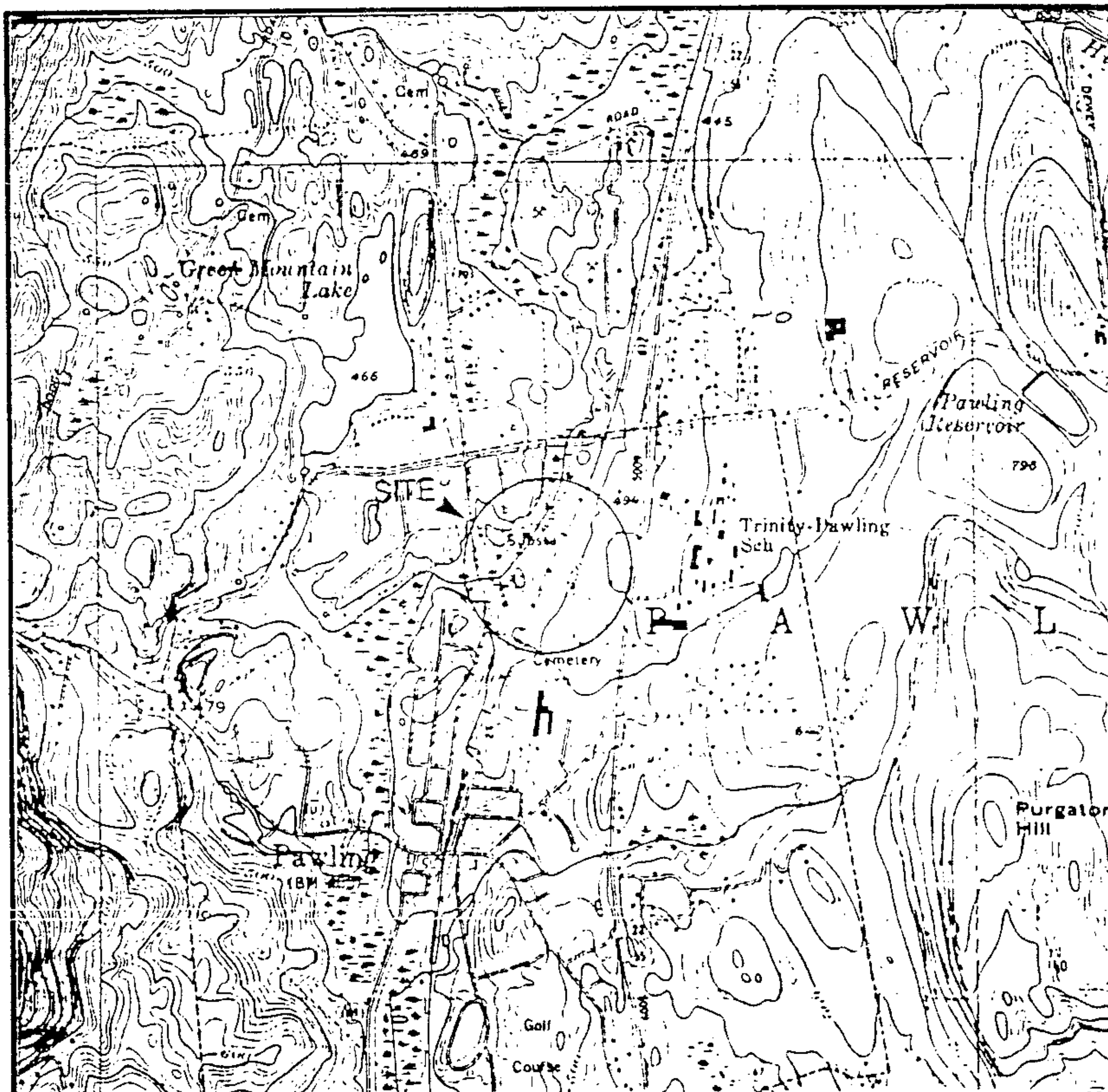
A consent order, issued by the DEC, Case #3-1489/8712, was received by Pawling Corporation on February 24, 1988 documenting these allegations and requiring that a ground water investigation be performed to identify the extent and source of ground water contamination. Pawling Corporation contracted Groundwater Technology, Inc. to perform the ground water investigation.

FIGURE 1

SITE LOCATION MAP

PAWLING CORPORATION

PAWLING, NEW YORK



SOURCE: NYS DOT 7.5 MIN. PAWLING QUAD SCALE: 1 IN. EQUALS 2,000 FT.

Groundwater Technology, Inc. developed a work plan which was approved by the DEC on June 17, 1988. The work plan contained details for a Remedial Investigation/Feasibility Study for the Pawling site. This report presents the results of the Preliminary Assessment and Preliminary Remedial Investigation. Recommendations and proposed work steps for a Comprehensive Remedial Investigation are also included in this report.

1.2 Objectives and Overview

The overall objectives of the ground water investigation were:

- to delineate the concentration and extent of metal and solvent contamination in the ground water
- to determine if upgradient sources are contributing to the contamination
- to evaluate the pathways of contaminant migration and,
- to provide the information required for design of a site remediation system.

The specific work scope designed to achieve these objectives consisted of a site inspection and background data review, soil borings and soil sample analysis, installation of ground water monitor wells in both overburden and bedrock, ground water gauging and sampling, and stream water and sediment sampling. The procedures, results, data analysis and conclusions associated with these tasks are detailed in Sections 2 and 3 of this report. Recommendations for the Comprehensive Remedial Investigation are outlined in Section 4.

2.0 TECHNICAL WORK SCOPE

The format of this technical work scope closely follows that of the approved work plan. The work steps of the Preliminary Assessment and Preliminary Remedial Investigation are detailed in Sections 2.1 and 2.2. Each section contains information on the specific procedures employed for each task and presents the results obtained. Conclusions derived from these work steps are provided in Section 3.0.

2.1 Preliminary Assessment/Site Inspection

The Preliminary Assessment and Site Inspection were performed in order to acquire background and site specific information to be utilized in selecting the boring and monitor well locations. Background geologic data, on-site production well information, past and current plant disposal practices, and a fracture trace analysis were undertaken to aid in the selection of the locations.

2.1.1 Background Geology

A review of selected published topographic, geologic and soil maps shows that the Pawling Corporation site lies in the broad Harlem Valley. This valley extends in a north-south direction through eastern Dutchess County, New York (Simmons et al, 1961). The Swamp River and its 100 year flood plain occupy this valley within the site area.

The soils covering the site consist of the Saco soil series occupying the area along the Swamp River, and the Copake soil series situated east of the river (Secor, 1955). The Saco soil is silty clay loam in texture and forms in very poorly drained alluvial material. It occurs along slowly flowing streams on nearly level relief. The soil is subject to frequent flooding. The surficial material at depth consists of stratified sands and gravel composed chiefly of bedrock fragments.

The Copake soil is fine sandy loam in texture and is found along well drained stream terraces. The surficial material at depth is stratified glacial outwash consisting of sand and gravel.

Bedrock in the site area outcrops along the railroad right-of-way south of the Pawling facility buildings. Depth to bedrock across the remainder of the site was estimated from the background literature to be approximately 20 feet.

Fisher et al (1970) have mapped the bedrock as the Stockbridge Marble, Cambrian in age. A thrust fault was also mapped by Fisher et al as being located within the site area, coincident with the Swamp River.

2.1.2 Production Well Information

The well log for one of the on-site production wells was located through a US Department of Interior computer search of well records. The log is contained in Appendix A. The log states that bedrock was encountered at 20 feet, and is specified as the Stockbridge limestone. The well construction consists of six-inch diameter steel casing to 20 feet, with open borehole to 145 feet. The well yield was rated at 50 gallons per minute (gpm). Discussions with Pawling Corporation employees indicated that the actual yield of this well is 125 gpm and that the pump is a 7 1/2 hp jet pump set at 55 feet below grade.

Information obtained from Pawling Corporation employees concerning the second production well specified that the total depth is 164 feet and that a 2 hp jet pump is set at 80 feet below grade. They estimated that the yield is 100 gpm. Well construction consists of six-inch steel casing and open borehole. No well log was available.

FIGURE 2

MONITOR WELL LOCATION MAP

PROJECT: PAWLING CORP.

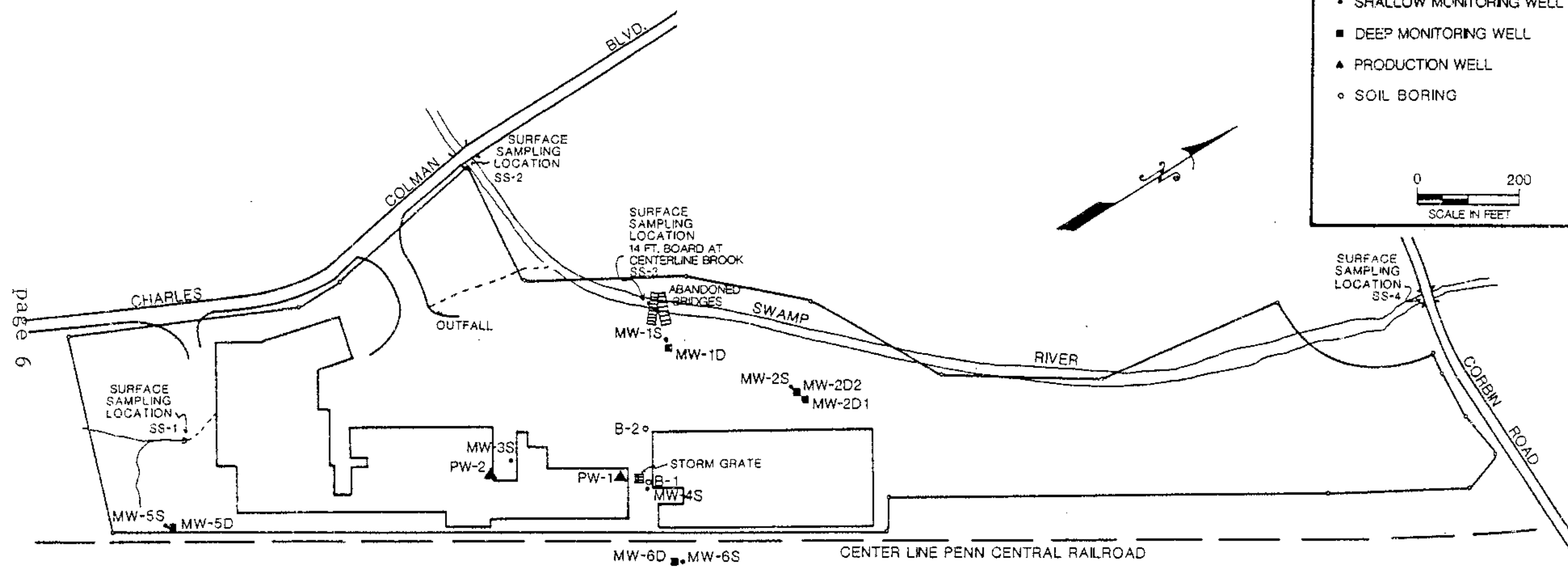
LOCATION: PAWLING, NY

PROJECT NO.: 110 001 8708

MONITORING DATE:

- • SHALLOW MONITORING WELL
- ■ DEEP MONITORING WELL
- ▲ PRODUCTION WELL
- ○ SOIL BORING

0 200
SCALE IN FEET



SOURCE: PAWLING CORPORATION

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

2.1.3 Environmental Audit

The plant audit delineated the following:

- Plant has SPDES discharge for temperature.
- Plant uses Methyl Ethyl Ketone, Toluene, Naphtha, 1,1,1 Trichloroethane, Trichloroethene, (in past) Tetrachloroethene (in past), Hexane, and Isopropyl Alcohol.
- Plant used powdered Lead in the past.
- Plant does not use Copper.
- Approximately 75,000 gallons per day of water are being pumped from the production wells.
- The storm grate between the buildings goes to a dry well in the parking lot. The waste storage area is near this grate.
- Present and former sanitary sewer lines run adjacent to the plant along the east side (former, abandoned line is closer to plant).
- Both loading docks have drainage sumps which are pumped via diaphragm pumps to the 001 outfall and the storm grate.
- Drum storage areas are bermed, with drain pipe through berm with valves.

The site visit delineated the following potential contaminant source areas (see Figure 2):

- landfill - contains hospital wastes, municipal wastes, cured rubber and machinery
- storm grate/dry well
- solvent burning in trenches
- surface spillage/dumping from hazardous materials handling area and storm runoff

2.1.4 Fracture Trace Analysis

A fracture trace analysis was performed on the bedrock out-crop located south of the facility along the railroad right-of-way. A brunton compass was used to measure selected planar features. Strikes and dips were measured on surfaces which appeared to represent bedding planes, joints, horizontal features, and fractures.

The strikes and dips were plotted on a stereonet to determine the general orientation of the readings. The results indicated the presence of a joint set trending N 8 W vertical, a horizontal surface trending N 70 E 10 S, and a bedding plane trending N 57 E 72 S. Bedding planes were correlated to the mineral banding in the rocks. There was no clustering of the fracture readings, suggesting that there is either more than one fracture set or that the fractures relate to the folding of the rocks. Appendix B contains all of the collected data.

2.1.5 Soil Boring and Monitor Well Location

The information obtained from the Preliminary Assessment and Site Inspection was utilized in selecting the boring and monitor well locations. Figure 2 denotes the locations. The rationale for the locations selected is as follows:

- MW-1S and MW-1D were placed downgradient of the dry well
- MW-2S and MW-2D were placed downgradient of the trenching and as far downgradient as access would allow

- MW-3 and MW-4 were placed as couplets to the production wells
- MW-5S and MW-5D were placed upgradient of all known site disposal activities
- B-1 was placed near the storm grate, and
- B-2 was placed near the trenching area.

2.2 Preliminary Remedial Investigation

The Preliminary Remedial Investigation included seven soil borings, five overburden monitor wells, four bedrock monitor wells, ground water gauging and sampling, and stream sediment and water sampling. The investigation was designed to evaluate the contaminant concentrations present at this site, and to determine the pathways of on-site and off-site migration.

Detailed procedures for each task performed during the Preliminary Investigation are presented in Sections 2.2.1 through 2.2.6. The remaining sections of the Preliminary Remedial Investigation specify decontamination, quality assurance/quality control, and health and safety measures utilized throughout the investigation.

2.2.1 Soil Borings

A total of seven soil borings were drilled in the overburden materials in order to determine geologic and chemical characteristics of the soils across the site. The five overburden shallow well locations and two boring locations are shown on Figure 2. The location of each soil boring was approved by the on-site DEC engineer, Shayne Mitchell, prior to drilling.

The soil borings were drilled with Groundwater Technology, Inc.'s Mobile B-47 hollow-stem auger drill rig. The auger size was 4.25 inch I.D. and 7.63 inch O.D. Soil samples were collected with a split-spoon sampler advanced using a 140 pound drive hammer, as per Standard ASTM Method. Soil samples were collected at five-foot intervals or at significant lithologic changes, until bedrock was encountered. A project hydrogeologist supervised all drilling activities.

The upper four to eight feet of unconsolidated material at each location consisted of fill material. The fill material was comprised of dark brown fine sand, stones, and rubber pieces. The underlying materials in MW-1, MW-3, and MW-5 consisted of stratified alluvium. Soil textures ranged from predominantly fine sand and silt in MW-1 to sand and gravel in MW-3 and MW-5. The underlying materials in MW-2, MW-4, B-1, and B-2 were comprised of fine sands. Auger refusal was encountered in each boring; the depth ranged from 4.5 feet in B-2 to 18.5 feet in MW-3S. At the time of drilling, auger refusal was believed to be bedrock. The average depth to the water table encountered during drilling was eight feet. The drilling logs provide the specific information for each borehole (Appendix C).

During drilling operations, soil samples were collected from each major lithologic unit and sent to a laboratory for grain size analysis. Appendix D contains the grain size distribution curves developed from the standard sieve analyses. The hydraulic conductivities calculated from these curves are shown in Table 1.

TABLE 1

HYDRAULIC CONDUCTIVITY VALUES
DERIVED FROM GRAIN-SIZE ANALYSIS

Sample		Hydraulic Conductivity (cm/sec)
MW-1 S-2	10-12 feet	2.5×10^{-3}
MW-2	10-12 feet	9.0×10^{-4}
MW-3 S-2	10-12 feet	1.6×10^{-3}
MW-3 S-3	15-17 feet	4.9×10^{-3}
B-1 S-2	10-12 feet	4.9×10^{-3}
MW-5 S-2	10-12 feet	4.9×10^{-3}
MW-5 S-3	15-17 feet	2.5×10^{-3}

Soil samples obtained from the split-spoon sampler were also field screened with a portable Gas Chromatograph (GC). This instrument detected volatile organic compounds at the part per billion level. The GC extracted a small sample of soil gas from each sample vial. The gas was passed through a chromatographic column and then over a chemical detector. The level of response and the time it took the sample to pass through the column were used to determine relative concentrations and types of compounds. The GC was calibrated for Trans 1,2 Dichloroethylene, 1,1,1 Trichloroethane, Trichloroethene, Tetrachloroethene, and Toluene.

The results of the analysis are shown in Table 2. Only the soil samples from MW-2 showed levels above the detection limit [1 part per billion (ppb)]. Sample SS-1, collected from five to seven feet, showed 1.10 ppb of TCE; sample SS-2, collected from 10 to 12 feet, showed 11.78 ppb TCE and 414.69 ppb of Toluene. Some preliminary water sampling results from the GC screening are also shown in Table 2.

Upon retrieval of the spoon sampler device from the borehole at each sampling depth, proper containers were filled with soil for volatile organic and inorganic parameter analysis. These samples were stored on ice. The soil samples that exhibited the highest levels during the field screening were sent to the laboratory for analysis. If no levels were detected, the deepest sample with sufficient volume for sample analysis was sent.

Based upon the above rationale, the following samples were submitted for laboratory analysis: B-1 SS-2, MW-1 SS-2, MW-2 SS-2, MW-3 SS-3, and MW-5 SS-3. An additional soil sample from MW-2 collected at 19.5 feet (MW-2 Core Hole) was also analyzed. A sample from MW-4S was not selected because of its proximity to B-1. Section 2.2.2 discusses the results of the laboratory testing.

TABLE 2

SOIL & WATER ANALYSIS FROM PORTABLE GAS CHROMATOGRAPH

SAMPLE ID	DATE SAMPLED	1,2 DCE PPB*	1,1,1 TCA PPB*	TCE PPB*	PCE PPB*	TOLUENE PPB*	TOTAL DCE,TCA TCE,PCE TOLUENE PPB
B-1 SS-1	6-6-88	ND	ND	ND	ND	ND	ND
B-1 SS-2	6-6-88	ND	ND	ND	ND	ND	ND
B-2 SS-1	6-7-88	ND	ND	ND	ND	ND	ND
MW-1S SS-1	6-6-88	ND	ND	ND	ND	ND	ND
MW-1S SS-2	6-6-88	ND	ND	ND	ND	ND	ND
MW-1S SS-3	6-6-88	BDL	ND	BDL	BDL	ND	BDL
MW-2S SS-1	6-6-88	ND	ND	1.10	ND	ND	1.10
MW-2S SS-2	6-6-88	ND	BDL	11.78	ND	414.69	426.47
MW-3S SS-1	6-7-88	ND	ND	ND	BDL	ND	BDL/ND
MW-3S SS-2	6-7-88	ND	ND	ND	BDL	ND	BDL
MW-3S SS-3	6-7-88	ND	ND	ND	BDL	ND	BDL
MW-3S SS-4	6-7-88	ND	ND	ND	ND	ND	ND

* DETECTION LIMITS - 1 PPB ON THE FIELD GAS CHROMATOGRAPH

(CONTINUED) TABLE 2

SAMPLE ID	DATE SAMPLED	1,2 DCE PPB	1,1,1 TCA PPB	TCE PPB	PCE PPB	TOLUENE PPB	TOTAL DCE,TCA TCE, PCE TOLUENE PPB
MW-4S SS-1	6-8-88	ND	ND	ND	ND	ND	ND
MW-4S SS-2	6-8-88	ND	ND	ND	ND	ND	ND
MW-5S SS-1	6-8-88	ND	ND	ND	ND	ND	ND
MW-5S SS-2	6-8-88	ND	ND	ND	ND	ND	ND
MW-5S SS-3	6-8-88	ND	ND	ND	ND	ND	ND
MW-1S WATER	6-6-88	BDL	ND	BDL	BDL	ND	BDL
MW-2S WATER UNDEV.	6-7-88	9.8	2407.55*	81.72	ND	5676.0	8175.07
MW-2S WATER	6-8-88	13.70	3516.70*	93.50	ND	22140.0	25763.9
MW-3S WATER UNDEV.	6-8-88	ND	ND	BDL	4.85	ND	4.85
MW-4S WATER	6-8-88	ND	ND	ND	1.4	ND	1.4
MW-5S WATER	6-8-88	ND	ND	ND	BDL	ND	BDL
FIRE HYD. WATER	6-8-88	ND	ND	ND	ND	ND	ND

* COELUTION OF LIGHT ALIPHATIC & AROMATIC HYDROCARBONS WITH 1,1,1 TCA
ND- NOT DETECTABLE
BDL- BELOW DETECTABLE LIMITS (Detection limits for all compounds is 1 ppb with field GC)
1,2 DCE - TRANS 1,2 DICHLOROETHYLENE
1,1,1 TCA - 1-1-1 TRICHLOROETHANE
TCE - TRICHLOROETHENE
PCE - TETRACHLOROETHENE

The two boreholes not completed as monitor wells (B-1 and B-2) were abandoned by grouting with a cement-bentonite mixture. The cuttings from the boreholes were field screened to determine proper disposal procedures. All the soils, except those from MW-2, recorded less than 1 part per million (ppm) volatiles and were therefore disposed of on-site. The cuttings from MW-2 were containerized and stored on-site for later disposal.

2.2.2 Soil Sampling

The selected soil samples were delivered to Camo Laboratories in Poughkeepsie, New York for confirmatory analysis for Purgeable Organics by EPA Method 624, for Base Neutral Extractable Organic analysis by EPA Method 625, and for Priority Pollutant Metals analysis.

The results indicated that no Purgeable Volatiles or Base Neutral compounds were detected in any of the soil samples. This data confirms the non-detectable levels recorded by the field GC for B-1, MW-1, MW-3, and MW-5; however, it contradicts the field GC data for MW-2. The laboratory results report non-detectable levels for MW-2 SS-2, while the field GC reported 414.69 ppb Toluene and 11.78 ppb TCE.

The laboratory results of the Priority Pollutant Metals analyses in soils are shown in Table 3. Concentrations of Antimony, Selenium, Silver, and Thallium were all reported as below the detection limits. The complete laboratory report is included in Appendix E.

TABLE 3

PRIORITY POLLUTANT METALS IN SOILS
(in ppm)

	Ar	Be	Cd	Cr	Cu
B-1 SS-2	1.4	1	3	10	16
MW-1 SS-1	25.0	<1	2	13	23
MW-2 SS-2	12.0	<1	2	12	17
MW-3 SS-3	2.2	<1	2	9	19
MW-5 SS-3	6.6	<1	2	10	16
MW-2 Core Hole	33.0	<1	3	14	17
Bohn Background Range	--	3-40	0.01-7	5-1,000	2-100
Baker & Chesnin Background Range	1-50	6 (av)	0.01-0.07	5-1,000	2-100

TABLE 3 (continued)

PRIORITY POLLUTANT METALS IN SOILS
(in ppm)

	Pb	Hg	Ni	Zn
B-1 SS-2	30	<0.1	21	26
MW-1 SS-1	20	0.1	29	79
MW-2 SS-2	20	0.3	18	38
MW-3 SS-3	20	<0.1	21	26
MW-5 SS-3	10	0.2	18	35
MW-2 Core Hole	10	<0.1	23	45
Bohn Background Range	2-200	0.02-0.2	10-1,000	10-300
Baker & Chesnin Background Range	2-200	0.03-0.3	5-500	10-300

The metal concentrations in Table 3 represent total metals in the soils. A range of naturally occurring metal concentrations have been reported by Bohn (1979) and Baker and Chesnin (1975). These ranges are also listed in Table 3. All of the on-site soil samples lie within these reported background levels. The soil sample from the upgradient location (MW-5 SS-3) contains levels of most of the metals sampled, at concentrations that are within an order of magnitude of the levels detected in soil samples from other well or boring locations at the site.

The results of the Camo laboratory analysis on the soil samples indicates that there is no Volatile, Semi-Volatile or Priority Pollutant Metal contamination in the soils at the locations sampled.

2.2.3 Monitor Well Installation

The objectives of this work scope were to install monitor wells in the aquifer in the overburden material as well as deep monitor wells into the bedrock. The result of this work scope would determine:

- the overburden aquifer flow direction
- the bedrock aquifer flow direction
- the interaction between both aquifers, and
- the extent of contamination, both vertically and horizontally.

2.2.3.1 Overburden Wells

Five overburden wells were installed on June 6 through 8, 1988 inside the boreholes drilled by a hollow-stem auger rig at the five selected locations (Figure 2). Each monitor well was constructed of two-inch fiberglass reinforced epoxy (FRP) well screen and casing with flush threaded joints. The well screen was placed from five feet above the water table to the depth of auger refusal. A bentonite seal, one foot in thickness, was placed above the sand pack. A cement-bentonite grout was placed above this bentonite seal. A lockable protective metal casing was installed at the top of MW-1S, the other wells received eight-inch or five-inch flush-mounted road boxes. Well construction details are shown on the drilling logs (Appendix C).

2.2.3.2 Bedrock Wells

Three bedrock wells were drilled in close proximity to the overburden wells shown in Figure 2. Two monitor well nests (MW-3 and MW-4) utilize the production wells as the bedrock wells (PW-1 and PW-2). The drilling was performed in two phases:

- Coring of the upper 15 feet of rock by Groundwater Technology, Inc.'s Mobile B-47 drill rig
- Air rotary drilling with monitor well completion performed by Goold and Sons Well Drillers.

The coring was performed on June 9, 10, and 14, 1988. Augers were advanced until a good seal into the rock was achieved. A five-foot long N-X core barrel was then utilized to obtain core samples. A Groundwater Technology, Inc. hydrogeologist supervised all coring operations. The core samples were labeled and stored in wooden boxes for subsequent examination.

The results of the coring determined that a boulder layer, ranging in thickness from 5 to 14 feet, is present above the bedrock. The bedrock encountered was a banded and brecciated marble, with fracture zones containing iron staining and silt. The drilling logs in Appendix C denote the depths and abundance of observed fractures.

The Rock Quality Designator (RQD) was determined for each core barrel sample. The RQD represents a modified form of recording core recovery. The equation to calculate RQD is:

$$\% \text{ RQD} = 100 \times \frac{\text{length of core in pieces 4 inches and longer}}{\text{hole length actually drilled}}$$

The % RQD for the collected core samples ranged from 0 to 98.1 %. The very low percentages of 0 % in MW-2D and 8.3 % in MW-1D represent a boulder layer. The other percentages indicate a weathered upper bedrock surface which (within 15 feet) becomes fairly competent.

The remaining drilling and monitor well installations were performed using an air rotary drill rig. Alan Goold and Sons installed the bedrock wells on June 16, 17, 20, and 21, 1988 under Groundwater Technology, Inc. supervision. The overburden sections of the bedrock wells were drilled using a roller bit inside the same borehole used for the rock coring. Due to a boulder layer above the bedrock, this technique caused the hole to cave; therefore, mud rotary was used in the overburden sections of the boreholes at MW-2D1, MW-2D2, and MW-5D.

The overburden sections of the bedrock wells were completed by driving a six-inch steel casing with an attached drive shoe into competent bedrock. An air rotary bit was used to complete the wells open hole by drilling inside the casing into bedrock. Total depth of the three proposed wells was 150 feet.

Two bedrock wells were installed at the MW-2 well location. A highly fractured zone, from 35 feet to 42 feet, was encountered in MW-2D1, which contained high levels of contamination. A field decision was rendered that this zone might not be connected to underlying fractures; therefore, drilling was ceased and the well completed at only 42 feet. An additional well (MW-2D2) was drilled adjacent to MW-2D1, which was cased through this upper fractured zone and drilled to the proposed completion depth of 150 feet.

The geology and fracture determination discerned from the cuttings, drilling water, and rate of drilling are shown in the drilling logs in Appendix C. Various colored marble was encountered at all three locations. MW-2D and MW-5D contained a highly fractured and major water bearing zone at approximately 30 to 42 feet. At the MW-2 location, 5 ppm of volatile organics was measured on the headspace of the drilling waters from this zone with the PID utilized for the ambient air monitoring (see Section 2.2.9). A fracture was encountered at 42 feet in MW-1; however, it was not a major water bearing fracture. At MW-1, the water bearing zones were present at 85 to 145 feet.

The mud used during casing installation was containerized and proper disposal procedures were followed. All drilling waters were placed into polyethylene holding ponds and treated with activated carbon. The waters were discharged to the ground or the sanitary sewer, as directed by the DEC.

2.2.4 Well Development/Elevation and Location Survey

The wells were developed immediately after installation in order to remove fine sediments and other associated drilling materials. The overburden wells were developed by repeated surging and bailing with a bailer. The bedrock wells were developed by air jetting until the water was free of sediment. MW-2S was developed a second time on June 28, 1988 using a water jet. Drilling muds from MW-2D2 had filled the well screen and necessitated the redevelopment.

The development water was retained in polyethylene lined holding ponds and treated using activated carbon. The water was discharged to the ground or the sanitary sewer. The sediment remaining in the polyethylene was containerized for future laboratory analysis. The wells were undisturbed from June 20, 1988 to June 28, 1988 to allow equilibration with the surrounding aquifer.

Following the installation of the monitor wells, top-of-casing and ground elevations were surveyed to a common benchmark by J.K. Devine, a licensed land surveyor, (see Survey Data, Appendix F).

2.2.5 Ground Water Gauging and Sampling

The monitor wells were gauged on June 28 and August 1, 1988 in order to determine the ground water gradient(s). The water level in each well was gauged using an ORS interface probe (see Ground Water Gradient Data, Appendix G). This instrument can detect air/water/product interfaces with an accuracy of ± 0.01 feet. This probe was also used to determine if a phase-separated immiscible layer was present in each well. Based on the gauging data from August 1, 1988, an immiscible layer was not detected in any of the wells.

The gauging data from August 1, 1988 was utilized to produce ground water contour maps for the overburden and bedrock wells (Figures 3 and 4). The June 28 data was not used because of missing water level data. The MW-2S water level for both dates is suspect due to the presence of drilling mud.

The overburden aquifer portrayed a ground water flow direction to the north-northwest at a 0.6 % gradient. The ground water in the bedrock wells indicated a north-northwest flow direction at a 0.55 % gradient. This data indicates that MW-5S and MW-5D are upgradient of only part of the Pawling site.

The observed elevation difference between the overburden and bedrock wells was 0.01 feet at MW-1, 1.07 feet at MW-2, and 0.14 feet at MW-5. The MW-2S elevation may not accurately represent the overburden water level due to the presence of drilling mud. The bedrock wells have slightly higher water level elevations than the overburden wells, indicating the existence of a vertical gradient.

The monitor wells were sampled on June 28 and 29, 1988. Prior to sample collection, three well volumes of water were evacuated from each well. This water was discharged to polyethylene lined holding ponds and treated using activated

FIGURE 3
GROUND WATER CONTOUR
MAP OF OVERBURDEN WELLS

PROJECT: PAWLING CORP.

LOCATION: PAWLING, NY

PROJECT NO.: 110 001 8708

MONITORING DATE: 8-1-88

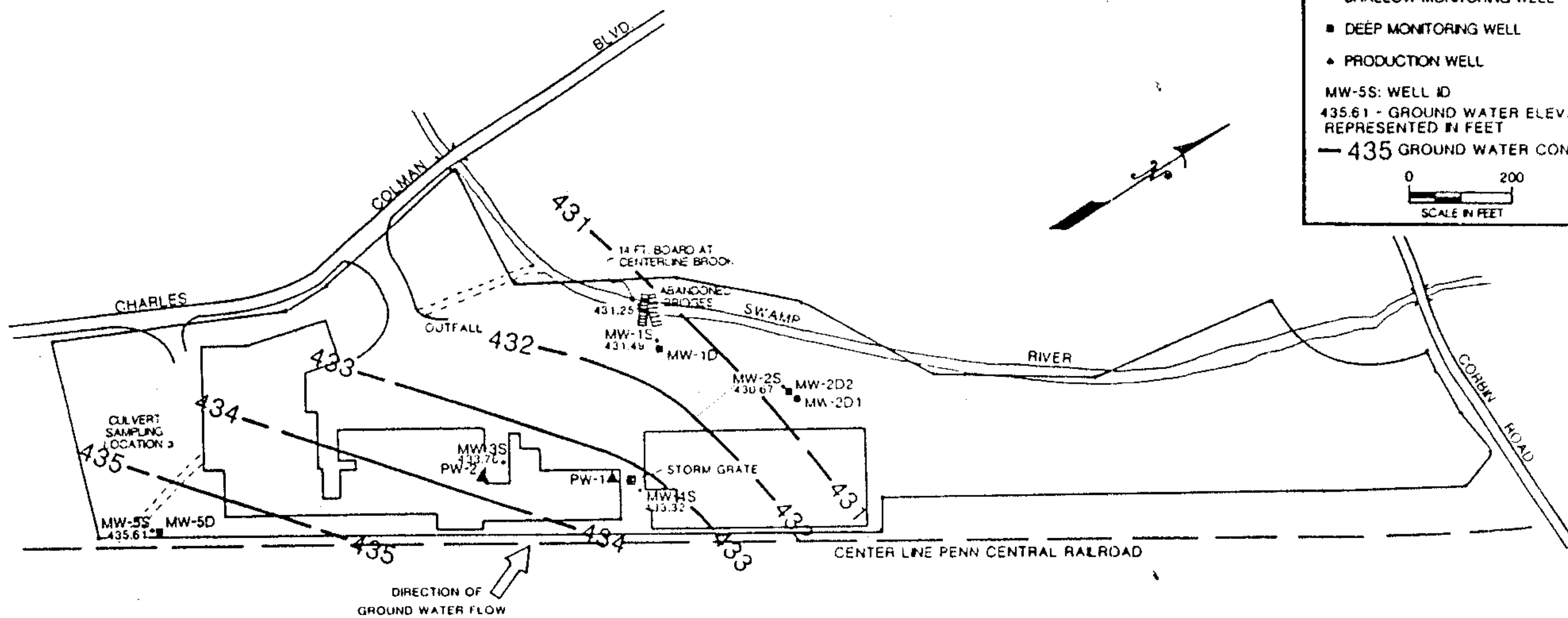
- • SHALLOW MONITORING WELL
- ■ DEEP MONITORING WELL
- ▲ PRODUCTION WELL

MW-5S: WELL ID

435.61 - GROUND WATER ELEVATION REPRESENTED IN FEET

— 435 GROUND WATER CONTOUR

0 200
SCALE IN FEET



SOURCE: PAWLING CORPORATION

GROUNDWATER TECHNOLOGY, INC.

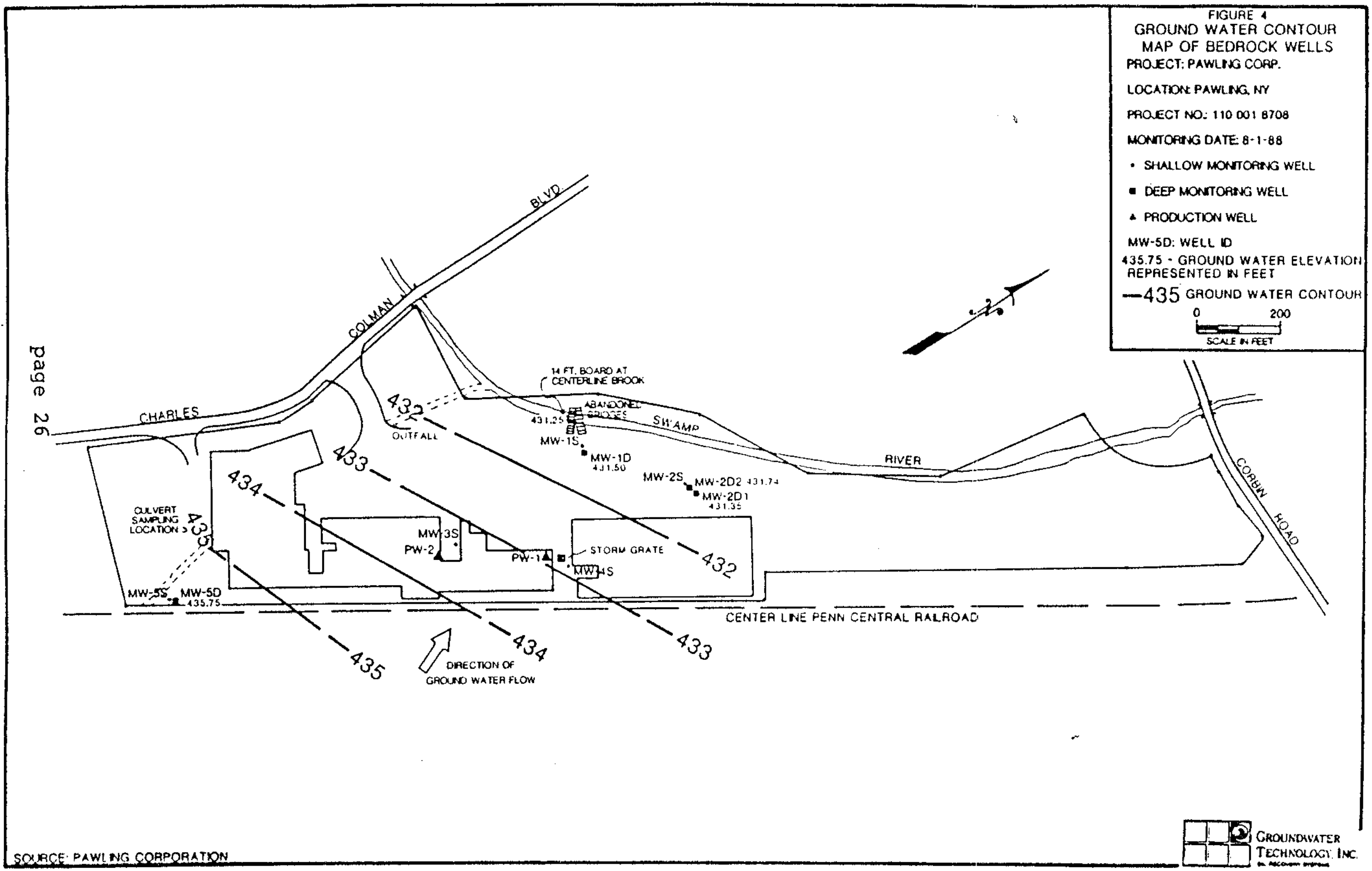


FIGURE 4
GROUND WATER CONTOUR
MAP OF BEDROCK WELLS
PROJECT: PAWLING CORP.
LOCATION: PAWLING, NY
PROJECT NO.: 110 001 8708
MONITORING DATE: 8-1-88
• SHALLOW MONITORING WELL
■ DEEP MONITORING WELL
▲ PRODUCTION WELL
MW-5D: WELL ID
435.75 - GROUND WATER ELEVATION REPRESENTED IN FEET
—435 GROUND WATER CONTOUR
0
200
SCALE IN FEET
BLVD
COLMAN
CHARLES
14 FT. BOARD AT CENTERLINE BROOK
ABANDONED BRIDGES
431.25
SWAMP
RIVER
CORBIN ROAD
OUTFALL
MW-1S
MW-1D
431.50
MW-2S
MW-2D2 431.74
MW-2D1
431.35
CULVERT SAMPLING LOCATION 5
MW-3S
PW-2
PW-1
STORM GRATE
MW-4S
MW-5S
MW-5D
435.75
432
433
434
435
CENTER LINE PENN CENTRAL RAILROAD
DIRECTION OF GROUND WATER FLOW
SOURCE: PAWLING CORPORATION
GROUNDWATER TECHNOLOGY, INC.

carbon. A submersible pump was used to evacuate the water from the bedrock monitor wells and a bailer was used for the evacuation of the overburden wells.

The wells were sampled from least to most contaminated based upon contamination levels observed during drilling. The sampling order for the deep wells was MW-5D, MW-1D, MW-2D2, MW-2D1. The sampling sequence for the overburden wells was MW-5, MW-3, MW-1, MW-4. MW-2 was not sampled due to the inability to remove the drilling mud; however, sampling results were recorded on the field GC.

Samples were collected using decontaminated teflon bailers and clean rope. Decontamination procedures are described in Section 2.2.7. Water samples were poured directly from the bailer into properly prepared laboratory jars, and placed on ice until delivery to the laboratory. Proper chain of custody procedures were employed throughout the sampling.

The two production wells at the Pawling facility were sampled from a sampling port located in the piping on June 30, 1988. These wells were constantly in use during the day, and it was assumed that at least three to five well volumes had been removed prior to sample collection.

Analyses for all samples included Purgeable Organics by EPA Method 624, Base Neutral Extractable Organics by EPA Method 625, and Priority Pollutant Metals. Two samples were collected for metals analysis from the monitor wells: one unfiltered and one filtered. Hydrochloric acid and Nitric acid were used as preservatives in the 624 analysis and the metals analysis, respectively. Camo Laboratories in Poughkeepsie, New York performed all analyses.

The laboratory results indicated that all compounds in the Base Neutral 625 analysis were below detection limits. The ground water sampling results of the volatile organics and metals are summarized in Tables 4 and 5. Appendix H contains full laboratory results.

Six volatile organic compounds were detected in the ground water samples: 1,1 Dichloroethylene (1,1 DCE), Trans 1,2 Dichloroethylene (Trans 1,2 DCE), 1,1,1 Trichloroethane (1,1,1 TCA), Trichloroethene (TCE), Tetrachloroethene (PCE), and Toluene.

Toluene was the volatile compound present at the highest concentration, 3,000 ppb in MW-2D1 and 22,140 ppb in MW-2S (Table 4). Toluene was not detected at any other well location. Trans 1,2 DEC (DCE), ~~1,1,1 TCA~~, TCE, and PCE were detected at various concentrations in many of the wells, ranging from 2 ppb to 3,517 ppb (Table 4) The production wells contained only these four compounds. Trans 1,2 DCE generally exhibited the highest concentrations of the four compounds. Trans, 1,2 DCE is a breakdown product of TCE and PCE. MW-2D contained the highest level of Trans 1,2 DCE 880 ppb. Only one well, MW-1S, contained 1,1 DCE at 8 ppb. The upgradient overburden well, MW-5S, contained 14 ppb PCE.

The MW-2 location, particularly the overburden well, contained the highest concentrations of total volatiles on the site. PW-2 contains the next highest concentrations. The high pumping rate of this well may be drawing the contamination from the MW-2 area.

The DEC Ground Water Quality Standards and Guidance Values for the detected volatile organics are shown in Table 4. The regulations require that no individual standard or guidance value be exceeded, and that the total of the listed volatiles not exceed 100 ppb. According to these regulations, the water quality in MW-1D is within DEC drinking water limits.

The metals which were detected above the laboratory detection limits were Arsenic, Copper, Lead, and Zinc. The concentrations of Arsenic, Copper, and Zinc are below the DEC ground water quality standards. The concentrations stated in the regulations are listed in Table 5. The only sample results which exceed the DEC standards are the Lead contents in MW-1D, MW-5S, and PW-1. The concentration in MW-5S (0.11ppm), the upgradient well, is approximately the same concentration as in PW-1 (0.13 ppm). The Lead concentrations may vary due to natural background variations in the Lead mineral content in the overburden materials and bedrock.

TABLE 4

VOLATILE ORGANICS IN GROUND WATER
(in ppb)

	1,1 DCE	Trans 1,2 DCE	1,1,1 TCA	TCE	PCE	Toluene	Total Volatiles
MW-1S	8	8	--	--	--	--	16
MW-1D	--	6	--	6	--	--	12
MW-2S*	NA	14	3,517	94	--	22,140	25,765
MW-2D1	--	880	--	90	--	3,000	3,970
MW-2D2	--	100	3	44	29	--	176
MW-3S	--	4	5	2	16	--	27
MW-4S	--	--	--	--	14	--	14
MW-5S	--	--	--	--	14	--	14
MW-5D	--	--	--	--	--	--	--
PW-1	--	5	5	2	2	--	14
PW-2	--	52	12	10	31	--	105
DEC Ground Water Quality Standards and Guidance Values	0.07	50	50	10	0.7	50	100

* Analysis from field GC.

TABLE 5

PRIORITY POLLUTANT METALS IN GROUND WATER
(in ppm)

	Arsenic	Copper	Lead	Zinc
MW-1S	0.006	0.01	0.006	0.01
MW-1D	--	0.01	0.035	0.02
MW-2D1	--	0.01	--	0.05
MW-2D2	--	0.01	--	--
MW-3S	0.008	0.01	0.012	0.01
MW-4S	0.007	0.02	--	0.02
MW-5S	0.007	0.07	0.11	0.24
MW-5D	--	0.01	--	0.02
PW-1	--	0.02	0.13	0.01
PW-2	--	0.02	0.008	0.10
DEC Ground Water Quality Standards	0.025	1.00	0.025	5.0

NOTES: -- = non-detectable
NA = not analyzed

2.2.6 Surface Water Gauging and Sampling

The interaction of the surface water and ground water at this site was evaluated through surface water gauging and sampling. A staff gauge was placed on the abandoned railroad bridge at the edge of Swamp River to measure the stream water level (Figure 2). The elevation of the top of the gauge was surveyed by Mr. Devine. The stream water level was recorded at the same time that the ground water levels were gauged on June 28 and August 1, 1988. The elevations of the stream were 430.65 and 431.25 feet, respectively. These elevations compare very closely to the overburden and bedrock ground water elevations, suggesting that the Swamp River is an effluent stream receiving ground water discharge from the overburden and bedrock aquifers.

Surface water and sediment samples were collected on June 29, 1988 at four locations: two on upgradient stream channels and two downgradient on the Swamp River. Figure 2 shows the sampling locations. The sampling sequence was SS-1, SS-2, SS-3, and SS-4.

A double ended sampler was utilized to collect a sample from the water column just above the stream bed. After the samples were collected, they were poured directly into properly cleaned laboratory jars. The sediment samples were collected at the same locations as the water samples using a properly decontaminated steel shovel. Samples were placed on ice until delivery to the laboratory. Analyses included

Purgeable Volatile Organics by EPA Method 624, Base Neutrals Extractable Organics by EPA Method 625, and Priority Pollutant Metals.

The lab results indicate that all the volatile organic and base neutral compounds are at concentrations at or below detectable limits in both the water and sediment samples. The following table summarizes the levels of metals found in the water and sediments from the stream. Full laboratory results are contained in Appendix H.

TABLE 6

PRIORITY POLLUTANT METALS IN SURFACE WATER
(in ppm)

	Arsenic	Copper	Lead	Mercury	Zinc
SS-1	0.005	0.01	0.010	--	0.01
SS-2	--	0.02	0.013	0.0002	0.01
SS-3	--	0.02	0.033	--	0.01
SS-4	--	0.02	--	--	--

TABLE 7

PRIORITY POLLUTANT METALS IN STREAM SEDIMENT
(in ppm)

	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
SS-S1	6.0	5.0	25.0	40.0	--	13.0	1.0	106
SS-S2	7.9	7.0	18.0	30.0	--	17.0	1.0	103
SS-S3	10.7	7.0	27.0	30.0	--	18.0	2.0	124
SS-S4	6.0	9.0	27.0	30.0	0.2	22.0	2.0	87

NOTE: -- = non-detectable levels

The surface water sample results show no significant increase in metals concentration from the upstream sampling locations (SS-1 and SS-2) to the downstream location (SS-4). Lead levels increase from SS-1 and SS-2 to SS-3. At SS-3, Lead concentrations exceed DEC Water Quality Standards; however, the concentration becomes non-detectable further downstream (SS-4).

The stream sediment sample results compare fairly closely to the soil sample results; however, no Cadmium was detected in the stream sediment and low levels of Silver were detected. There appears to be no significant increase in concentrations from the upstream locations to the downstream sampling point.

2.2.7 Decontamination Procedures

A portable steam generator was used to clean all drilling equipment, such as augers, core barrels and split-spoon samplers, between monitor well locations. The split-spoon sampler was cleaned between samples with a soap and water wash, and a tap water and final distilled water rinse. Decontamination waters were containerized in polyethylene holding ponds and treated with activated carbon.

The teflon bailers and double-ended sampler were cleaned with Liquinox and water and rinsed with distilled water. The bailers used to collect samples for the 624 and 625 analyses were rinsed with acetone and hexane. The bailers used to collect samples for the metals analyses were rinsed with hydrochloric acid. The bailers and sampler were allowed to thoroughly air dry before use. The interface probe was cleaned between gaugings in a similar manner as for the 624/625 analyses.

2.2.8 Field QA/QC Program

A trip blank was prepared and analyzed as part of the ground water and surface water sampling. Two vials were filled with deionized water at the laboratory. Transportation to the site and return to the lab was completed in an identical manner. The trip blank was analyzed for Purgeable Volatile Organics via EPA 624.

An equipment or field blank was collected the day of water sampling to ensure that the sampler was effectively cleaned. Deionized water was poured through a decontaminated teflon bailer and collected in sample bottles and returned to the lab for analysis.

The analysis completed on the field and trip blank indicate non-detectable levels of cross contamination.

2.2.9 Health and Safety

The Health and Safety Plan for this site is enclosed in Appendix I. All OHSA health and safety standards applicable to hazardous site investigations were undertaken at this site to ensure worker safety. A portable Photoionization Detector

(PID) was used to monitor ambient air for the presence of volatile organic compounds in the work area. No levels greater than 1 ppm were recorded in the ambient air in the work area at any time during this investigation. Level D protection was utilized throughout the field investigation.

3.0 CONCLUSIONS

The conclusions presented relate to the achievement of the original objectives of this investigation. The following conclusions are based on the work performed during this investigation and may alter with additional data.

Objective 1

Delineate the concentration and extent of metal and solvent contamination in the ground water.

Conclusions:

- The highest concentrations of dissolved organic solvents were detected in ground water sampled from the overburden aquifer at MW-2S. Trans 1,2 DCE, 1,1,1 TCA, and TCE were identified at concentrations ranging from 14 to 3,517 ppb. Toluene was also detected at a concentration of 22,140 ppb. 3,000

- A production well (PW-2) exhibited the second highest level of dissolved organic solvents in the ground water. Trans 1,2 DCE, 1,1,1 TCA, TCE and PCE were identified at concentrations ranging from 10 to 52 ppb.

- All other ground water samples contained less than 100 ppb of dissolved organic solvents.

- Lead concentrations exceeded DEC Ground Water Quality Standards in three wells - MW-1D, MW-5S, and PW-1. Detected concentrations were 0.035 ppm, 0.11 ppm, and 0.13 ppm. The upgradient well, MW-5S, contained concentrations greater than or approximately equal to the levels recorded in other wells on-site; therefore, the levels of Lead in the ground water at Pawling Corporation do not appear to be the result of contamination produced by site industrial activities. No other Priority Pollutant Metal was detected in the ground water sampled.

- The data collected above indicates that the Pawling Corporation has not contributed to levels of Priority Pollutant Metals in ground water that are in excess of DEC standards.

<u>Objective 2</u>

Determine if upgradient sources are contributing to the contamination.

<u>Conclusions:</u>

- The upgradient wells MW-5S and MW-5D are upgradient of only part of the Pawling Corporation site. Additional information is necessary in order to determine if upgradient sources are contributing to the contamination.

- MW-5S exhibited concentrations of Lead and PCE exceeding DEC Ground Water Quality Standards and Guidance Values. These levels may indicate a low level upgradient source contributing to the contamination.

Objective 3

Evaluate the pathways of migration of contaminant movement.

Conclusions:

- Based upon the observed volatile organic concentrations, most contaminated ground water is in the overburden aquifer at MW-2. The soils from the ground suface to a depth of five feet below grade exhibited less than 1.2 ppb volatile organics; therefore, the contamination has either been transported to this location via overburden ground water flow from an upgradient source, or the source was placed on the land surface at or near this location prior to filling when the area was lower in elevation.
- The contamination observed in the bedrock at MW-2D1 is probably due to migration from the overburden soil and/or ground water through the highly fractured upper bedrock surface.
- The contamination in MW-2D2 is probably also due to migration through bedrock fractures. Downward migration was probably enhanced by the greater density of the chlorinated solvents.
- Delineation of contaminant migration routes to the production wells needs to be further investigated.
- The Swamp River does not appear to play a role in contaminant migration within the area sampled during this investigation.
- Off-site migration routes are not fully known.

Objective 4

Provide information required for design of a site remediation system.

Conclusions:

- Geologic data concerning lithology, stratigraphy, permeability, and ground water gradients have been obtained.

- A better delineation of on-site and off-site contaminant migration is required before a complete remediation system can be designed.

4.0 COMPREHENSIVE REMEDIAL INVESTIGATION

4.1 Introduction

The results of the Preliminary Remedial Investigation indicate the need for further delineation of potential upgradient sources. Groundwater Technology, Inc. proposes that an additional upgradient monitor well couplet be drilled east of the Pawling facility. The exact location will be approved by the DEC prior to drilling. An extensive Comprehensive Remedial Investigation and Feasibility Study will be submitted if the ground water sampling results indicate that the solvent contamination originates on the Pawling property.

The work scope detailed in Section 4.2 consists of installation of an overburden and bedrock monitor well and ground water gauging and sampling. Information concerning decontamination, health and safety, project staff, and project schedule are also provided.

4.2 Technical Work Scope

4.2.1 Overburden Monitor Well Installation

An overburden monitor well will be installed east (upgradient) of the Pawling site in order to determine the ground water quality in the upper aquifer. An air rotary drill rig using a roller bit and temporary casing will be utilized for the well installation. This method will allow one drill rig to be employed for both the overburden and bedrock drilling.

The overburden monitor well will be constructed of two-inch fiberglass reinforced epoxy (FRP) well screen and casing with flush threaded joints. FRP construction ensures that low levels of organic compounds will not desorb out or adsorb onto the well screen and material. This assures the collection of representative samples of the ground water in the formation surrounding the well. Use of FRP well material has been EPA-approved.

The well screen will extend from five feet above the water table to the top of bedrock, site conditions permitting. A bentonite seal, two-feet in thickness, will be emplaced at the top of the sand pack. A cement-bentonite grout, tremied in place, will be used above the bentonite seal. A lockable, protective metal casing will be installed at the top of the well. Figure 5 shows the construction of a typical overburden monitor well.

4.2.2 Bedrock Well Installation

The purpose of the bedrock well will be to denote water quality in the bedrock upgradient of the site. It will also determine whether vertical migration of contaminants exists between the overburden and bedrock aquifers. One bedrock well will be drilled east of the site in close proximity to the overburden monitor well.

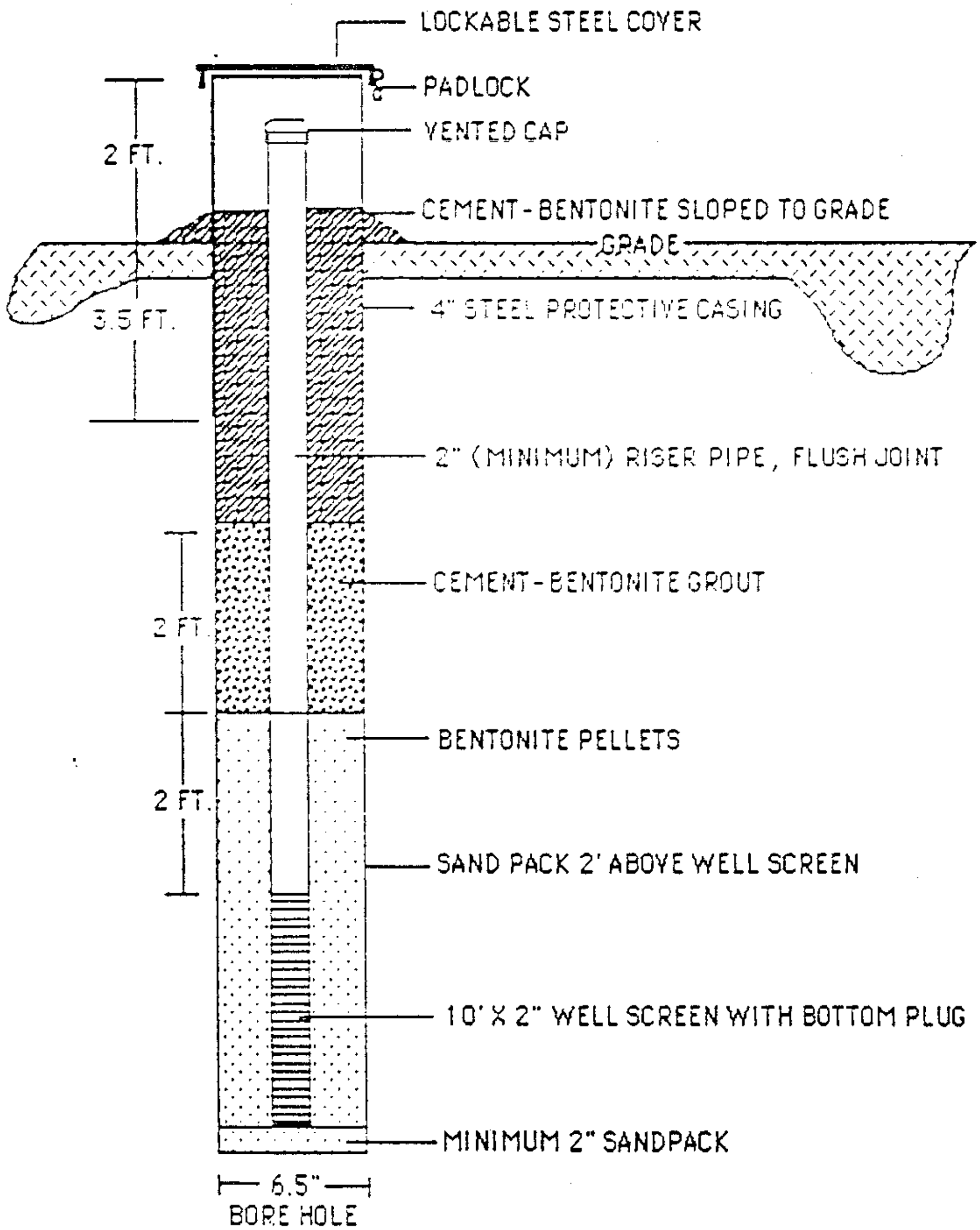
An air rotary drill rig will be utilized to install the bedrock well. A six-inch steel casing will be tremie grouted in place from the top of the bedrock to the ground surface. Drilling will proceed inside of this casing to a depth of approximately 150 feet below grade. The well will be completed as open hole.

Figure 6 shows the typical construction to be employed. The project hydrogeologist will supervise all monitor well installations. All well construction specifications will be included on the drilling log.

FIGURE 5

TYPICAL OVERBURDEN MONITOR WELL

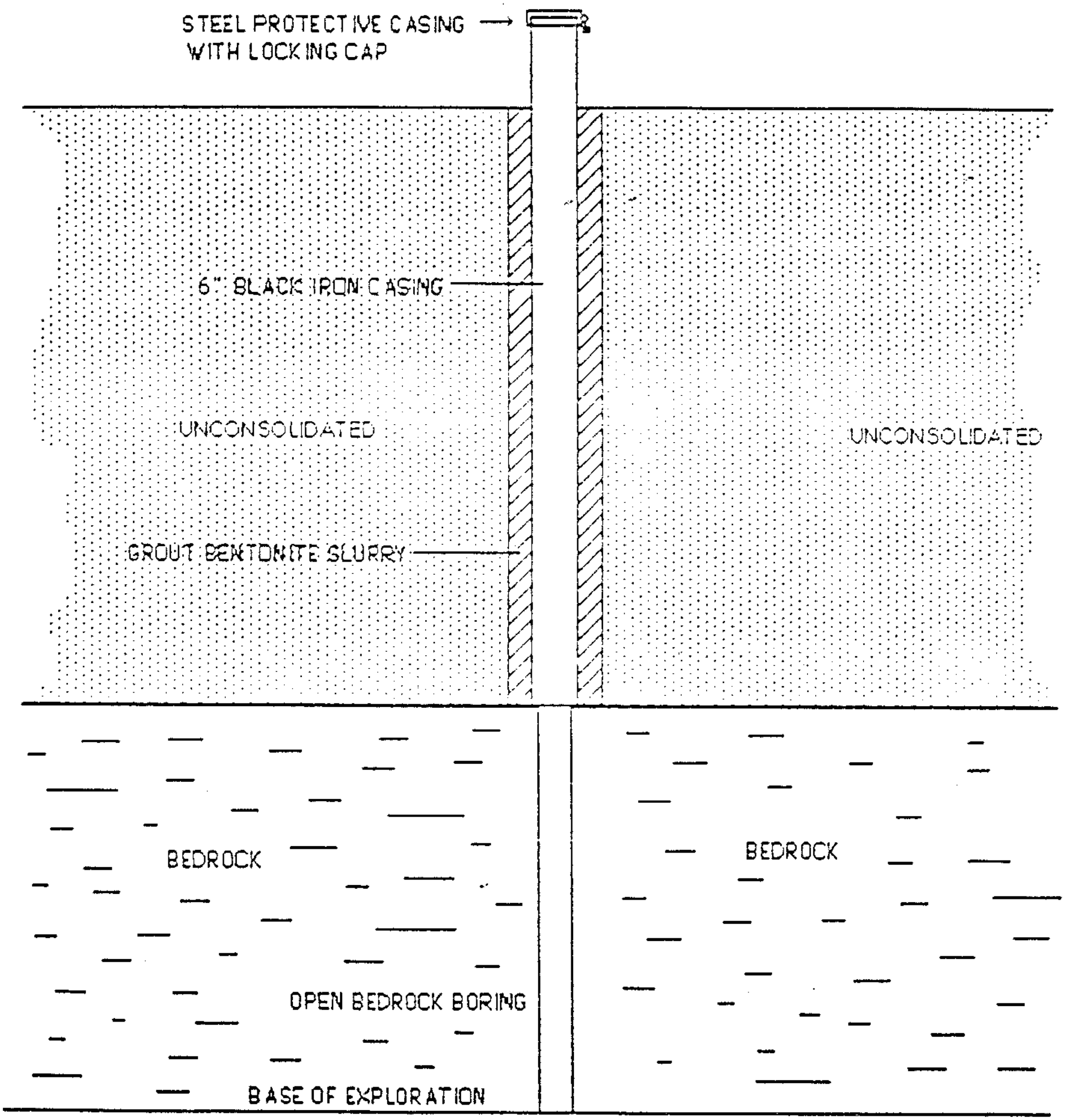
(NOT TO SCALE)



GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

FIGURE 6

TYPICAL BEDROCK MONITOR WELL
(NOT TO SCALE)



GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

4.2.3 Well Development/Elevation and Location Survey

The well development will be performed immediately after well installation. Water levels will be measured before and after development in order to estimate permeability from recovery time.

The overburden well will be developed by repeated surging and bailing with a surface sampler. The bedrock well will be developed by air jetting. These methods will remove any fine sediments from the formation immediately adjacent to the well screen and annulus of the rock hole. Water samples will therefore be free of sediments and other associated drilling materials.

Purged waters will be collected and treated through activated carbon. Wells will be left undisturbed for at least one week after development to allow time for the wells to equilibrate with the surrounding aquifer.

Following the installation of the monitor wells, top-of-casing elevations will be surveyed to a common benchmark by a licensed land surveyor. Locations of monitor wells will also be denoted during this survey.

4.2.4 Ground Water Gauging and Sampling

Following the completion of the monitor well installation program, Groundwater Technology, Inc. will gauge each monitor well using an ORS interface probe. From this data, the ground water gradient will be determined. This information will be compared to previous gauging events in order to verify ground water movement at the site.

The two newly installed upgradient wells will be sampled subsequent to gauging. Prior to sample collection, three to five well casing volumes of water will be evacuated from each well. A bailer will be used for the evacuation of the overburden well and a submersible pump will be used in the bedrock well. Evacuated water will be collected and treated in a similar manner as the development waters.

Samples will be collected using a decontaminated teflon bailer and rope. Water samples will be poured directly from the bailer into properly prepared laboratory jars, and placed on ice until delivery to the laboratory. Proper chain of custody procedures will be employed throughout the sampling. The sample will be analyzed for Purgeable Organics by EPA Method 624.

4.2.5 Decontamination Procedures

A portable steam generator will be used to clean all drilling equipment, drill rods, bit and casing between monitor wells. Decontamination waters will be containerized and treated through activated carbon prior to disposal.

The teflon bailer will be cleaned with Liquinox and water and rinsed with distilled water, acetone and hexane. The bailer will be allowed to thoroughly air dry before use. The interface probe will be cleaned in a similar manner between gaugings.

If protective clothing is deemed necessary for worker safety, the discarded clothing will be stored in DOT approved drums for later disposal.

4.2.6 Field QA/QC Program

A trip blank will be prepared and analyzed as part of the ground water sampling. Volatile organic bottles will be filled with deionized water at the laboratory. Transportation to the site and return to the lab will be in an identical manner as the other sample containers. The trip blank will be subjected to the same analysis as the ground water.

4.2.7 Health and Safety

Groundwater Technology, Inc. has prepared a health and safety plan for the Pawling site which is enclosed in Appendix I. All OHSA health and safety standards applicable to hazardous waste site investigations will be undertaken at this site to ensure worker safety. A portable Photoionization Detector (PID) will be used to monitor ambient air for the presence of volatile organic compounds in the work area. The PID levels associated with the different levels of personal protective gear are specified in the site health and safety plan.

4.2.8 Summary Report

A report detailing work steps and results will be prepared upon the completion of the laboratory analyses. Conclusions will be presented evaluating the contribution of upgradient sources to the solvent contamination.

4.3 Project Organization

The project organizational chart is shown in Figure 7. Groundwater Technology Inc. personnel will perform all hydrogeological and engineering work.

4.4 Schedule

The proposed schedule of work is shown in Figure 8.

FIGURE 7
PROJECT ORGANIZATION CHART
PAWLING CORPORATION
PAWLING, NEW YORK

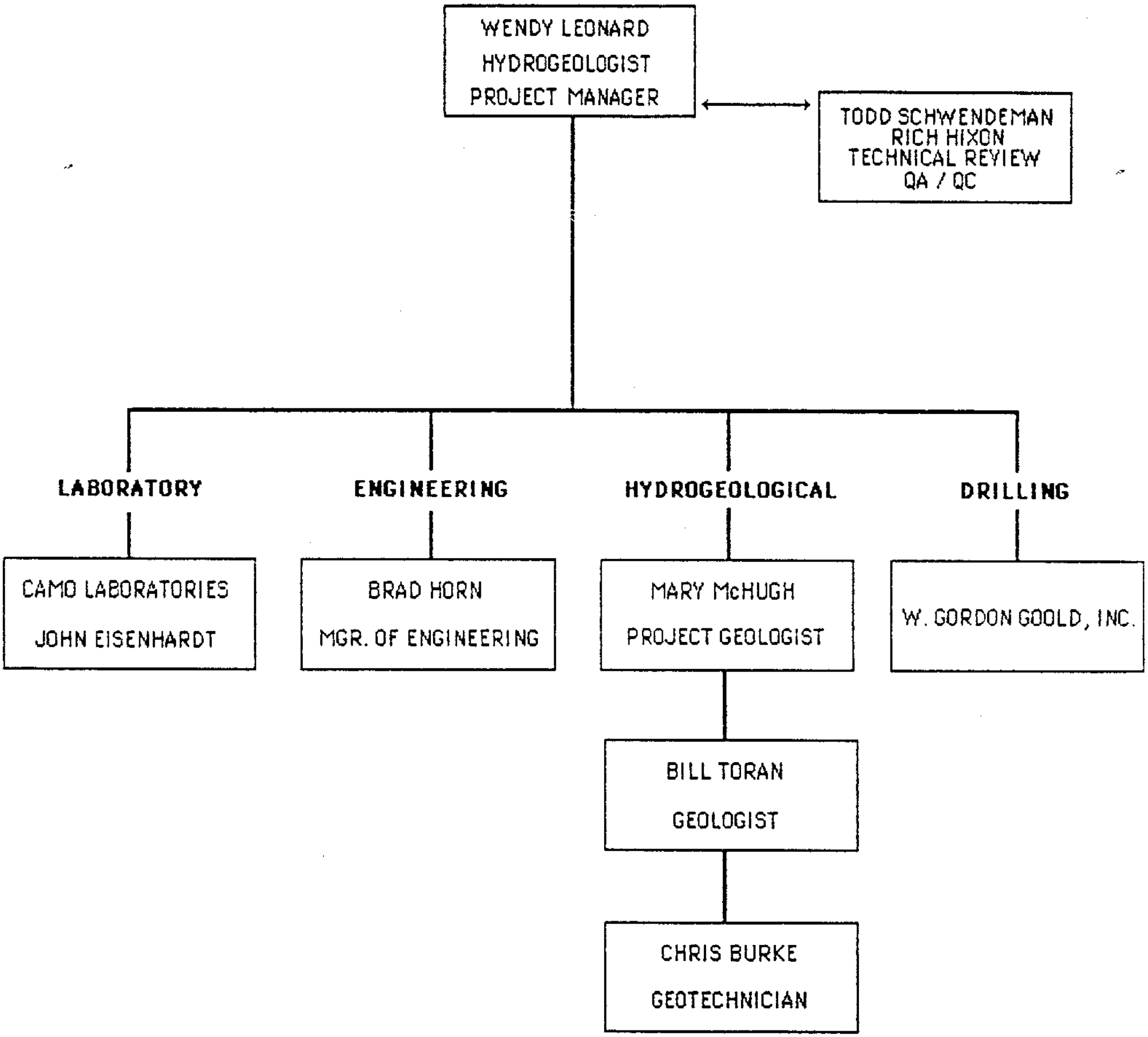
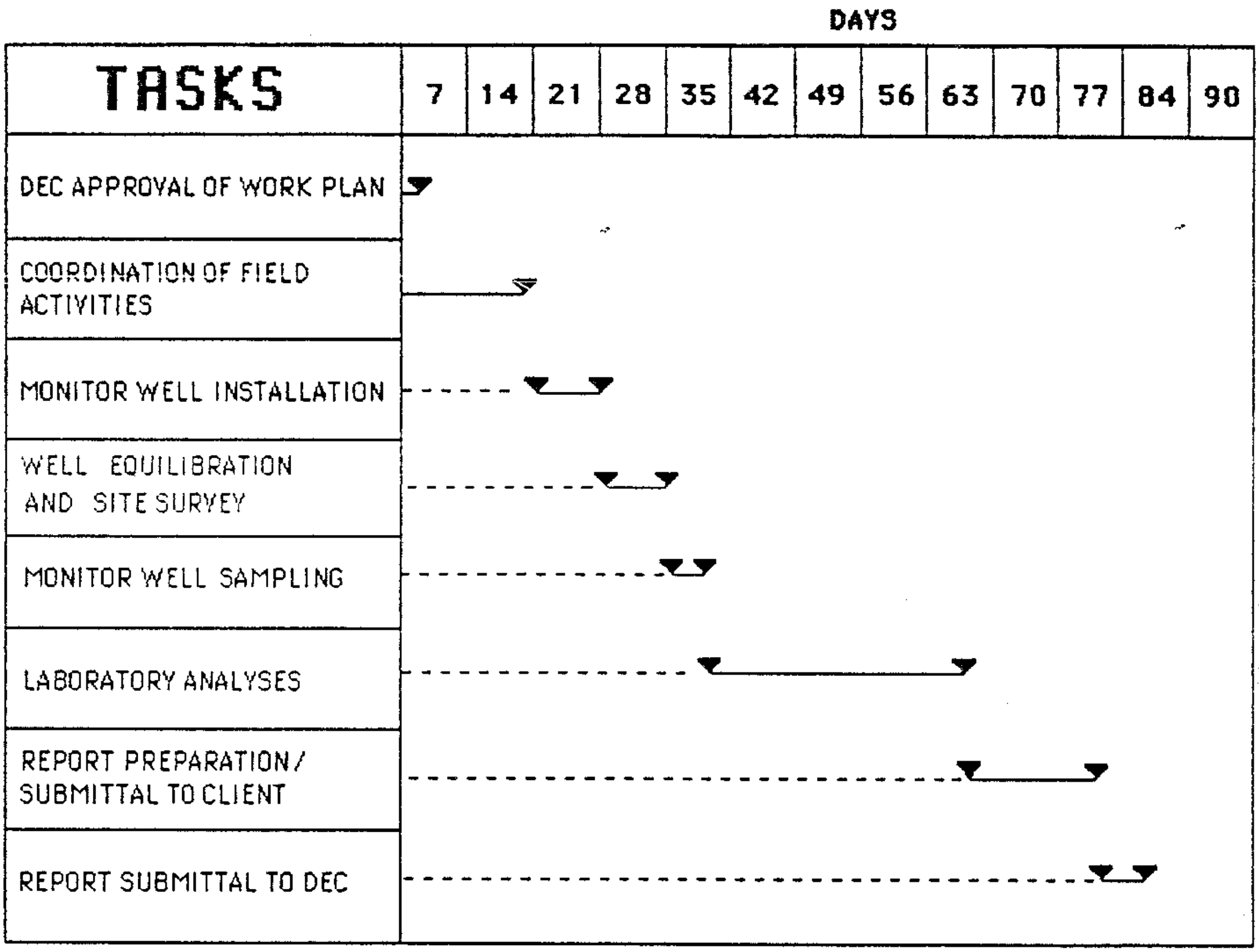


FIGURE 8

PROJECT SCHEDULE



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APPENDIX A

DRILLING LOGS

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 11-15-88 TOTAL DEPTH OF HOLE 17.0'

DIAMETER 8.5"

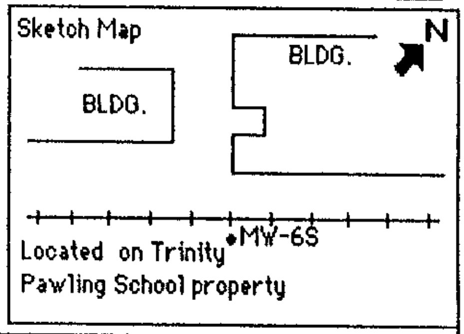
SCREEN DIA. 2" LENGTH 10.0' SLOT SIZE 0.012"

CASING DIA. 2" LENGTH 8.5' TYPE FIBERGLASS

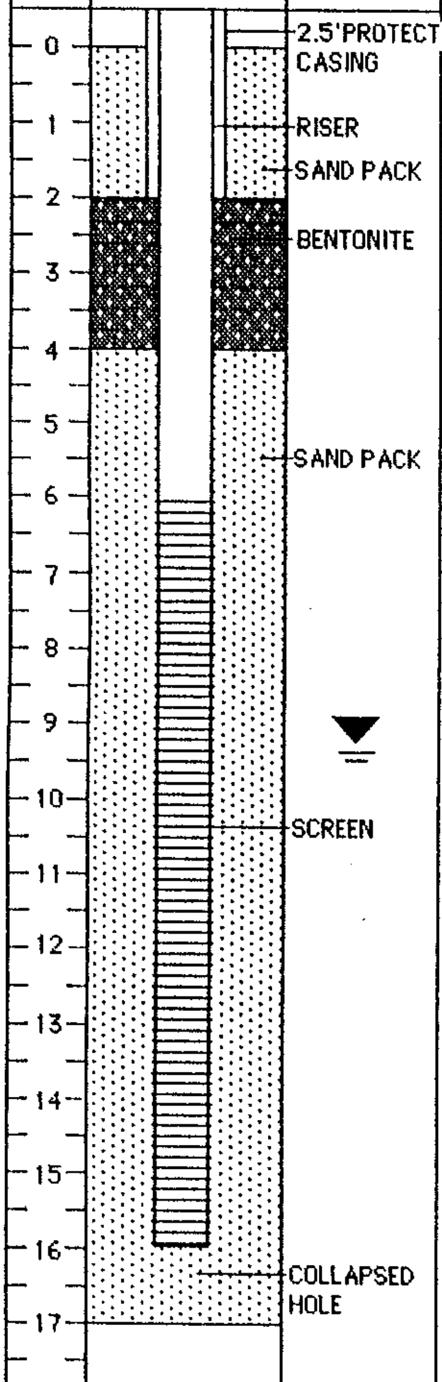
DRILLING CO. GOULD DRILLING METHOD AIR ROTARY

DRILLER GOULD JR. LOG BY M.L. McHUGH

WELL NUMBER MW-6S



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)



Description
Grass & sod at surface
0-1.5' Brown, moist, SAND.
1.5'-2.5' Brown, moist, SAND, little cobbles, little gravel.
2.5'-8' Brown, moist, SAND
8'-10' Brown, wet, SAND, some gravel/cobbles.
10'-11' Brown, wet, SAND.
11'-14' Brown, wet, SAND, some gravel/cobbles.
14'-16' Cobbles & boulders
~16' Top of bedrock
BOTTOM OF BORE 17'

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 11-16-88 TOTAL DEPTH OF HOLE 150

DIAMETER 8.5"

SCREEN DIA. 5 5/8" LENGTH 130' SLOT SIZE OPEN HOLE

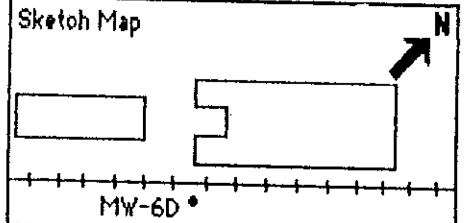
CASING DIA. 6" LENGTH 20' TYPE OPEN HOLE

DRILLING CO. GOULD DRILLING METHOD AIR ROTARY

DRILLER GOULD JR. LOG BY W. LEONARD

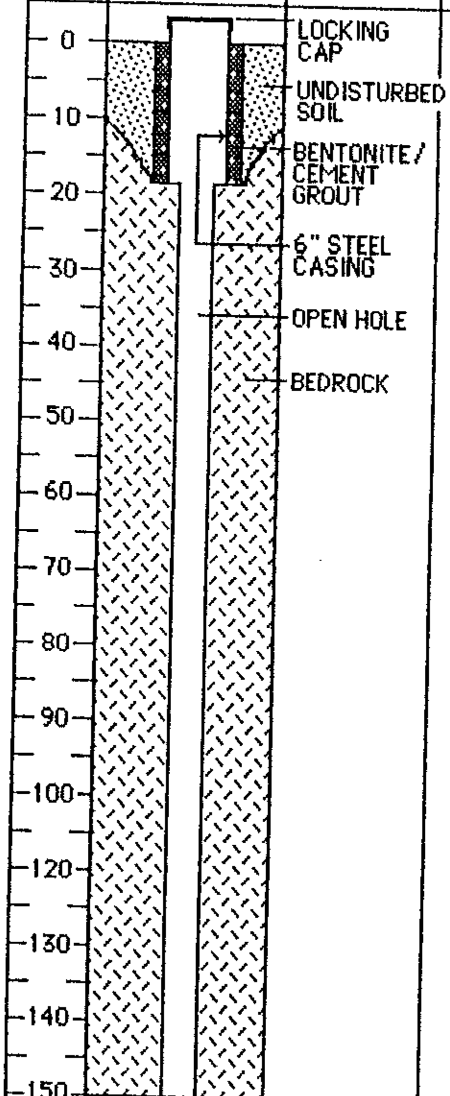
WELL NUMBER MW-6D

Sketch Map



Notes

Located on Trinity Pawling School property



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–10					Unconsolidated overburden to 11', boulders 11'-14', top of rock ~14'. 2-3 GPM top of aquifer
27					27' Water bearing zone ~5 GPM Marble cuttings.
65					65' Water bearing zone ~50-55 GPM Marble cuttings
83					83' Water bearing zone ~30 GPM
95					95' Water bearing zone ~10 GPM Marble cuttings
150					BOTTOM OF BORE
					Total Yeild ~150 GPM

APPENDIX B

GAUGING DATA

GROUNDWATER TECHNOLOGY, INC.

12 Walker Way, Albany, NY 12205

GROUND WATER GRADIENT DATA

CLIENT: Pawling 110-001-8708
LOCATION: Pawling, NY
DATE: 11/29/89

OBSERVATION WELL

NO.	TOP WELL ELEV.	DTW	DTP	PT	PT X	ADJ. DTW	ELEV. WATER
MW-1D	439.63	7.89					431.74
MW-1S	440.91	9.56					431.35
MW-2D1	437.66	6.41					431.25
MW-2D2	438.02	6.27					431.75
MW-2S	438.02	6.70					431.32
MW-3S	439.01	5.06					433.95
MW-4S	439.42	6.27					433.15
MW-5D	443.06	6.86					436.20
MW-5S	442.02	6.27					435.75
MW-6D	442.13	7.44					434.69
MW-6S	443.59	8.82					434.77
stream	427.85	3.40 *					431.25

* Water level of stream 3.40 feet above the survey mark.

APPENDIX C

Drilling Logs

PROJECT PAWLING OWNER PAWLING

WELL NUMBER B-1

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-6-88 TOTAL DEPTH OF HOLE 10.8'

DIAMETER 6.25"

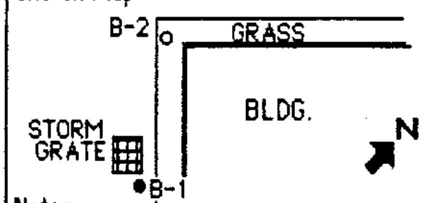
SCREEN DIA. ______ LENGTH ______ SLOT SIZE ______

CASING DIA. ______ LENGTH ______ TYPE ______

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

Sketch Map



Notes

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0				
1				
2				Light tan, fine SAND, very well sorted
3				
4				
5			S-1 25-16-14-13	White, fine SAND Brown, moist, fine SAND with 1/4" pebbles
6				
7				
8				
9		▼		
10			S-2 10-100/0.3" AUGER REFUSAL @ 10.8'	Brown, wet, medium to fine SAND with small pebbles
11				T.D. 10.8'
12				
13				
14				
15				
16				
17				

PROJECT PAWLING   OWNER PAWLING

LOCATION PAWLING, NY   PROJECT NO. 110 001 8708

DATE DRILLED 6-7-88   TOTAL DEPTH OF HOLE 4.8'

DIAMETER 6.25"

SCREEN DIA. ______ LENGTH ______ SLOT SIZE ______

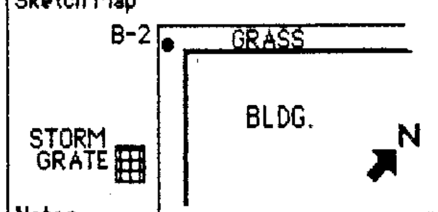
CASING DIA. ______ LENGTH ______ TYPE ______

DRILLING CO. GROUNDWATER TECHNOLOGY   DRILLING METHOD HSA

DRILLER M. MULHERN   LOG BY W. LEONARD

WELL NUMBER B-2

Sketch Map



Notes

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0				
1–2				Tan, dry, fine SAND
4–5			S-1 100/0.3"	WHITE MARBLE ROCK
5				T.D. 4.8'

PROJECT PAWLING OWNER PAWLING

WELL NUMBER MW-1S

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-6-88 TOTAL DEPTH OF HOLE 15.2'

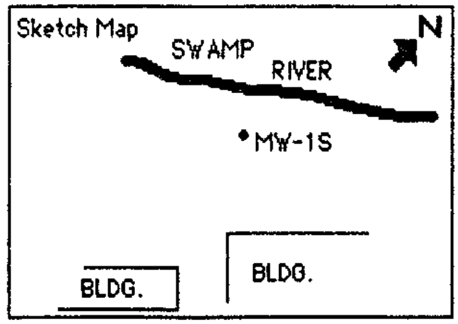
DIAMETER 6.25"

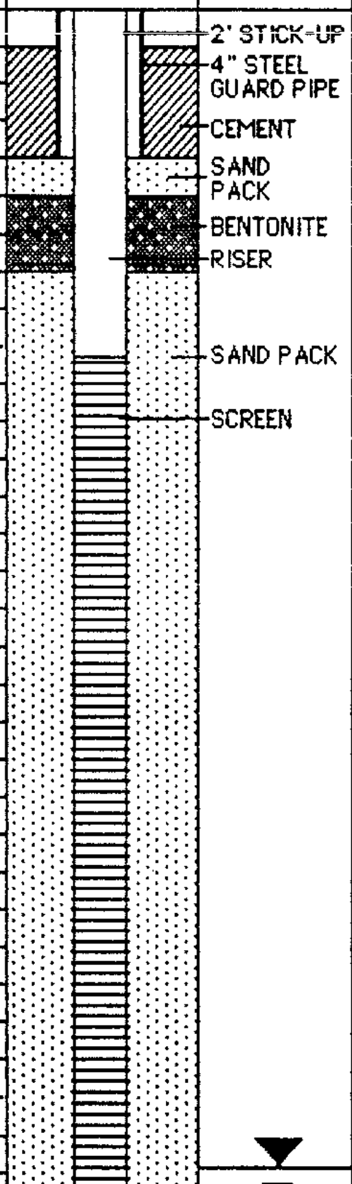
SCREEN DIA. 2" LENGTH 11' SLOT SIZE 0.012"

CASING DIA. 2" LENGTH 6' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD





DEPTH IN FEET	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	2' STICK-UP		
	4" STEEL GUARD PIPE		
1	CEMENT		Dark brown, fine SAND & rubber pieces (Fill)
2	SAND PACK		
	BENTONITE		
3	RISER		
4	SAND PACK	S-1 3-1-1-1	Brown, fine SAND with 1" stones, bottom 2" wet (Fill)
5	SCREEN		
6			
7			
8			
9			
10		S-2	Dark gray, SILT & fine SAND, some wood fragments
11			
12			
13			
14			
15		S-3 100/0.2"	Dark gray, fine SAND
			T.D. 15.2'
16			
17			

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-7-88 TOTAL DEPTH OF HOLE 10.7'

DIAMETER 6.25"

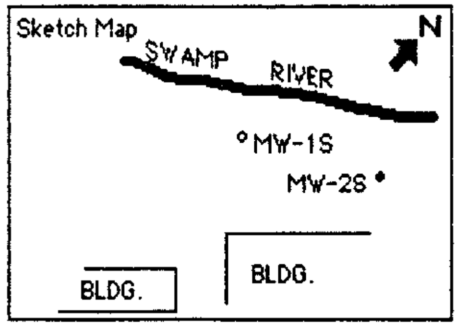
SCREEN DIA. 2" LENGTH 7.5' SLOT SIZE 0.012"

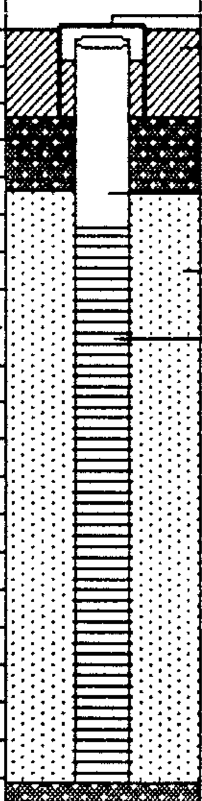
CASING DIA. 2" LENGTH 2.7' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-2S





DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX, CEMENT		Brown, fine SAND (Fill)
1–2		BENTONITE, RISER		
3–4		SAND PACK, SCREEN		
5–6			S-1 2-2-2-2	Yellow brown, fine SAND, bottom of spoon moist
7		▼ (water level)		
10			S-2 13-100/0.2"	Green & white weathered marble rock
				T.D. 10.7'

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-7,8-88 TOTAL DEPTH OF HOLE 19.0'

DIAMETER 6.25"

SCREEN DIA. 2" LENGTH 15.5' SLOT SIZE 0.012"

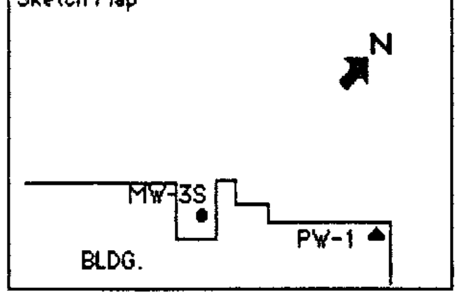
CASING DIA. 2" LENGTH 3' TYPE FIBERGLASS

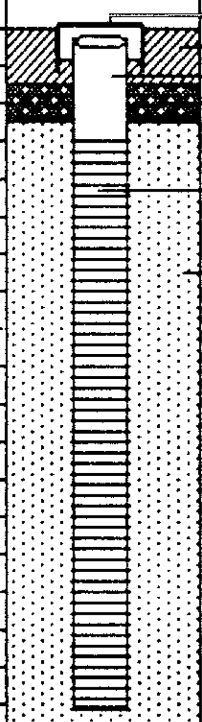
DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-3S

Sketch Map



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX CEMENT RISER BENTONITE		
4		SCREEN		Fill consisting of SAND & PEBBLES Rock fragments - GRANITE & QUARTZITE
6		SAND PACK	S-1 3-5-13-8	Moist, SAND & GRAVEL
10			S-2 10-12-14-14	Gray brown, wet, fine SAND, SAND & GRAVEL
12				Fine to very fine SAND
14			S-3 18-25-32-25	Light gray SAND & GRAVEL weathered rock- MARBLE- FE stained SAND & GRAVEL with PEBBLES of different mineralogy (till?)
18		AUGER RE-FUSAL AT 18.5'	S-4 27-100/.1"	Tan calcic SANDSTONE
20				T.D. 19.0'

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-8-88 TOTAL DEPTH OF HOLE 10.6'

DIAMETER 6.25"

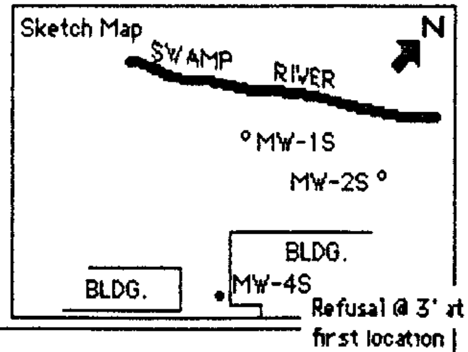
SCREEN DIA. 2" LENGTH 8' SLOT SIZE 0.012"

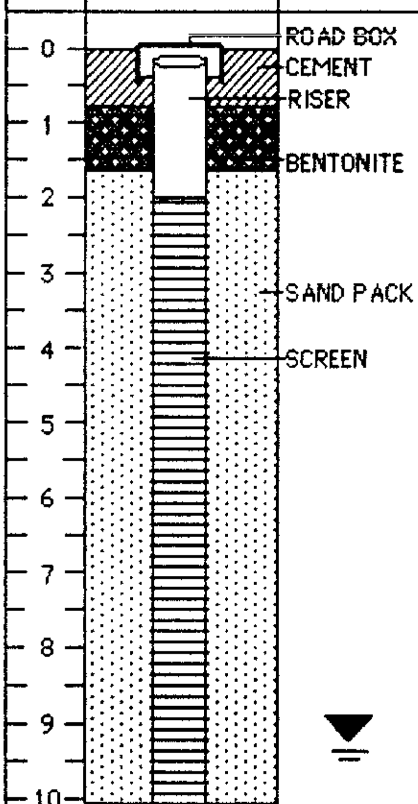
CASING DIA. 2" LENGTH 2' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-4S





DEPTH IN FEET	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0			Fill consisting of brown SAND & COBBLES
4			Brown, dry, fine SAND
5		S-1 18-29-41-40	Weathered rock - white & green very fine SAND with iron stained zones
9	▼ (water level)		
10		S-2 37-100/.1"	Wet, weathered rock
10.6			T.D. 10.6'

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-8-88 TOTAL DEPTH OF HOLE 16.8'

DIAMETER 6.25"

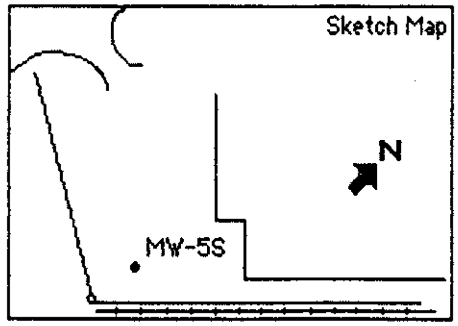
SCREEN DIA. 2" LENGTH 13.8' SLOT SIZE 0.012"

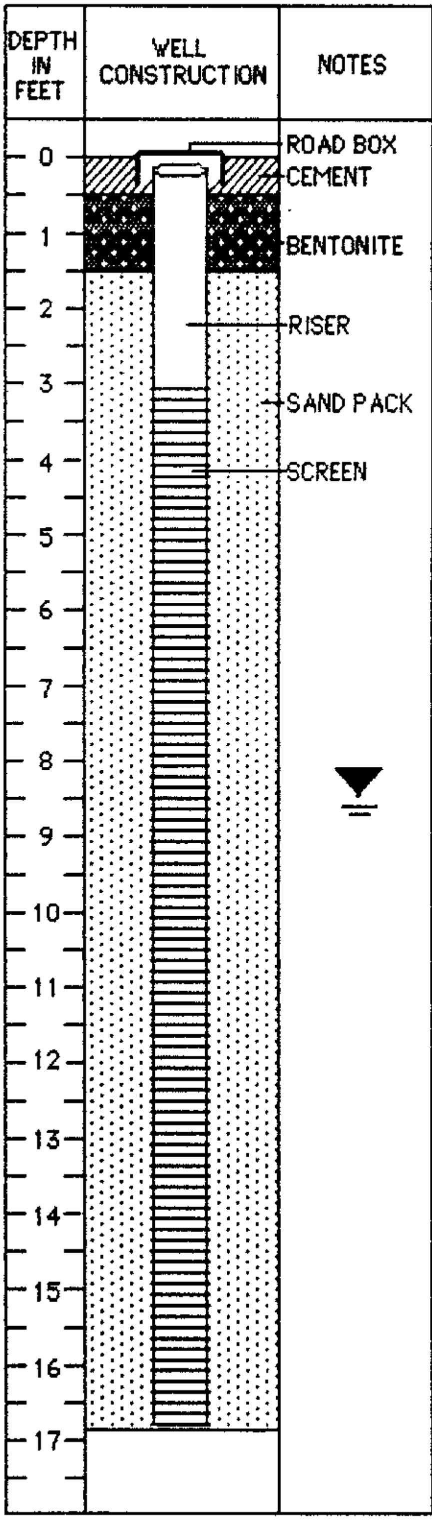
CASING DIA. 2" LENGTH 3' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-5S



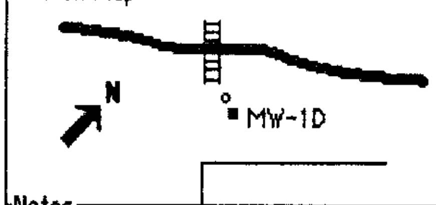


BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	Fill consisting of red-brown fine SAND with PEBBLES bottom of spoon moist
S-1 2-2-2-3	
S-2 8-8-14-18	Dark green to brown, wet, SAND & GRAVEL
S-3 5-8-24 100/.3"	SAND & GRAVEL Tan yellow calcic SANDSTONE
	T.D. 16.8'

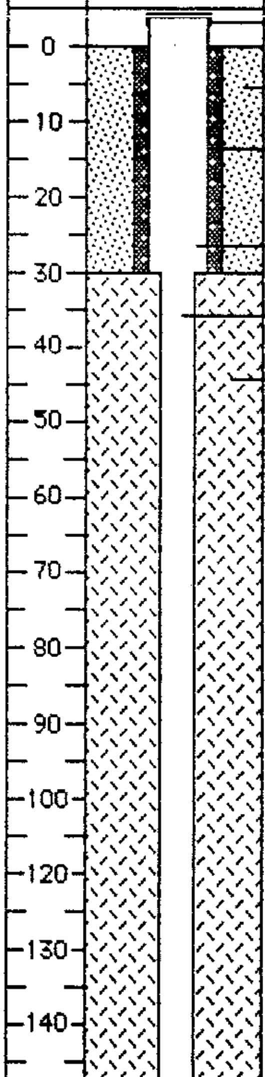
PROJECT PAWLING
OWNER PAWLING CORPORATION
LOCATION PAWLING, NY
PROJECT NO. 110 001 8708
DATE DRILLED 6-9,6-16-88
TOTAL DEPTH OF HOLE 147'
DIAMETER
SCREEN DIA. 5 5/8"   LENGTH 117'   SLOT SIZE
CASING DIA. 6"   LENGTH 30'   TYPE OPEN HOLE
DRILLING CO. GOULD   DRILLING METHOD AIR ROTORY
DRILLER ALAN GOULD   LOG BY W. LEONARD

WELL NUMBER MW-1D

Sketch Map



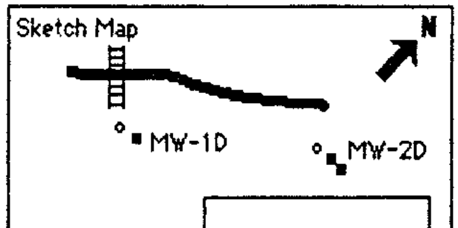
Notes
NO HNU READING IN ANY WATER SAMPLE



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–33.5		LOCKING CAP UNDISTURBED SOIL BENTONITE/ CEMENT GROUT 6" STEEL CASING OPEN HOLE BEDROCK	AUGERED TO 18.5' CORED 18.5'-33.5' C-1 C-2 C-3		C-1 19.8' Fracture- no water returing to surface 21'-22' Fracture, mikly cuttings - not competent rock - BOULDERS. RQD = 8.3% biotite hornblende gneiss C-2 24.5' Fracture - losing 50-60% of the water - silty seam 26.0' Slower drilling, RQD = 37.1%, very brecciated marble C-3 No obvious fractures, white sand cuttings, RQD = 98.1%, highly banded marble
					Marble cuttings 42' Mud seam, 1 1/2' thick 50' Seam 85' Water bearing seam, ~ 30 gpm Marble cuttings 115' Seam ~2' thick, Fe stained 130' Seam ~1' thick, Fe stained, light brown zone 145' Water bearing seam, 1.5' thick
					TD ~ 147' TOTAL YIELD ~150 GPM

PROJECT PAWLING OWNER PAWLING CORPORATION

WELL NUMBER MW- 2D



Notes

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-10-88 TOTAL DEPTH OF HOLE 31.0'

DIAMETER

SCREEN DIA. LENGTH SLOT SIZE

CASING DIA. LENGTH TYPE

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD CORING

DRILLER M. MULHERN LOG BY W. LEONARD

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 20		UNDISTURBED SOIL	AUGERED TO 21.5' CORED 21.5'-31.0' SS 100/0.4"		Green silty SAND with boulders SS 19.5'-19.9' Light brown SAND with weathered RX
		CORE	C-1		C-1 24.5' Lost all water, RQD = 0%, Boulder upper part, lower - white marble with vertical Fe stained fracture
			C-2		C-2 26.5' Fracture, no water returning to surface, RQD = 78.3%, white marble first 1.0', 45 degree angled Fe stained fracture, lower clay seam
		BEDROCK			Attempted C-3 but water holes in core barrel got plugged with mud, sheared off diamond bit HOLE ABANDONED TD 31.0'

Depth scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 130, 140, 150

PROJECT PAWLING OWNER PAWLING CORPORATION

WELL NUMBER MW-2D1

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-17-88 TOTAL DEPTH OF HOLE 42'

DIAMETER ____

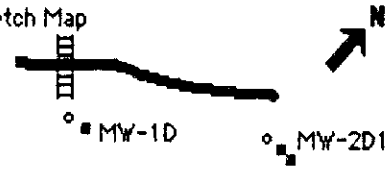
SCREEN DIA. 5 5/8" LENGTH 14' SLOT SIZE ____

CASING DIA. 6" LENGTH 28' TYPE OPEN HOLE

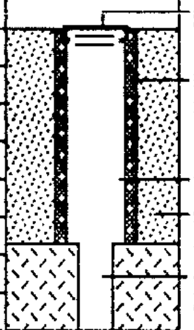
DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

DRILLER ALAN GOULD LOG BY W. LEONARD

Sketch Map



Notes



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX			
10		BENTONITE SEAL			
20		6" CASING			
		UNDISTURBED SOIL			Very broken up rock
30				5	30' fracture, small amount of water
		OPEN ROCK HOLE			35' Major water bearing zone, 50-60 GPM
40				5	42' Water bearing fracture, ~ 30 GPM
					TD 42'
50					
60					
70					
80					
90					
100					
120					
130					
140					
150					

PROJECT PAWLING OWNER PAWLING CORPORATION

WELL NUMBER MW- 2D2

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-20-88 TOTAL DEPTH OF HOLE 150'

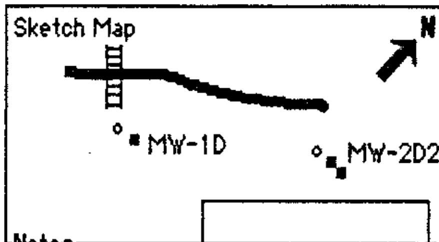
DIAMETER

SCREEN DIA. 5 5/8" LENGTH 105' SLOT SIZE

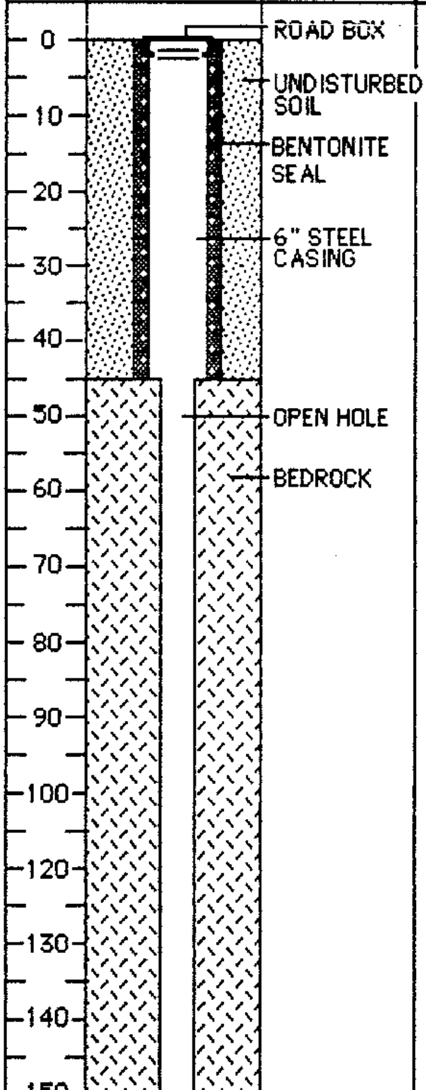
CASING DIA. 6" LENGTH 45' TYPE OPEN HOLE

DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

DRILLER GOULD JR. LOG BY W. LEONARD



Notes



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
				0	47' Small amount of water, marble, various colors
				0	63' Fracture
				0	72' Fracture with brown mud 1'-2' thick
				0	
				0	
				0	104' Increase a small amount of water
					119' Fracture with yellow mud, ~1' thick
				0	131' Fracture, Fe stained, some water
					TD 150'

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-14,6-21-88 TOTAL DEPTH OF HOLE 150'

DIAMETER

SCREEN DIA. 5 5/8" LENGTH 120' SLOT SIZE

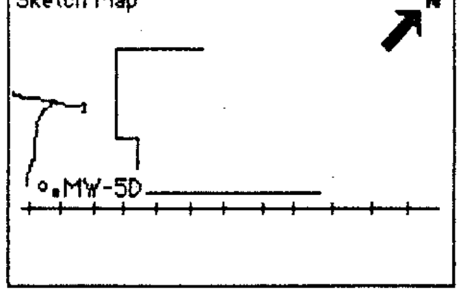
CASING DIA. 6" LENGTH 30' TYPE OPEN HOLE

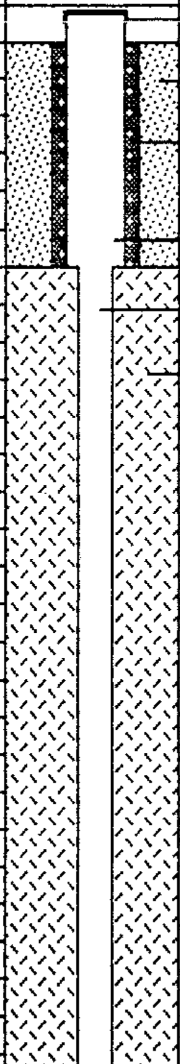
DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

DRILLER GOULD JR. LOG BY W. LEONARD

WELL NUMBER MW-5D

Sketch Map





DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		LOCKING CAP	AUGERED TO 22.8' CORED 22.8'-37.8'		C-1 Seam at 24', lost water, RQD = 80.2%, white marble
10		UNDISTURBED SOIL			
		BENTONITE SEAL			C-2 25.8' Fracture, no water returning to surface, RQD = 66.7%, white marble
20			C-1		
		6" STEEL CASING	C-2		
30			C-3		C-3 No water returning to the surface, RQD = 50.8%, gray crystalline marble
		OPEN HOLE	C-4	0	
40		BEDROCK			C-4 No water returning to the surface, RQD = 100%, gray/white crystalline marble
50				0	
60					30'-40' Very muddy water 38.5' Water bearing fracture, 40-50 GPM
70					~45' Cleaner water
80					48.5'-54' Brown muddy very cold water
90				0	~70' Muddy water, various colored marble, gray, white, yellow, light brown, pink throughout borehole
100					
120				0	Various colored marble, gray, white, yellow, light brown, pink throughout borehole
130				0	
140				0	
150					TD ~ 150'

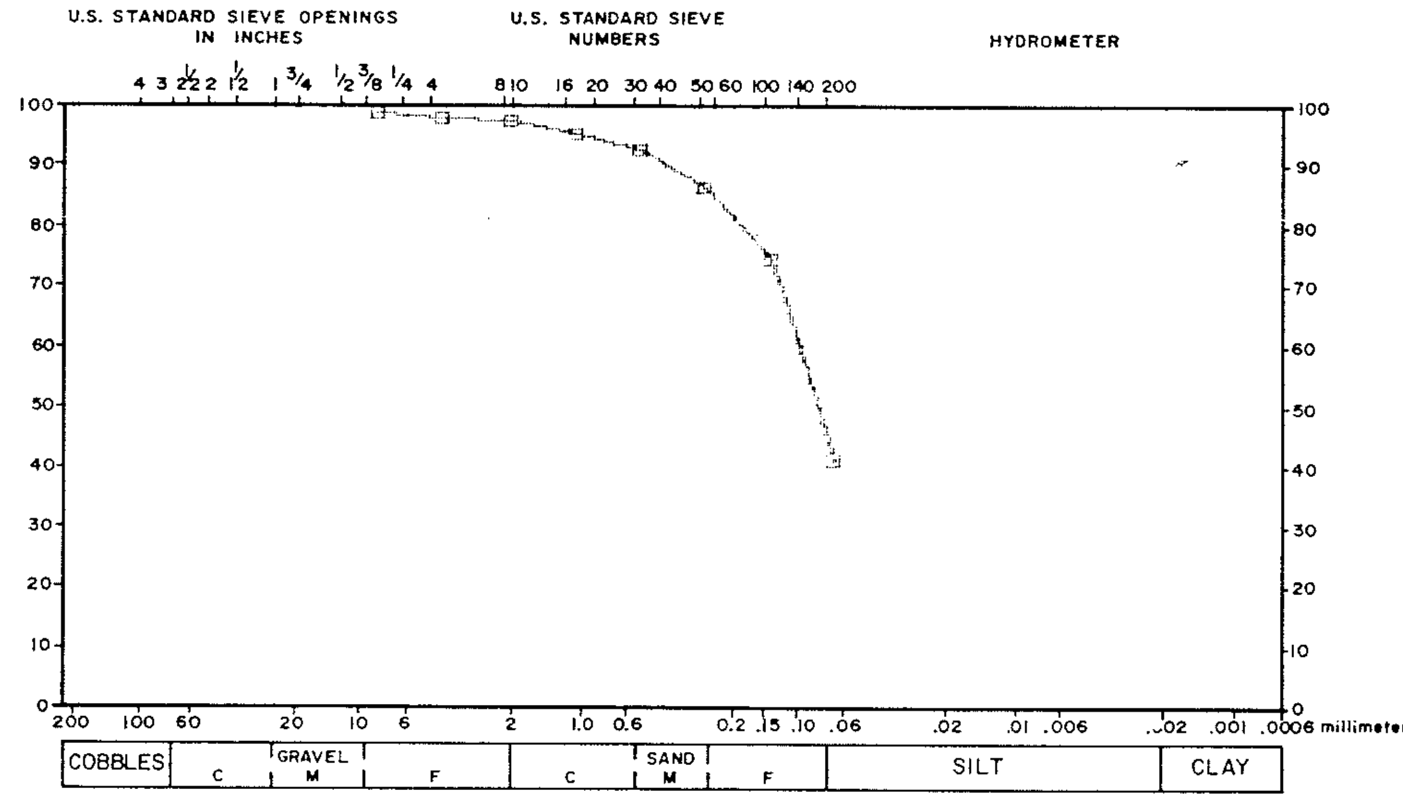
APPENDIX D

Grain-Size Distribution Curves

Dunn Geoscience Laboratory

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-41 DATE RECEIVED: 8/18/88
TEST BY: JWH DATE TESTED: 8/19/88
REVIEWED BY: WJO DATE REPORTED: 8/23/88
SAMPLE DESCR: PAWLING SITE, BORING MW-2, 11.0 - FT

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
3/8	0.94	99.06	
4	0.69	98.37	
8	0.65	97.72	
16	1.95	95.77	
30	2.89	92.89	
50	6.32	86.57	
100	11.81	74.76	
200	33.41	41.35	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 41.35%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

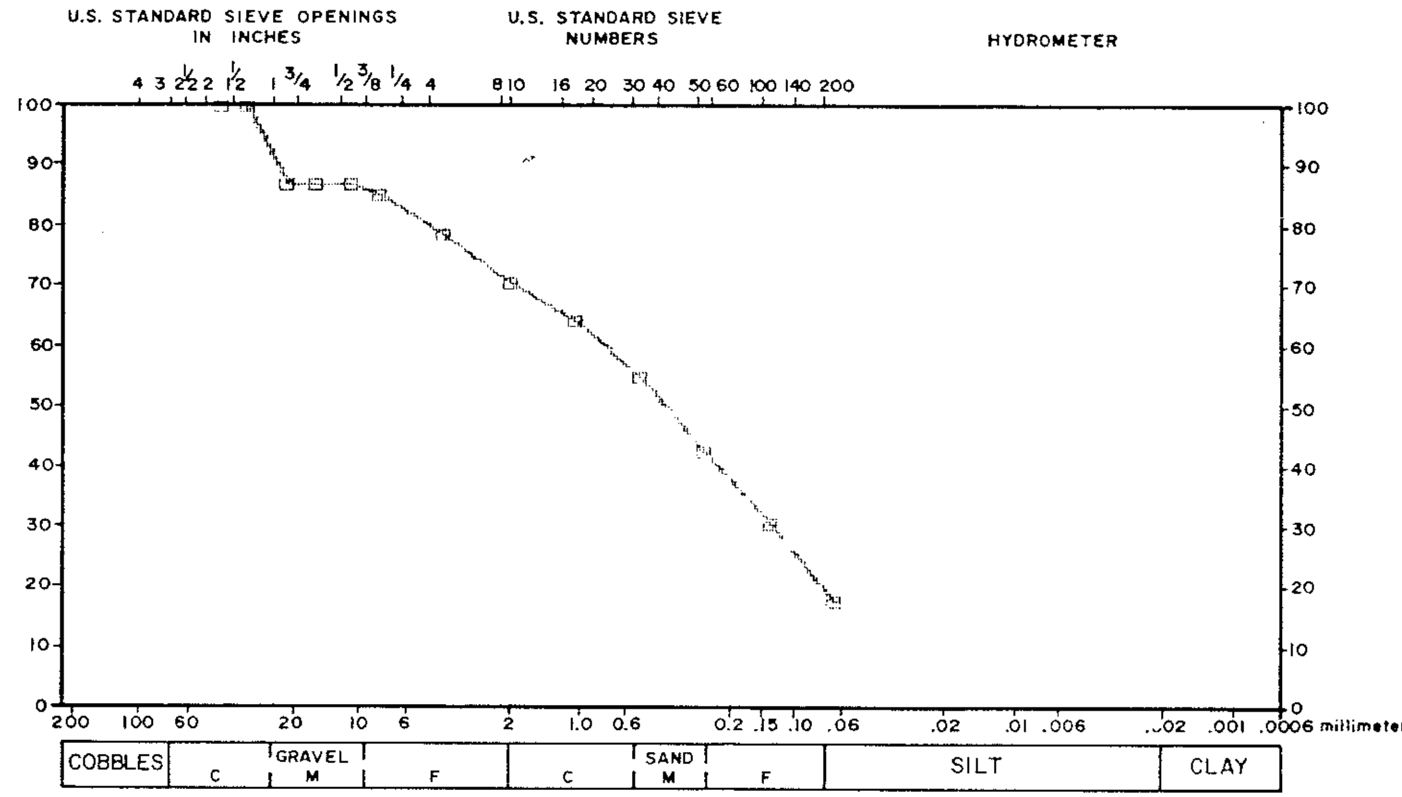
Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-39 DATE RECEIVED: 8/18/88
TEST BY: JWH DATE TESTED: 8/19/88
REVIEWED BY: WJO DATE REPORTED: 8/23/88
SAMPLE DESCR: PAWLING SITE, BORING MW-3, SAMPLE 2, 10.0-12.0 FT

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
2	0.00	100.00	
11/2	0.00	100.00	
1	12.87	87.13	
3/4	0.00	87.13	
1/2	0.00	87.13	
3/8	1.91	85.22	

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	6.72	78.50	
8	7.88	70.62	
16	6.15	64.47	
30	9.53	54.93	
50	12.16	42.78	
100	12.05	30.73	
200	12.83	17.90	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 17.90%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

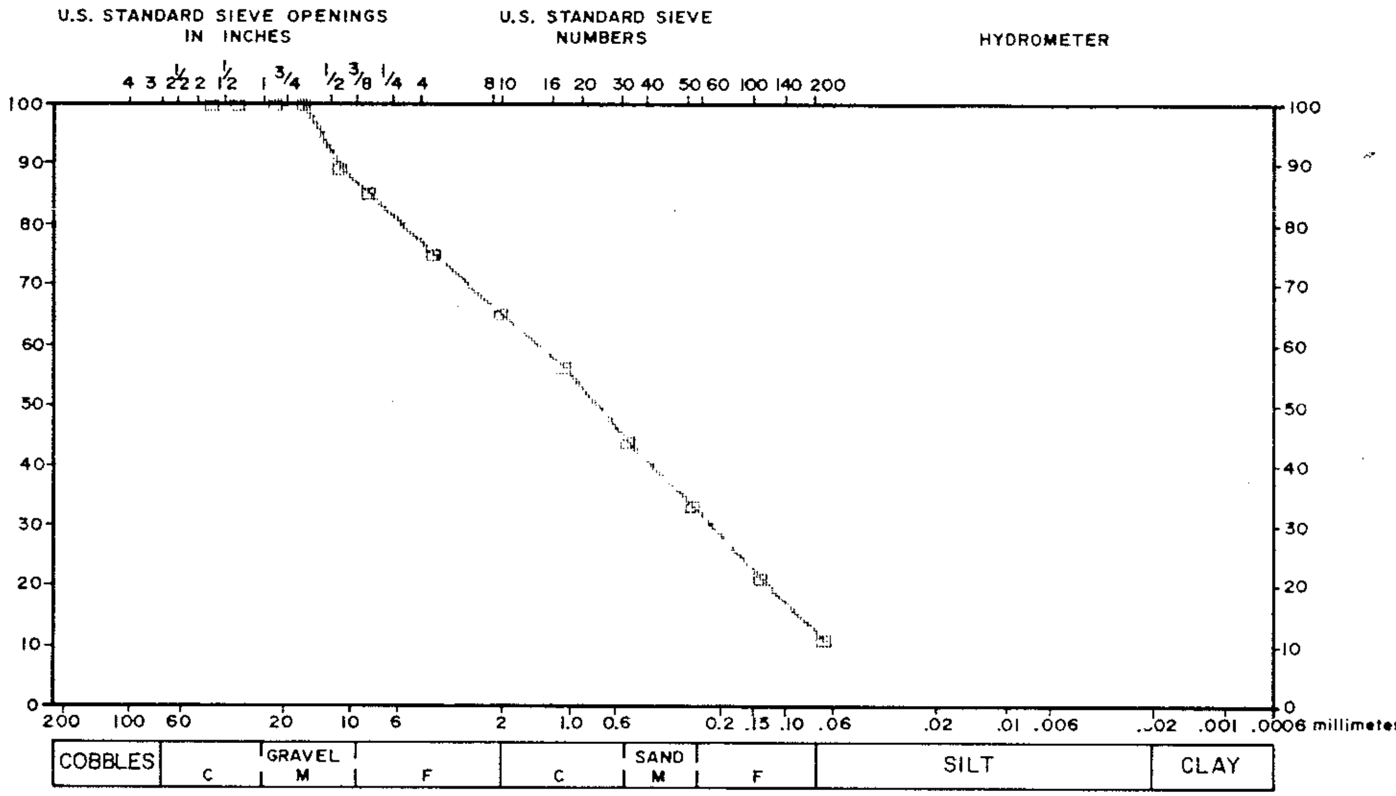
Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-38 DATE RECEIVED: 8/18/88
TEST BY: JWH DATE TESTED: 8/19/88
REVIEWED BY: WJO DATE REPORTED: 8/23/88
SAMPLE DESCR: PAWLING SITE, BORING MW 3, SAMPLE 3, 15.0-17.0 FT

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
2	0.00	100.00	
11/2	0.00	100.00	
1	0.00	100.00	
3/4	0.00	100.00	
1/2	10.68	89.32	
3/8	3.83	85.49	

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	10.30	75.19	
8	9.74	65.45	
16	8.98	56.47	
30	12.26	44.21	
50	11.09	33.12	
100	11.92	21.20	
200	10.30	10.90	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 10.90%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

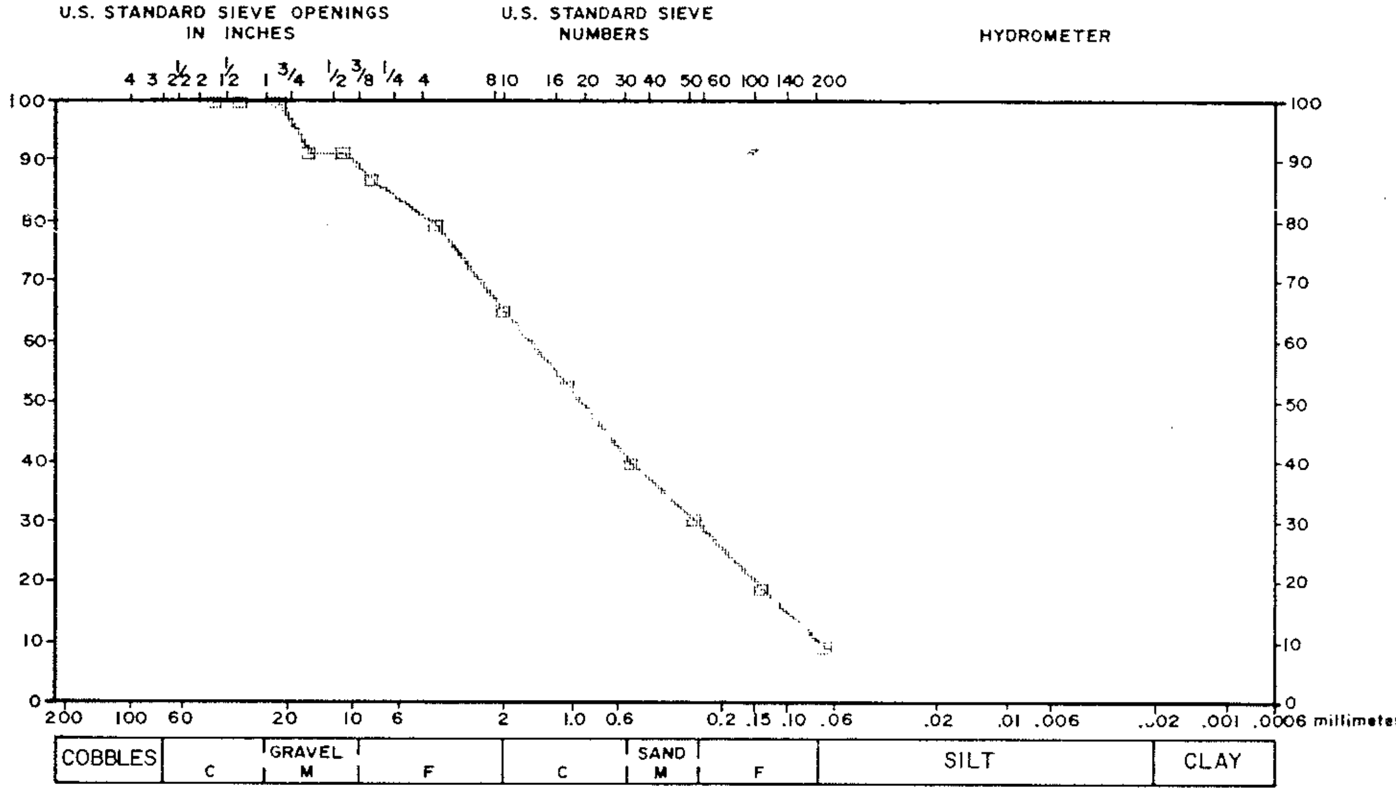
Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory

CLIENT:	GROUNDWATER TECHNOLOGY, INC.		
LAB NUMBER:	88-8-37	DATE RECEIVED:	8/18/88
TEST BY:	JWH	DATE TESTED:	8/19/88
REVIEWED BY:	WJO	DATE REPORTED:	8/23/88
SAMPLE DESCR:	PAWLING SITE, BORING MW-5, SAMPLE 2, 10.0-12.0 FT		

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
2	0.00	100.00	
11/2	0.00	100.00	
1	0.00	100.00	
3/4	8.39	91.61	
1/2	0.00	91.61	
3/8	4.36	87.25	

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	7.69	79.56	
8	14.35	65.21	
16	12.36	52.85	
30	13.00	39.85	
50	9.35	30.49	
100	11.27	19.22	
200	9.74	9.48	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 9.48%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

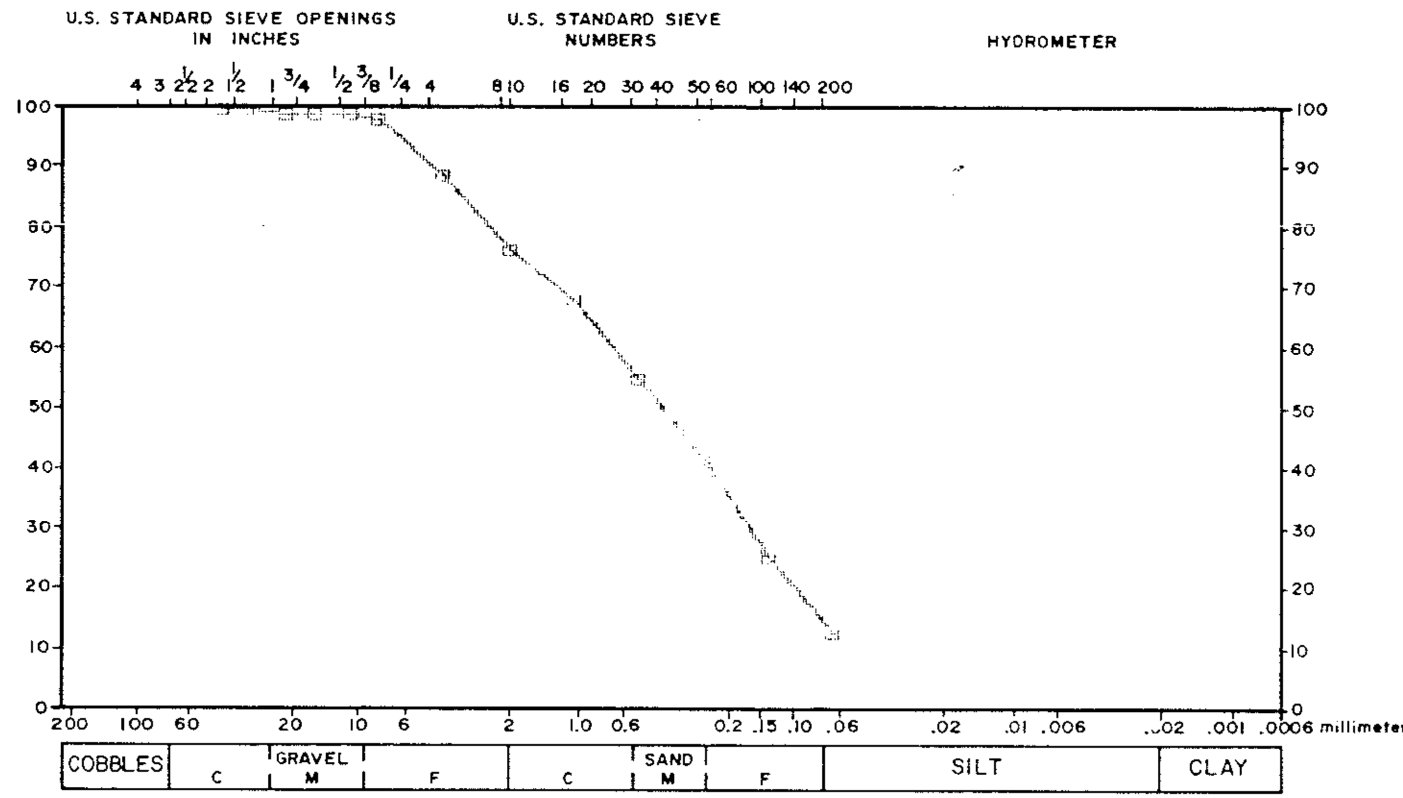
Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-40 DATE RECEIVED: 8/18/88
TEST BY: JWH DATE TESTED: 8/19/88
REVIEWED BY: WJO DATE REPORTED: 8/23/88
SAMPLE DESCR: PAWLING SITE, BORING MW-5, SAMPLE 3, 15.0-17.0 FT

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
2	0.00	100.00	
11/2	0.00	100.00	
1	0.81	99.19	
3/4	0.00	99.19	
1/2	0.00	99.19	
3/8	0.81	98.38	

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	9.44	88.94	
8	12.56	76.38	
16	8.35	68.03	
30	12.80	55.23	
50	13.25	41.98	
100	16.77	25.20	
200	12.48	12.72	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 12.72%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

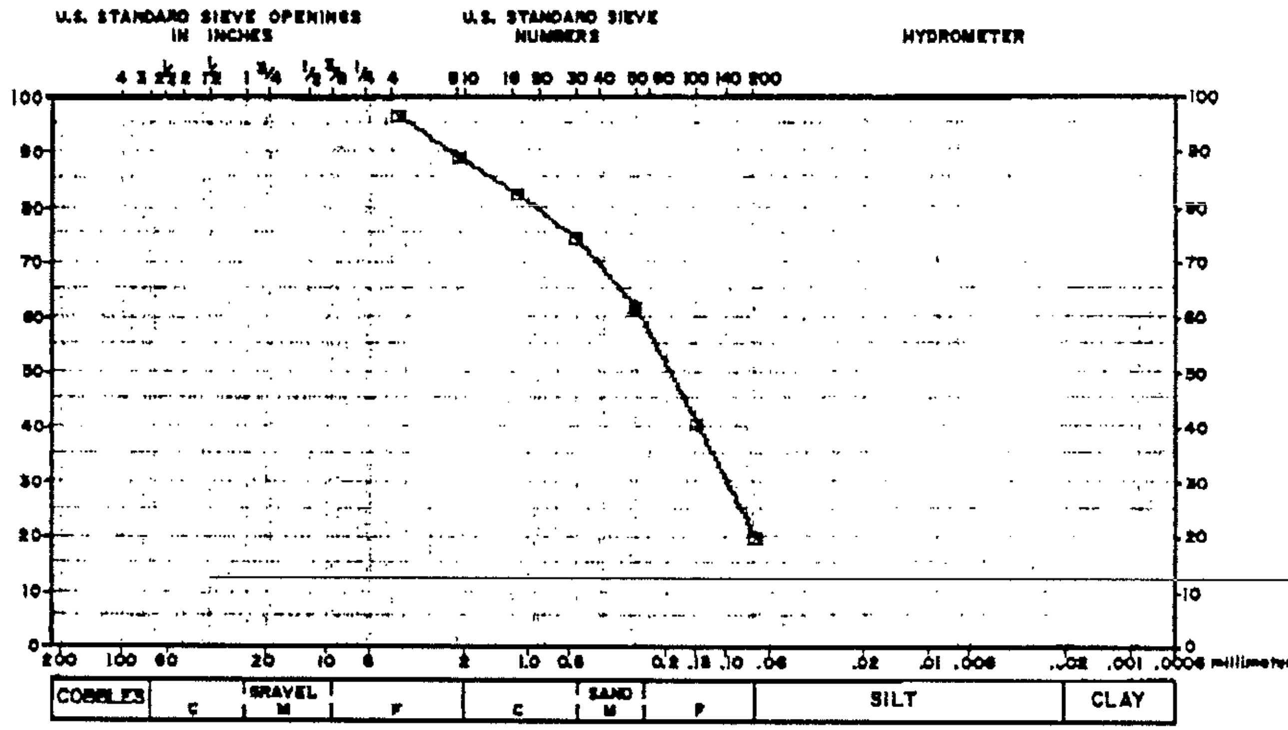
WJO

Dunn Geoscience Laboratory

12 Metro Park Road, Albany, NY 12205 (518) 458-1313

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-81 DATE RECEIVED: 8/23/88
TEST BY: JWH DATE TESTED: 8/26/88
REVIEWED BY: WJO DATE REPORTED: 9/2/88
SAMPLE DESCR: PAWLING BORING #1 SAMPLE 2 10-12 FT

GRAIN SIZE DISTRIBUTION



COARSE				FINE				HYDROMETER		
SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.	PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.
				4	3.37	96.63				
				8	7.75	88.87				
				16	6.48	82.40				
				30	8.21	74.19				
				50	12.27	61.92				
				100	21.39	40.54				
				200	20.52	20.02				

Pan = 20.02%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

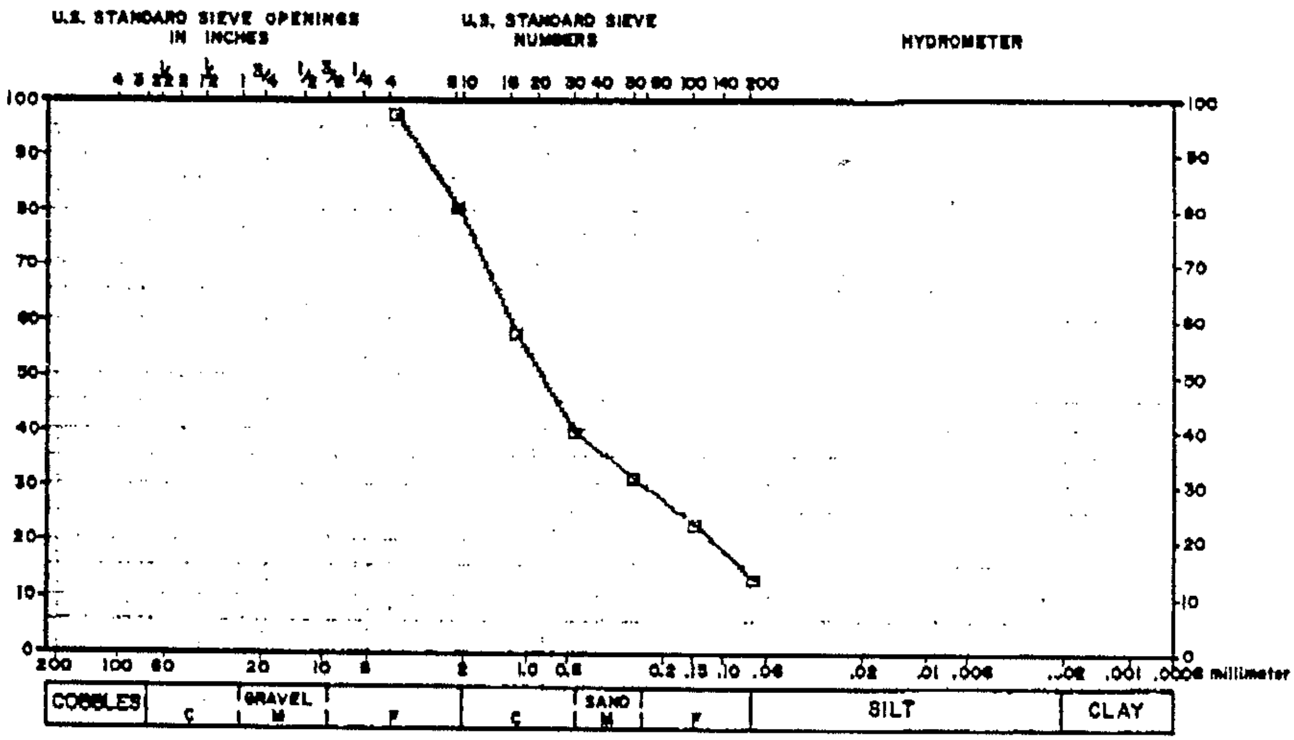
WJO

Dunn Geoscience Laboratory

12 Metro Park Road, Albany, NY 12205 (518) 458-1313

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-82 DATE RECEIVED: 8/23/88
TEST BY: JWH DATE TESTED: 8/26/88
REVIEWED BY: WJO DATE REPORTED: 9/2/88
SAMPLE DESCR: PAWLING BORING MW-1 SAMPLE 2 10-12 FT

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	3.19	96.81	
8	16.93	79.87	
16	22.36	57.51	
30	17.89	39.62	
50	8.63	30.99	
100	8.31	22.68	
200	9.90	12.78	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 12.78%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

A P P E N D I X   E

Soil Sampling Laboratory Results

CAMO LABORATORIES
367 VIOLET AVENUE
POUGHKEEPSIE, NEW YORK 12601
(914) 473-9200
FED. I.D. #14-1514539
NYS LAB ID NO.: 10310

Pawling Corporation
157 Charles Coleman Boulevard
Pawling, New York 12564

Date of Invoice: 07-06-88
P.O. #:
Job #:
Invoice #: 88-6-2502

Analytical Report

Date Samples Collected: 6/6 - 6/8/88
Date Samples Received: 06-09-88
Samples Collected By: Client
Samples Delivered By: Client
Matrix: Soil

Sample Identification

A. B1 SS2
B. MW1 SS2
C. MW2 SS2
D. MW3 SS3
E. MW5 SS3
F. MW2 Core Hole

Parameters	Unit/ Measure	A	B	C	D	E	F
Method 624		*	*	*	*	*	*
Method 625		*	*	*	*	*	*
Priority Pollutant Metals		*	*	*	*	*	*

Analysis Comments: * See attached tables.

Comments: All samples will be discarded after twenty-one (21) days or EPA Holding time, whichever is shorter, unless we are notified otherwise.

Hazardous waste samples will be returned to client.

Analytical Methods: All analytical methods comply with those specified in APHA "Standard Methods" and/or EPA approved methods.

CAMO LOG NO.: 88-6-2502

VOLATILES

PARAMETERS	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
Chloromethane	<5	<5	<5	<5	<5	<5
Bromomethane	<5	<5	<5	<5	<5	<5
Vinyl Chloride	<5	<5	<5	<5	<5	<5
Chloroethane	<5	<5	<5	<5	<5	<5
Methylene Chloride	<5	<5	<5	<5	<5	<5
Trichlorofluoromethane	<5	<5	<5	<5	<5	<5
1,1-Dichloroethylene	<5	<5	<5	<5	<5	<5
1,1-Dichloroethane	<5	<5	<5	<5	<5	<5
Trans-1,2-dichloroethylene	<5	<5	<5	<5	<5	<5
Dichlorodifluoromethane	<5	<5	<5	<5	<5	<5
Chloroform	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	<5	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	<5	<5	<5	<5	<5	<5
Carbon Tetrachloride	<5	<5	<5	<5	<5	<5
Bromodichloromethane	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	<5	<5	<5	<5	<5	<5

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

VOLATILES

PARAMETERS	SAMPLE IDENTIFICATIONS					
	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
Trans-1,3-dichloropropene	<5	<5	<5	<5	<5	<5
Trichloroethylene	<5	<5	<5	<5	<5	<5
Dibromochloromethane	<5	<5	<5	<5	<5	<5
Cis-1,3-dichloropropene	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	<5	<5	<5	<5	<5	<5
Benzene	<5	<5	<5	<5	<5	<5
2-Chloroethylvinyl Ether	<50	<50	<50	<50	<50	<50
Bromoform	<25	<25	<25	<25	<25	<25
Tetrachloroethylene	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	<5	<5	<5	<5	<5	<5
Toluene	<5	<5	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5	<5	<5
Ethylbenzene	<5	<5	<5	<5	<5	<5
Acrolein	<500	<500	<500	<500	<500	<500
Acrylonitrile	<500	<500	<500	<500	<500	<500

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION					
	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
1,2 Dichlorobenzene	<2	<2	<2	<2	<2	<2
1,3 Dichlorobenzene	<2	<2	<2	<2	<2	<2
1,4 Dichlorobenzene	<2	<2	<2	<2	<2	<2
Hexachloroethane	<2	<2	<2	<2	<2	<2
Hexachlorobutadiene	<2	<2	<2	<2	<2	<2
Hexachlorobenzene	<2	<2	<2	<2	<2	<2
1,2,4 Trichlorobenzene	<2	<2	<2	<2	<2	<2
Bis(2-Chloroethoxy) Methane	<2	<2	<2	<2	<2	<2
Naphthalene	<2	<2	<2	<2	<2	<2
2 Chloronaphthalene	<2	<2	<2	<2	<2	<2
Isophorone	<2	<2	<2	<2	<2	<2
Nitrobenzene	<2	<2	<2	<2	<2	<2
2,4 Dinitrotoluene	<2	<2	<2	<2	<2	<2
2,6 Dinitrotoluene	<2	<2	<2	<2	<2	<2
4 Bromophenyl Phenyl Ether	<2	<2	<2	<2	<2	<2
Bis(2-Ethylhexyl) Phthalate	<2	<2	<2	<2	<2	<2
Di-n-octyl Phthalate	<2	<2	<2	<2	<2	<2

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION					
	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
Dimethyl phthalate	<2	<2	<2	<2	<2	<2
Diethyl phthalate	<2	<2	<2	<2	<2	<2
Di-n-butyl phthalate	<2	<2	<2	<2	<2	<2
Fluorene	<2	<2	<2	<2	<2	<2
Fluoranthene	<2	<2	<2	<2	<2	<2
Chrysene	<2	<2	<2	<2	<2	<2
Pyrene	<2	<2	<2	<2	<2	<2
Phenanthrene	<2	<2	<2	<2	<2	<2
Anthracene	<2	<2	<2	<2	<2	<2
Benzo(a)anthracene	<2	<2	<2	<2	<2	<2
Benzo(b)fluoranthene	<2	<2	<2	<2	<2	<2
Benzo(k)fluoranthene	<2	<2	<2	<2	<2	<2
Benzo(a)pyrene	<2	<2	<2	<2	<2	<2
Indeno(1,2,3-c,d)pyrene	<2	<2	<2	<2	<2	<2
Dibenzo(a,h)anthracene	<2	<2	<2	<2	<2	<2
Benzo(g,h,i)perylene	<2	<2	<2	<2	<2	<2

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION					
	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
4 Chlorophenyl Phenyl Ether	<2	<2	<2	<2	<2	<2
3,3' Dichlorobenzidine	<4	<4	<4	<4	<4	<4
Benzidine	<20	<20	<20	<20	<20	<20
bis(2-Chloroethyl)ether	<2	<2	<2	<2	<2	<2
1,2-Diphenylhydrazine	<2	<2	<2	<2	<2	<2
Hexachlorocyclopentadiene	<2	<2	<2	<2	<2	<2
N-Nitrosodiphenylamine	<2	<2	<2	<2	<2	<2
Acenaphthylene	<2	<2	<2	<2	<2	<2
Acenaphthene	<2	<2	<2	<2	<2	<2
Butyl benzyl phthalate	<2	<2	<2	<2	<2	<2
N-Nitrosodimethylamine	<2	<2	<2	<2	<2	<2
Nitrosodi-n-propylamine	<2	<2	<2	<2	<2	<2
bis(2-Chloroisopropyl)ether	<2	<2	<2	<2	<2	<2

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

PRIORITY POLLUTANT METALS

PARAMETERS	SAMPLE IDENTIFICATIONS					
	A B1 SS2	B MW1 SS1	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
Antimony	<10	<10	<10	<10	<10	<10
Arsenic	1.4	25	12	2.2	6.6	33
Beryllium	1	<1	1	<1	<1	<1
Cadmium	3	2	2	2	2	3
Chromium	10	13	12	9	10	14
Copper	16	23	17	19	16	17
Lead	30	20	20	20	10	10
Mercury	<0.1	0.1	0.3	<0.1	0.2	<0.1
Nickel	21	29	18	21	18	23
Selenium	<5	<5	<5	<5	<5	<5
Silver	<1	<1	<1	<1	<1	<1
Thallium	<1	<1	<1	<1	<1	<1
Zinc	26	79	38	26	35	45

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LABORATORIES

A DIVISION OF CAMO POLLUTION CONTROL, INC.

POUGHKEEPSIE AREA FACILITY:
CAMO LABORATORY
387 VIOLET AVENUE
POUGHKEEPSIE, N.Y. 12601
(914) 473-9200

Log # 88-6-2502

CHAIN OF CUSTODY

CLIENT: C9

SAMPLER: GTI

SAMPLE NO./ID	LOCATION/CONTAINER	DATE	TIME	SAMPLE TYPE	COMP	GRAB	NO. CONT	ANALYSIS REQUIRED
B1 SS2		6/6/88					2	EPA 624, 625(base neutrals),priority pollut.metals
MW1 SS2		6/6/88					2	
MW2 SS2		6/7/88					2	"
MW3 SS3		6/7/88					2	"
MW5 SS3		6/8/88					2	"
								"
								"
								"
								"
								"
								"
								"
								"
								"

Relinquished by:	Received by:	Date	Time
J.R. Bongason			
Relinquished:	Received by:	Date	Time

Dispatched by:	Date	Time	Received for Laboratory by:	Date	Time
			Michael Diaz	6/9/88	6:40PM

Method of Shipment:

CAMO LABORATORIES

A DIVISION OF CAMO POLLUTION CONTROL, INC.

POUGHKEEPSIE AREA FACILITY:
CAMO LABORATORY
367 VIOLET AVENUE
POUGHKEEPSIE, N.Y. 12501
(914) 473-9200

CHAIN OF CUSTODY

CLIENT: C9

SAMPLER: GTI

SAMPLE NO./ID	LOCATION/CONTAINER	DATE	TIME	SAMPLE TYPE	COMP	GRAB	NO. OF CONT.	ANALYSIS REQUIRED
B1 SS2		6/6/88					1	EPA 624, 625(base neutrals),priority pollut.metals
MW1 SS2		6/6/88					1	"
MW2 SS2		6/7/88					1	"
MW3 SS3		6/7/88					1	"
								"
								"
								"
								"
								"
								"
								"
								"
								"

Relinquished by: Susan R Thompson	Received by:	Date	Time
Relinquished:	Received by:	Date	Time
Dispatched by: Date Time	Received for Laboratory by: [signature]	Date 6/9/88	Time 12:30
Method of Shipment:			

Comments:

CAMO LABORATORIES

A DIVISION OF CAMO POLLUTION CONTROL, INC.

POUGHKEEPSIE AREA FACILITY
CAMO LABORATORY
367 VIOLET AVENUE
POUGHKEEPSIE, N.Y. 12601
(914) 473-9200

CHAIN OF CUSTODY

CLIENT: C9

SAMPLER: GTI

SAMPLE NO./ID	LOCATION/CONTAINER	DATE	TIME	SAMPLE TYPE	COMP.	GRAB	NO. OF CONT.	ANALYSIS REQUIRED
MW2 core hole		6/10/88		soil			2	EPA 624, 625(base neutrals),priorit[y] pollut.metals
								"
								"
								"
								"
								"
								"
								"
								"
								"
								"
								"
								"

Relinquished by:	Received by:	Date	Time
Susan R. Thompson			
Relinquished:	Received by:	Date	Time

Dispatched by:	Date	Time	Received for Laboratory by:	Date	Time
			[illegible signature]	6/10/88	

Method of Shipment:

Comments:

APPENDIX G

Ground Water Gradient Data

GROUNDWATER TECHNOLOGY

Project: Pawling Corporation
Location:
Date: 6/28/88
Operator: G. Pafumi & C. Burke
Method: IP
Equipment #:

Project #: 110-001-87
Time: 1:30 p.m.

WELL DATA MONITORING FORM

Well ID	Well Depth	T.O.C. Elev.	Depth to Water	Depth to Petro.	Petro. Thickness	Petro. Gravity	Hydro. Equiv.	Corrected DTW	Corrected Water Elev.
MW-5D	150	443.06	8.05						435.01
MW-3S	18.5	439.01	7.04						431.97
MW-4S	approx. 12	439.42	7.95						431.47
MW-1S	17	440.91	10.98						429.93
MW-1D	150	439.63	9.10						430.53
MW-2S	10.5	438.02	6.89						431.13
MW-2D1	42	437.66	7.17						430.49
MW-2D2	150	438.02	7.46						430.56
MW-5S	16.8	442.02	--*						
stream	11.30	427.95	2.7						430.65

Comments: * Not gauged this day. Could not locate early enough.

GROUNDWATER TECHNOLOGY

Project: Pawling Corporation
Location: Pawling, NY
Date: 8/01/88
Operator: C. Burke
Method: Interface Probe
Equipment #: 373

Project #: 110-001-870[illegible]
Time:

WELL DATA MONITORING FORM

Well ID	Well Depth	T.O.C. Elev.	Depth to Water	Depth to Petro.	Petro. Thickness	Petro. Gravity	Hydro. Equiv.	Corrected DTW	Corrected Water Elev.
MW-1_S	17	440.91	9.42						431.49
MW-1_D	150	439.63	8.13						431.50
MW-2_S	10.5	438.02	7.35	solid					430.67
MW-2_{D1}	42	437.66	6.31						431.35
MW-2_{D2}	150	438.02	6.28						431.74
MW-3	18.5	439.01	5.25						433.76
MW-4	9.10	439.42	6.10						433.32
MW-5_S	16.8	442.02	6.41						435.61
MW-5_D	150	443.06	7.31						435.75
stream	10.75	427.95*	3.3						431.25

Comments: * 0 feet stream gaugin, datum plane at 427.95 feet stream level 3.3 feet above this 0 feet mark.

A P P E N D I X   F

Survey Data

PREPARED FOR: GROUNDWATER TECHNOLOGIES

WELL DESIGNATION	(INSIDE) ELEVATION OF CASING @ MARK	ELEVATION @ ADJACENT GROUND	
MW 1-D	439.63	437.60	
MW 1-S	440.91	438.42	
MW 2-D1	437.66	437.98	
MW 2-D2	438.02	438.16	
MW 2-S	438.02	438.31	
MW 3-S	439.01	439.19	
MW 4	439.42	439.77	
MW 5-D	443.06	442.34	
MW 5-S	442.02	442.19	

ELEVATION OF TOP 14' BOARD @ ℄ BROOK	441.95
ELEVATION OF PRODUCTION WELL #1 (TAKEN @ TOP OF CASING)	440.15 (GROUND 439.86)
ELEVATION OF PRODUCTION WELL #2 (TAKEN @ CONCRETE SLAB)	438.51

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

APPENDIX H

Ground Water, Surface Water, and Stream Sediment Laboratory Results

CAMO LABORATORIES
367 VIOLET AVENUE
POUGHKEEPSIE, NEW YORK 12601
(914) 473-9200
FED. I.D. #14-1514539
NYS LAB ID NO.: 10310

Pawling Corporation
157 Charles Coleman Boulevard
Pawling, New York 12564

Date of Invoice: 07/22/88
P.O. #:
Job #:
Invoice #: 88-6-2831

CORRECTED
Analytical Report

		Sample Identification	
Date Samples Collected:	06-30-88	A. MW-1S	F. MW-4S
Date Samples Received:	06-30-88	B. MW-1D	G. MW-5S
Samples Collected By:	Client	C. MW-2D1	H. MW-5D
Samples Delivered By:	Client	D. MW-2D2	I. SS-1
Matrix:	Water/Soil	E. MW-3S	J. SS-2

Parameters	Unit/ Measure	A	B	C	D	E	F	G	H	I	J
EPA Method 624		*	*	*	*	*	*	*	*	*	*
Base/Neutral Extractables		*	*	*	*	*	*	*	*	*	*
Priority Pollutant Metals		*	*	*	*	*	*	*	*	*	*

Analysis Comments: Page 1 of 2

* See attached tables.

Comments: All samples will be discarded after twenty-one (21) days or EPA Holding time, whichever is shorter, unless we are notified otherwise.

Hazardous waste samples will be returned to client.

Analytical Methods: All analytical methods comply with those specified in APHA "Standard Methods" and/or EPA approved methods.

CAMO LABORATORIES
367 VIOLET AVENUE
POUGHKEEPSIE, NEW YORK 12601
(914) 473-9200
FED. I.D. #14-1514539
NYS LAB ID NO.: 10310

Pawling Corporation
157 Charles Coleman Boulevard
Pawling, New York 12564

Date of Invoice: 07/22/88
P.O. #:
Job #:
Invoice #: 88-6-2831

CORRECTED
Analytical Report

Date Samples Collected:	06-30-88	
Date Samples Received:	06-30-88	
Samples Collected By:	Client	
Samples Delivered By:	Client	
Matrix:	Water/Soil	

Sample Identification

K. SS-3	P. SSS-4 (Soil)
L. SS-4	Q. DW-I
M. SSS-1 (Soil)	R. DW-II
N. SSS-2 (Soil)	S. Field Blank
O. SSS-3 (Soil)	T. Trip Blank

Parameters	Unit/ Measure	K	L	M	N	O	P	Q	R	S	T
EPA Method 624		*	*	*	*	*	*	*	*	*	*
Base/Neutral Extractables		*	*	*	*	*	*	*	*	*	*
Priority Pollutant Metals		*	*	*	*	*	*	*	*	*	*

Analysis Comments: Page 2 of 2

* See attached tables.

Comments: All samples will be discarded after twenty-one (21) days or EPA Holding time, whichever is shorter, unless we are notified otherwise.

Hazardous waste samples will be returned to client.

Analytical Methods: All analytical methods comply with those specified in APHA "Standard Methods" and/or EPA approved methods.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
Chloromethane	<1	<1	<1	<1	<1
Bromomethane	<1	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1	<1
Chloroethane	<1	<1	<1	<1	<1
Methylene Chloride	<1	<1	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1	<1	<1
1,1-Dichloroethylene	<1	<1	<1	<1	<1
1,1-Dichloroethane	8	<1	<1	<1	<1
Trans-1,2-dichloroethylene	8	6	880	100	4
Dichlorodifluoromethane	<1	<1	<1	<1	<1
Chloroform	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	3	5
Carbon Tetrachloride	<1	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
Trans-1,3-dichloropropene	<1	<1	<1	<1	<1
Trichloroethylene	<1	6	90	44	2
Dibromochloromethane	<1	<1	<1	<1	<1
Cis-1,3-dichloropropene	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1
Benzene	<1	<1	<1	<1	<1
2-Chloroethylvinyl Ether	<10	<10	<10	<10	<10
Bromoform	<5	<5	<5	<5	<5
Tetrachloroethylene	<1	<1	<1	29	16
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1
Toluene	<1	<1	3,000	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Acrolein	<100	<100	<100	<100	<100
Acrylonitrile	<100	<100	<100	<100	<100

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
Chloromethane	<1	<1	<1	<1	<1
Bromomethane	<1	<1	<1	<1	<1
Vinvl Chloride	<1	<1	<1	<1	<1
Chloroethane	<1	<1	<1	<1	<1
Methylene Chloride	<1	<1	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1	<1	<1
1,1-Dichloroethylene	<1	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1	<1
Trans-1,2-dichloroethylene	<1	<1	<1	<1	<1
Dichlorodifluoromethane	<1	<1	<1	<1	<1
Chloroform	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	<1
Carbon Tetrachloride	<1	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
Trans-1,3-dichloropropene	<1	<1	<1	<1	<1
Trichloroethylene	<1	<1	<1	<1	<1
Dibromochloromethane	<1	<1	<1	<1	<1
Cis-1,3-dichloropropene	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1
Benzene	<1	<1	<1	<1	<1
2-Chloroethylvinyl Ether	<10	<10	<10	<10	<10
Bromoform	<5	<5	<5	<5	<5
Tetrachloroethylene	14	14	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Acrolein	<100	<100	<100	<100	<100
Acrylonitrile	<100	<100	<100	<100	<100

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
Chloromethane	<1	<1	<5	<5	<5
Bromomethane	<1	<1	<5	<5	<5
Vinyl Chloride	<1	<1	<5	<5	<5
Chloroethane	<1	<1	<5	<5	<5
Methylene Chloride	<1	<1	<5	<5	<5
Trichlorofluoromethane	<1	<1	<5	<5	<5
1,1-Dichloroethylene	<1	<1	<5	<5	<5
1,1-Dichloroethane	<1	<1	<5	<5	<5
Trans-1,2-dichloroethylene	<1	<1	<5	<5	<5
Dichlorodifluoromethane	<1	<1	<5	<5	<5
Chloroform	<1	<1	<5	<5	<5
1,2-Dichloroethane	<1	<1	<5	<5	<5
1,1,1-Trichloroethane	<1	<1	<5	<5	<5
Carbon Tetrachloride	<1	<1	<5	<5	<5
Bromodichloromethane	<1	<1	<5	<5	<5
1,2-Dichloropropane	<1	<1	<5	<5	<5

NOTE: All results expressed in ug/L unless noted otherwise.

* ug/kg

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
Trans-1,3-dichloropropene	<1	<1	<5	<5	<5
Trichloroethylene	<1	<1	<5	<5	<5
Dibromochloromethane	<1	<1	<5	<5	<5
Cis-1,3-dichloropropene	<1	<1	<5	<5	<5
1,1,2-Trichloroethane	<1	<1	<5	<5	<5
Benzene	<1	<1	<5	<5	<5
2-Chloroethylvinyl Ether	<10	<10	<50	<50	<50
Bromoform	<5	<5	<25	<25	<25
Tetrachloroethylene	<1	<1	<5	<5	<5
1,1,2,2-Tetrachloroethane	<1	<1	<5	<5	<5
Toluene	<1	<1	<5	<5	<5
Chlorobenzene	<1	<1	<5	<5	<5
Ethylbenzene	<1	<1	<5	<5	<5
Acrolein	<100	<100	<500	<500	<500
Acrylonitrile	<100	<100	<500	<500	<500

NOTE: All results expressed in ug/L unless noted otherwise.

* ug/kg

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II	S Field Blank	T Trip Blank
Chloromethane	<5	<1	<1	<1	<1
Bromomethane	<5	<1	<1	<1	<1
Vinyl Chloride	<5	<1	<1	<1	<1
Chloroethane	<5	<1	<1	<1	<1
Methylene Chloride	<5	<1	<1	<1	<1
Trichlorofluoromethane	<5	<1	<1	<1	<1
1,1-Dichloroethylene	<5	<1	<1	<1	<1
1,1-Dichloroethane	<5	<1	<1	<1	<1
Trans-1,2-dichloroethylene	<5	5	52	<1	<1
Dichlorodifluoromethane	<5	<1	<1	<1	<1
Chloroform	<5	<1	<1	<1	<1
1,2-Dichloroethane	<5	<1	<1	<1	<1
1,1,1-Trichloroethane	<5	5	12	<1	<1
Carbon Tetrachloride	<5	<1	<1	<1	<1
Bromodichloromethane	<5	<1	<1	<1	<1
1,2-Dichloropropane	<5	<1	<1	<1	<1

NOTE: All results expressed in ug/L unless noted otherwise.

* ug/kg

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II	S Field Blank	T Trip Blank
Trans-1,3-dichloropropene	<5	<1	<1	<1	<1
Trichloroethylene	<5	2	10	<1	<1
Dibromochloromethane	<5	<1	<1	<1	<1
Cis-1,3-dichloropropene	<5	<1	<1	<1	<1
1,1,2-Trichloroethane	<5	<1	<1	<1	<1
Benzene	<5	<1	<1	<1	<1
2-Chloroethylvinyl Ether	<50	<10	<10	<10	<10
Bromoform	<25	<5	<5	<5	<5
Tetrachloroethylene	<5	2	31	<1	<1
1,1,2,2-Tetrachloroethane	<5	<1	<1	<1	<1
Toluene	<5	<1	<1	<1	<1
Chlorobenzene	<5	<1	<1	<1	<1
Ethylbenzene	<5	<1	<1	<1	<1
Acrolein	<500	<100	<100	<100	<100
Acrylonitrile	<500	<100	<100	<100	<100

NOTE: All results expressed in ug/L unless noted otherwise.

* ug/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
1,2 Dichlorobenzene	<10	<10	<10	<10	<10
1,3 Dichlorobenzene	<10	<10	<10	<10	<10
1,4 Dichlorobenzene	<10	<10	<10	<10	<10
Hexachloroethane	<10	<10	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10	<10	<10
Hexachlorobenzene	<10	<10	<10	<10	<10
1,2,4 Trichlorobenzene	<10	<10	<10	<10	<10
Bis(2-Chloroethoxy) Methane	<10	<10	<10	<10	<10
Naphthalene	<10	<10	<10	<10	<10
2 Chloronaphthalene	<10	<10	<10	<10	<10
Isophorone	<10	<10	<10	<10	<10
Nitrobenzene	<10	<10	<10	<10	<10
2,4 Dinitrotoluene	<10	<10	<10	<10	<10
2,6 Dinitrotoluene	<10	<10	<10	<10	<10
4 Bromophenyl Phenyl Ether	<10	<10	<10	<10	<10
Bis(2-Ethylhexyl) Phthalate	<10	<10	<10	<10	<10
Di-n-octyl Phthalate	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
Dimethyl phthalate	<10	<10	<10	<10	<10
Diethyl phthalate	<10	<10	<10	<10	<10
Di-n-butyl phthalate	<10	<10	<10	<10	<10
Fluorene	<10	<10	<10	<10	<10
Fluoranthene	<10	<10	<10	<10	<10
Chrysene	<10	<10	<10	<10	<10
Pyrene	<10	<10	<10	<10	<10
Phenanthrene	<10	<10	<10	<10	<10
Anthracene	<10	<10	<10	<10	<10
Benzo(a)anthracene	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	<10	<10	<10	<10	<10
Benzo(a)pyrene	<10	<10	<10	<10	<10
Indeno(1,2,3-c,d)pyrene	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
4 Chlorophenyl Phenyl Ether	<10	<10	<10	<10	<10
3,3' Dichlorobenzidine	<20	<20	<20	<20	<20
Benzidine	<80	<80	<80	<80	<80
bis(2-Chloroethyl)ether	<10	<10	<10	<10	<10
1,2-Diphenylhydrazine	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	<10	<10	<10	<10	<10
Acenaphthylene	<10	<10	<10	<10	<10
Acenaphthene	<10	<10	<10	<10	<10
Butyl benzyl phthalate	<10	<10	<10	<10	<10
N-Nitrosodimethylamine	<10	<10	<10	<10	<10
Nitrosodi-n-propylamine	<10	<10	<10	<10	<10
bis(2-Chloroisopropyl)ether	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

	SAMPLE IDENTIFICATION				
PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
1,2 Dichlorobenzene	<10	<10	<10	<10	<10
1,3 Dichlorobenzene	<10	<10	<10	<10	<10
1,4 Dichlorobenzene	<10	<10	<10	<10	<10
Hexachloroethane	<10	<10	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10	<10	<10
Hexachlorobenzene	<10	<10	<10	<10	<10
1,2,4 Trichlorobenzene	<10	<10	<10	<10	<10
Bis(2-Chloroethoxy) Methane	<10	<10	<10	<10	<10
Naphthalene	<10	<10	<10	<10	<10
2 Chloronaphthalene	<10	<10	<10	<10	<10
Isophorone	<10	<10	<10	<10	<10
Nitrobenzene	<10	<10	<10	<10	<10
2,4 Dinitrotoluene	<10	<10	<10	<10	<10
2,6 Dinitrotoluene	<10	<10	<10	<10	<10
4 Bromophenyl Phenyl Ether	<10	<10	<10	<10	<10
Bis(2-Ethylhexyl) Phthalate	<10	<10	<10	<10	<10
Di-n-octyl Phthalate	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
Dimethyl phthalate	<10	<10	<10	<10	<10
Diethyl phthalate	<10	<10	<10	<10	<10
Di-n-butyl phthalate	<10	<10	<10	<10	<10
Fluorene	<10	<10	<10	<10	<10
Fluoranthene	<10	<10	<10	<10	<10
Chrysene	<10	<10	<10	<10	<10
Pyrene	<10	<10	<10	<10	<10
Phenanthrene	<10	<10	<10	<10	<10
Anthracene	<10	<10	<10	<10	<10
Benzo(a)anthracene	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	<10	<10	<10	<10	<10
Benzo(a)pyrene	<10	<10	<10	<10	<10
Indeno(1,2,3-c,d)pyrene	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

	SAMPLE IDENTIFICATION				
PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
4 Chlorophenyl Phenyl Ether	<10	<10	<10	<10	<10
3,3' Dichlorobenzidine	<20	<20	<20	<20	<20
Benzidine	<80	<80	<80	<80	<80
bis(2-Chloroethyl)ether	<10	<10	<10	<10	<10
1,2-Diphenylhydrazine	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	<10	<10	<10	<10	<10
Acenaphthylene	<10	<10	<10	<10	<10
Acenaphthene	<10	<10	<10	<10	<10
Butyl benzyl phthalate	<10	<10	<10	<10	<10
N-Nitrosodimethylamine	<10	<10	<10	<10	<10
Nitrosodi-n-propylamine	<10	<10	<10	<10	<10
bis(2-Chloroisopropyl)ether	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
	SAMPLE IDENTIFICATION				
1,2 Dichlorobenzene	<10	<10	<2	<2	<2
1,3 Dichlorobenzene	<10	<10	<2	<2	<2
1,4 Dichlorobenzene	<10	<10	<2	<2	<2
Hexachloroethane	<10	<10	<2	<2	<2
Hexachlorobutadiene	<10	<10	<2	<2	<2
Hexachlorobenzene	<10	<10	<2	<2	<2
1,2,4 Trichlorobenzene	<10	<10	<2	<2	<2
Bis(2-Chloroethoxy) Methane	<10	<10	<2	<2	<2
Naphthalene	<10	<10	<2	<2	<2
2 Chloronaphthalene	<10	<10	<2	<2	<2
Isophorone	<10	<10	<2	<2	<2
Nitrobenzene	<10	<10	<2	<2	<2
2,4 Dinitrotoluene	<10	<10	<2	<2	<2
2,6 Dinitrotoluene	<10	<10	<2	<2	<2
4 Bromophenyl Phenyl Ether	<10	<10	<2	<2	<2
Bis(2-Ethylhexyl) Phthalate	<10	<10	<2	<2	<2
Di-n-octyl Phthalate	<10	<10	<2	<2	<2

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
Dimethyl phthalate	<10	<10	<2	<2	<2
Diethyl phthalate	<10	<10	<2	<2	<2
Di-n-butyl phthalate	<10	<10	<2	<2	<2
Fluorene	<10	<10	<2	<2	<2
Fluoranthene	<10	<10	<2	<2	<2
Chrysene	<10	<10	<2	<2	<2
Pyrene	<10	<10	<2	<2	<2
Phenanthrene	<10	<10	<2	<2	<2
Anthracene	<10	<10	<2	<2	<2
Benzo(a)anthracene	<10	<10	<2	<2	<2
Benzo(b)fluoranthene	<10	<10	<2	<2	<2
Benzo(k)fluoranthene	<10	<10	<2	<2	<2
Benzo(a)pyrene	<10	<10	<2	<2	<2
Indeno(1,2,3-c,d)pyrene	<10	<10	<2	<2	<2
Dibenzo(a,h)anthracene	<10	<10	<2	<2	<2
Benzo(g,h,i)perylene	<10	<10	<2	<2	<2

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
4 Chlorophenyl Phenyl Ether	<10	<10	<2	<2	<2
3,3' Dichlorobenzidine	<20	<20	<4	<4	<4
Benzidine	<80	<80	<20	<20	<20
bis(2-Chloroethyl)ether	<10	<10	<2	<2	<2
1,2-Diphenylhydrazine	<10	<10	<2	<2	<2
Hexachlorocyclopentadiene	<10	<10	<2	<2	<2
N-Nitrosodiphenylamine	<10	<10	<2	<2	<2
Acenaphthylene	<10	<10	<2	<2	<2
Acenaphthene	<10	<10	<2	<2	<2
Butyl benzyl phthalate	<10	<10	<2	<2	<2
N-Nitrosodimethylamine	<10	<10	<2	<2	<2
Nitrosodi-n-propylamine	<10	<10	<2	<2	<2
bis(2-Chloroisopropyl)ether	<10	<10	<2	<2	<2

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION P SSS-4 (Soil)*	Q DW-I	R DW-II
1,2 Dichlorobenzene	<2	<10	<10
1,3 Dichlorobenzene	<2	<10	<10
1,4 Dichlorobenzene	<2	<10	<10
Hexachloroethane	<2	<10	<10
Hexachlorobutadiene	<2	<10	<10
Hexachlorobenzene	<2	<10	<10
1,2,4 Trichlorobenzene	<2	<10	<10
Bis(2-Chloroethoxy) Methane	<2	<10	<10
Naphthalene	<2	<10	<10
2 Chloronaphthalene	<2	<10	<10
Isophorone	<2	<10	<10
Nitrobenzene	<2	<10	<10
2,4 Dinitrotoluene	<2	<10	<10
2,6 Dinitrotoluene	<2	<10	<10
4 Bromophenyl Phenyl Ether	<2	<10	<10
Bis(2-Ethylhexyl) Phthalate	<2	<10	<10
Di-n-octyl Phthalate	<2	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION P SSS-4 (Soil)*	 Q DW-I	 R DW-II
Dimethyl phthalate	<2	<10	<10
Diethyl phthalate	<2	<10	<10
Di-n-butyl phthalate	<2	<10	<10
Fluorene	<2	<10	<10
Fluoranthene	<2	<10	<10
Chrysene	<2	<10	<10
Pyrene	<2	<10	<10
Phenanthrene	<2	<10	<10
Anthracene	<2	<10	<10
Benzo(a)anthracene	<2	<10	<10
Benzo(b)fluoranthene	<2	<10	<10
Benzo(k)fluoranthene	<2	<10	<10
Benzo(a)pyrene	<2	<10	<10
Indeno(1,2,3-c,d)pyrene	<2	<10	<10
Dibenzo(a,h)anthracene	<2	<10	<10
Benzo(g,h,i)perylene	<2	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II
4 Chlorophenyl Phenyl Ether	<2	<10	<10
3,3' Dichlorobenzidine	<4	<20	<20
Benzidine	<20	<80	<80
bis(2-Chloroethyl)ether	<2	<10	<10
1,2-Diphenylhydrazine	<2	<10	<10
Hexachlorocyclopentadiene	<2	<10	<10
N-Nitrosodiphenylamine	<2	<10	<10
Acenaphthylene	<2	<10	<10
Acenaphthene	<2	<10	<10
Butyl benzyl phthalate	<2	<10	<10
N-Nitrosodimethylamine	<2	<10	<10
Nitrosodi-n-propylamine	<2	<10	<10
bis(2-Chloroisopropyl)ether	<2	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
Antimony	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	0.006	<0.005	<0.005	<0.005	0.008
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.03	<0.03	<0.03	<0.03	<0.03
Copper	0.01	0.01	0.01	0.01	0.01
Lead	0.006	0.035	<0.005	<0.005	0.012
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.01	0.02	0.05	<0.01	0.01

NOTE: All results expressed in mg/L unless noted otherwise.

CAMD LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
Antimony	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	0.007	0.007	<0.005	0.005	<0.005
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.03	<0.03	<0.03	<0.03	<0.03
Copper	0.02	0.07	0.01	0.01	0.02
Lead	<0.005	0.11	<0.005	0.010	0.013
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.02	0.24	0.02	0.01	0.01

NOTE: All results expressed in mg/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
Antimony	<0.01	<0.01	<1	<1	<1
Arsenic	<0.005	<0.005	6.0	7.9	10.7
Beryllium	<0.01	<0.01	<1	<1	<1
Cadmium	<0.01	<0.01	<1	<1	<1
Chromium	<0.03	<0.03	5	7	7
Copper	0.02	0.02	25	18	27
Lead	0.033	<0.005	40	30	30
Mercury	<0.0002	<0.0002	<0.1	<0.1	<0.1
Nickel	<0.05	<0.05	13	17	18
Selenium	<0.005	<0.005	<0.5	<0.5	<0.5
Silver	<0.01	<0.01	1	1	2
Thallium	<0.01	<0.01	<1	<1	<1
Zinc	0.01	<0.01	106	103	124

NOTE: All results expressed in mg/L unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II
Antimony	<1	<0.01	<0.01
Arsenic	6	<0.005	<0.005
Beryllium	<1	<0.01	<0.01
Cadmium	<1	<0.01	<0.01
Chromium	9	<0.03	<0.03
Copper	27	0.02	0.02
Lead	30	0.13	0.008
Mercury	0.2	<0.0002	<0.0002
Nickel	22	<0.05	<0.05
Selenium	<0.5	<0.005	<0.005
Silver	2	<0.01	<0.01
Thallium	<1	<0.01	<0.01
Zinc	87	0.01	0.10

NOTE: All results expressed in mg/L unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

VOLATILES

DUPS: SAMPLE IDENTIFICATIONS

PARAMETERS	Test 1 MW-2D1	Test 2 MW-2D1	Test 1 MW-4S	Test 2 MW-4S
Chloromethane	<1	<1	<1	<1
Bromomethane	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1
Chloroethane	<1	<1	<1	<1
Methylene Chloride	<1	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1	<1
1,1-Dichloroethylene	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1
Trans-1,2-dichloroethylene	880	850	<1	<1
Dichlorodifluoromethane	<1	<1	<1	<1
Chloroform	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1
Carbon Tetrachloride	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

DUPS: SAMPLE IDENTIFICATIONS

PARAMETERS	Test 1 MW-2D1	Test 2 MW-2D1	Test 1 MW-4S	Test 2 MW-4S
Trans-1,3-dichloropropene	<1	<1	<1	<1
Trichloroethylene	90	88	<1	<1
Dibromochloromethane	<1	<1	<1	<1
Cis-1,3-dichloropropene	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1
Benzene	<1	<1	<1	<1
2-Chloroethylvinyl Ether	<10	<10	<10	<10
Bromoform	<5	<5	<5	<5
Tetrachloroethylene	<1	<1	14	13
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1
Toluene	3,000	3,300	<1	<1
Chlorobenzene	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1
Acrolein	<100	<100	<100	<100
Acrylonitrile	<100	<100	<100	<100

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SPIKES: SAMPLE IDENTIFICATIONS

PARAMETERS	Sample Conc. MW-5D	Known Spike	Obtained	% Recovery
Chloromethane	<1			
Bromomethane	<1			
Vinyl Chloride	<1			
Chloroethane	<1			
Methylene Chloride	<1	29.4	32.2	110%
Trichlorofluoromethane	<1			
1,1-Dichloroethylene	<1	29.3	26.9	92%
1,1-Dichloroethane	<1	29.6	26.5	90%
Trans-1,2-dichloroethylene	<1	30.0	29.0	97%
Dichlorodifluoromethane	<1			
Chloroform	<1	30.0	32.4	108%
1,2-Dichloroethane	<1	29.9	27.1	91%
1,1,1-Trichloroethane	<1	49.8	50.6	102%
Carbon Tetrachloride	<1			
Bromodichloromethane	<1			
1,2-Dichloropropane	<1			

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SPIKE:

SAMPLE IDENTIFICATIONS

PARAMETERS	Sample Conc. MW-5D	Known Spike	Obtained	% Recovery
Trans-1,3-dichloropropene	<1			
Trichloroethylene	<1	48.6	51.5	106%
Dibromochloromethane	<1			
Cis-1,3-dichloropropene	<1			
1,1,2-Trichloroethane	<1			
Benzene	<1			
2-Chloroethylvinyl Ether	<10			
Bromoform	<5			
Tetrachloroethylene	<1	49.4	47.2	96%
1,1,2,2-Tetrachloroethane	<1			
Toluene	<1			
Chlorobenzene	<1			
Ethylbenzene	<1			
Acrolein	<100			
Acrylonitrile	<100			

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

DUPS: SAMPLE IDENTIFICATION

PARAMETERS	SS-1 Test 1 ug/L	SS-1 Test 2 ug/L	SSS-1 Test 1 mg/kg	SSS-1 Test 2 mg/kg
1,2 Dichlorobenzene	<10	<10	<2	<2
1,3 Dichlorobenzene	<10	<10	<2	<2
1,4 Dichlorobenzene	<10	<10	<2	<2
Hexachloroethane	<10	<10	<2	<2
Hexachlorobutadiene	<10	<10	<2	<2
Hexachlorobenzene	<10	<10	<2	<2
1,2,4 Trichlorobenzene	<10	<10	<2	<2
Bis(2-Chloroethoxy) Methane	<10	<10	<2	<2
Naphthalene	<10	<10	<2	<2
2 Chloronaphthalene	<10	<10	<2	<2
Isophorone	<10	<10	<2	<2
Nitrobenzene	<10	<10	<2	<2
2,4 Dinitrotoluene	<10	<10	<2	<2
2,6 Dinitrotoluene	<10	<10	<2	<2
4 Bromophenyl Phenyl Ether	<10	<10	<2	<2
Bis(2-Ethylhexyl) Phthalate	<10	<10	<2	<2
Di-n-octyl Phthalate	<10	<10	<2	<2

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

DUPS: SAMPLE IDENTIFICATION

PARAMETERS	SS-1 Test 1 ug/L	SS-1 Test 2 ug/L	SSS-1 Test 1 mg/kg	SSS-1 Test 2 mg/kg
Dimethyl phthalate	<10	<10	<2	<2
Diethyl phthalate	<10	<10	<2	<2
Di-n-butyl phthalate	<10	<10	<2	<2
Fluorene	<10	<10	<2	<2
Fluoranthene	<10	<10	<2	<2
Chrysene	<10	<10	<2	<2
Pyrene	<10	<10	<2	<2
Phenanthrene	<10	<10	<2	<2
Anthracene	<10	<10	<2	<2
Benzo(a)anthracene	<10	<10	<2	<2
Benzo(b)fluoranthene	<10	<10	<2	<2
Benzo(k)fluoranthene	<10	<10	<2	<2
Benzo(a)pyrene	<10	<10	<2	<2
Indeno(1,2,3-c,d)pyrene	<10	<10	<2	<2
Dibenzo(a,h)anthracene	<10	<10	<2	<2
Benzo(g,h,i)perylene	<10	<10	<2	<2

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

DUPS: SAMPLE IDENTIFICATION

PARAMETERS	SS-1 Test 1 ug/L	SS-1 Test 2 ug/L	SSS-1 Test 1 mg/kg	SSS-1 Test 2 mg/kg
4 Chlorophenyl Phenyl Ether	<10	<10	<2	<2
3,3' Dichlorobenzidine	<20	<20	<4	<4
Benzidine	<80	<80	<20	<20
bis(2-Chloroethyl)ether	<10	<10	<2	<2
1,2-Diphenylhydrazine	<10	<10	<2	<2
Hexachlorocyclopentadiene	<10	<10	<2	<2
N-Nitrosodiphenylamine	<10	<10	<2	<2
Acenaphthylene	<10	<10	<2	<2
Acenaphthene	<10	<10	<2	<2
Butyl benzyl phthalate	<10	<10	<2	<2
N-Nitrosodimethylamine	<10	<10	<2	<2
Nitrosodi-n-propylamine	<10	<10	<2	<2
bis(2-Chloroisopropyl)ether	<10	<10	<2	<2

CAMO LOG NO.: 88-6-2831

CAMO GC/MS SPIKE

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SPIKE: SAMPLE IDENTIFICATION

PARAMETERS	Known Spike	Obtained	% Recovery
Dimethyl Phthalate	100	22	22%
Fluoranthene	100	26	26%
Chrysene	100	37	37%
Anthracene	100	39	39%
Benzo(b)fluoranthene	100	32	32%
Benzo(g,h,i)perylene	100	36	36%
4-Chlorophenyl phenyl ether	100	32	32%
1,4-Dichlorobenzene	100	39	39%
Naphthalene	100	35	35%

NOTE: All results are expressed in ug/L unless otherwise indicated.

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

DUPS:

PARAMETERS	MW-2D1 Test 1	MW-2D1 Test 2
Antimony	<0.01	<0.01
Arsenic	<0.005	<0.005
Beryllium	<0.01	<0.01
Cadmium	<0.01	<0.01
Chromium	<0.03	<0.03
Copper	0.01	0.01
Lead	<0.005	<0.005
Mercury	<0.0002	<0.0002
Nickel	<0.05	<0.05
Selenium	<0.005	<0.005
Silver	<0.01	<0.01
Thallium	<0.01	<0.01
Zinc	0.05	0.05

NOTE: All results expressed in mg/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

SPIKES:

PARAMETERS	MW-2D1 Sample Conc.	Known Spike	Obtained	% Recovery
Antimony	<0.01	0.02	0.02	100%
Arsenic	<0.005 (0.003)	0.020	0.023	100%
Beryllium	<0.01	0.40	0.40	100%
Cadmium	<0.01	0.40	0.38	95%
Chromium	<0.03	0.40	0.42	105%
Copper	0.01	0.40	0.43	108%
Lead	<0.005	0.02	0.021	105%
Mercury	<0.0002	0.0050	0.0050	100%
Nickel	<0.05	0.40	0.41	103%
Selenium	<0.005	0.020	0.017	85%
Silver	<0.01			
Thallium	<0.01	0.02	0.02	100%
Zinc	0.05	0.40	0.46	103%

NOTE: All results expressed in mg/L unless noted otherwise.

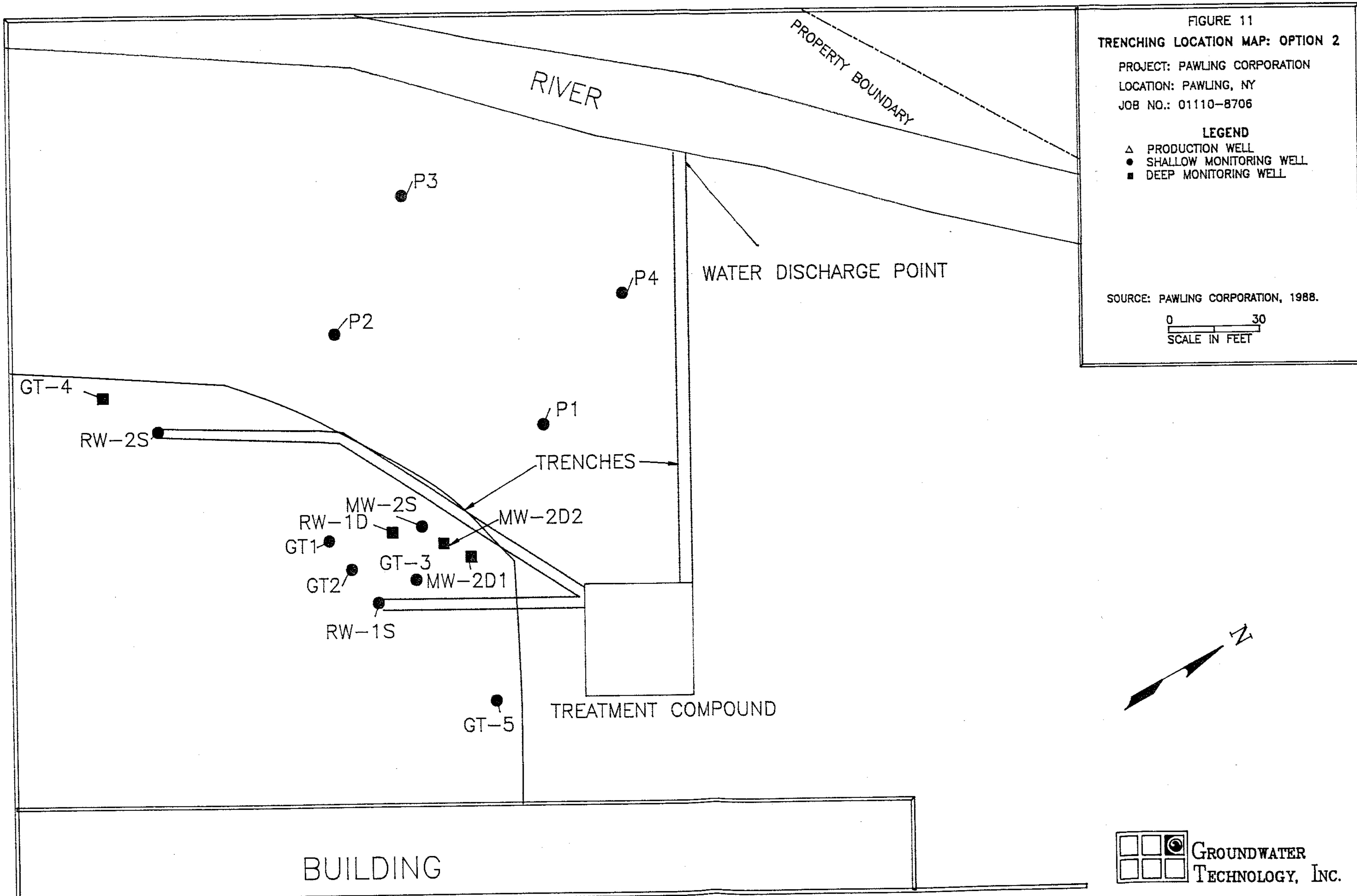


FIGURE 11
TRENCHING LOCATION MAP: OPTION 2
PROJECT: PAWLING CORPORATION
LOCATION: PAWLING, NY
JOB NO.: 01110-8706
LEGEND
PRODUCTION WELL
SHALLOW MONITORING WELL
DEEP MONITORING WELL
SOURCE: PAWLING CORPORATION, 1988.
0
30
SCALE IN FEET
RIVER
PROPERTY BOUNDARY
WATER DISCHARGE POINT
P3
P4
P2
P1
GT-4
RW-2S
TRENCHES
MW-2S
RW-1D
MW-2D2
GT1
GT-3
GT2
MW-2D1
RW-1S
GT-5
TREATMENT COMPOUND
BUILDING
N
GROUNDWATER TECHNOLOGY, INC.

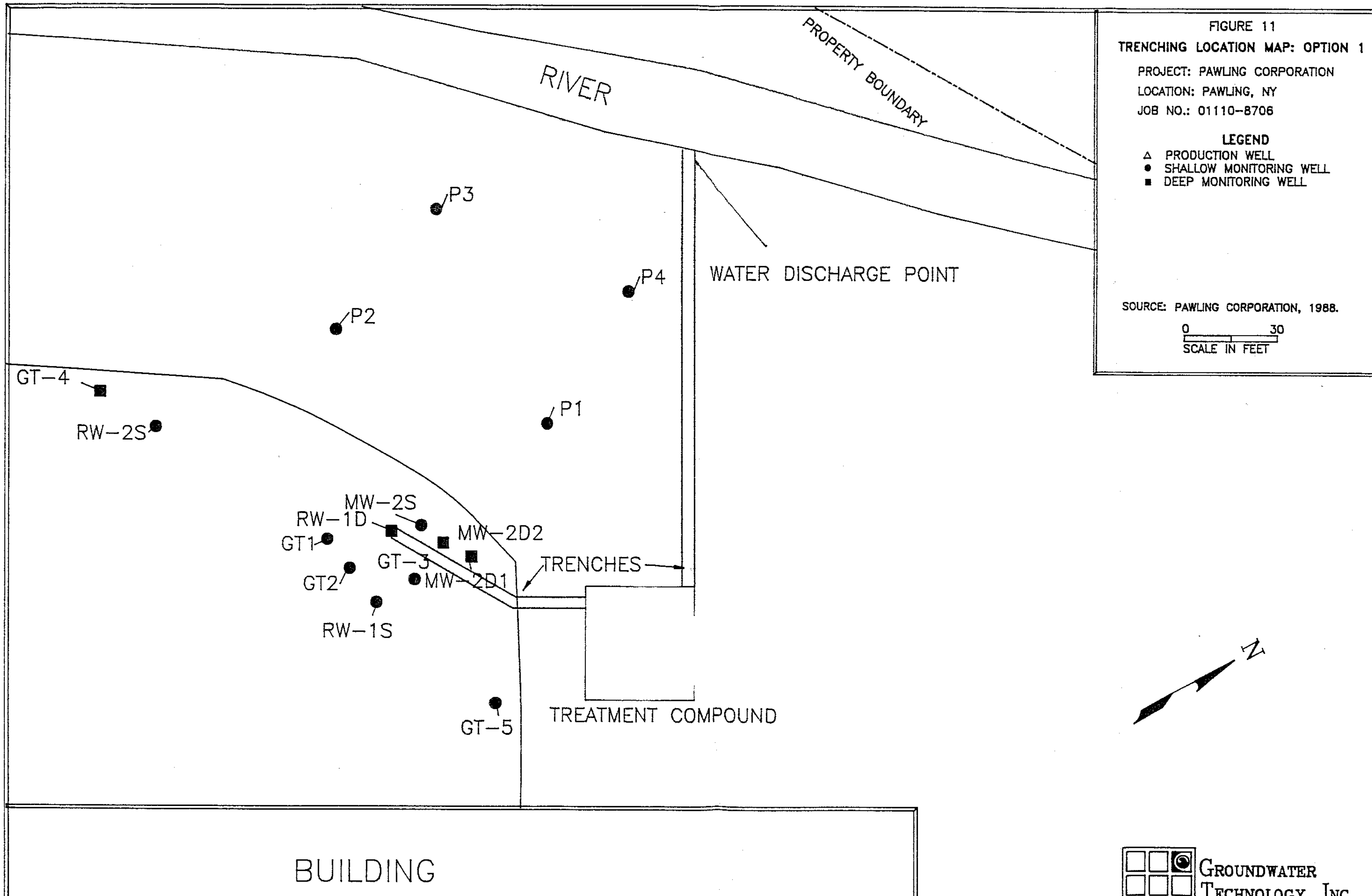


FIGURE 11
TRENCHING LOCATION MAP: OPTION 1
PROJECT: PAWLING CORPORATION
LOCATION: PAWLING, NY
JOB NO.: 01110-8706
LEGEND
PRODUCTION WELL
SHALLOW MONITORING WELL
DEEP MONITORING WELL
SOURCE: PAWLING CORPORATION, 1988.
0
30
SCALE IN FEET
RIVER
PROPERTY BOUNDARY
WATER DISCHARGE POINT
P3
P4
P2
P1
GT-4
RW-2S
MW-2S
RW-1D
GT1
MW-2D2
GT-3
GT2
MW-2D1
TRENCHES
RW-1S
GT-5
TREATMENT COMPOUND
BUILDING
N
GROUNDWATER TECHNOLOGY, INC.

DRAFT

GROUND WATER INVESTIGATION AND
REMEDIAL DESIGN REPORT
PAWLING CORPORATION
Pawling, New York

August 28, 1990

Prepared for:

Ms. Susan Thompson
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DRAFT

GROUND WATER INVESTIGATION AND REMEDIAL DESIGN REPORT
PAWLING CORPORATION
Pawling, New York

September 12, 1990

Prepared for:

Ms. Susan Thompson
Pawling Corporation
157 Charles Colman Boulevard
Pawling, New York 12564-1188

Submitted by:

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- MW-3 and MW-4 were placed as couplets to the production wells
- MW-5S and MW-5D were placed upgradient of all known site disposal activities
- B-1 was placed near the storm grate, and
- B-2 was placed near the trenching area.

2.2 Preliminary Remedial Investigation

The Preliminary Remedial Investigation included seven soil borings, five overburden monitor wells, four bedrock monitor wells, ground water gauging and sampling, and stream sediment and water sampling. The investigation was designed to evaluate the contaminant concentrations present at this site, and to determine the pathways of on-site and off-site migration.

Detailed procedures for each task performed during the Preliminary Investigation are presented in Sections 2.2.1 through 2.2.6. The remaining sections of the Preliminary Remedial Investigation specify decontamination, quality assurance/quality control, and health and safety measures utilized throughout the investigation.

2.2.1 Soil Borings

A total of seven soil borings were drilled in the overburden materials in order to determine geologic and chemical characteristics of the soils across the site. The five overburden shallow well locations and two boring locations are shown on Figure 2. The location of each soil boring was approved by the on-site DEC engineer, Shayne Mitchell, prior to drilling.

The soil borings were drilled with Groundwater Technology, Inc.'s Mobile B-47 hollow-stem auger drill rig. The auger size was 4.25 inch I.D. and 7.63 inch O.D. Soil samples were collected with a split-spoon sampler advanced using a 140 pound drive hammer, as per Standard ASTM Method. Soil samples were collected at five-foot intervals or at significant lithologic changes, until bedrock was encountered. A project hydrogeologist supervised all drilling activities.

The upper four to eight feet of unconsolidated material at each location consisted of fill material. The fill material was comprised of dark brown fine sand, stones, and rubber pieces. The underlying materials in MW-1, MW-3, and MW-5 consisted of stratified alluvium. Soil textures ranged from predominantly fine sand and silt in MW-1 to sand and gravel in MW-3 and MW-5. The underlying materials in MW-2, MW-4, B-1, and B-2 were comprised of fine sands. Auger refusal was encountered in each boring; the depth ranged from 4.5 feet in B-2 to 18.5 feet in MW-3S. At the time of drilling, auger refusal was believed to be bedrock. The average depth to the water table encountered during drilling was eight feet. The drilling logs provide the specific information for each borehole (Appendix C).

During drilling operations, soil samples were collected from each major lithologic unit and sent to a laboratory for grain size analysis. Appendix D contains the grain size distribution curves developed from the standard sieve analyses. The hydraulic conductivities calculated from these curves are shown in Table 1.

TABLE 1

HYDRAULIC CONDUCTIVITY VALUES
DERIVED FROM GRAIN-SIZE ANALYSIS

Sample			Hydraulic Conductivity (cm/sec)
MW-1 S-2	10-12 feet	....	2.5×10^{-3}
MW-2	10-12 feet	....	9.0×10^{-4}
MW-3 S-2	10-12 feet	....	1.6×10^{-3}
MW-3 S-3	15-17 feet	....	4.9×10^{-3}
B-1 S-2	10-12 feet	....	4.9×10^{-3}
MW-5 S-2	10-12 feet	....	4.9×10^{-3}
MW-5 S-3	15-17 feet	....	2.5×10^{-3}

Soil samples obtained from the split-spoon sampler were also field screened with a portable Gas Chromatograph (GC). This instrument detected volatile organic compounds at the part per billion level. The GC extracted a small sample of soil gas from each sample vial. The gas was passed through a chromatographic column and then over a chemical detector. The level of response and the time it took the sample to pass through the column were used to determine relative concentrations and types of compounds. The GC was calibrated for Trans 1,2 Dichloroethylene, 1,1,1 Trichloroethane, Trichloroethene, Tetrachloroethene, and Toluene.

The results of the analysis are shown in Table 2. Only the soil samples from MW-2 showed levels above the detection limit [1 part per billion (ppb)]. Sample SS-1, collected from five to seven feet, showed 1.10 ppb of TCE; sample SS-2, collected from 10 to 12 feet, showed 11.78 ppb TCE and 414.69 ppb of Toluene. Some preliminary water sampling results from the GC screening are also shown in Table 2.

Upon retrieval of the spoon sampler device from the bore-hole at each sampling depth, proper containers were filled with soil for volatile organic and inorganic parameter analysis. These samples were stored on ice. The soil samples that exhibited the highest levels during the field screening were sent to the laboratory for analysis. If no levels were detected, the deepest sample with sufficient volume for sample analysis was sent.

Based upon the above rationale, the following samples were submitted for laboratory analysis: B-1 SS-2, MW-1 SS-2, MW-2 SS-2, MW-3 SS-3, and MW-5 SS-3. An additional soil sample from MW-2 collected at 19.5 feet (MW-2 Core Hole) was also analyzed. A sample from MW-4S was not selected because of its proximity to B-1. Section 2.2.2 discusses the results of the laboratory testing.

TABLE 2

SOIL & WATER ANALYSIS FROM PORTABLE GAS CHROMATOGRAPH

SAMPLE ID	DATE SAMPLED	1,2 DCE PPB*	1,1,1 TCA PPB*	TCE PPB*	PCE PPB*	TOLUENE PPB*	TOTAL DCE,TCA TCE,PCE TOLUENE PPB
B-1 SS-1	6-6-88	ND	ND	ND	ND	ND	ND
B-1 SS-2	6-6-88	ND	ND	ND	ND	ND	ND
B-2 SS-1	6-7-88	ND	ND	ND	ND	ND	ND
MW-1S SS-1	6-6-88	ND	ND	ND	ND	ND	ND
MW-1S SS-2	6-6-88	ND	ND	ND	ND	ND	ND
MW-1S SS-3	6-6-88	BDL	ND	BDL	BDL	ND	BDL
MW-2S SS-1	6-6-88	ND	ND	1.10	ND	ND	1.10
MW-2S SS-2	6-6-88	ND	BDL	11.78	ND	414.69	426.47
MW-3S SS-1	6-7-88	ND	ND	ND	BDL	ND	BDL/ND
MW-3S SS-2	6-7-88	ND	ND	ND	BDL	ND	BDL
MW-3S SS-3	6-7-88	ND	ND	ND	BDL	ND	BDL
MW-3S SS-4	6-7-88	ND	ND	ND	ND	ND	ND

* DETECTION LIMITS - 1 PPB ON THE FIELD GAS CHROMATOGRAPH

(CONTINUED) TABLE 2

SAMPLE ID	DATE SAMPLED	1,2 DCE PPB	1,1,1 TCA PPB	TCE PPB	PCE PPB	TOLUENE PPB	TOTAL DCE, TCA TCE, PCE TOLUENE PPB
MW-4S SS-1	6-8-88	ND	ND	ND	ND	ND	ND
MW-4S SS-2	6-8-88	ND	ND	ND	ND	ND	ND
MW-5S SS-1	6-8-88	ND	ND	ND	ND	ND	ND
MW-5S SS-2	6-8-88	ND	ND	ND	ND	ND	ND
MW-5S SS-3	6-8-88	ND	ND	ND	ND	ND	ND
MW-1S WATER	6-6-88	BDL	ND	BDL	BDL	ND	BDL
MW-2S WATER UNDEV.	6-7-88	9.8	2407.55*	81.72	ND	5676.0	8175.07
MW-2S WATER	6-8-88	13.70	3516.70*	93.50	ND	22140.0	25763.9
MW-3S WATER UNDEV.	6-8-88	ND	ND	BDL	4.85	ND	4.85
MW-4S WATER	6-8-88	ND	ND	ND	1.4	ND	1.4
MW-5S WATER	6-8-88	ND	ND	ND	BDL	ND	BDL
FIRE HYD. WATER	6-8-88	ND	ND	ND	ND	ND	ND

* COELUTION OF LIGHT ALIPHATIC & AROMATIC HYDROCARBONS WITH 1,1,1 TCA
ND- NOT DETECTABLE
BDL- BELOW DETECTABLE LIMITS (Detection limits for all compounds is 1 ppb with field GC)
1,2 DCE- TRANS 1,2 DICHLOROETHYLENE
1,1,1 TCA - 1-1-1 TRICHLOROETHANE
TCE - TRICHLOROETHENE
PCE - TETRACHLOROETHENE

The two boreholes not completed as monitor wells (B-1 and B-2) were abandoned by grouting with a cement-bentonite mixture. The cuttings from the boreholes were field screened to determine proper disposal procedures. All the soils, except those from MW-2, recorded less than 1 part per million (ppm) volatiles and were therefore disposed of on-site. The cuttings from MW-2 were containerized and stored on-site for later disposal.

2.2.2 Soil Sampling

The selected soil samples were delivered to Camo Laboratories in Poughkeepsie, New York for confirmatory analysis for Purgeable Organics by EPA Method 624, for Base Neutral Extractable Organic analysis by EPA Method 625, and for Priority Pollutant Metals analysis.

The results indicated that no Purgeable Volatiles or Base Neutral compounds were detected in any of the soil samples. This data confirms the non-detectable levels recorded by the field GC for B-1, MW-1, MW-3, and MW-5; however, it contradicts the field GC data for MW-2. The laboratory results report non-detectable levels for MW-2 SS-2, while the field GC reported 414.69 ppb Toluene and 11.78 ppb TCE.

The laboratory results of the Priority Pollutant Metals analyses in soils are shown in Table 3. Concentrations of Antimony, Selenium, Silver, and Thallium were all reported as below the detection limits. The complete laboratory report is included in Appendix E.

TABLE 3

PRIORITY POLLUTANT METALS IN SOILS
(in ppm)

	Ar	Be	Cd	Cr	Cu
B-1 SS-2	1.4	1	3	10	16
MW-1 SS-1	25.0	<1	2	13	23
MW-2 SS-2	12.0	<1	2	12	17
MW-3 SS-3	2.2	<1	2	9	19
MW-5 SS-3	6.6	<1	2	10	16
MW-2 Core Hole	33.0	<1	3	14	17
Bohn Background Range	--	3-40	0.01-7	5-1,000	2-100
Baker & Chesnin Background Range	1-50	6 (av)	0.01-0.07	5-1,000	2-100

TABLE 3 (continued)

PRIORITY POLLUTANT METALS IN SOILS
(in ppm)

	Pb	Hg	Ni	Zn
B-1 SS-2	30	<0.1	21	26
MW-1 SS-1	20	0.1	29	79
MW-2 SS-2	20	0.3	18	38
MW-3 SS-3	20	<0.1	21	26
MW-5 SS-3	10	0.2	18	35
MW-2 Core Hole	10	<0.1	23	45
Bohn Background Range	2-200	0.02-0.2	10-1,000	10-300
Baker & Chesnin Background Range	2-200	0.03-0.3	5-500	10-300

The metal concentrations in Table 3 represent total metals in the soils. A range of naturally occurring metal concentrations have been reported by Bohn (1979) and Baker and Chesnin (1975). These ranges are also listed in Table 3. All of the on-site soil samples lie within these reported background levels. The soil sample from the upgradient location (MW-5 SS-3) contains levels of most of the metals sampled, at concentrations that are within an order of magnitude of the levels detected in soil samples from other well or boring locations at the site.

The results of the Camo laboratory analysis on the soil samples indicates that there is no Volatile, Semi-Volatile or Priority Pollutant Metal contamination in the soils at the locations sampled.

2.2.3 Monitor Well Installation

The objectives of this work scope were to install monitor wells in the aquifer in the overburden material as well as deep monitor wells into the bedrock. The result of this work scope would determine:

- the overburden aquifer flow direction
- the bedrock aquifer flow direction
- the interaction between both aquifers, and
- the extent of contamination, both vertically and horizontally.

2.2.3.1 Overburden Wells

Five overburden wells were installed on June 6 through 8, 1988 inside the boreholes drilled by a hollow-stem auger rig at the five selected locations (Figure 2). Each monitor well was constructed of two-inch fiberglass reinforced epoxy (FRP) well screen and casing with flush threaded joints. The well screen was placed from five feet above the water table to the depth of auger refusal. A bentonite seal, one foot in thickness, was placed above the sand pack. A cement-bentonite grout was placed above this bentonite seal. A lockable protective metal casing was installed at the top of MW-1S, the other wells received eight-inch or five-inch flush-mounted road boxes. Well construction details are shown on the drilling logs (Appendix C).

2.2.3.2 Bedrock Wells

Three bedrock wells were drilled in close proximity to the overburden wells shown in Figure 2. Two monitor well nests (MW-3 and MW-4) utilize the production wells as the bedrock wells (PW-1 and PW-2). The drilling was performed in two phases:

- Coring of the upper 15 feet of rock by Groundwater Technology, Inc.'s Mobile B-47 drill rig
- Air rotary drilling with monitor well completion performed by Goold and Sons Well Drillers.

The coring was performed on June 9, 10, and 14, 1988. Augers were advanced until a good seal into the rock was achieved. A five-foot long N-X core barrel was then utilized to obtain core samples. A Groundwater Technology, Inc. hydrogeologist supervised all coring operations. The core samples were labeled and stored in wooden boxes for subsequent examination.

The results of the coring determined that a boulder layer, ranging in thickness from 5 to 14 feet, is present above the bedrock. The bedrock encountered was a banded and brecciated marble, with fracture zones containing iron staining and silt. The drilling logs in Appendix C denote the depths and abundance of observed fractures.

The Rock Quality Designator (RQD) was determined for each core barrel sample. The RQD represents a modified form of recording core recovery. The equation to calculate RQD is:

$$\% \text{ RQD} = 100 \times \frac{\text{length of core in pieces 4 inches and longer}}{\text{hole length actually drilled}}$$

The % RQD for the collected core samples ranged from 0 to 98.1 %. The very low percentages of 0 % in MW-2D and 8.3 % in MW-1D represent a boulder layer. The other percentages indicate a weathered upper bedrock surface which (within 15 feet) becomes fairly competent.

The remaining drilling and monitor well installations were performed using an air rotary drill rig. Alan Goold and Sons installed the bedrock wells on June 16, 17, 20, and 21, 1988 under Groundwater Technology, Inc. supervision. The overburden sections of the bedrock wells were drilled using a roller bit inside the same borehole used for the rock coring. Due to a boulder layer above the bedrock, this technique caused the hole to cave; therefore, mud rotary was used in the overburden sections of the boreholes at MW-2D1, MW-2D2, and MW-5D.

The overburden sections of the bedrock wells were completed by driving a six-inch steel casing with an attached drive shoe into competent bedrock. An air rotary bit was used to complete the wells open hole by drilling inside the casing into bedrock. Total depth of the three proposed wells was 150 feet.

Two bedrock wells were installed at the MW-2 well location. A highly fractured zone, from 35 feet to 42 feet, was encountered in MW-2D1, which contained high levels of contamination. A field decision was rendered that this zone might not be connected to underlying fractures; therefore, drilling was ceased and the well completed at only 42 feet. An additional well (MW-2D2) was drilled adjacent to MW-2D1, which was cased through this upper fractured zone and drilled to the proposed completion depth of 150 feet.

The geology and fracture determination discerned from the cuttings, drilling water, and rate of drilling are shown in the drilling logs in Appendix C. Various colored marble was encountered at all three locations. MW-2D and MW-5D contained a highly fractured and major water bearing zone at approximately 30 to 42 feet. At the MW-2 location, 5 ppm of volatile organics was measured on the headspace of the drilling waters from this zone with the PID utilized for the ambient air monitoring (see Section 2.2.9). A fracture was encountered at 42 feet in MW-1; however, it was not a major water bearing fracture. At MW-1, the water bearing zones were present at 85 to 145 feet.

The mud used during casing installation was containerized and proper disposal procedures were followed. All drilling waters were placed into polyethylene holding ponds and treated with activated carbon. The waters were discharged to the ground or the sanitary sewer, as directed by the DEC.

2.2.4 Well Development/Elevation and Location Survey

The wells were developed immediately after installation in order to remove fine sediments and other associated drilling materials. The overburden wells were developed by repeated surging and bailing with a bailer. The bedrock wells were developed by air jetting until the water was free of sediment. MW-2S was developed a second time on June 28, 1988 using a water jet. Drilling muds from MW-2D2 had filled the well screen and necessitated the redevelopment.

The development water was retained in polyethylene lined holding ponds and treated using activated carbon. The water was discharged to the ground or the sanitary sewer. The sediment remaining in the polyethylene was containerized for future laboratory analysis. The wells were undisturbed from June 20, 1988 to June 28, 1988 to allow equilibration with the surrounding aquifer.

Following the installation of the monitor wells, top-of-casing and ground elevations were surveyed to a common benchmark by J.K. Devine, a licensed land surveyor, (see Survey Data, Appendix F).

2.2.5 Ground Water Gauging and Sampling

The monitor wells were gauged on June 28 and August 1, 1988 in order to determine the ground water gradient(s). The water level in each well was gauged using an ORS interface probe (see Ground Water Gradient Data, Appendix G). This instrument can detect air/water/product interfaces with an accuracy of ± 0.01 feet. This probe was also used to determine if a phase-separated immiscible layer was present in each well. Based on the gauging data from August 1, 1988, an immiscible layer was not detected in any of the wells.

The gauging data from August 1, 1988 was utilized to produce ground water contour maps for the overburden and bedrock wells (Figures 3 and 4). The June 28 data was not used because of missing water level data. The MW-2S water level for both dates is suspect due to the presence of drilling mud.

The overburden aquifer portrayed a ground water flow direction to the north-northwest at a 0.6 % gradient. The ground water in the bedrock wells indicated a north-northwest flow direction at a 0.55 % gradient. This data indicates that MW-5S and MW-5D are upgradient of only part of the Pawling site.

The observed elevation difference between the overburden and bedrock wells was 0.01 feet at MW-1, 1.07 feet at MW-2, and 0.14 feet at MW-5. The MW-2S elevation may not accurately represent the overburden water level due to the presence of drilling mud. The bedrock wells have slightly higher water level elevations than the overburden wells, indicating the existence of a vertical gradient.

The monitor wells were sampled on June 28 and 29, 1988. Prior to sample collection, three well volumes of water were evacuated from each well. This water was discharged to polyethylene lined holding ponds and treated using activated

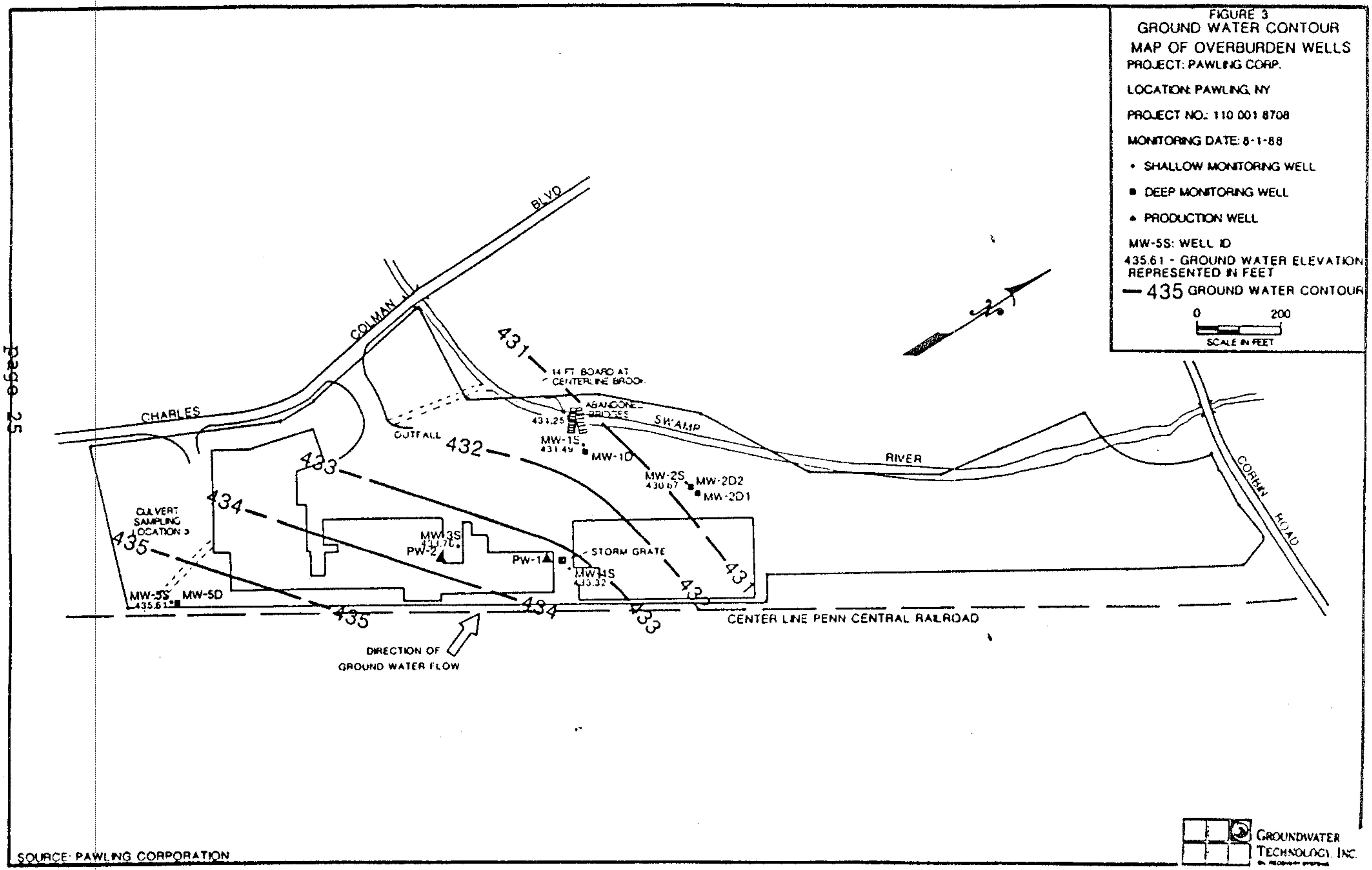
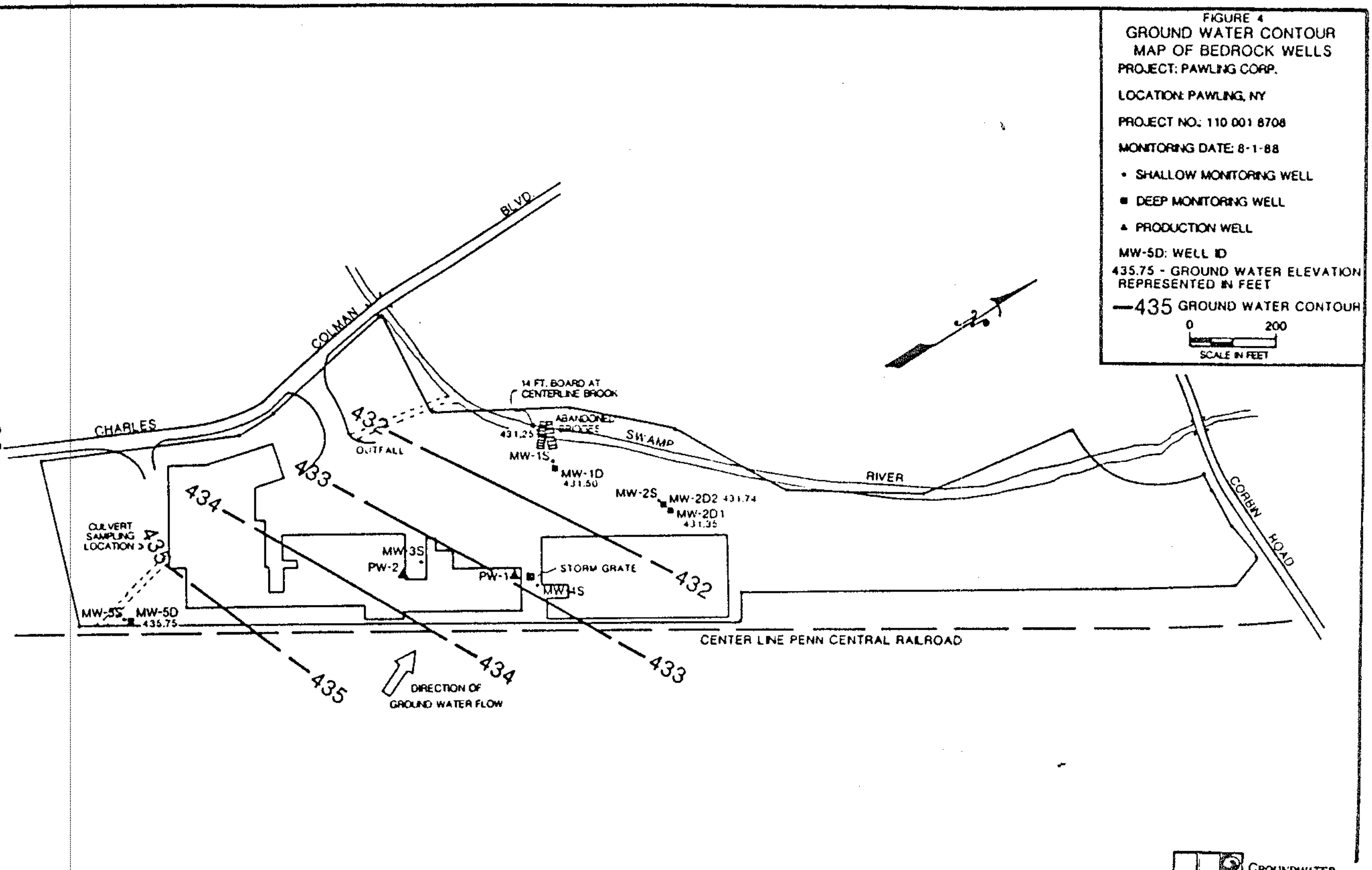


FIGURE 3
GROUND WATER CONTOUR
MAP OF OVERBURDEN WELLS
PROJECT: PAWLING CORP.
LOCATION: PAWLING, NY
PROJECT NO.: 110 001 8708
MONITORING DATE: 8-1-88
• SHALLOW MONITORING WELL
■ DEEP MONITORING WELL
▲ PRODUCTION WELL
MW-5S: WELL ID
435.61 - GROUND WATER ELEVATION REPRESENTED IN FEET
— 435 GROUND WATER CONTOUR
0
200
SCALE IN FEET
CHARLES
COLMAN
BLVD
CORBIN
ROAD
SWAMP
RIVER
OUTFALL
14 FT. BOARD AT CENTERLINE BROOK
431.25
MW-1S
431.49
MW-1D
MW-2S
430.67
MW-2D2
MW-2D1
MW-3S
PW-2
PW-1
STORM GRATE
433.32
CULVERT SAMPLING LOCATION 3
MW-5S
435.61
MW-5D
431
432
433
434
435
CENTER LINE PENN CENTRAL RAILROAD
DIRECTION OF GROUND WATER FLOW
GROUNDWATER TECHNOLOGY, INC.
SOURCE: PAWLING CORPORATION



SOURCE: PAWLING CORPORATION

carbon. A submersible pump was used to evacuate the water from the bedrock monitor wells and a bailer was used for the evacuation of the overburden wells.

The wells were sampled from least to most contaminated based upon contamination levels observed during drilling. The sampling order for the deep wells was MW-5D, MW-1D, MW-2D2, MW-2D1. The sampling sequence for the overburden wells was MW-5, MW-3, MW-1, MW-4. MW-2 was not sampled due to the inability to remove the drilling mud; however, sampling results were recorded on the field GC.

Samples were collected using decontaminated teflon bailers and clean rope. Decontamination procedures are described in Section 2.2.7. Water samples were poured directly from the bailer into properly prepared laboratory jars, and placed on ice until delivery to the laboratory. Proper chain of custody procedures were employed throughout the sampling.

The two production wells at the Pawling facility were sampled from a sampling port located in the piping on June 30, 1988. These wells were constantly in use during the day, and it was assumed that at least three to five well volumes had been removed prior to sample collection.

Analyses for all samples included Purgeable Organics by EPA Method 624, Base Neutral Extractable Organics by EPA Method 625, and Priority Pollutant Metals. Two samples were collected for metals analysis from the monitor wells: one unfiltered and one filtered. Hydrochloric acid and Nitric acid were used as preservatives in the 624 analysis and the metals analysis, respectively. Camo Laboratories in Poughkeepsie, New York performed all analyses.

The laboratory results indicated that all compounds in the Base Neutral 625 analysis were below detection limits. The ground water sampling results of the volatile organics and metals are summarized in Tables 4 and 5. Appendix H contains full laboratory results.

Six volatile organic compounds were detected in the ground water samples: 1,1 Dichloroethylene (1,1 DCE), Trans 1,2 Dichloroethylene (Trans 1,2 DCE), 1,1,1 Trichloroethane (1,1,1 TCA), Trichloroethene (TCE), Tetrachloroethene (PCE), and Toluene.

Toluene was the volatile compound present at the highest concentration, 3,000 ppb in MW-2D1 and 22,140 ppb in MW-2S (Table 4). Toluene was not detected at any other well location. Trans 1,2 DEC (DCE), ~~1,1,1 TCA~~, TCE, and PCE were detected at various concentrations in many of the wells, ranging from 2 ppb to 3,517 ppb (Table 4) The production wells contained only these four compounds. Trans 1,2 DCE generally exhibited the highest concentrations of the four compounds. Trans, 1,2 DCE is a breakdown product of TCE and PCE. MW-2D contained the highest level of Trans 1,2 DCE 880 ppb. Only one well, MW-1S, contained 1,1 DCE at 8 ppb. The upgradient overburden well, MW-5S, contained 14 ppb PCE.

The MW-2 location, particularly the overburden well, contained the highest concentrations of total volatiles on the site. PW-2 contains the next highest concentrations. The high pumping rate of this well may be drawing the contamination from the MW-2 area.

The DEC Ground Water Quality Standards and Guidance Values for the detected volatile organics are shown in Table 4. The regulations require that no individual standard or guidance value be exceeded, and that the total of the listed volatiles not exceed 100 ppb. According to these regulations, the water quality in MW-1D is within DEC drinking water limits.

The metals which were detected above the laboratory detection limits were Arsenic, Copper, Lead, and Zinc. The concentrations of Arsenic, Copper, and Zinc are below the DEC ground water quality standards. The concentrations stated in the regulations are listed in Table 5. The only sample results which exceed the DEC standards are the Lead contents in MW-1D, MW-5S, and PW-1. The concentration in MW-5S (0.11ppm), the upgradient well, is approximately the same concentration as in PW-1 (0.13 ppm). The Lead concentrations may vary due to natural background variations in the Lead mineral content in the overburden materials and bedrock.

TABLE 4

VOLATILE ORGANICS IN GROUND WATER
(in ppb)

	1,1 DCE	Trans 1,2 DCE	1,1,1 TCA	TCE	PCE	Toluene	Total Volatiles
MW-1S	8	8	--	--	--	--	16
MW-1D	--	6	--	6	--	--	12
MW-2S*	NA	14	3,517	94	--	22,140	25,765
MW-2D1	--	880	--	90	--	3,000	3,970
MW-2D2	--	100	3	44	29	--	176
MW-3S	--	4	5	2	16	--	27
MW-4S	--	--	--	--	14	--	14
MW-5S	--	--	--	--	14	--	14
MW-5D	--	--	--	--	--	--	--
PW-1	--	5	5	2	2	--	14
PW-2	--	52	12	10	31	--	105
DEC Ground Water Quality Standards and Guidance Values	0.07	50	50	10	0.7	50	100

* Analysis from field GC.

TABLE 5

PRIORITY POLLUTANT METALS IN GROUND WATER
(in ppm)

	Arsenic	Copper	Lead	Zinc
MW-1S	0.006	0.01	0.006	0.01
MW-1D	--	0.01	0.035	0.02
MW-2D1	--	0.01	--	0.05
MW-2D2	--	0.01	--	--
MW-3S	0.008	0.01	0.012	0.01
MW-4S	0.007	0.02	--	0.02
MW-5S	0.007	0.07	0.11	0.24
MW-5D	--	0.01	--	0.02
PW-1	--	0.02	0.13	0.01
PW-2	--	0.02	0.008	0.10
DEC Ground Water Quality Standards	0.025	1.00	0.025	5.0

NOTES: -- = non-detectable
NA = not analyzed

2.2.6 Surface Water Gauging and Sampling

The interaction of the surface water and ground water at this site was evaluated through surface water gauging and sampling. A staff gauge was placed on the abandoned railroad bridge at the edge of Swamp River to measure the stream water level (Figure 2). The elevation of the top of the gauge was surveyed by Mr. Devine. The stream water level was recorded at the same time that the ground water levels were gauged on June 28 and August 1, 1988. The elevations of the stream were 430.65 and 431.25 feet, respectively. These elevations compare very closely to the overburden and bedrock ground water elevations, suggesting that the Swamp River is an effluent stream receiving ground water discharge from the overburden and bedrock aquifers.

Surface water and sediment samples were collected on June 29, 1988 at four locations: two on upgradient stream channels and two downgradient on the Swamp River. Figure 2 shows the sampling locations. The sampling sequence was SS-1, SS-2, SS-3, and SS-4.

A double ended sampler was utilized to collect a sample from the water column just above the stream bed. After the samples were collected, they were poured directly into properly cleaned laboratory jars. The sediment samples were collected at the same locations as the water samples using a properly decontaminated steel shovel. Samples were placed on ice until delivery to the laboratory. Analyses included

Purgeable Volatile Organics by EPA Method 624, Base Neutrals Extractable Organics by EPA Method 625, and Priority Pollutant Metals.

The lab results indicate that all the volatile organic and base neutral compounds are at concentrations at or below detectable limits in both the water and sediment samples. The following table summarizes the levels of metals found in the water and sediments from the stream. Full laboratory results are contained in Appendix H.

TABLE 6

PRIORITY POLLUTANT METALS IN SURFACE WATER
(in ppm)

	Arsenic	Copper	Lead	Mercury	Zinc
SS-1	0.005	0.01	0.010	--	0.01
SS-2	--	0.02	0.013	0.0002	0.01
SS-3	--	0.02	0.033	--	0.01
SS-4	--	0.02	--	--	--

TABLE 7

PRIORITY POLLUTANT METALS IN STREAM SEDIMENT
(in ppm)

	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
SS-S1	6.0	5.0	25.0	40.0	--	13.0	1.0	106
SS-S2	7.9	7.0	18.0	30.0	--	17.0	1.0	103
SS-S3	10.7	7.0	27.0	30.0	--	18.0	2.0	124
SS-S4	6.0	9.0	27.0	30.0	0.2	22.0	2.0	87

NOTE: -- = non-detectable levels

The surface water sample results show no significant increase in metals concentration from the upstream sampling locations (SS-1 and SS-2) to the downstream location (SS-4). Lead levels increase from SS-1 and SS-2 to SS-3. At SS-3, Lead concentrations exceed DEC Water Quality Standards; however, the concentration becomes non-detectable further downstream (SS-4).

The stream sediment sample results compare fairly closely to the soil sample results; however, no Cadmium was detected in the stream sediment and low levels of Silver were detected. There appears to be no significant increase in concentrations from the upstream locations to the downstream sampling point.

2.2.7 Decontamination Procedures

A portable steam generator was used to clean all drilling equipment, such as augers, core barrels and split-spoon samplers, between monitor well locations. The split-spoon sampler was cleaned between samples with a soap and water wash, and a tap water and final distilled water rinse. Decontamination waters were containerized in polyethylene holding ponds and treated with activated carbon.

The teflon bailers and double-ended sampler were cleaned with Liquinox and water and rinsed with distilled water. The bailers used to collect samples for the 624 and 625 analyses were rinsed with acetone and hexane. The bailers used to collect samples for the metals analyses were rinsed with hydrochloric acid. The bailers and sampler were allowed to thoroughly air dry before use. The interface probe was cleaned between gaugings in a similar manner as for the 624/625 analyses.

2.2.8 Field QA/QC Program

A trip blank was prepared and analyzed as part of the ground water and surface water sampling. Two vials were filled with deionized water at the laboratory. Transportation to the site and return to the lab was completed in an identical manner. The trip blank was analyzed for Purgeable Volatile Organics via EPA 624.

An equipment or field blank was collected the day of water sampling to ensure that the sampler was effectively cleaned. Deionized water was poured through a decontaminated teflon bailer and collected in sample bottles and returned to the lab for analysis.

The analysis completed on the field and trip blank indicate non-detectable levels of cross contamination.

2.2.9 Health and Safety

The Health and Safety Plan for this site is enclosed in Appendix I. All OHSA health and safety standards applicable to hazardous site investigations were undertaken at this site to ensure worker safety. A portable Photoionization Detector

(PID) was used to monitor ambient air for the presence of volatile organic compounds in the work area. No levels greater than 1 ppm were recorded in the ambient air in the work area at any time during this investigation. Level D protection was utilized throughout the field investigation.

3.0 CONCLUSIONS

The conclusions presented relate to the achievement of the original objectives of this investigation. The following conclusions are based on the work performed during this investigation and may alter with additional data.

Objective 1

Delineate the concentration and extent of metal and solvent contamination in the ground water.

Conclusions:

- The highest concentrations of dissolved organic solvents were detected in ground water sampled from the overburden aquifer at MW-2S. Trans 1,2 DCE, 1,1,1 TCA, and TCE were identified at concentrations ranging from 14 to 3,517 ppb. Toluene was also detected at a concentration of 22,140 ppb.

- A production well (PW-2) exhibited the second highest level of dissolved organic solvents in the ground water. Trans 1,2 DCE, 1,1,1 TCA, TCE and PCE were identified at concentrations ranging from 10 to 52 ppb.

- All other ground water samples contained less than 100 ppb of dissolved organic solvents.

- Lead concentrations exceeded DEC Ground Water Quality Standards in three wells - MW-1D, MW-5S, and PW-1. Detected concentrations were 0.035 ppm, 0.11 ppm, and 0.13 ppm. The upgradient well, MW-5S, contained concentrations greater than or approximately equal to the levels recorded in other wells on-site; therefore, the levels of Lead in the ground water at Pawling Corporation do not appear to be the result of contamination produced by site industrial activities. No other Priority Pollutant Metal was detected in the ground water sampled.

- The data collected above indicates that the Pawling Corporation has not contributed to levels of Priority Pollutant Metals in ground water that are in excess of DEC standards.

<u>Objective 2</u>

Determine if upgradient sources are contributing to the contamination.

<u>Conclusions:</u>

- The upgradient wells MW-5S and MW-5D are upgradient of only part of the Pawling Corporation site. Additional information is necessary in order to determine if upgradient sources are contributing to the contamination.

- MW-5S exhibited concentrations of Lead and PCE exceeding DEC Ground Water Quality Standards and Guidance Values. These levels may indicate a low level upgradient source contributing to the contamination.

Objective 3

Evaluate the pathways of migration of contaminant movement.

Conclusions:

- Based upon the observed volatile organic concentrations, most contaminated ground water is in the overburden aquifer at MW-2. The soils from the ground suface to a depth of five feet below grade exhibited less than 1.2 ppb volatile organics; therefore, the contamination has either been transported to this location via overburden ground water flow from an upgradient source, or the source was placed on the land surface at or near this location prior to filling when the area was lower in elevation.

- The contamination observed in the bedrock at MW-2D1 is probably due to migration from the overburden soil and/or ground water through the highly fractured upper bedrock surface.

- The contamination in MW-2D2 is probably also due to migration through bedrock fractures. Downward migration was probably enhanced by the greater density of the chlorinated solvents.

- Delineation of contaminant migration routes to the production wells needs to be further investigated.

- The Swamp River does not appear to play a role in contaminant migration within the area sampled during this investigation.

- Off-site migration routes are not fully known.

Objective 4

Provide information required for design of a site remediation system.

Conclusions:

- Geologic data concerning lithology, stratigraphy, permeability, and ground water gradients have been obtained.
- A better delineation of on-site and off-site contaminant migration is required before a complete remediation system can be designed.

4.0 COMPREHENSIVE REMEDIAL INVESTIGATION

4.1 Introduction

The results of the Preliminary Remedial Investigation indicate the need for further delineation of potential upgradient sources. Groundwater Technology, Inc. proposes that an additional upgradient monitor well couplet be drilled east of the Pawling facility. The exact location will be approved by the DEC prior to drilling. An extensive Comprehensive Remedial Investigation and Feasibility Study will be submitted if the ground water sampling results indicate that the solvent contamination originates on the Pawling property.

The work scope detailed in Section 4.2 consists of installation of an overburden and bedrock monitor well and ground water gauging and sampling. Information concerning decontamination, health and safety, project staff, and project schedule are also provided.

4.2 Technical Work Scope

4.2.1 Overburden Monitor Well Installation

An overburden monitor well will be installed east (upgradient) of the Pawling site in order to determine the ground water quality in the upper aquifer. An air rotary drill rig using a roller bit and temporary casing will be utilized for the well installation. This method will allow one drill rig to be employed for both the overburden and bedrock drilling.

The overburden monitor well will be constructed of two-inch fiberglass reinforced epoxy (FRP) well screen and casing with flush threaded joints. FRP construction ensures that low levels of organic compounds will not desorb out or adsorb onto the well screen and material. This assures the collection of representative samples of the ground water in the formation surrounding the well. Use of FRP well material has been EPA-approved.

The well screen will extend from five feet above the water table to the top of bedrock, site conditions permitting. A bentonite seal, two-feet in thickness, will be emplaced at the top of the sand pack. A cement-bentonite grout, tremied in place, will be used above the bentonite seal. A lockable, protective metal casing will be installed at the top of the well. Figure 5 shows the construction of a typical overburden monitor well.

4.2.2 Bedrock Well Installation

The purpose of the bedrock well will be to denote water quality in the bedrock upgradient of the site. It will also determine whether vertical migration of contaminants exists between the overburden and bedrock aquifers. One bedrock well will be drilled east of the site in close proximity to the overburden monitor well.

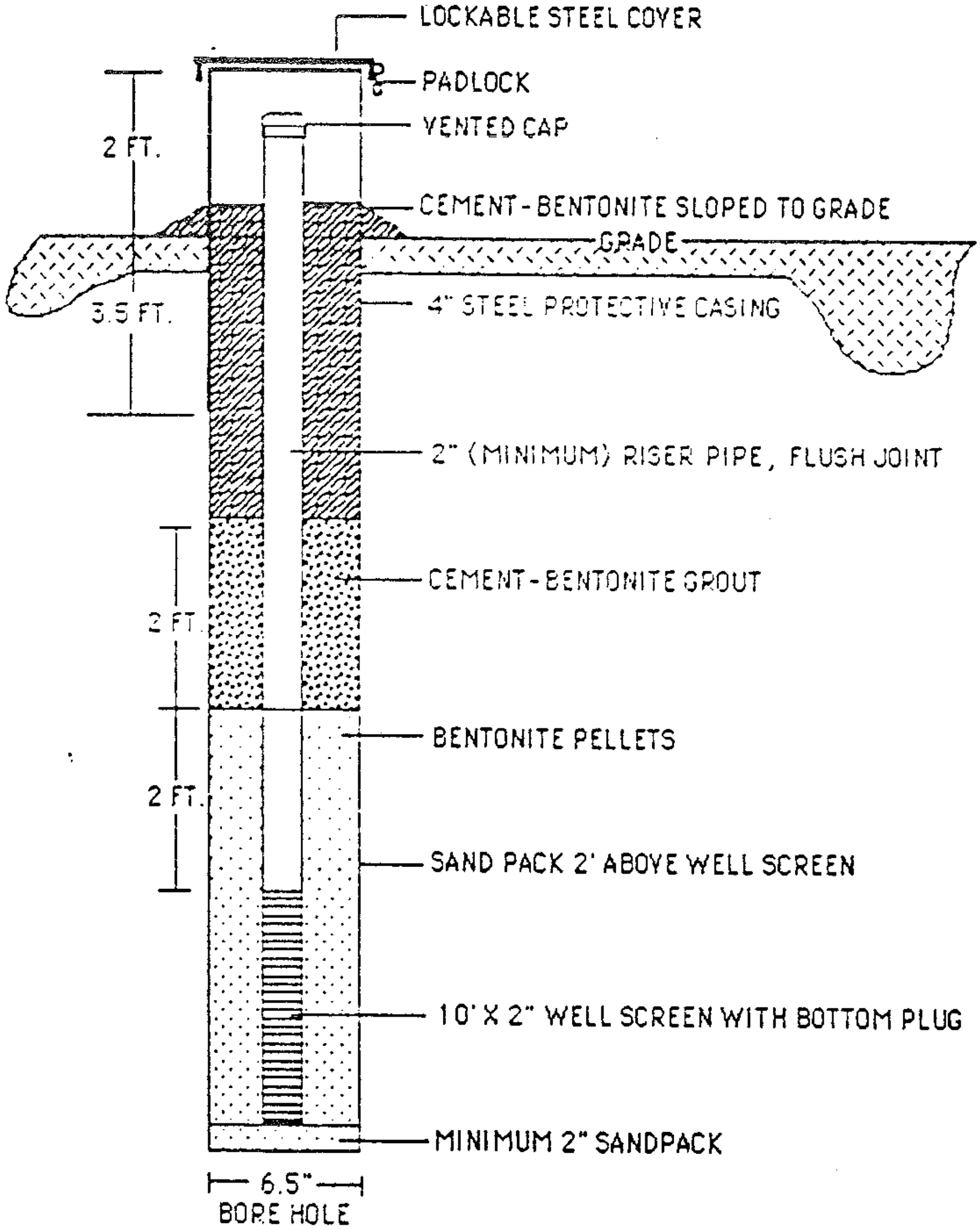
An air rotary drill rig will be utilized to install the bedrock well. A six-inch steel casing will be tremie grouted in place from the top of the bedrock to the ground surface. Drilling will proceed inside of this casing to a depth of approximately 150 feet below grade. The well will be completed as open hole.

Figure 6 shows the typical construction to be employed. The project hydrogeologist will supervise all monitor well installations. All well construction specifications will be included on the drilling log.

FIGURE 5

TYPICAL OVERBURDEN MONITOR WELL

(NOT TO SCALE)

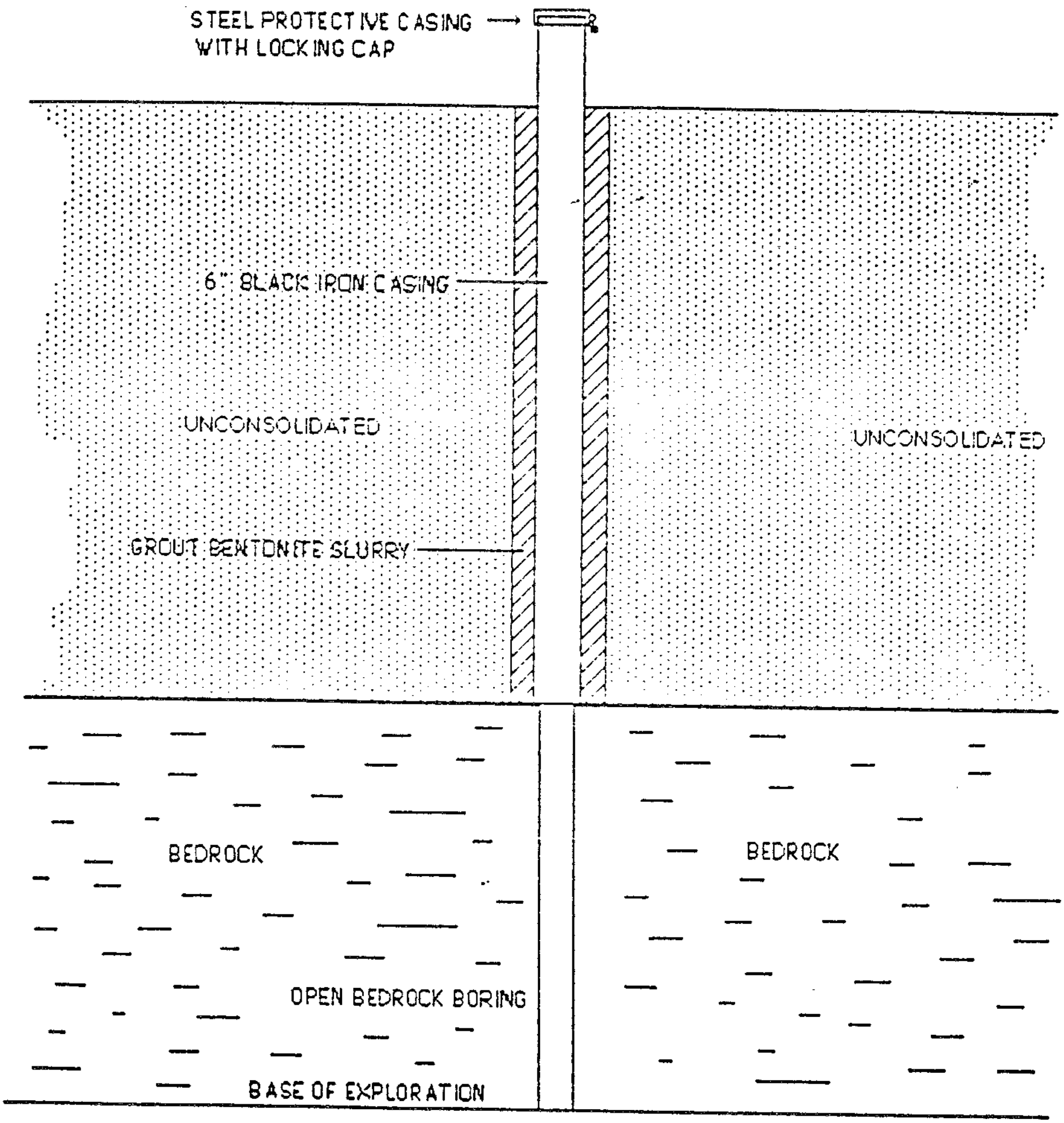


GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

FIGURE 6

TYPICAL BEDROCK MONITOR WELL

(NOT TO SCALE)



GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

4.2.3 Well Development/Elevation and Location Survey

The well development will be performed immediately after well installation. Water levels will be measured before and after development in order to estimate permeability from recovery time.

The overburden well will be developed by repeated surging and bailing with a surface sampler. The bedrock well will be developed by air jetting. These methods will remove any fine sediments from the formation immediately adjacent to the well screen and annulus of the rock hole. Water samples will therefore be free of sediments and other associated drilling materials.

Purged waters will be collected and treated through activated carbon. Wells will be left undisturbed for at least one week after development to allow time for the wells to equilibrate with the surrounding aquifer.

Following the installation of the monitor wells, top-of-casing elevations will be surveyed to a common benchmark by a licensed land surveyor. Locations of monitor wells will also be denoted during this survey.

4.2.4 Ground Water Gauging and Sampling

Following the completion of the monitor well installation program, Groundwater Technology, Inc. will gauge each monitor well using an ORS interface probe. From this data, the ground water gradient will be determined. This information will be compared to previous gauging events in order to verify ground water movement at the site.

The two newly installed upgradient wells will be sampled subsequent to gauging. Prior to sample collection, three to five well casing volumes of water will be evacuated from each well. A bailer will be used for the evacuation of the overburden well and a submersible pump will be used in the bedrock well. Evacuated water will be collected and treated in a similar manner as the development waters.

Samples will be collected using a decontaminated teflon bailer and rope. Water samples will be poured directly from the bailer into properly prepared laboratory jars, and placed on ice until delivery to the laboratory. Proper chain of custody procedures will be employed throughout the sampling. The sample will be analyzed for Purgeable Organics by EPA Method 624.

4.2.5 Decontamination Procedures

A portable steam generator will be used to clean all drilling equipment, drill rods, bit and casing between monitor wells. Decontamination waters will be containerized and treated through activated carbon prior to disposal.

The teflon bailer will be cleaned with Liquinox and water and rinsed with distilled water, acetone and hexane. The bailer will be allowed to thoroughly air dry before use. The interface probe will be cleaned in a similar manner between gaugings.

If protective clothing is deemed necessary for worker safety, the discarded clothing will be stored in DOT approved drums for later disposal.

4.2.6 Field QA/QC Program

A trip blank will be prepared and analyzed as part of the ground water sampling. Volatile organic bottles will be filled with deionized water at the laboratory. Transportation to the site and return to the lab will be in an identical manner as the other sample containers. The trip blank will be subjected to the same analysis as the ground water.

4.2.7 Health and Safety

Groundwater Technology, Inc. has prepared a health and safety plan for the Pawling site which is enclosed in Appendix I. All OHSA health and safety standards applicable to hazardous waste site investigations will be undertaken at this site to ensure worker safety. A portable Photoionization Detector (PID) will be used to monitor ambient air for the presence of volatile organic compounds in the work area. The PID levels associated with the different levels of personal protective gear are specified in the site health and safety plan.

4.2.8 Summary Report

A report detailing work steps and results will be prepared upon the completion of the laboratory analyses. Conclusions will be presented evaluating the contribution of upgradient sources to the solvent contamination.

4.3 Project Organization

The project organizational chart is shown in Figure 7. Groundwater Technology Inc. personnel will perform all hydrogeological and engineering work.

4.4 Schedule

The proposed schedule of work is shown in Figure 8.

FIGURE 7
PROJECT ORGANIZATION CHART
PAWLING CORPORATION
PAWLING, NEW YORK

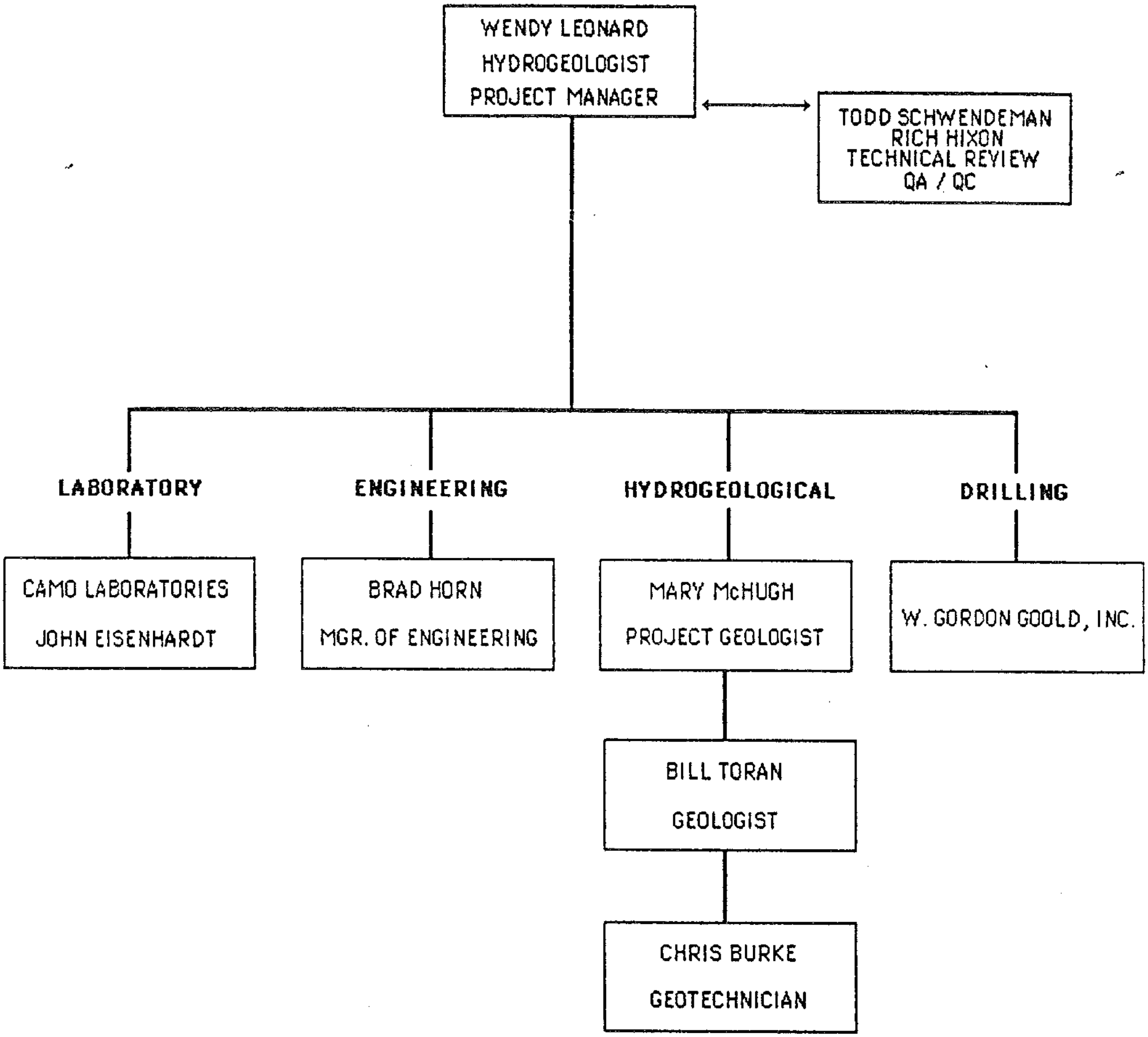
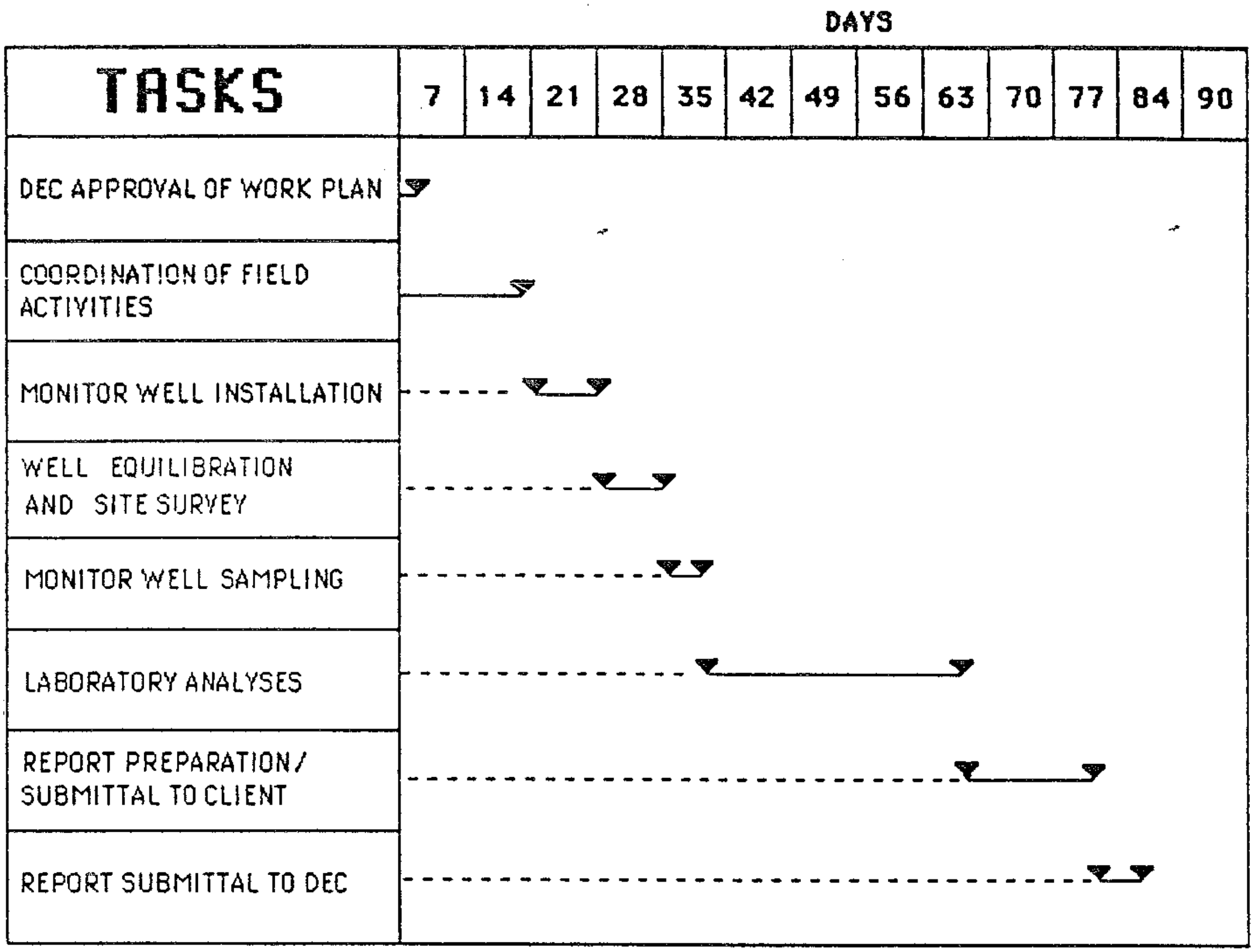


FIGURE 8

PROJECT SCHEDULE



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Fisher, D.W., Isachsen, Y.W., Rickard, L.V., 1970. Geologic Map of New York, Lower Hudson Street, The University of the State of New York, The State Education Department, New York State Museum and Science Service, Albany, New York.

Means, R.E., Parcher J.V., 1963. Physical Properties of Soil, Charles E. Merrill Co., Columbus, Ohio.

Secor, W., Soil Survey, Dutchess County, New York, 1955. United States Department of Agriculture Soil Conservation Service in Cooperation with Cornell University Agricultural Experiment Station, Ithaca, New York.

Simmons, E.T., Grossman, I.G., Heath, R.C., Ground-Water Resources of Dutchess County, New York, 1961. US Geological Survey and the New York Water Resources Commission, Albany, New York.

A P P E N D I X   A

Pawling Corporation Production Well Log

9—255
(Jan. 1927)

Clore
Pud.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

Du 550

RECORD OF WELL

14 W, 12.55, 29.5

Locate well on plat of section.

1. Location: State New York County Dutchess
Nearest P. O. Pawling Direction from P. O. N
Distance from P. O. 1 miles; ..... ¼ sec. ....., T. ....., R. .....
If in city, give street and number .....

Pawling Rubber Company.

2. Owner: ~~Rubber Products Inc~~ Address Pawling, N.Y.
Driller: Heller & Son Address Pleasant Valley
3. Situation: Is well on upland, in valley, or on hillside? Valley
4. Elevation of top of well: 440 ft. above (Above or below) the level of M.S.L. (Sea, depot, lake, or stream)
5. Type of well: Drilled (Dug, driven, bored, or drilled); kind of drilling rig used S.T. (Solid tool, jetting, rotary, etc.)
6. Depth of well: 145 ft.; year in which well was finished 1946
Does well enter rock? Yes; if so, at what depth? 20 ft.; kind of rock limestone
7. Diameter: At top 6 inches; at bottom 6 inches.
8. Principal water bed: Stockbridge limestone. (Gravel, sand, clay, or rock. If rock, state kind)
Depth to principal water bed 20 ft.; thickness of bed 125 ft.
If other water supplies were found, give depth to each .....
9. Casings: Kind Steel; size 6; length 20 ft.; between depths of ..... and ..... ft.
Kind .....; size .....; length ..... ft.; between depths of ..... and ..... ft.
Kind .....; size .....; length ..... ft.; between depths of ..... and ..... ft.
Packers (if any): Depth at which packers were used .....; kind .....
Screen or Strainer: Was well finished with screen? .....; kind of screen .....;
length of screen ..... ft.; diameter ..... inches; size of openings .....
10. Head: Does well at present overflow without pumping? No; did it overflow when new? No;
if flowing, give pressure ..... lb. per sq. inch; or height water will rise in a pipe ..... ft. above surface;
original pressure or head .....; if not flowing, give water level in well over ft. below surface.
11. Pump: Is the well pumped? Yes; kind of pump Morse - Jet (Pipe 80 feet);
size or capacity of pump .....; kind of power Electric
12. Yield: Natural flow at present (if any) ..... gallons per minute; original flow ..... gallons per minute;
well has been pumped at 50 gallons per minute continuously for 10 hours;
quantity of water ordinarily obtained from well 30,000 gallons per day. D.D. 10 feet.
13. Use: For what purpose is the water used? Cooling.
14. Quality of the water: Good. (Hard or soft, fresh or salty, etc.); is there an analysis? Yes
15. Cost of well, not including pump: ..... Temperature of water ~~56~~ 51° F.
Name of person filling blank E.T. Simmons from McCue (Eng.)

550

Date 6/22/49. Address .....

6—0612

On the back of this sheet give the record of the beds through which the well passes and any other facts not given above.

LOG OF WELL

KIND OF ROCK OR OTHER MATERIAL (Give color and tell whether hard or soft)	DEPTH, IN FEET From—	DEPTH, IN FEET To—	THICKNESS, IN FEET	REMARKS (Especially information as to water found)
Waterlevel is 4 feet during periods of high precipitation and 15 feet during periods of low precipitation.				

A P P E N D I X   B

Fracture Trace Analysis Results

PAWLING CORPORATION - FRACTURE TRACE ANALYSIS

	Joints	Fractures	Bedding	Horizontal
1.	N80E 70 SE	N64W 48 NE	N46E 72 SE	N72E 8 S
2.	N80E 84 NW	N64W 64 NE	N50E 70 SE	N71E 8 S
3.	N74E 76 NW	N84W 67 NW	N36E 85 SE	N51W 20 S
4.	N86E 76 SE	N39E V	N54E 59 SE	N64E 12 S
5.	N78E 80 SE	N20E 71 SE	N60E 78 SE	N15W 24 S
6.	N14W 78 SW	N68W 59 S	N61E 72 SE	
7.		N59W 76 S	N51E 69 SE	
8.		N36W 86 NE	N51E 82 SE	
9.		N36W 76 NE	N59E 84 SE	
10.		N21W 74 SE	N59E 60 SE	
11.		N38E 78 SE	N40E 54 NW	
12.			N80E 70 NW	
13.			N85E 70 NW	

Average Orientation from the Stereonet

N8W Vertical	No cluster	N57E 72 S	N70E 10 S

A P P E N D I X C

Drilling Logs

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-6-88 TOTAL DEPTH OF HOLE 10.8'

DIAMETER 6.25"

SCREEN DIA. ______ LENGTH ______ SLOT SIZE ______

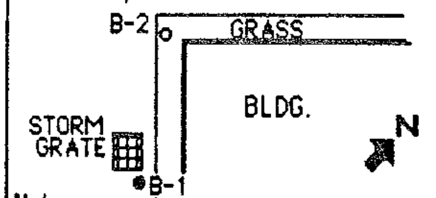
CASING DIA. ______ LENGTH ______ TYPE ______

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER B-1

Sketch Map



Notes

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0				
1				
2				Light tan, fine SAND, very well sorted
3				
4				
5			S-1 25-16-14-13	White, fine SAND Brown, moist, fine SAND with 1/4" pebbles
6				
7				
8				
9		▼		
10			S-2 10-100/0.3" AUGER REFUSAL @ 10.8'	Brown, wet, medium to fine SAND with small pebbles
11				T.D. 10.8'
12				
13				
14				
15				
16				
17				

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-7-88 TOTAL DEPTH OF HOLE 4.8'

DIAMETER 6.25"

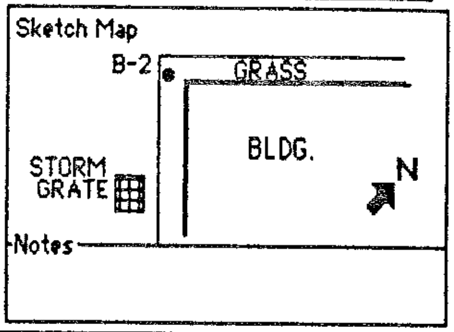
SCREEN DIA. ______ LENGTH ______ SLOT SIZE ______

CASING DIA. ______ LENGTH ______ TYPE ______

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER B-2



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0				
1				
2				Tan, dry, fine SAND
3				
4				
5			S-1 100/0.3"	WHITE MARBLE ROCK
				T.D. 4.8'
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				

PROJECT PAWLING — OWNER PAWLING

WELL NUMBER MW-1S

LOCATION PAWLING, NY — PROJECT NO. 110 001 8708

DATE DRILLED 6-6-88 — TOTAL DEPTH OF HOLE 15.2'

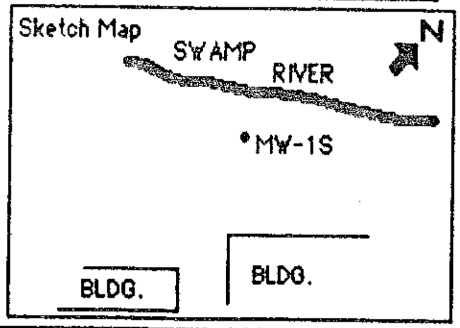
DIAMETER 6.25"

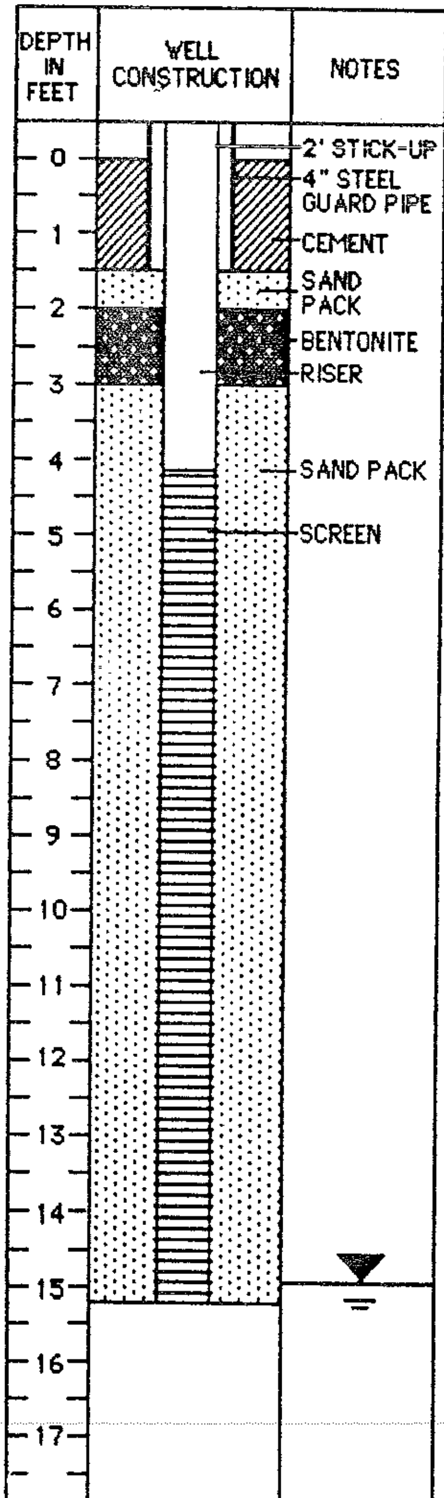
SCREEN DIA. 2" — LENGTH 11' — SLOT SIZE 0.012"

CASING DIA. 2" — LENGTH 6' — TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY — DRILLING METHOD HSA

DRILLER M. MULHERN — LOG BY W. LEONARD





DEPTH IN FEET	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
1		Dark brown, fine SAND & rubber pieces (Fill)
4–5	S-1 3-1-1-1	Brown, fine SAND with 1" stones, bottom 2" wet (Fill)
10	S-2	Dark gray, SILT & fine SAND, some wood fragments
15	S-3 100/0.2"	Dark gray, fine SAND
15.2		T.D. 15.2'

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-7-88 TOTAL DEPTH OF HOLE 10.7'

DIAMETER 6.25"

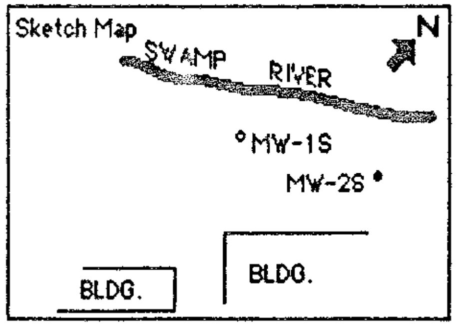
SCREEN DIA. 2" LENGTH 7.5' SLOT SIZE 0.012"

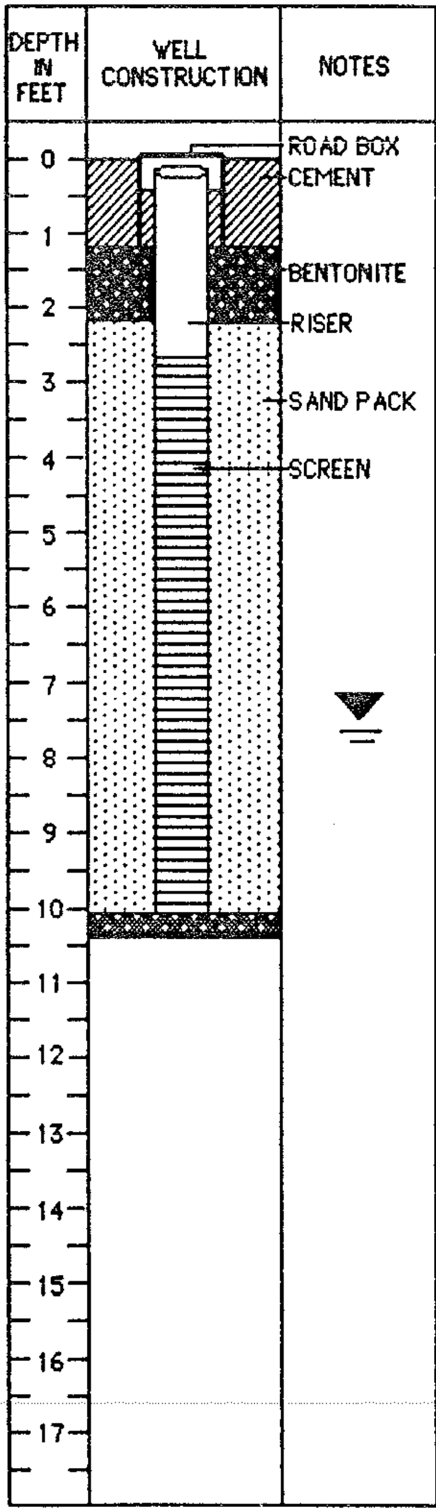
CASING DIA. 2" LENGTH 2.7' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-2S





BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	Brown, fine SAND (Fill)
S-1 2-2-2-2	Yellow brown, fine SAND, bottom of spoon moist
S-2 13-100/0.2"	Green & white weathered marble rock
	T.D. 10.7'

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-7,8-88 TOTAL DEPTH OF HOLE 19.0'

DIAMETER 6.25"

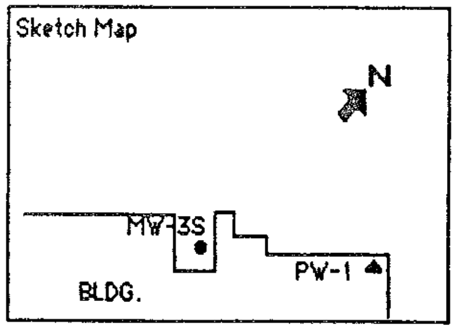
SCREEN DIA. 2" LENGTH 15.5' SLOT SIZE 0.012"

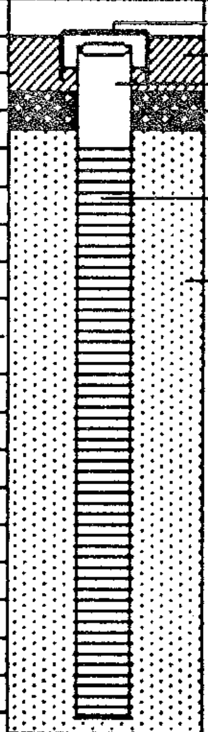
CASING DIA. 2" LENGTH 3' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-3S





DEPTH IN FEET	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–6	ROAD BOX, CEMENT, RISER, BENTONITE, SCREEN	S-1 3-5-13-8	Fill consisting of SAND & PEBBLES Rock fragments - GRANITE & QUARTZITE
6–9	SAND PACK		Moist, SAND & GRAVEL
9–10	▼ (water level)	S-2 10-12-14-14	Gray brown, wet, fine SAND,
10–11			SAND & GRAVEL
11–14			Fine to very fine SAND
14–18.5		S-3 18-25-32-25	Light gray SAND & GRAVEL weathered rock- MARBLE- FE stained SAND & GRAVEL with PEBBLES of different mineralogy (till?)
18.5–19	AUGER RE-FUSAL AT 18.5'	S-4 27-100/.1"	Tan calcic SANDSTONE
19			T.D. 19.0'

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-8-88 TOTAL DEPTH OF HOLE 10.6'

DIAMETER 6.25"

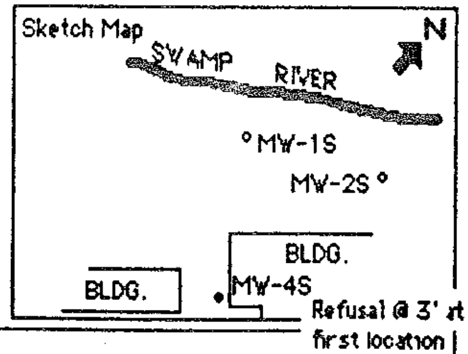
SCREEN DIA. 2" LENGTH 8' SLOT SIZE 0.012"

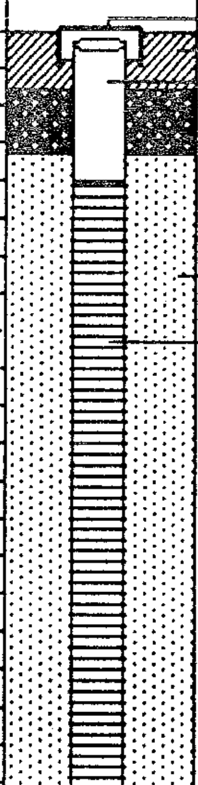
CASING DIA. 2" LENGTH 2' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-4S



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–4.3		ROAD BOX, CEMENT, RISER, BENTONITE, SAND PACK, SCREEN		Fill consisting of brown SAND & COBBLES
4.3–4.9			S-1 18-29-41-40	Brown, dry, fine SAND
4.9–9.5				Weathered rock - white & green very fine SAND with iron stained zones
9.5–10.6		▼ (water level)	S-2 37-100/.1"	Wet, weathered rock
				T.D. 10.6'

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-8-88 TOTAL DEPTH OF HOLE 16.8'

DIAMETER 6.25"

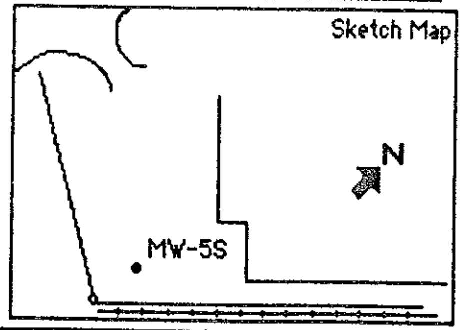
SCREEN DIA. 2" LENGTH 13.8' SLOT SIZE 0.012"

CASING DIA. 2" LENGTH 3' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-5S



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX CEMENT		
1		BENTONITE		
2		RISER		
3		SAND PACK		
4		SCREEN		Fill consisting of red-brown fine SAND with PEBBLES bottom of spoon moist
5			S-1 2-2-2-3	
6				
7				
8		▼		
9				
10			S-2 8-8-14-18	Dark green to brown, wet, SAND & GRAVEL
11				
12				
13				
14				
15				
16			S-3 5-8-24 100/.3"	SAND & GRAVEL Tan yellow calcic SANDSTONE
17				T.D. 16.8'

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-9,6-16-88 TOTAL DEPTH OF HOLE 147'

DIAMETER

SCREEN DIA. 5 5/8" LENGTH 117' SLOT SIZE

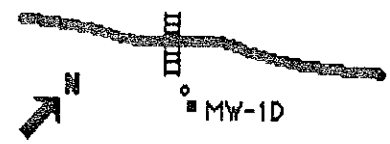
CASING DIA. 6" LENGTH 30' TYPE OPEN HOLE

DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

DRILLER ALAN GOULD LOG BY W. LEONARD

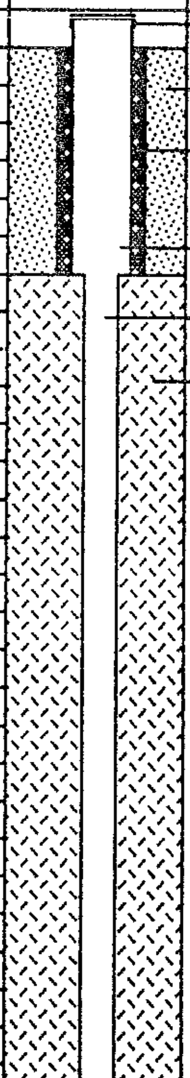
WELL NUMBER MW-1D

Sketch Map



Notes

NO HNU READING IN ANY WATER SAMPLE

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 150		LOCKING CAP; UNDISTURBED SOIL; BENTONITE/ CEMENT GROUT; 6" STEEL CASING; OPEN HOLE; BEDROCK	AUGERED TO 18.5' CORED 18.5'-33.5'		C-1 19.8' Fracture- no water returing to surface 21'-22' Fracture, mikly cuttings - not competent rock - BOULDERS. RQD = 8.3% biotite hornblende gneiss
			C-1		C-2 24.5' Fracture - losing 50-60% of the water - silty seam 26.0' Slower drilling, RQD = 37.1%, very brecciated marble
			C-2		C-3 No obvious fractures, white sand cuttings, RQD = 98.1%, highly banded marble
			C-3		Marble cuttings 42' Mud seam, 1 1/2' thick 50' Seam 85' Water bearing seam, ~ 30 gpm Marble cuttings 115' Seam ~2' thick, Fe stained 130' Seam ~1' thick, Fe stained, light brown zone 145' Water bearing seam, 1.5' thick
					TD ~ 147' TOTAL YIELD ~150 GPM

Depth scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 130, 140, 150

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-10-88 TOTAL DEPTH OF HOLE 31.0'

DIAMETER ____

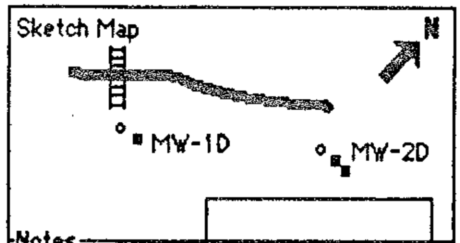
SCREEN DIA. ____ LENGTH ____ SLOT SIZE ____

CASING DIA. ____ LENGTH ____ TYPE ____

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD CORING

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-2D



Notes

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–20		UNDISTURBED SOIL	AUGERED TO 21.5' CORED 21.5'-31.0' SS 100/0.4"		Green silty SAND with boulders SS 19.5'-19.9' Light brown SAND with weathered RX
20–31		CORE	C-1		C-1 24.5' Lost all water, RQD = 0%, Boulder upper part, lower - white marble with vertical Fe stained fracture
			C-2		C-2 26.5' Fracture, no water returning to surface, RQD = 78.3%, white marble first 1.0', 45 degree angled Fe stained fracture, lower clay seam
30–150		BEDROCK			Attempted C-3 but water holes in core barrel got plugged with mud, sheared off diamond bit HOLE ABANDONED TD 31.0'

Depth scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 130, 140, 150

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-17-88 TOTAL DEPTH OF HOLE 42'

DIAMETER

SCREEN DIA. 5 5/8" LENGTH 14' SLOT SIZE

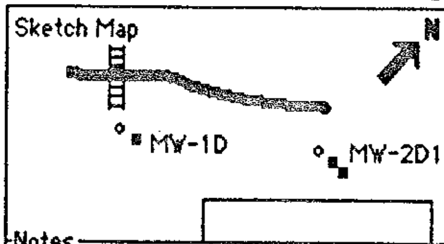
CASING DIA. 6" LENGTH 28' TYPE OPEN HOLE

DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

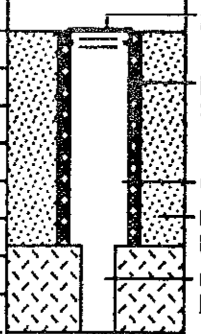
DRILLER ALAN GOULD LOG BY W. LEONARD

WELL NUMBER MW-2D1

Sketch Map



Notes

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–40		ROAD BOX; BENTONITE SEAL; 6" CASING; UNDISTURBED SOIL; OPEN ROCK HOLE			Very broken up rock
30				5	30' fracture, small amount of water
35					35' Major water bearing zone, 50-60 GPM
42				5	42' Water bearing fracture, ~ 30 GPM
					TD 42'

Depth scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 130, 140, 150

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-20-88 TOTAL DEPTH OF HOLE 150'

DIAMETER

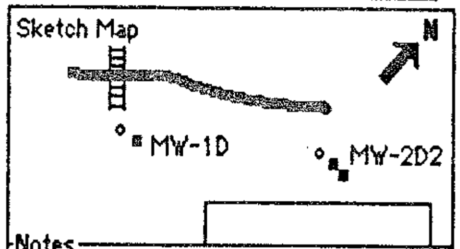
SCREEN DIA. 5 5/8" LENGTH 105' SLOT SIZE

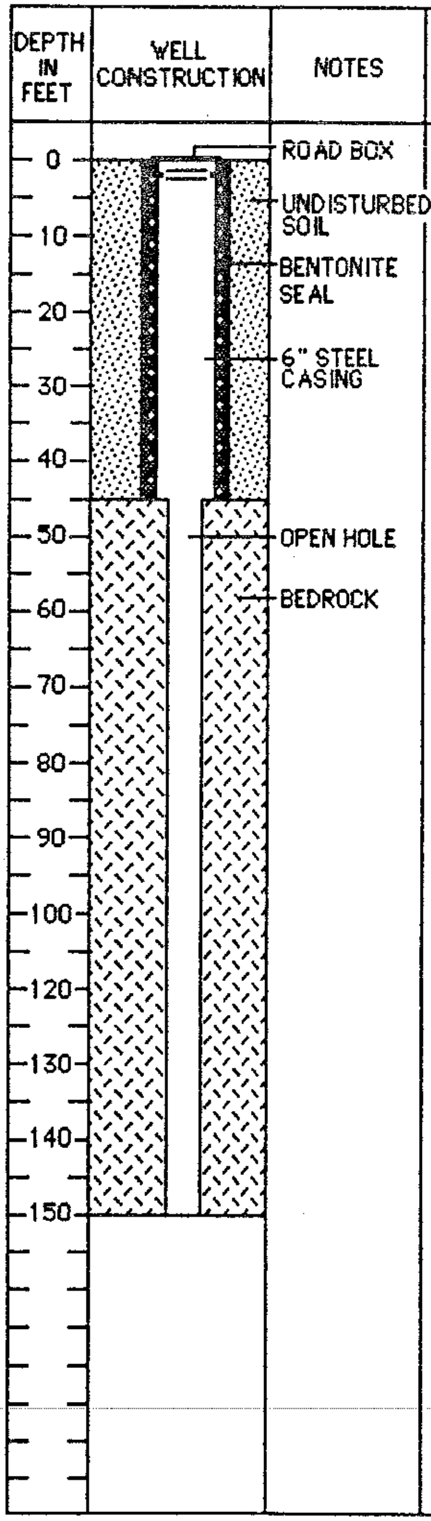
CASING DIA. 6" LENGTH 45' TYPE OPEN HOLE

DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

DRILLER GOULD JR. LOG BY W. LEONARD

WELL NUMBER MW-2D2





BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	0	47' Small amount of water, marble, various colors
	0	63' Fracture
	0	72' Fracture with brown mud 1'-2' thick
	0	
	0	
	0	104' Increase a small amount of water
		119' Fracture with yellow mud, ~1' thick
	0	131' Fracture, Fe stained, some water
		TD 150'

PROJECT PAWLING   OWNER PAWLING CORPORATION

WELL NUMBER MW-5D

LOCATION PAWLING, NY   PROJECT NO. 110 001 8708

DATE DRILLED 6-14,6-21-88   TOTAL DEPTH OF HOLE 150'

DIAMETER

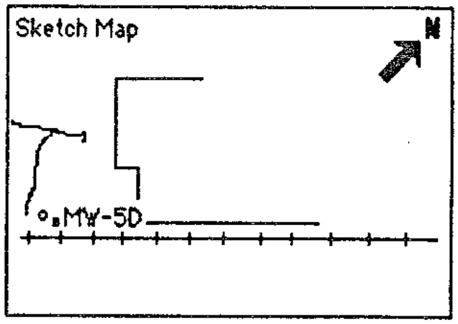
SCREEN DIA. 5 5/8"   LENGTH 120'   SLOT SIZE

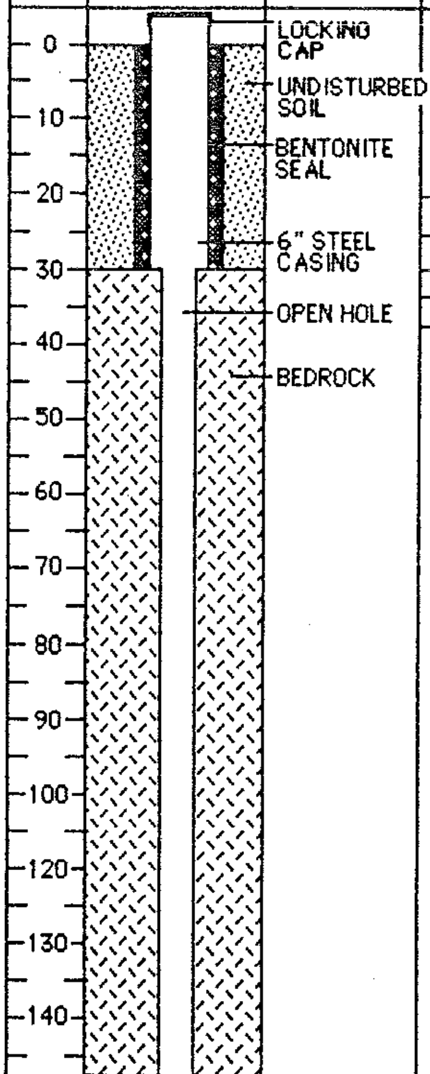
CASING DIA. 6"   LENGTH 30'   TYPE OPEN HOLE

DRILLING CO. GOULD   DRILLING METHOD AIR ROTORY

DRILLER GOULD JR.   LOG BY W. LEONARD

Sketch Map





DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
			AUGERED TO 22.8' CORED 22.8'-37.8'		C-1 Seam at 24', lost water, RQD = 80.2%, white marble
			C-1		C-2 25.8' Fracture, no water returning to surface, RQD = 66.7%, white marble
			C-2		
			C-3		C-3 No water returning to the surface, RQD = 50.8%, gray crystalline marble
			C-4	0	C-4 No water returning to the surface, RQD = 100%, gray / white crystalline marble
				0	
				0	30'-40' Very muddy water 38.5' Water bearing fracture, 40-50 GPM ~45' Cleaner water 48.5'-54' Brown muddy very cold water ~70' Muddy water, various colored marble, gray, white, yellow, light brown, pink throughout borehole
				0 0 0	Various colored marble, gray, white, yellow, light brown, pink throughout borehole
					TD ~ 150'

A P P E N D I X D

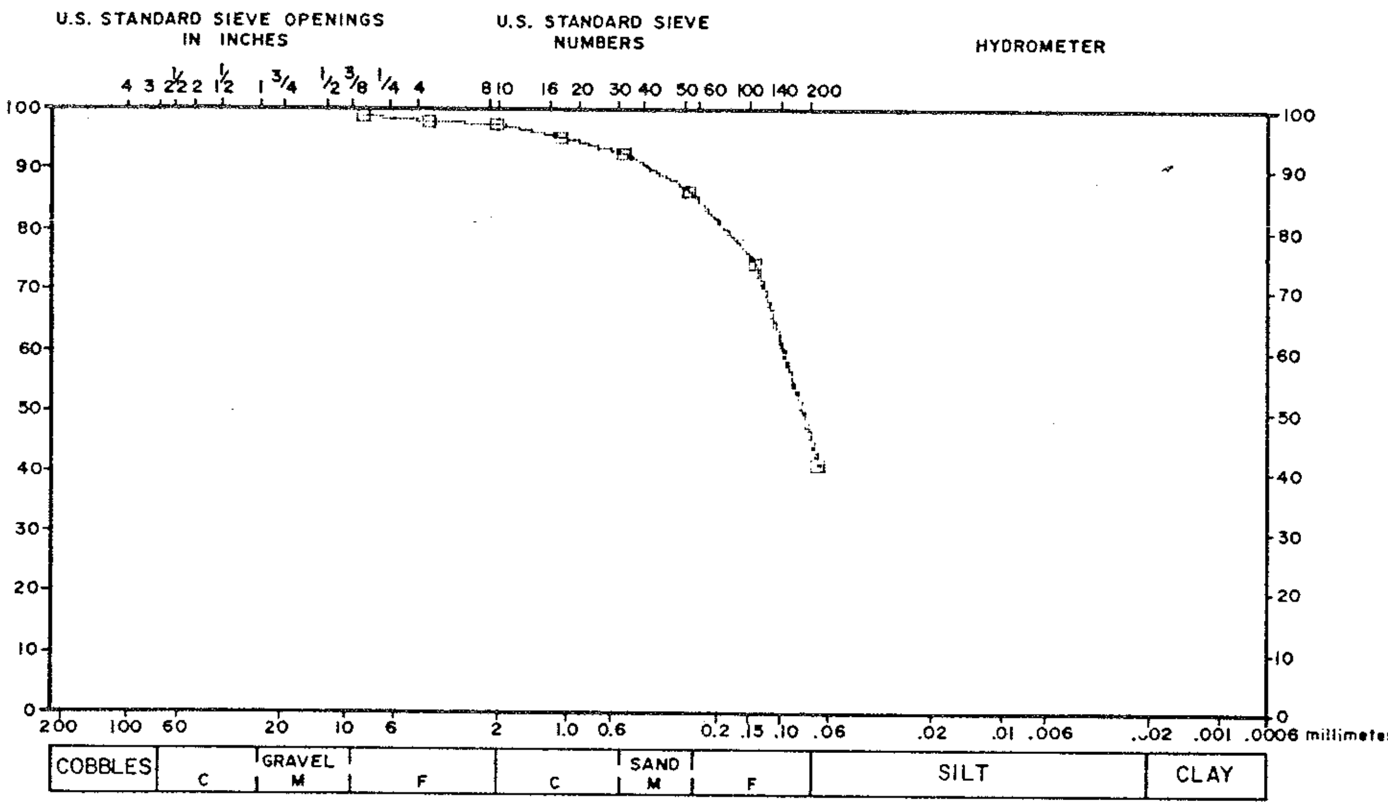
Grain-Size Distribution Curves

Dunn Geoscience Laboratory

[illegible] Metro Park Road Albany [illegible]

CLIENT:	GROUNDWATER TECHNOLOGY, INC.		
LAB NUMBER:	88-8-41	DATE RECEIVED:	8/18/88
TEST BY:	JWH	DATE TESTED:	8/19/88
REVIEWED BY:	WJO	DATE REPORTED:	8/23/88
SAMPLE DESCR:	PAWLING SITE, BORING MW-2, 11.0 - FT		

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
3/8	0.94	99.06	
4	0.69	98.37	
8	0.65	97.72	
16	1.95	95.77	
30	2.89	92.89	
50	6.32	86.57	
100	11.81	74.76	
200	33.41	41.35	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 41.35%

Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136

TEST STANDARD:

NOTES:

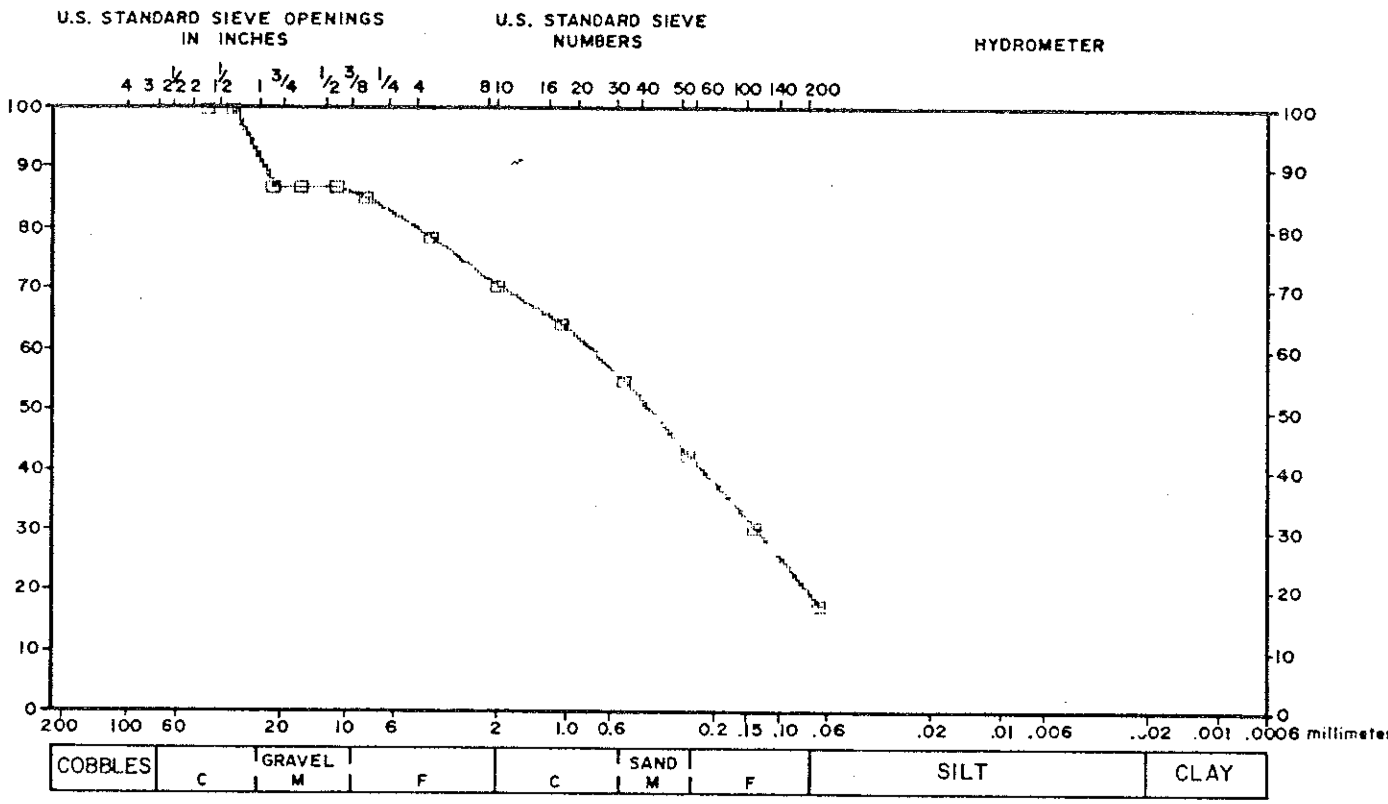
~~Test Samples are retained for 30 days after submission~~
and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory

CLIENT:	GROUNDWATER TECHNOLOGY, INC.		
LAB NUMBER:	88-8-39	DATE RECEIVED:	8/18/88
TEST BY:	JWH	DATE TESTED:	8/19/88
REVIEWED BY:	WJo	DATE REPORTED:	8/23/88
SAMPLE DESCR:	PAWLING SITE, BORING MW-3, SAMPLE 2, 10.0-12.0 FT		

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
2	0.00	100.00	
11/2	0.00	100.00	
1	12.87	87.13	
3/4	0.00	87.13	
1/2	0.00	87.13	
3/8	1.91	85.22	

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	6.72	78.50	
8	7.88	70.62	
16	6.15	64.47	
30	9.53	54.93	
50	12.16	42.78	
100	12.05	30.73	
200	12.83	17.90	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 17.90%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

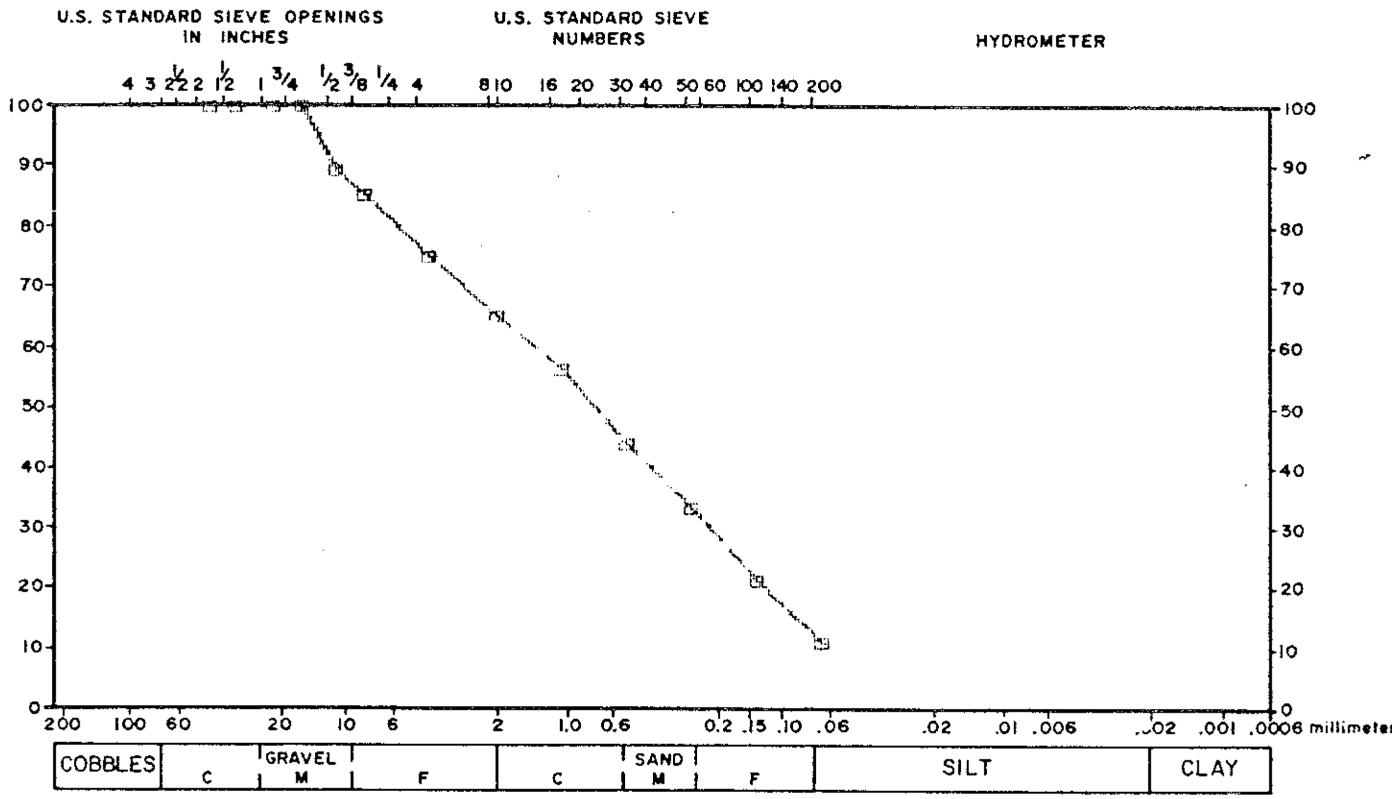
~~Test Samples are retained for 30 days after submission~~
and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-38 DATE RECEIVED: 8/18/88
TEST BY: JWH DATE TESTED: 8/19/88
REVIEWED BY: WJO DATE REPORTED: 8/23/88
SAMPLE DESCR: PAWLING SITE, BORING MW 3, SAMPLE 3, 15.0-17.0 FT

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
2	0.00	100.00	
11/2	0.00	100.00	
1	0.00	100.00	
3/4	0.00	100.00	
1/2	10.68	89.32	
3/8	3.83	85.49	

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	10.30	75.19	
8	9.74	65.45	
16	8.98	56.47	
30	12.26	44.21	
50	11.09	33.12	
100	11.92	21.20	
200	10.30	10.90	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 10.90%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

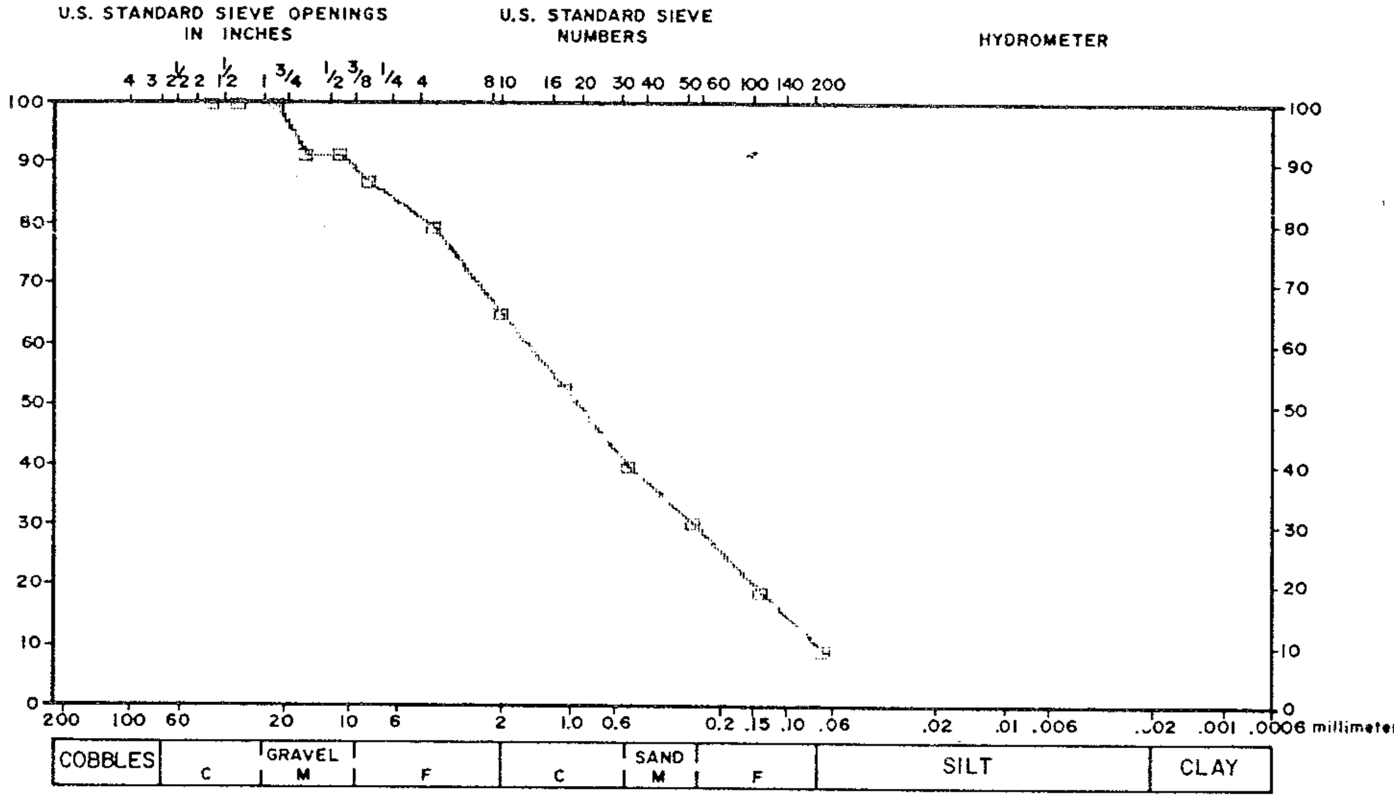
Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-37 DATE RECEIVED: 8/18/88
TEST BY: JWH DATE TESTED: 8/19/88
REVIEWED BY: WJO DATE REPORTED: 8/23/88
SAMPLE DESCR: PAWLING SITE, BORING MW-5, SAMPLE 2, 10.0-12.0 FT

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
2	0.00	100.00	
11/2	0.00	100.00	
1	0.00	100.00	
3/4	8.39	91.61	
1/2	0.00	91.61	
3/8	4.36	87.25	

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	7.69	79.56	
8	14.35	65.21	
16	12.36	52.85	
30	13.00	39.85	
50	9.35	30.49	
100	11.27	19.22	
200	9.74	9.48	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 9.48%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

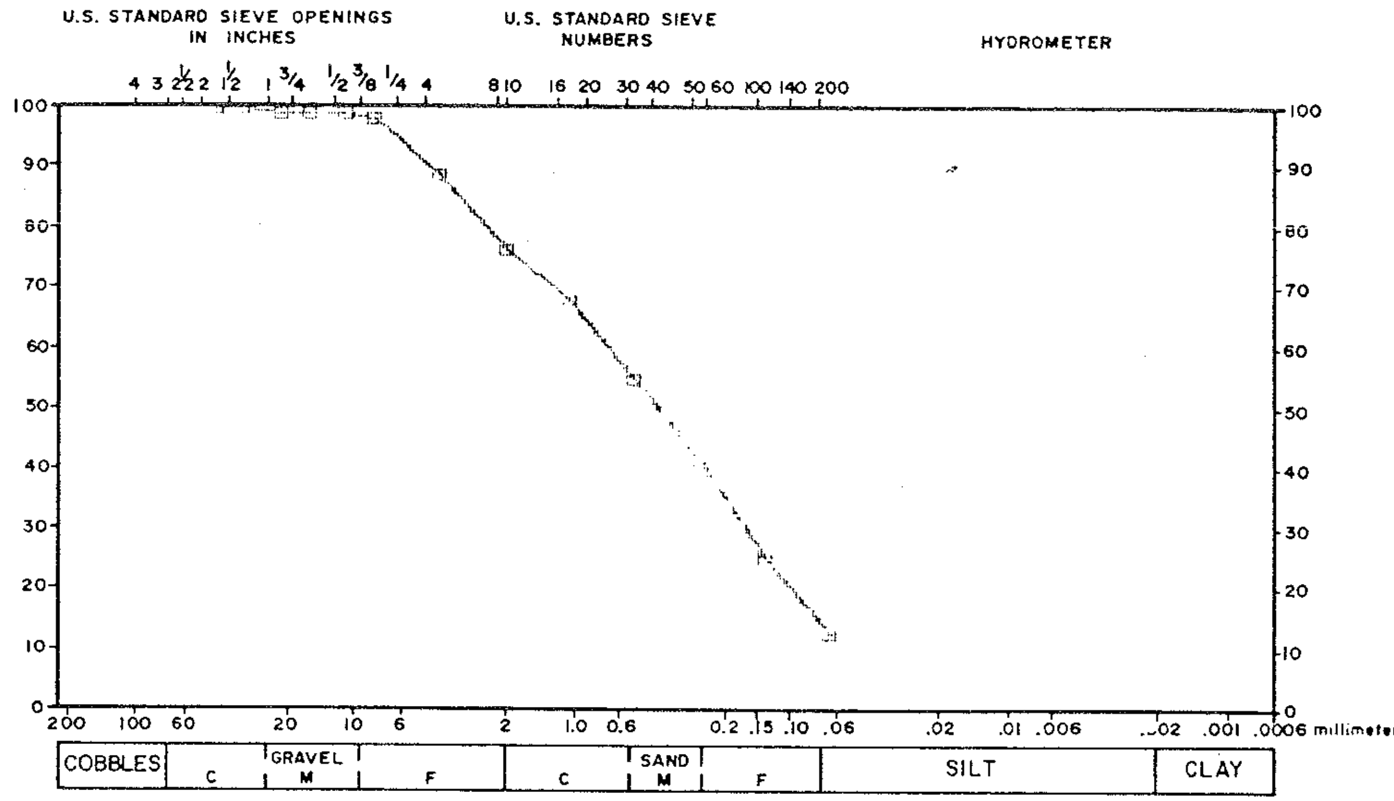
Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory

CLIENT:	GROUNDWATER TECHNOLOGY, INC.		
LAB NUMBER:	88-8-40	DATE RECEIVED:	8/18/88
TEST BY:	JWH	DATE TESTED:	8/19/88
REVIEWED BY:	WJO	DATE REPORTED:	8/23/88
SAMPLE DESCR:	PAWLING SITE, BORING MW-5, SAMPLE 3, 15.0-17.0 FT		

GRAIN SIZE DISTRIBUTION



COARSE

SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
2	0.00	100.00	
11/2	0.00	100.00	
1	0.81	99.19	
3/4	0.00	99.19	
1/2	0.00	99.19	
3/8	0.81	98.38	

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	9.44	88.94	
8	12.56	76.38	
16	8.35	68.03	
30	12.80	55.23	
50	13.25	41.98	
100	16.77	25.20	
200	12.48	12.72	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 12.72%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

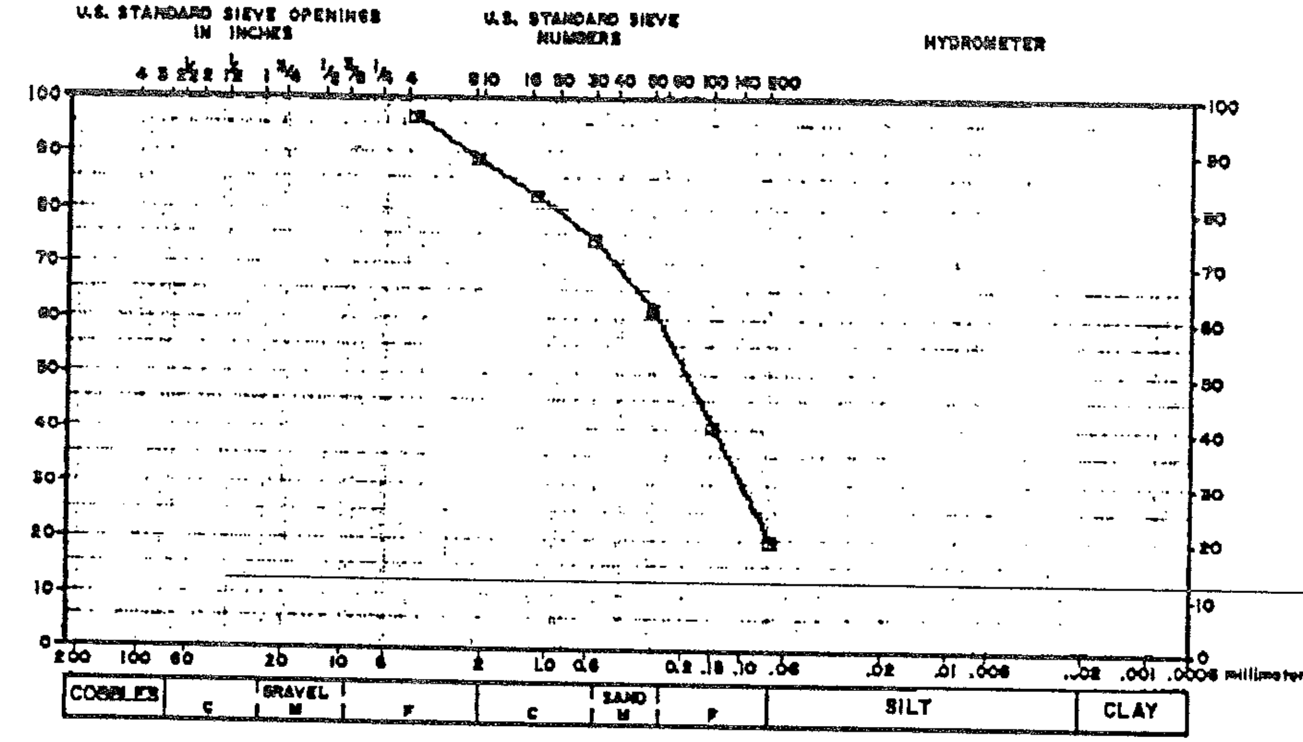
WJO

Dunn Geoscience Laboratory

12 Metro Park Road, Albany, NY 12205 (518) 458-1313

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-81 DATE RECEIVED: 8/23/88
TEST BY: JWH DATE TESTED: 8/26/88
REVIEWED BY: WJO DATE REPORTED: 9/2/88
SAMPLE DESCR: PAWLING BORING #1 SAMPLE 2 10-12 FT

GRAIN SIZE DISTRIBUTION



COARSE

SIZE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.

FINE

SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	3.37	96.63	
8	7.75	88.87	
16	6.48	82.40	
30	8.21	74.19	
50	12.27	61.92	
100	21.39	40.54	
200	20.52	20.02	

HYDROMETER

PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 20.02%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

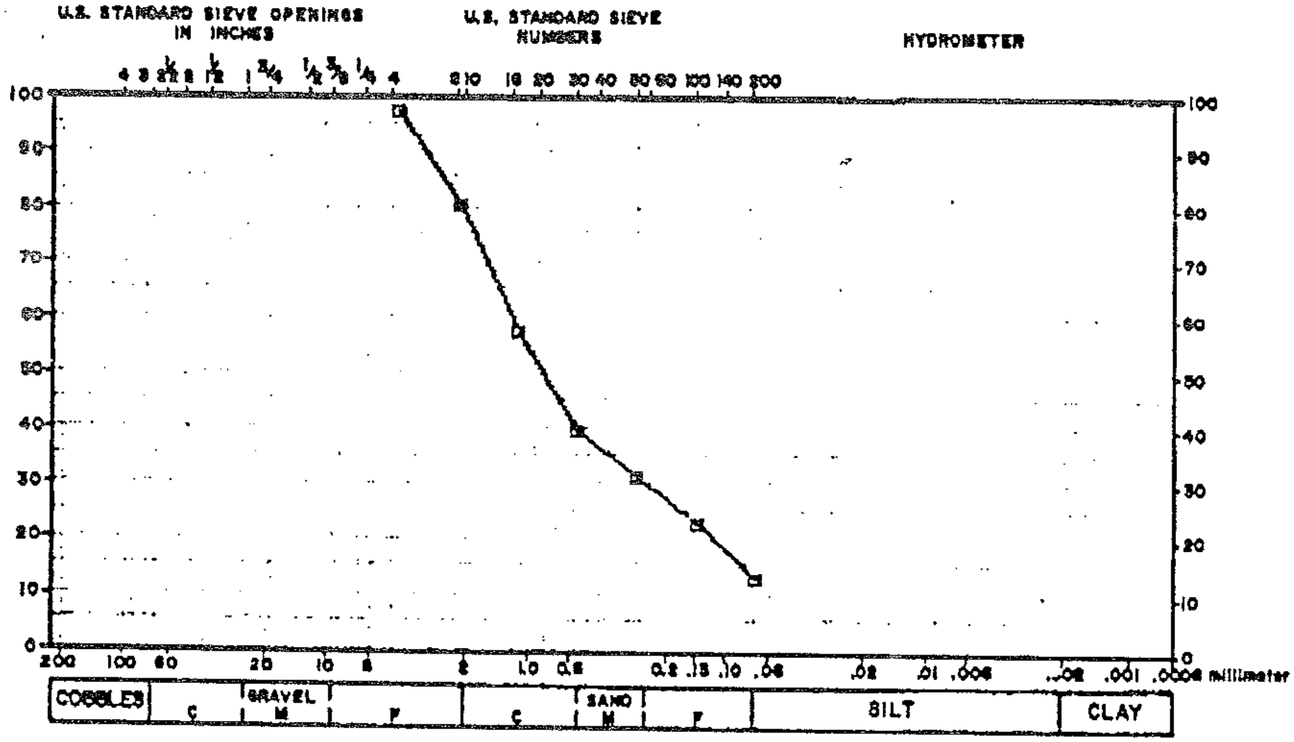
Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

Dunn Geoscience Laboratory
12 Metro Park Road, Albany, NY 12205 (518) 458-1313

CLIENT: GROUNDWATER TECHNOLOGY, INC.
LAB NUMBER: 88-8-82 DATE RECEIVED: 8/23/88
TEST BY: JWH DATE TESTED: 8/26/88
REVIEWED BY: WJO DATE REPORTED: 9/2/88
SAMPLE DESCR: PAWLING BORING MW-1 SAMPLE 2 10-12 FT

GRAIN SIZE DISTRIBUTION



COARSE			
SIZE (inches)	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.

FINE			
SIEVE	PERCENT RETAINED	CUMULATIVE PERCENT PASSING	SPECS.
4	3.19	96.81	
8	16.93	79.87	
16	22.36	57.51	
30	17.89	39.62	
50	8.63	30.99	
100	8.31	22.68	
200	9.90	12.78	

HYDROMETER		
PARTICLE DIAMETER (mm)	PERCENT PASSING	SPECS.

Pan = 12.78%
Wash Loss Was Not Tested.

SPECIFICATION: ASTM C 136
TEST STANDARD:
NOTES:

Test Samples are retained for 30 days after submission and then discarded, unless other arrangements are made.

WJO

APPENDIX E

Soil Sampling Laboratory Results

CAMO LABORATORIES
367 VIOLET AVENUE
POUGHKEEPSIE, NEW YORK 12601
(914) 473-9200
FED. I.D. #14-1514539
NYS LAB ID NO.: 10310

Pawling Corporation
157 Charles Coleman Boulevard
Pawling, New York 12564

Date of Invoice: 07-06-88
P.O. #:
Job #:
Invoice #: 88-6-2502

Analytical Report

Date Samples Collected: 6/6 - 6/8/88
Date Samples Received: 06-09-88
Samples Collected By: Client
Samples Delivered By: Client
Matrix: Soil

Sample Identification

A. B1 SS2
B. MW1 SS2
C. MW2 SS2
D. MW3 SS3
E. MW5 SS3
F. MW2 Core Hole

Parameters	Unit/ Measure	A	B	C	D	E	F
Method 624		*	*	*	*	*	*
Method 625		*	*	*	*	*	*
Priority Pollutant Metals		*	*	*	*	*	*

Analysis Comments: * See attached tables.

Comments: All samples will be discarded after twenty-one (21) days or EPA Holding time, whichever is shorter, unless we are notified otherwise.

Hazardous waste samples will be returned to client.

Analytical Methods: All analytical methods comply with those specified in APHA "Standard Methods" and/or EPA approved methods.

CAMO LOG NO.: 88-6-2502

VOLATILES

PARAMETERS	SAMPLE IDENTIFICATIONS					
	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
Chloromethane	<5	<5	<5	<5	<5	<5
Bromomethane	<5	<5	<5	<5	<5	<5
Vinyl Chloride	<5	<5	<5	<5	<5	<5
Chloroethane	<5	<5	<5	<5	<5	<5
Methylene Chloride	<5	<5	<5	<5	<5	<5
Trichlorofluoromethane	<5	<5	<5	<5	<5	<5
1,1-Dichloroethylene	<5	<5	<5	<5	<5	<5
1,1-Dichloroethane	<5	<5	<5	<5	<5	<5
Trans-1,2-dichloroethylene	<5	<5	<5	<5	<5	<5
Dichlorodifluoromethane	<5	<5	<5	<5	<5	<5
Chloroform	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	<5	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	<5	<5	<5	<5	<5	<5
Carbon Tetrachloride	<5	<5	<5	<5	<5	<5
Bromodichloromethane	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	<5	<5	<5	<5	<5	<5

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

VOLATILES

PARAMETERS

SAMPLE IDENTIFICATIONS

	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
Trans-1,3-dichloropropene	<5	<5	<5	<5	<5	<5
Trichloroethylene	<5	<5	<5	<5	<5	<5
Dibromochloromethane	<5	<5	<5	<5	<5	<5
Cis-1,3-dichloropropene	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	<5	<5	<5	<5	<5	<5
Benzene	<5	<5	<5	<5	<5	<5
2-Chloroethylvinyl Ether	<50	<50	<50	<50	<50	<50
Bromoform	<25	<25	<25	<25	<25	<25
Tetrachloroethylene	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	<5	<5	<5	<5	<5	<5
Toluene	<5	<5	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5	<5	<5
Ethylbenzene	<5	<5	<5	<5	<5	<5
Acrolein	<500	<500	<500	<500	<500	<500
Acrylonitrile	<500	<500	<500	<500	<500	<500

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
1,2 Dichlorobenzene	<2	<2	<2	<2	<2	<2
1,3 Dichlorobenzene	<2	<2	<2	<2	<2	<2
1,4 Dichlorobenzene	<2	<2	<2	<2	<2	<2
Hexachloroethane	<2	<2	<2	<2	<2	<2
Hexachlorobutadiene	<2	<2	<2	<2	<2	<2
Hexachlorobenzene	<2	<2	<2	<2	<2	<2
1,2,4 Trichlorobenzene	<2	<2	<2	<2	<2	<2
Bis(2-Chloroethoxy) Methane	<2	<2	<2	<2	<2	<2
Naphthalene	<2	<2	<2	<2	<2	<2
2 Chloronaphthalene	<2	<2	<2	<2	<2	<2
Isophorone	<2	<2	<2	<2	<2	<2
Nitrobenzene	<2	<2	<2	<2	<2	<2
2,4 Dinitrotoluene	<2	<2	<2	<2	<2	<2
2,6 Dinitrotoluene	<2	<2	<2	<2	<2	<2
4 Bromophenyl Phenyl Ether	<2	<2	<2	<2	<2	<2
Bis(2-Ethylhexyl) Phthalate	<2	<2	<2	<2	<2	<2
Di-n-octyl Phthalate	<2	<2	<2	<2	<2	<2

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
	SAMPLE IDENTIFICATION					
Dimethyl phthalate	<2	<2	<2	<2	<2	<2
Diethyl phthalate	<2	<2	<2	<2	<2	<2
Di-n-butyl phthalate	<2	<2	<2	<2	<2	<2
Fluorene	<2	<2	<2	<2	<2	<2
Fluoranthene	<2	<2	<2	<2	<2	<2
Chrysene	<2	<2	<2	<2	<2	<2
Pyrene	<2	<2	<2	<2	<2	<2
Phenanthrene	<2	<2	<2	<2	<2	<2
Anthracene	<2	<2	<2	<2	<2	<2
Benzo(a)anthracene	<2	<2	<2	<2	<2	<2
Benzo(b)fluoranthene	<2	<2	<2	<2	<2	<2
Benzo(k)fluoranthene	<2	<2	<2	<2	<2	<2
Benzo(a)pyrene	<2	<2	<2	<2	<2	<2
Indeno(1,2,3-c,d)pyrene	<2	<2	<2	<2	<2	<2
Dibenzo(a,h)anthracene	<2	<2	<2	<2	<2	<2
Benzo(g,h,i)perylene	<2	<2	<2	<2	<2	<2

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION					
	A B1 SS2	B MW1 SS2	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
4 Chlorophenyl Phenyl Ether	<2	<2	<2	<2	<2	<2
3,3' Dichlorobenzidine	<4	<4	<4	<4	<4	<4
Benzidine	<20	<20	<20	<20	<20	<20
bis(2-Chloroethyl)ether	<2	<2	<2	<2	<2	<2
1,2-Diphenylhydrazine	<2	<2	<2	<2	<2	<2
Hexachlorocyclopentadiene	<2	<2	<2	<2	<2	<2
N-Nitrosodiphenylamine	<2	<2	<2	<2	<2	<2
Acenaphthylene	<2	<2	<2	<2	<2	<2
Acenaphthene	<2	<2	<2	<2	<2	<2
Butyl benzyl phthalate	<2	<2	<2	<2	<2	<2
N-Nitrosodimethylamine	<2	<2	<2	<2	<2	<2
Nitrosodi-n-propylamine	<2	<2	<2	<2	<2	<2
bis(2-Chloroisopropyl)ether	<2	<2	<2	<2	<2	<2

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LOG NO.: 88-6-2502

PRIORITY POLLUTANT METALS

PARAMETERS	SAMPLE IDENTIFICATIONS					
	A B1 SS2	B MW1 SS1	C MW2 SS2	D MW3 SS3	E MW5 SS3	F MW2 Core Hole
Antimony	<10	<10	<10	<10	<10	<10
Arsenic	1.4	25	12	2.2	6.6	33
Beryllium	1	<1	1	<1	<1	<1
Cadmium	3	2	2	2	2	3
Chromium	10	13	12	9	10	14
Copper	16	23	17	19	16	17
Lead	30	20	20	20	10	10
Mercury	<0.1	0.1	0.3	<0.1	0.2	<0.1
Nickel	21	29	18	21	18	23
Selenium	<5	<5	<5	<5	<5	<5
Silver	<1	<1	<1	<1	<1	<1
Thallium	<1	<1	<1	<1	<1	<1
Zinc	26	79	38	26	35	45

NOTE: All results expressed in mg/kg unless noted otherwise.

CAMO LABORATORIES

A DIVISION OF CAMO POLLUTION CONTROL, INC.

POUGHKEEPSIE AREA FACILITY:
CAMO LABORATORY
367 VIOLET AVENUE
POUGHKEEPSIE, N.Y. 12601
(914) 473-9200

Log # 88-6-2502

CHAIN OF CUSTODY

CLIENT: C9

SAMPLER: GTI

SAMPLE NO./ID	LOCATION/CONTAINER	DATE	TIME	SAMPLE TYPE	COMP	GRAB	NO. CONT.	ANALYSIS REQUIRED
B1 SS2		6/6/88					2	EPA 624, 625(base neutrals),priorit pollut.metals
MW1 SS2		6/6/88					2	"
MW2 SS2		6/7/88					2	"
MW3 SS3		6/7/88					2	"
MW5 SS3		6/8/88					2	"
								"
								"
								"
								"
								"
								"
								"
								"

Relinquished by: J R Thompson

Received by: | Date | Time

Relinquished:

Received by: | Date | Time

Dispatched by: | Date | Time

Received for Laboratory by: Michael Diaz | Date 6/9/88 | Time 6:40PM

Method of Shipment:

CAMO LABORATORIES

A DIVISION OF CAMO POLLUTION CONTROL, INC.

POUGHKEEPSIE AREA FACILITY:
CAMO LABORATORY
367 VIOLET AVENUE
POUGHKEEPSIE, N.Y. 12501
(914) 473-9200

CHAIN OF CUSTODY

CLIENT: C9

SAMPLER: GTI

SAMPLE NO./ID	LOCATION/CONTAINER	DATE	TIME	SAMPLE TYPE	COMP	GRAB	NO. OF CONT.	ANALYSIS REQUIRED
B1 SS2		6/6/88					1	EPA 624, 625(base neutrals),priorit pollut.metals
MW1 SS2		6/6/88					1	"
MW2 SS2		6/7/88					1	"
MW3 SS3		6/7/88					1	"
								"
								"
								"
								"
								"
								"
								"
								"
								"

Relinquished by: Susan R Thompson	Received by:	Date	Time
Relinquished:	Received by:	Date	Time
Dispatched by: Date Time	Received for Laboratory by: [signature]	Date 6/9/88	Time 12:30

Method of Shipment:

Comments:

CAMO LABORATORIES

A DIVISION OF CAMO POLLUTION CONTROL INC.

POUGHKEEPSIE AREA FACILITY:
CAMO LABORATORY
367 VIOLET AVENUE
POUGHKEEPSIE, N.Y. 12601
(914) 473-9200

CHAIN OF CUSTODY

CLIENT: C9

SAMPLER: GTI

SAMPLE NO./ID	LOCATION/CONTAINER	DATE	TIME	SAMPLE TYPE	COMP	GRAB	NO. OF CONT.	ANALYSIS REQUIRED
MW2 core hole		6/10/88		soil			2	EPA 624, 625(bas neutrals),priori pollut.metals
								"
								"
								"
								"
								"
								"
								"
								"
								"
								"
								"
								"

Relinquished by:	Received by:	Date	Time
[illegible signature]			
Relinquished:	Received by:	Date	Time

Dispatched by:	Date	Time	Received for Laboratory by:	Date	Time
			[illegible signature]	6/10/88	

Method of Shipment:

A P P E N D I X   F

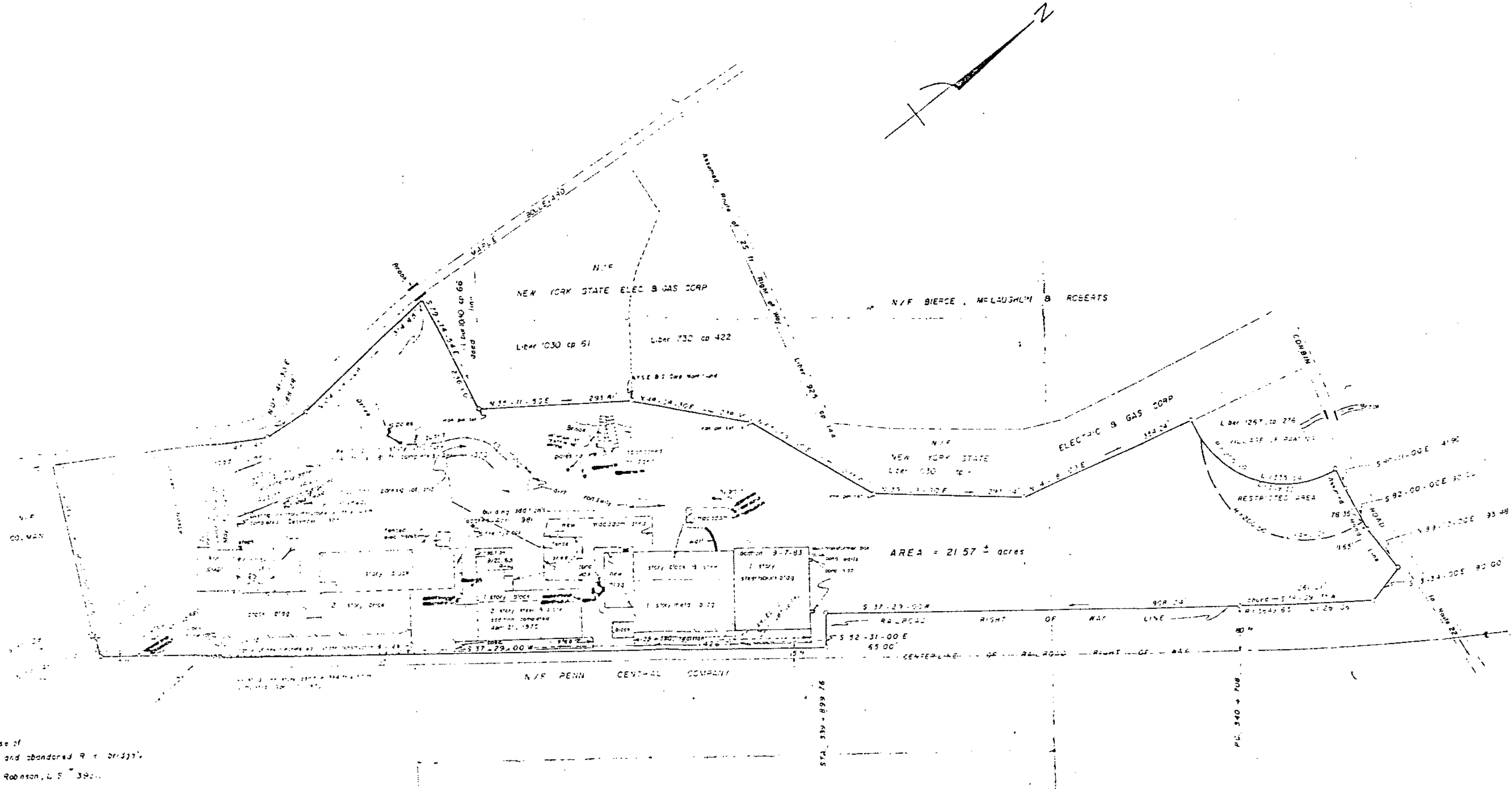
Survey Data

PREPARED FOR: GROUNDWATER TECHNOLOGIES

WELL DESIGNATION	([illegible]) ELEVATION OF CASING @ MARK	ELEVATION OF ADJACENT GROUND
MW 1-D	439.63	437.60
MW 1-S	440.91	438.42
MW 2-D1	437.66	437.98
MW 2-D2	438.02	438.16
MW 2-S	438.02	438.31
MW 3-S	439.01	439.19
MW 4	439.42	439.77
MW 5-D	443.06	442.34
MW 5-S	442.02	442.19

ELEVATION OF TOP 14' BOARD @ Ⓒ BROOK	441.95
ELEVATION OF PRODUCTION WELL #1 (TAKEN @ TOP OF CASING)	440.15 (GROUND 439.86)
ELEVATION OF PRODUCTION WELL #2 (TAKEN @ CONCRETE SLAB)	438.51

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS



NOTE

This Map prepared for purpose of locating new building additions, and abandoned R.R. bridges.

Boundary Survey by Spencer G Robinson, L.S. 39..
August 1, 1969
Last Revision December 1, 1977

MAP PREPARED FOR

PAWLING RUBBER CORPORATION

LOCATED IN

VILLAGE & TOWN OF PAWLING

COUNTY OF DUTCHESS
SCALE 1" = 100'

STATE OF NEW YORK
APRIL 27, 1981
OCTOBER 21, 1982
SEPTEMBER 15, 1983
SEPTEMBER 22, 1983
JANUARY 14, 1985
JUNE 29, 1988

JAMES K DEVINE
LAND SURVEYOR
PAWLING, NEW YORK

A P P E N D I X G

Ground Water Gradient Data

GROUNDWATER TECHNOLOGY

Project: Pawling Corporation
Location:
Date: 6/28/88
Operator: G. Pafumi & C. Burke
Method: IP
Equipment #:

Project #: 110-001-8

Time: 1:30 p.m.

WELL DATA MONITORING FORM

Well ID	Well Depth	T.O.C. Elev.	Depth to Water	Depth to Petro.	Petro. Thickness	Petro. Gravity	Hydro. Equiv.	Corrected DTW	Corrected Water Elev.
MW-5D	150	443.06	8.05						435.01
MW-3S	18.5	439.01	7.04						431.97
MW-4S	approx. 12	439.42	7.95						431.47
MW-1S	17	440.91	10.98						429.93
MW-1D	150	439.63	9.10						430.53
MW-2S	10.5	438.02	6.89						431.13
MW-2D1	42	437.66	7.17						430.49
MW-2D2	150	438.02	7.46						430.56
MW-5S	16.8	442.02	--*						
stream	11.30	427.95	2.7						430.65

Comments: * Not gauged this day. Could not locate early enough.

GROUNDWATER TECHNOLOGY

Project: Pawling Corporation
Location: Pawling, NY
Date: 8/01/88
Operator: C. Burke
Method: Interface Probe
Equipment #: 373

Project #: 110-001-870
Time:

WELL DATA MONITORING FORM

Well ID	Well Depth	T.O.C. Elev.	Depth to Water	Depth to Petro.	Petro. Thickness	Petro. Gravity	Hydro. Equiv.	Corrected DTW	Corrected Water Elev.
MW-1_s	17	440.91	9.42						431.49
MW-1_D	150	439.63	8.13						431.50
MW-2_s	10.5	438.02	7.35	solid					430.67
MW-2_{D1}	42	437.66	6.31						431.35
MW-2_{D2}	150	438.02	6.28						431.74
MW-3	18.5	439.01	5.25						433.76
MW-4	9.10	439.42	6.10						433.32
MW-5_s	16.8	442.02	6.41						435.61
MW-5_D	150	443.06	7.31						435.75
stream	10.75	427.95*	3.3						431.25

Comments: * 0 feet stream gauging datum plane at 427.95 feet stream level 3.3 feet above this 0 feet mark.

A P P E N D I X   H

Ground Water, Surface Water, and
Stream Sediment Laboratory Results

CAMO LABORATORIES
367 VIOLET AVENUE
POUGHKEEPSIE, NEW YORK 12601
(914) 473-9200
FED. I.D. #14-1514539
NYS LAB ID NO.: 10310

Pawling Corporation
157 Charles Coleman Boulevard
Pawling, New York 12564

Date of Invoice: 07/22/88
P.O. #:
Job #:
Invoice #: 88-6-2831

CORRECTED
Analytical Report

Date Samples Collected: 06-30-88
Date Samples Received: 06-30-88
Samples Collected By: Client
Samples Delivered By: Client
Matrix: Water/Soil

Sample Identification

A. MW-1S
B. MW-1D
C. MW-2D1
D. MW-2D2
E. MW-3S
F. MW-4S
G. MW-5S
H. MW-5D
I. SS-1
J. SS-2

Parameters	Unit/ Measure	A	B	C	D	E	F	G	H	I	J
EPA Method 624		*	*	*	*	*	*	*	*	*	*
Base/Neutral Extractables		*	*	*	*	*	*	*	*	*	*
Priority Pollutant Metals		*	*	*	*	*	*	*	*	*	*

Analysis Comments: Page 1 of 2

* See attached tables.

Comments: All samples will be discarded after twenty-one (21) days or EPA Holding time, whichever is shorter, unless we are notified otherwise.

Hazardous waste samples will be returned to client.

Analytical Methods: All analytical methods comply with those specified in APHA "Standard Methods" and/or EPA approved methods.

CAMO LABORATORIES
367 VIOLET AVENUE
POUGHKEEPSIE, NEW YORK 12601
(914) 473-9200
FED. I.D. #14-1514539
NYS LAB ID NO.: 10310

Pawling Corporation
157 Charles Coleman Boulevard
Pawling, New York 12564

Date of Invoice: 07/22/88
P.O. #:
Job #:
Invoice #: 88-6-2831

CORRECTED
Analytical Report

Date Samples Collected: 06-30-88
Date Samples Received: 06-30-88
Samples Collected By: Client
Samples Delivered By: Client
Matrix: Water/Soil

Sample Identification

K. SS-3
L. SS-4
M. SSS-1 (Soil)
N. SSS-2 (Soil)
O. SSS-3 (Soil)
P. SSS-4 (Soil)
Q. DW-I
R. DW-II
S. Field Blank
T. Trip Blank

Parameters	Unit/ Measure	K	L	M	N	O	P	Q	R	S	T
EPA Method 624		*	*	*	*	*	*	*	*	*	*
Base/Neutral Extractables		*	*	*	*	*	*	*	*	*	*
Priority Pollutant Metals		*	*	*	*	*	*	*	*	*	*

Analysis Comments:

* See attached tables.

Comments: All samples will be discarded after twenty-one (21) days or EPA Holding time, whichever is shorter, unless we are notified otherwise.

Hazardous waste samples will be returned to client.

Analytical Methods: All analytical methods comply with those specified in APHA "Standard Methods" and/or EPA approved methods.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
Chloromethane	<1	<1	<1	<1	<1
Bromomethane	<1	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1	<1
Chloroethane	<1	<1	<1	<1	<1
Methylene Chloride	<1	<1	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1	<1	<1
1,1-Dichloroethylene	<1	<1	<1	<1	<1
1,1-Dichloroethane	8	<1	<1	<1	<1
Trans-1,2-dichloroethylene	8	6	880	100	4
Dichlorodifluoromethane	<1	<1	<1	<1	<1
Chloroform	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	3	5
Carbon Tetrachloride	<1	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
Trans-1,3-dichloropropene	<1	<1	<1	<1	<1
Trichloroethylene	<1	6	90	44	2
Dibromochloromethane	<1	<1	<1	<1	<1
Cis-1,3-dichloropropene	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1
Benzene	<1	<1	<1	<1	<1
2-Chloroethylvinyl Ether	<10	<10	<10	<10	<10
Bromoform	<5	<5	<5	<5	<5
Tetrachloroethylene	<1	<1	<1	29	16
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1
Toluene	<1	<1	3,000	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Acrolein	<100	<100	<100	<100	<100
Acrylonitrile	<100	<100	<100	<100	<100

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
Chloromethane	<1	<1	<1	<1	<1
Bromomethane	<1	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1	<1
Chloroethane	<1	<1	<1	<1	<1
Methylene Chloride	<1	<1	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1	<1	<1
1,1-Dichloroethylene	<1	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1	<1
Trans-1,2-dichloroethylene	<1	<1	<1	<1	<1
Dichlorodifluoromethane	<1	<1	<1	<1	<1
Chloroform	<1	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	<1
Carbon Tetrachloride	<1	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1	<1

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
Trans-1,3-dichloropropene	<1	<1	<1	<1	<1
Trichloroethylene	<1	<1	<1	<1	<1
Dibromochloromethane	<1	<1	<1	<1	<1
Cis-1,3-dichloropropene	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1	<1
Benzene	<1	<1	<1	<1	<1
2-Chloroethylvinyl Ether	<10	<10	<10	<10	<10
Bromoform	<5	<5	<5	<5	<5
Tetrachloroethylene	14	14	<1	<1	<1
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Acrolein	<100	<100	<100	<100	<100
Acrylonitrile	<100	<100	<100	<100	<100

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
Chloromethane	<1	<1	<5	<5	<5
Bromomethane	<1	<1	<5	<5	<5
Vinyl Chloride	<1	<1	<5	<5	<5
Chloroethane	<1	<1	<5	<5	<5
Methylene Chloride	<1	<1	<5	<5	<5
Trichlorofluoromethane	<1	<1	<5	<5	<5
1,1-Dichloroethylene	<1	<1	<5	<5	<5
1,1-Dichloroethane	<1	<1	<5	<5	<5
Trans-1,2-dichloroethylene	<1	<1	<5	<5	<5
Dichlorodifluoromethane	<1	<1	<5	<5	<5
Chloroform	<1	<1	<5	<5	<5
1,2-Dichloroethane	<1	<1	<5	<5	<5
1,1,1-Trichloroethane	<1	<1	<5	<5	<5
Carbon Tetrachloride	<1	<1	<5	<5	<5
Bromodichloromethane	<1	<1	<5	<5	<5
1,2-Dichloropropane	<1	<1	<5	<5	<5

NOTE: All results expressed in ug/L unless noted otherwise.

* ug/kg

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
Trans-1,3-dichloropropene	<1	<1	<5	<5	<5
Trichloroethylene	<1	<1	<5	<5	<5
Dibromochloromethane	<1	<1	<5	<5	<5
Cis-1,3-dichloropropene	<1	<1	<5	<5	<5
1,1,2-Trichloroethane	<1	<1	<5	<5	<5
Benzene	<1	<1	<5	<5	<5
2-Chloroethylvinyl Ether	<10	<10	<50	<50	<50
Bromoform	<5	<5	<25	<25	<25
Tetrachloroethylene	<1	<1	<5	<5	<5
1,1,2,2-Tetrachloroethane	<1	<1	<5	<5	<5
Toluene	<1	<1	<5	<5	<5
Chlorobenzene	<1	<1	<5	<5	<5
Ethylbenzene	<1	<1	<5	<5	<5
Acrolein	<100	<100	<500	<500	<500
Acrylonitrile	<100	<100	<500	<500	<500

NOTE: All results expressed in ug/L unless noted otherwise.

* ug/kg

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II	S Field Blank	T Trip Blank
Chloromethane	<5	<1	<1	<1	<1
Bromomethane	<5	<1	<1	<1	<1
Vinyl Chloride	<5	<1	<1	<1	<1
Chloroethane	<5	<1	<1	<1	<1
Methylene Chloride	<5	<1	<1	<1	<1
Trichlorofluoromethane	<5	<1	<1	<1	<1
1,1-Dichloroethylene	<5	<1	<1	<1	<1
1,1-Dichloroethane	<5	<1	<1	<1	<1
Trans-1,2-dichloroethylene	<5	5	52	<1	<1
Dichlorodifluoromethane	<5	<1	<1	<1	<1
Chloroform	<5	<1	<1	<1	<1
1,2-Dichloroethane	<5	<1	<1	<1	<1
1,1,1-Trichloroethane	<5	5	12	<1	<1
Carbon Tetrachloride	<5	<1	<1	<1	<1
Bromodichloromethane	<5	<1	<1	<1	<1
1,2-Dichloropropane	<5	<1	<1	<1	<1

NOTE: All results expressed in ug/L unless noted otherwise.

* ug/kg

CAMO LOG NO.: 88-6-2831

VOLATILES

SAMPLE IDENTIFICATIONS

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II	S Field Blank	T Trip Blank
Trans-1,3-dichloropropene	<5	<1	<1	<1	<1
Trichloroethylene	<5	2	10	<1	<1
Dibromochloromethane	<5	<1	<1	<1	<1
Cis-1,3-dichloropropene	<5	<1	<1	<1	<1
1,1,2-Trichloroethane	<5	<1	<1	<1	<1
Benzene	<5	<1	<1	<1	<1
2-Chloroethylvinyl Ether	<50	<10	<10	<10	<10
Bromoform	<25	<5	<5	<5	<5
Tetrachloroethylene	<5	2	31	<1	<1
1,1,2,2-Tetrachloroethane	<5	<1	<1	<1	<1
Toluene	<5	<1	<1	<1	<1
Chlorobenzene	<5	<1	<1	<1	<1
Ethylbenzene	<5	<1	<1	<1	<1
Acrolein	<500	<100	<100	<100	<100
Acrylonitrile	<500	<100	<100	<100	<100

NOTE: All results expressed in ug/L unless noted otherwise.

* ug/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
1,2 Dichlorobenzene	<10	<10	<10	<10	<10
1,3 Dichlorobenzene	<10	<10	<10	<10	<10
1,4 Dichlorobenzene	<10	<10	<10	<10	<10
Hexachloroethane	<10	<10	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10	<10	<10
Hexachlorobenzene	<10	<10	<10	<10	<10
1,2,4 Trichlorobenzene	<10	<10	<10	<10	<10
Bis(2-Chloroethoxy) Methane	<10	<10	<10	<10	<10
Naphthalene	<10	<10	<10	<10	<10
2 Chloronaphthalene	<10	<10	<10	<10	<10
Isophorone	<10	<10	<10	<10	<10
Nitrobenzene	<10	<10	<10	<10	<10
2,4 Dinitrotoluene	<10	<10	<10	<10	<10
2,6 Dinitrotoluene	<10	<10	<10	<10	<10
4 Bromophenyl Phenyl Ether	<10	<10	<10	<10	<10
Bis(2-Ethylhexyl) Phthalate	<10	<10	<10	<10	<10
Di-n-octyl Phthalate	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION A MW-1S	 B MW-1D	 C MW-2D1	 D MW-2D2	 E MW-3S
Dimethyl phthalate	<10	<10	<10	<10	<10
Diethyl phthalate	<10	<10	<10	<10	<10
Di-n-butyl phthalate	<10	<10	<10	<10	<10
Fluorene	<10	<10	<10	<10	<10
Fluoranthene	<10	<10	<10	<10	<10
Chrysene	<10	<10	<10	<10	<10
Pyrene	<10	<10	<10	<10	<10
Phenanthrene	<10	<10	<10	<10	<10
Anthracene	<10	<10	<10	<10	<10
Benzo(a)anthracene	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	<10	<10	<10	<10	<10
Benzo(a)pyrene	<10	<10	<10	<10	<10
Indeno(1,2,3-c,d)pyrene	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
4 Chlorophenyl Phenyl Ether	<10	<10	<10	<10	<10
3,3' Dichlorobenzidine	<20	<20	<20	<20	<20
Benzidine	<80	<80	<80	<80	<80
bis(2-Chloroethyl)ether	<10	<10	<10	<10	<10
1,2-Diphenylhydrazine	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	<10	<10	<10	<10	<10
Acenaphthylene	<10	<10	<10	<10	<10
Acenaphthene	<10	<10	<10	<10	<10
Butyl benzyl phthalate	<10	<10	<10	<10	<10
N-Nitrosodimethylamine	<10	<10	<10	<10	<10
Nitrosodi-n-propylamine	<10	<10	<10	<10	<10
bis(2-Chloroisopropyl)ether	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION F MW-4S	 G MW-5S	 H MW-5D	 I SS-1	 J SS-2
1,2 Dichlorobenzene	<10	<10	<10	<10	<10
1,3 Dichlorobenzene	<10	<10	<10	<10	<10
1,4 Dichlorobenzene	<10	<10	<10	<10	<10
Hexachloroethane	<10	<10	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10	<10	<10
Hexachlorobenzene	<10	<10	<10	<10	<10
1,2,4 Trichlorobenzene	<10	<10	<10	<10	<10
Bis(2-Chloroethoxy) Methane	<10	<10	<10	<10	<10
Naphthalene	<10	<10	<10	<10	<10
2 Chloronaphthalene	<10	<10	<10	<10	<10
Isophorone	<10	<10	<10	<10	<10
Nitrobenzene	<10	<10	<10	<10	<10
2,4 Dinitrotoluene	<10	<10	<10	<10	<10
2,6 Dinitrotoluene	<10	<10	<10	<10	<10
4 Bromophenyl Phenyl Ether	<10	<10	<10	<10	<10
Bis(2-Ethylhexyl) Phthalate	<10	<10	<10	<10	<10
Di-n-octyl Phthalate	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
Dimethyl phthalate	<10	<10	<10	<10	<10
Diethyl phthalate	<10	<10	<10	<10	<10
Di-n-butyl phthalate	<10	<10	<10	<10	<10
Fluorene	<10	<10	<10	<10	<10
Fluoranthene	<10	<10	<10	<10	<10
Chrysene	<10	<10	<10	<10	<10
Pyrene	<10	<10	<10	<10	<10
Phenanthrene	<10	<10	<10	<10	<10
Anthracene	<10	<10	<10	<10	<10
Benzo(a)anthracene	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	<10	<10	<10	<10	<10
Benzo(a)pyrene	<10	<10	<10	<10	<10
Indeno(1,2,3-c,d)pyrene	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
4 Chlorophenyl Phenyl Ether	<10	<10	<10	<10	<10
3,3' Dichlorobenzidine	<20	<20	<20	<20	<20
Benzidine	<80	<80	<80	<80	<80
bis(2-Chloroethyl)ether	<10	<10	<10	<10	<10
1,2-Diphenylhydrazine	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	<10	<10	<10	<10	<10
Acenaphthylene	<10	<10	<10	<10	<10
Acenaphthene	<10	<10	<10	<10	<10
Butyl benzyl phthalate	<10	<10	<10	<10	<10
N-Nitrosodimethylamine	<10	<10	<10	<10	<10
Nitrosodi-n-propylamine	<10	<10	<10	<10	<10
bis(2-Chloroisopropyl)ether	<10	<10	<10	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
1,2 Dichlorobenzene	<10	<10	<2	<2	<2
1,3 Dichlorobenzene	<10	<10	<2	<2	<2
1,4 Dichlorobenzene	<10	<10	<2	<2	<2
Hexachloroethane	<10	<10	<2	<2	<2
Hexachlorobutadiene	<10	<10	<2	<2	<2
Hexachlorobenzene	<10	<10	<2	<2	<2
1,2,4 Trichlorobenzene	<10	<10	<2	<2	<2
Bis(2-Chloroethoxy) Methane	<10	<10	<2	<2	<2
Naphthalene	<10	<10	<2	<2	<2
2 Chloronaphthalene	<10	<10	<2	<2	<2
Isophorone	<10	<10	<2	<2	<2
Nitrobenzene	<10	<10	<2	<2	<2
2,4 Dinitrotoluene	<10	<10	<2	<2	<2
2,6 Dinitrotoluene	<10	<10	<2	<2	<2
4 Bromophenyl Phenyl Ether	<10	<10	<2	<2	<2
Bis(2-Ethylhexyl) Phthalate	<10	<10	<2	<2	<2
Di-n-octyl Phthalate	<10	<10	<2	<2	<2

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
Dimethyl phthalate	<10	<10	<2	<2	<2
Diethyl phthalate	<10	<10	<2	<2	<2
Di-n-butyl phthalate	<10	<10	<2	<2	<2
Fluorene	<10	<10	<2	<2	<2
Fluoranthene	<10	<10	<2	<2	<2
Chrysene	<10	<10	<2	<2	<2
Pyrene	<10	<10	<2	<2	<2
Phenanthrene	<10	<10	<2	<2	<2
Anthracene	<10	<10	<2	<2	<2
Benzo(a)anthracene	<10	<10	<2	<2	<2
Benzo(b)fluoranthene	<10	<10	<2	<2	<2
Benzo(k)fluoranthene	<10	<10	<2	<2	<2
Benzo(a)pyrene	<10	<10	<2	<2	<2
Indeno(1,2,3-c,d)pyrene	<10	<10	<2	<2	<2
Dibenzo(a,h)anthracene	<10	<10	<2	<2	<2
Benzo(g,h,i)perylene	<10	<10	<2	<2	<2

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
4 Chlorophenyl Phenyl Ether	<10	<10	<2	<2	<2
3,3' Dichlorobenzidine	<20	<20	<4	<4	<4
Benzidine	<80	<80	<20	<20	<20
bis(2-Chloroethyl)ether	<10	<10	<2	<2	<2
1,2-Diphenylhydrazine	<10	<10	<2	<2	<2
Hexachlorocyclopentadiene	<10	<10	<2	<2	<2
N-Nitrosodiphenylamine	<10	<10	<2	<2	<2
Acenaphthylene	<10	<10	<2	<2	<2
Acenaphthene	<10	<10	<2	<2	<2
Butyl benzyl phthalate	<10	<10	<2	<2	<2
N-Nitrosodimethylamine	<10	<10	<2	<2	<2
Nitrosodi-n-propylamine	<10	<10	<2	<2	<2
bis(2-Chloroisopropyl)ether	<10	<10	<2	<2	<2

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II
1,2 Dichlorobenzene	<2	<10	<10
1,3 Dichlorobenzene	<2	<10	<10
1,4 Dichlorobenzene	<2	<10	<10
Hexachloroethane	<2	<10	<10
Hexachlorobutadiene	<2	<10	<10
Hexachlorobenzene	<2	<10	<10
1,2,4 Trichlorobenzene	<2	<10	<10
Bis(2-Chloroethoxy) Methane	<2	<10	<10
Naphthalene	<2	<10	<10
2 Chloronaphthalene	<2	<10	<10
Isophorone	<2	<10	<10
Nitrobenzene	<2	<10	<10
2,4 Dinitrotoluene	<2	<10	<10
2,6 Dinitrotoluene	<2	<10	<10
4 Bromophenyl Phenyl Ether	<2	<10	<10
Bis(2-Ethylhexyl) Phthalate	<2	<10	<10
Di-n-octyl Phthalate	<2	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

PARAMETERS	SAMPLE IDENTIFICATION P SSS-4 (Soil)*	Q DW-I	R DW-II
Dimethyl phthalate	<2	<10	<10
Diethyl phthalate	<2	<10	<10
Di-n-butyl phthalate	<2	<10	<10
Fluorene	<2	<10	<10
Fluoranthene	<2	<10	<10
Chrysene	<2	<10	<10
Pyrene	<2	<10	<10
Phenanthrene	<2	<10	<10
Anthracene	<2	<10	<10
Benzo(a)anthracene	<2	<10	<10
Benzo(b)fluoranthene	<2	<10	<10
Benzo(k)fluoranthene	<2	<10	<10
Benzo(a)pyrene	<2	<10	<10
Indeno(1,2,3-c,d)pyrene	<2	<10	<10
Dibenzo(a,h)anthracene	<2	<10	<10
Benzo(g,h,i)perylene	<2	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SAMPLE IDENTIFICATION

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II
4 Chlorophenyl Phenyl Ether	<2	<10	<10
3,3' Dichlorobenzidine	<4	<20	<20
Benzidine	<20	<80	<80
bis(2-Chloroethyl)ether	<2	<10	<10
1,2-Diphenylhydrazine	<2	<10	<10
Hexachlorocyclopentadiene	<2	<10	<10
N-Nitrosodiphenylamine	<2	<10	<10
Acenaphthylene	<2	<10	<10
Acenaphthene	<2	<10	<10
Butyl benzyl phthalate	<2	<10	<10
N-Nitrosodimethylamine	<2	<10	<10
Nitrosodi-n-propylamine	<2	<10	<10
bis(2-Chloroisopropyl)ether	<2	<10	<10

NOTE: All results expressed in ug/l unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

PARAMETERS	A MW-1S	B MW-1D	C MW-2D1	D MW-2D2	E MW-3S
Antimony	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	0.006	<0.005	<0.005	<0.005	0.008
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.03	<0.03	<0.03	<0.03	<0.03
Copper	0.01	0.01	0.01	0.01	0.01
Lead	0.006	0.035	<0.005	<0.005	0.012
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.01	0.02	0.05	<0.01	0.01

NOTE: All results expressed in mg/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

PARAMETERS	F MW-4S	G MW-5S	H MW-5D	I SS-1	J SS-2
Antimony	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	0.007	0.007	<0.005	0.005	<0.005
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.03	<0.03	<0.03	<0.03	<0.03
Copper	0.02	0.07	0.01	0.01	0.02
Lead	<0.005	0.11	<0.005	0.010	0.013
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.02	0.24	0.02	0.01	0.01

NOTE: All results expressed in mg/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

PARAMETERS	K SS-3	L SS-4	M SSS-1 (Soil)*	N SSS-2 (Soil)*	O SSS-3 (Soil)*
Antimony	<0.01	<0.01	<1	<1	<1
Arsenic	<0.005	<0.005	6.0	7.9	10.7
Beryllium	<0.01	<0.01	<1	<1	<1
Cadmium	<0.01	<0.01	<1	<1	<1
Chromium	<0.03	<0.03	5	7	7
Copper	0.02	0.02	25	18	27
Lead	0.033	<0.005	40	30	30
Mercury	<0.0002	<0.0002	<0.1	<0.1	<0.1
Nickel	<0.05	<0.05	13	17	18
Selenium	<0.005	<0.005	<0.5	<0.5	<0.5
Silver	<0.01	<0.01	1	1	2
Thallium	<0.01	<0.01	<1	<1	<1
Zinc	0.01	<0.01	106	103	124

NOTE: All results expressed in mg/L unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

PARAMETERS	P SSS-4 (Soil)*	Q DW-I	R DW-II
Antimony	<1	<0.01	<0.01
Arsenic	6	<0.005	<0.005
Beryllium	<1	<0.01	<0.01
Cadmium	<1	<0.01	<0.01
Chromium	9	<0.03	<0.03
Copper	27	0.02	0.02
Lead	30	0.13	0.008
Mercury	0.2	<0.0002	<0.0002
Nickel	22	<0.05	<0.05
Selenium	<0.5	<0.005	<0.005
Silver	2	<0.01	<0.01
Thallium	<1	<0.01	<0.01
Zinc	87	0.01	0.10

NOTE: All results expressed in mg/L unless noted otherwise.

* mg/kg

CAMO LOG NO.: 88-6-2831

VOLATILES

DUPS:

SAMPLE IDENTIFICATIONS

PARAMETERS	Test 1 MW-2D1	Test 2 MW-2D1	Test 1 MW-4S	Test 2 MW-4S
Chloromethane	<1	<1	<1	<1
Bromomethane	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1
Chloroethane	<1	<1	<1	<1
Methylene Chloride	<1	<1	<1	<1
Trichlorofluoromethane	<1	<1	<1	<1
1,1-Dichloroethylene	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1
Trans-1,2-dichloroethylene	880	850	<1	<1
Dichlorodifluoromethane	<1	<1	<1	<1
Chloroform	<1	<1	<1	<1
1,2-Dichloroethane	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1
Carbon Tetrachloride	<1	<1	<1	<1
Bromodichloromethane	<1	<1	<1	<1
1,2-Dichloropropane	<1	<1	<1	<1

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

DUPS:

SAMPLE IDENTIFICATIONS

PARAMETERS	Test 1 MW-2D1	Test 2 MW-2D1	Test 1 MW-4S	Test 2 MW-4S
Trans-1,3-dichloropropene	<1	<1	<1	<1
Trichloroethylene	90	88	<1	<1
Dibromochloromethane	<1	<1	<1	<1
Cis-1,3-dichloropropene	<1	<1	<1	<1
1,1,2-Trichloroethane	<1	<1	<1	<1
Benzene	<1	<1	<1	<1
2-Chloroethylvinyl Ether	<10	<10	<10	<10
Bromoform	<5	<5	<5	<5
Tetrachloroethylene	<1	<1	14	13
1,1,2,2-Tetrachloroethane	<1	<1	<1	<1
Toluene	3,000	3,300	<1	<1
Chlorobenzene	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1
Acrolein	<100	<100	<100	<100
Acrylonitrile	<100	<100	<100	<100

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SPIKES:

SAMPLE IDENTIFICATIONS

PARAMETERS	Sample Conc. MW-5D	Known Spike	Obtained	% Recovery
Chloromethane	<1			
Bromomethane	<1			
Vinyl Chloride	<1			
Chloroethane	<1			
Methylene Chloride	<1	29.4	32.2	110%
Trichlorofluoromethane	<1			
1,1-Dichloroethylene	<1	29.3	26.9	92%
1,1-Dichloroethane	<1	29.6	26.5	90%
Trans-1,2-dichloroethylene	<1	30.0	29.0	97%
Dichlorodifluoromethane	<1			
Chloroform	<1	30.0	32.4	108%
1,2-Dichloroethane	<1	29.9	27.1	91%
1,1,1-Trichloroethane	<1	49.8	50.6	102%
Carbon Tetrachloride	<1			
Bromodichloromethane	<1			
1,2-Dichloropropane	<1			

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

VOLATILES

SPIKE:

SAMPLE IDENTIFICATIONS

PARAMETERS	Sample Conc. MW-5D	Known Spike	Obtained	% Recovery
Trans-1,3-dichloropropene	<1			
Trichloroethylene	<1	48.6	51.5	106%
Dibromochloromethane	<1			
Cis-1,3-dichloropropene	<1			
1,1,2-Trichloroethane	<1			
Benzene	<1			
2-Chloroethylvinyl Ether	<10			
Bromoform	<5			
Tetrachloroethylene	<1	49.4	47.2	96%
1,1,2,2-Tetrachloroethane	<1			
Toluene	<1			
Chlorobenzene	<1			
Ethylbenzene	<1			
Acrolein	<100			
Acrylonitrile	<100			

NOTE: All results expressed in ug/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

DUPS: SAMPLE IDENTIFICATION

PARAMETERS	SS-1 Test 1 ug/L	SS-1 Test 2 ug/L	SSS-1 Test 1 mg/kg	SSS-1 Test 2 mg/kg
1,2 Dichlorobenzene	<10	<10	<2	<2
1,3 Dichlorobenzene	<10	<10	<2	<2
1,4 Dichlorobenzene	<10	<10	<2	<2
Hexachloroethane	<10	<10	<2	<2
Hexachlorobutadiene	<10	<10	<2	<2
Hexachlorobenzene	<10	<10	<2	<2
1,2,4 Trichlorobenzene	<10	<10	<2	<2
Bis(2-Chloroethoxy) Methane	<10	<10	<2	<2
Naphthalene	<10	<10	<2	<2
2 Chloronaphthalene	<10	<10	<2	<2
Isophorone	<10	<10	<2	<2
Nitrobenzene	<10	<10	<2	<2
2,4 Dinitrotoluene	<10	<10	<2	<2
2,6 Dinitrotoluene	<10	<10	<2	<2
4 Bromophenyl Phenyl Ether	<10	<10	<2	<2
Bis(2-Ethylhexyl) Phthalate	<10	<10	<2	<2
Di-n-octyl Phthalate	<10	<10	<2	<2

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

DUPS:

PARAMETERS	SS-1 Test 1 ug/L	SS-1 Test 2 ug/L	SSS-1 Test 1 mg/kg	SSS-1 Test 2 mg/kg
Dimethyl phthalate	<10	<10	<2	<2
Diethyl phthalate	<10	<10	<2	<2
Di-n-butyl phthalate	<10	<10	<2	<2
Fluorene	<10	<10	<2	<2
Fluoranthene	<10	<10	<2	<2
Chrysene	<10	<10	<2	<2
Pyrene	<10	<10	<2	<2
Phenanthrene	<10	<10	<2	<2
Anthracene	<10	<10	<2	<2
Benzo(a)anthracene	<10	<10	<2	<2
Benzo(b)fluoranthene	<10	<10	<2	<2
Benzo(k)fluoranthene	<10	<10	<2	<2
Benzo(a)pyrene	<10	<10	<2	<2
Indeno(1,2,3-c,d)pyrene	<10	<10	<2	<2
Dibenzo(a,h)anthracene	<10	<10	<2	<2
Benzo(g,h,i)perylene	<10	<10	<2	<2

CAMO LOG NO.: 88-6-2831

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

DUPS:

SAMPLE IDENTIFICATION

PARAMETERS	SS-1 Test 1 ug/L	SS-1 Test 2 ug/L	SSS-1 Test 1 mg/kg	SSS-1 Test 2 mg/kg
4 Chlorophenyl Phenyl Ether	<10	<10	<2	<2
3,3' Dichlorobenzidine	<20	<20	<4	<4
Benzidine	<80	<80	<20	<20
bis(2-Chloroethyl)ether	<10	<10	<2	<2
1,2-Diphenylhydrazine	<10	<10	<2	<2
Hexachlorocyclopentadiene	<10	<10	<2	<2
N-Nitrosodiphenylamine	<10	<10	<2	<2
Acenaphthylene	<10	<10	<2	<2
Acenaphthene	<10	<10	<2	<2
Butyl benzyl phthalate	<10	<10	<2	<2
N-Nitrosodimethylamine	<10	<10	<2	<2
Nitrosodi-n-propylamine	<10	<10	<2	<2
bis(2-Chloroisopropyl)ether	<10	<10	<2	<2

CAMO LOG NO.: 88-6-2831

CAMO GC/MS SPIKE

BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

SPIKE: SAMPLE IDENTIFICATION

PARAMETERS	Known Spike	Obtained	% Recovery
Dimethyl Phthalate	100	22	22%
Fluoranthene	100	26	26%
Chrysene	100	37	37%
Anthracene	100	39	39%
Benzo(b)fluoranthene	100	32	32%
Benzo(g,h,i)perylene	100	36	36%
4-Chlorophenyl phenyl ether	100	32	32%
1,4-Dichlorobenzene	100	39	39%
Naphthalene	100	35	35%

NOTE: All results are expressed in ug/L unless otherwise indicated.

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SAMPLE IDENTIFICATION

DUPS:

PARAMETERS	MW-2D1 Test 1	MW-2D1 Test 2
Antimony	<0.01	<0.01
Arsenic	<0.005	<0.005
Beryllium	<0.01	0.01
Cadmium	<0.01	<0.01
Chromium	<0.03	<0.03
Copper	0.01	0.01
Lead	<0.005	<0.005
Mercury	<0.0002	<0.0002
Nickel	<0.05	<0.05
Selenium	<0.005	<0.005
Silver	<0.01	<0.01
Thallium	<0.01	<0.01
Zinc	0.05	0.05

NOTE: All results expressed in mg/L unless noted otherwise.

CAMO LOG NO.: 88-6-2831

PRIORITY POLLUTANT METALS

SPIKES:

PARAMETERS	SAMPLE IDENTIFICATION MW-201 Sample Conc.	Known Spike	Obtained	% Recovery
Antimony	<0.01	0.02	0.02	100%
Arsenic	<0.005 (0.003)	0.020	0.023	100%
Beryllium	<0.01	0.40	0.40	100%
Cadmium	<0.01	0.40	0.38	95%
Chromium	<0.03	0.40	0.42	105%
Copper	0.01	0.40	0.43	108%
Lead	<0.005	0.02	0.021	105%
Mercury	<0.0002	0.0050	0.0050	100%
Nickel	<0.05	0.40	0.41	103%
Selenium	<0.005	0.020	0.017	85%
Silver	<0.01			
Thallium	<0.01	0.02	0.02	100%
Zinc	0.05	0.40	0.46	103%

NOTE: All results expressed in mg/L unless noted otherwise.

DRAFT

Limited Feasibility Study
Pawling Corporation

December 27, 1990

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TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose and General Approach

This limited scope feasibility study presents an evaluation of remediation alternatives to aid in selecting a remedial system design to treat soil and groundwater impacted by organic waste solvents at the Pawling Corporation facility in Pawling, New York. The study has been prepared to assist Pawling Corporation in choosing an appropriate remedial action to treat soil and groundwater impacted by volatile organic compounds (VOCs) near a former waste-burning trench located at the northern end of the facility's parking lot. Although Pawling Corporation is not presently under formal consent order or state RI/FS proceedings, the limited feasibility study has been requested by the New York State Department of Environmental Conservation (NYS DEC), Region 3, as part of ongoing NYS DEC oversight of the project.

This study has been conducted following the procedures for performing feasibility studies as outlined in the U.S. Environmental Protection Agency's (EPA) "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA", EPA/540/G-89/004 (October, 1988) . The analysis and conclusions presented herein are based on data collected between August, 1987 and August, 1990. A brief history of previous investigations performed at the site, a description of the geologic and hydrogeologic conditions at the site and the distribution of contaminants within the soil and groundwater are described in this introduction. Section 2.0 presents a review of existing soil and groundwater standards or anticipated cleanup levels based on state and federal standards and requirements. Section 3.0 screens various treatment technologies for remediation of soil and groundwater and the merits of each technology based on cost, implementability and effectiveness. Section 4 discusses treatability testing.

Finally, Section 5.0 describes two remedial alternatives based on a detailed evaluation of preferred treatment technologies that are cost effective, easily implementable, limit the migration of contaminants, and are proven technologies that will provide the best overall protection of human health and the environment.

1.2 Site History

The Pawling site (New York I.D.No. 314002, EPA I.D.No. NYD001354349) is located at 157 Charles Colman Boulevard (formerly Maple Boulevard), Pawling, Dutchess County, New York (Figure 1, Site

Location Map). The Pawling Corporation has been at this location since 1946 producing rubber products and fabricated plastics. The property is located adjacent to a wetlands area along the Swamp River. As part of daily plant operation, the facility is authorized to discharge non-contact cooling water to the Swamp River through a SPDES permit, number NY-000-4616, effective January 1, 1985. The NYS DEC alleges that from on or about June 2, 1987 the discharges of the cooling water to the Swamp River contained copper, zinc and organic solvents. In addition, the NYS DEC alleges that stormwater runoff from the Pawling property discharged to the groundwater via a storm grate and dry well, and beginning on approximately the same date, contained copper, lead and iron in concentrations exceeding New York State Groundwater discharge limits.

A consent order, issued by the NYS DEC (Case #3-1489/8712), was received by Pawling Corporation on February 24, 1988 documenting these allegations and requiring that a groundwater investigation be performed to identify the extent and source of groundwater contamination.

Subsequent investigation of the site began with a Phase I investigation completed by Gibbs & Hill, Inc., in June, 1988. The Phase I study provided a review of historical site usage, existing site conditions based on a site walkover and interviews with Pawling Corporation personnel, and the geology of the site based on a review of published data.

Concurrent with the Phase I investigation, Pawling Corporation contracted Groundwater Technology, Inc. to perform a groundwater investigation. To date, Groundwater Technology has completed the ground water investigations listed below.

- Groundwater Investigation, Pawling Corporation, Pawling, New York, September 2, 1988.

- Amended Groundwater Investigation, Pawling Corporation, Pawling, New York, February 1, 1989.

- Draft Phase II Groundwater Investigation, Pawling Corporation, Pawling, New York, September, 1990.

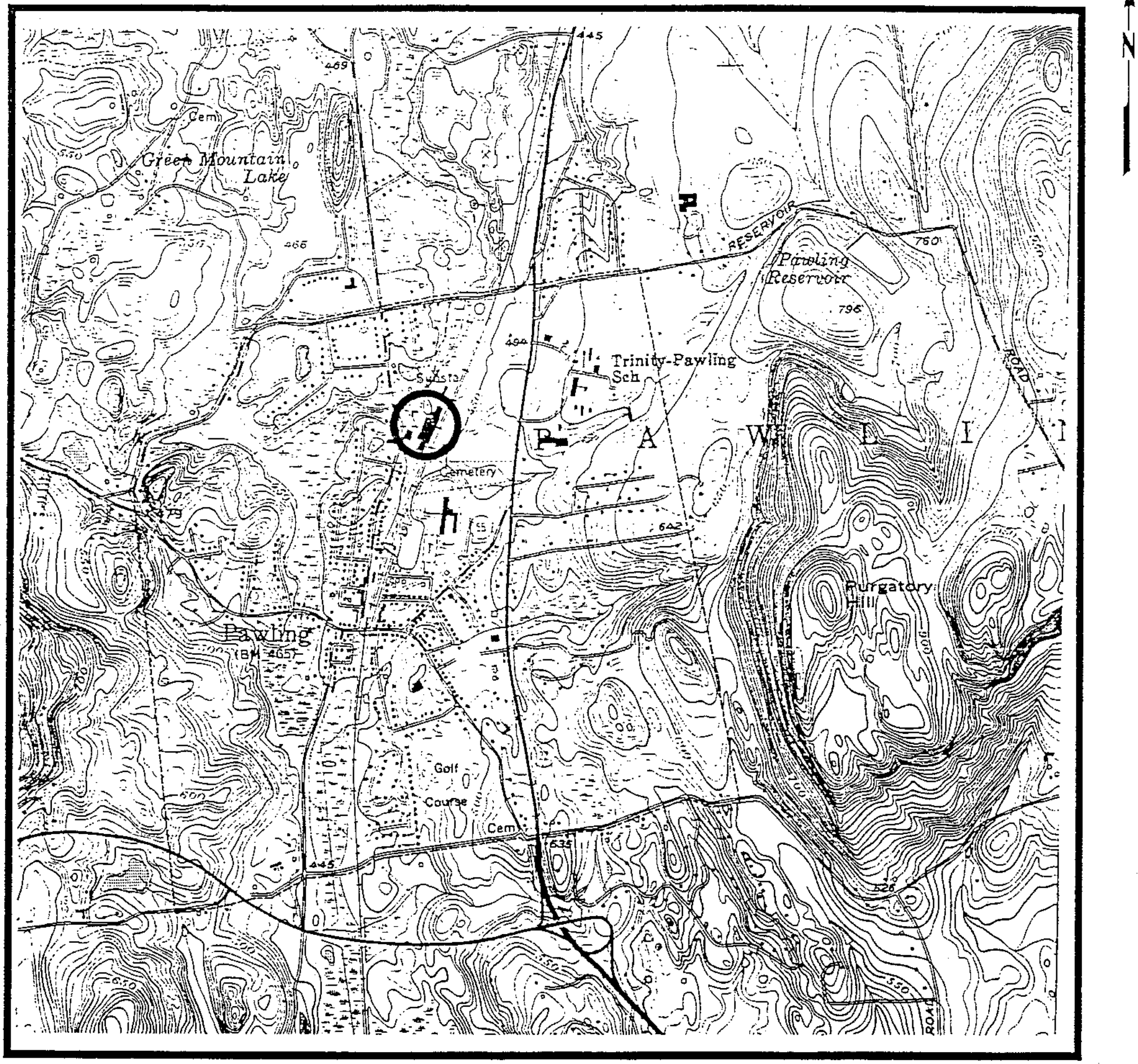
- Letter report on installation and sampling of monitoring wells, December, 1990.

FIGURE 1

SITE LOCATION MAP

PAWLING CORPORATION

PAWLING, NY



SOURCE: U.S.G.S. 7.5 MIN. PAWLING QUAD, 1971.

SCALE: 1" = 2083'

0 0.5

MILES

GROUNDWATER TECHNOLOGY, INC.

The overall objectives of the groundwater investigations were:

- to delineate the concentration and extent of metal and solvent contamination in the groundwater,
- to evaluate the pathways of contaminant migration, and
- to provide the information required for design of a site remediation system.

The overall work scope designed to achieve these objectives consisted of a site inspection, aerial photo review, background data review, soil borings and soil sample analysis, a soil gas survey, installation of groundwater monitoring wells in both overburden and bedrock, groundwater gauging and sampling, overburden and bedrock pumping tests, and stream water and sediment sampling. The locations of monitoring wells installed during the investigations are shown on the Site Map (Figure 2). The results of these investigations identified an area of groundwater containing dissolved concentrations of VOCs (vicinity of well RW-1S) near a former waste-solvent burning trench located at the northern end of the facility's parking lot.

Based on the discovery of the dissolved VOCs on site, Groundwater Technology began design of a remedial system in August of 1990. On October 29, 1990, the NYS DEC, Region 3, instituted a schedule for the remedial project which included deadlines for submittal of a limited feasibility study. This report summarizes the results of a limited feasibility study and describes two remedial alternatives applicable to the site.

1.3 Site Geology/Hydrogeology

The analysis of well logs from the monitoring well installations in the area of detected VOCs (northern edge of parking lot) reveals that the stratigraphy of overburden deposits below 3 to 4 feet of fill consists predominantly of silt and fine sand above a thin (2-4 feet) layer of sand and gravel and discontinuous till. Bedrock in the site area outcrops along the railroad located south of the Pawling Corporation buildings. A ridge of shallow bedrock (less than 10 feet below ground surface) extends between wells MW-1S and MW-4S. In the vicinity of RW-1S, the bedrock was encountered at depths ranging from 15 to 20 feet, and is highly fractured from the bedrock surface to a depth of approximately 42 feet below grade.

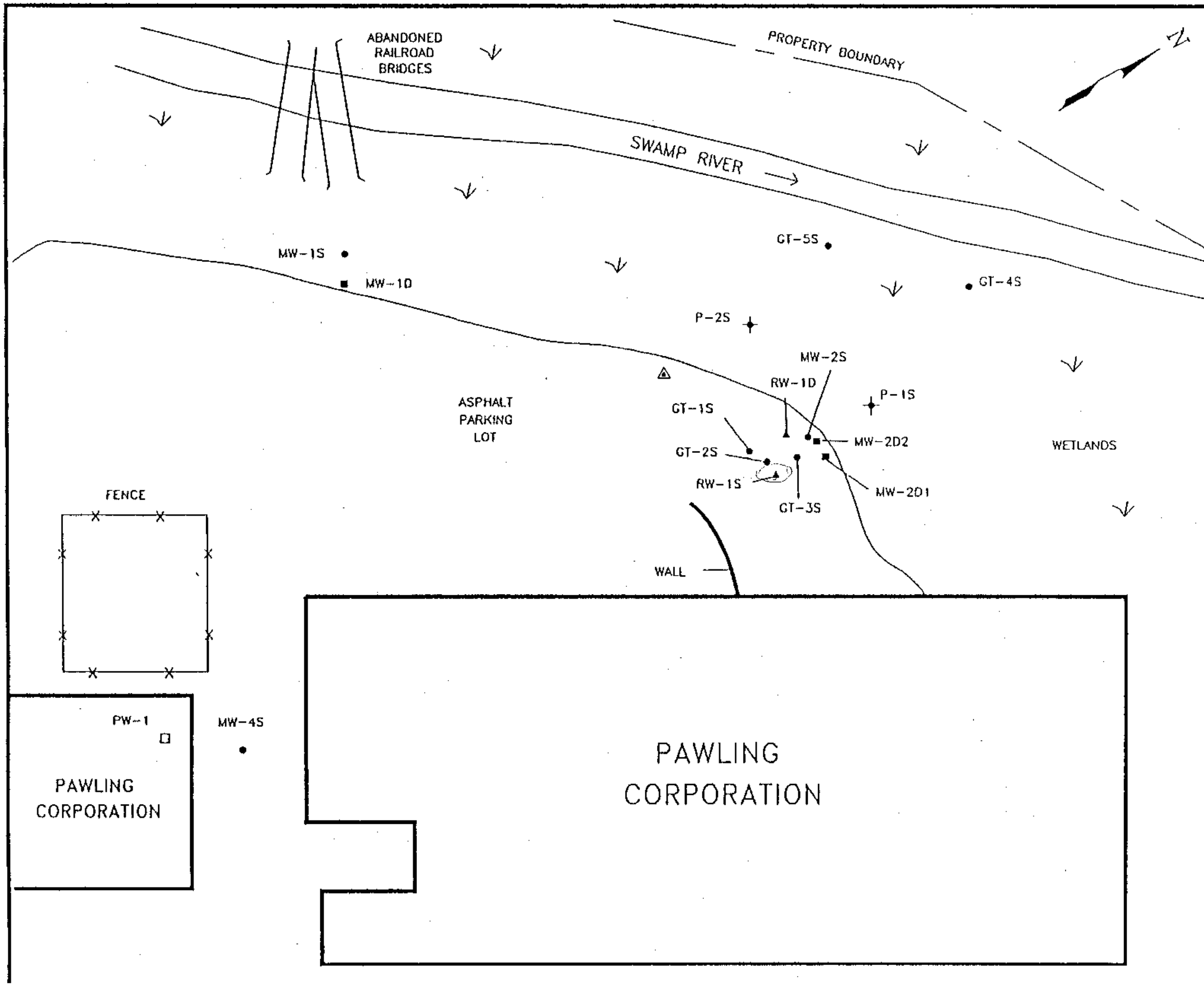


FIGURE 2
SITE MAP
PROJECT: PAWLING CORPORATION
LOCATION: PAWLING, NY
JOB NO.: 01110-8708

- ▲ RECOVERY WELL
- ● SHALLOW MONITORING WELL
- ■ DEEP MONITORING WELL
- ✦ DRIVE POINT
- □ PRODUCTION WELL
- △ PROPOSED RECOVERY WELL

NOTE: LOCATIONS OF GT-4S AND GT-5S ARE APPROXIMATE.

0 50
SCALE IN FEET

DECEMBER 20, 1990

SOURCE: PAWLING CORPORATION, 1990. 8708-50

GROUNDWATER

Rock fragments retrieved during drilling consisted of grey sandstone above yellow and grey limestone. Fisher et al (1970) have mapped the bedrock as the Stockbridge Limestone, Cambrian in age.

Depth to groundwater in the vicinity of RW-1S is approximately seven feet below grade and varies in response to seasonal fluctuations. The comparison of water levels in the nearby well couplet MW-1D and MW-1S, (and wells MW-5D and MW-5S, MW-6D and MW-6S) revealed that the bedrock wells show slightly higher water elevations than the overburden wells indicating the existence of an upward vertical gradient between the bedrock and overburden aquifers.

The wells drilled into top of the bedrock (MW-$2D_1$ and RW-1D, both drilled 22 feet into bedrock) showed slightly lower water levels than the deep bedrock well, MW-$2D_2$, indicating the existence of an upward vertical gradient also within the bedrock aquifer.

Both the overburden and the bedrock aquifers showed generally similar directions of groundwater flow. The groundwater flow in the overburden aquifer is to the north-northwest at a 0.8% average gradient. The groundwater levels in the bedrock wells also indicate a north-northwest flow direction at a uniform 0.8 % gradient.

Based on overburden and bedrock pumping tests, groundwater flow appears to be partitioned into three hydrogeologic units: the overburden fill and glacial deposits, the upper 22 feet of highly fractured bedrock, and a lower deep bedrock unit. Groundwater gauging data indicate that groundwater discharges to the Swamp River.

1.4 Distribution of Contaminants

1.4.1 Adsorbed-phase

Soil sampling performed at the site confirms the presence of vapor-phase and adsorbed-phase VOCs. The results of a soil gas survey and field screening of unsaturated soil samples from soil borings showed the presence of elevated VOC soil gas concentrations in the suspected source area near RW-1S (Sample locations and depths are discussed in detail in the Phase II Groundwater Investigation and Remedial Design Report, December 1990).

The results of the soil gas survey showed elevated concentrations of 1-1-1 Trichloroethane (1,1,1-TCA) [4,400 parts per million by volume (ppmv)] at several locations near the source area with lower levels of Trichloroethylene (TCE) (270ppmv) and Tetrachloroethylene (PCE) (2.0 ppmv). Field screening of soil samples from soil borings installed for monitoring wells GT-1S, GT-2S and GT-3S also showed the presence of chlorinated hydrocarbon concentrations ranging from 83 parts per million (ppm) (GT-3S) to 921.4 ppm (GT-2S). Toluene was also detected at a concentration of 630 ppm in a sample collected from a depth of 4-6 feet at well GT-2S.

The presence of adsorbed-phase contamination below the water table is indicated by comparison of field GC screening of soil samples with dissolved-phase VOC concentrations. Based on calculations of theoretical headspace concentrations for specific compounds using Henry's Law Constant, the levels of toluene and TCE from the portable GC analysis of soil samples are higher than calculated levels that would result solely from the volatilization of dissolved toluene and TCE in groundwater. Therefore, the elevated levels of toluene and TCE detected in the saturated soil samples are attributed to toluene and TCE that is adsorbed into the soils.

1.4.2 Dissolved-phase

Dissolved concentrations of VOCs in the groundwater in both the overburden and bedrock aquifers has been documented for the site. Groundwater in the source area contains high levels of VOCs of which toluene and TCE are the most predominant compounds. The dissolved-phase concentrations of VOCs are summarized on Table 1. As shown on this table, toluene was detected at a concentration of 170,000 parts per billion (ppb) in well RW-1S with lower concentrations of vinyl chloride, chloroethane, 1,1-dichloroethene (1,1-DCE), Trans-1,2-dichloroethylene (Trans-1,2-DCE), 1,1,1-TCA, TCE, 1,1,2-trichloroethane (1,1,2-TCA), (PCE), toluene and ethylbenzene. Comparison of analytical data from the overburden wells (designated by a suffix S) and bedrock wells (suffix D) shows that the contaminant plume appears to be concentrated in the overburden aquifer with VOC concentrations an order of magnitude lower in the upper bedrock aquifer.

The groundwater pH of both the overburden and bedrock aquifers is slightly acidic to slightly alkaline (6.9-7.3) which is typical for limestone bedrock terrain. The results of the other inorganic water quality analyses indicated elevated levels of iron (2-4 mg/l), manganese (50-60 mg/l), hardness (600-700 mg/l, as $CaCO_3$,) and turbidity (40-50 mg/l).

1.4.3 Separate-phase

No separate-phase materials have been detected at this site.

TABLE 1

SUMMARY OF ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS IN GROUND WATER

Parameters	Sample Identifications							
	RW-1S[1]	GT-1S[2]	GT-3S[2]	GT4S[4]	GT5S[4]	P1[2]	P2[3]	MW-1D[2]
Vinyl Chloride	4,800	<10,000	2,200	<5	27	<1,000	28	<10
1,1 - Dichloroethene	<5	<5	<5	<5	<5	<5	7	<5
Trans-1,2-dichloro-ethylene	9,600	9,000	20,000	17	32	<500	<5	<5
1,1,1-Trichloroethane	7	<5,000	<500	<5	<5	<500	<5	<5
Trichloro-ethylene	41,000	15,000	15,000	18	12	<500	<5	<5
1,1,2-Trichloroethane	12	<5,000	<500	<5	<5	<500	<5	<5
Tetrachloro-ethylene	42	<5,000	<500	<5	<5	<500	<5	<5
Toluene	170,000	86,000	146,000	<5	<5	3,400	8	24
Ethylbenzene	22	<5,000	<500	<5	<5	<500	<5	<5
TOTAL VOLATILES	225,483	110,000	183,200	35	71	3,400	43	24
TOTAL CHLORINATED VOLATILES	50,661	24,000	35,000	35	71	ND	ND	ND

TABLE 1.(continued)

SUMMARY OF ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS IN GROUND WATER

Parameters	Sample Identifications		
	$MW\text{-}2D_1$[(2)]	$MW\text{-}2D_2$[(2)]	RW-1D[(2)]
Vinyl Chloride	260	<10	<10
1,1 - Dichloroethene	<5	<5	<5
Trans-1,2-dichloro-ethylene	190	17	300
1,1,1-Trichloroethane	<5	<5	<5
Trichloro-ethylene	200	18	104
1,1,2-Trichloroethane	<5	<5	<5
Tetrachloro-ethylene	<5	18	<5
Toluene	1200	6	1400
Ethylbenzene	<5	<5	<5
TOTAL VOLATILES	1,850	59	1,804
TOTAL CHLORINATED VOLATILES	390	59	404

2.0 DEVELOPMENT OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The screening of remedial alternatives has included evaluation of each alternative to meet known or anticipated Applicable or Relevant and Appropriate Requirements (ARARs) for each impacted media (soil and groundwater) or potentially impacted media (air) on site. The ARARs have been developed based on a review of applicable state and federal regulatory standards or clean up levels for soil and groundwater. This review evaluated compliance with both chemical-specific ARARs, [eg., maximum contaminant levels (MCL)], location-specific ARARs, (eg. preservation of wetlands) and action-specific ARARs [eg. Resource Conservation and Recovery Act (RCRA) minimum technology standards]. State and federal regulations and standards reviewed included:

- Safe Drinking Water Act (SWDA)
- New York State Department of Health (NYSDOH) drinking water standards
- Clean Water Act (CWA)
- NYSDEC Water Quality Regulations
- Toxicity Characteristic Leaching Procedure (TCLP) regulatory levels
- New York State Air Guide 1 limits
- New York State Pollution Discharge Elimination System (SPDES) limits.

This discussion of ARARs is a preliminary evaluation of potential clean up limits. Final clean up standards will involve negotiation with the NYS DEC.

2.1 ARARs for Soil

The potential ARARs for VOCs detected in soil on site are shown on Table 2. As shown, the only known soil standards relate to concentrations specified by TCLP extract regulatory levels. One of the goals of the selected remedial alternative will be to reduce soil contamination to below TCLP levels and prevent leaching of adsorbed-phase contamination into the groundwater. In addition, the handling, transport and disposal of any excavated contaminated soils as a result of remedial actions will conform to RCRA standards, New York State Department of Transportation (NYS DOT) and EPA land disposal restriction regulations.

2.2 ARARs for Groundwater

The expected ARARs for contaminants detected in groundwater on site are listed in Table 3. Groundwater or drinking water standards may potentially represent clean up levels for contaminated groundwater. In addition to the potential clean up levels presented in Table 3, the NYS DEC will also require discharge limits of treated groundwater to the Swamp River through SPDES permitting (Table 4).

2.3 ARARs for Air

The NYS DEC, Region 3 Air Engineer, Steven Botsford, has indicated that off-gas concentrations of contaminants resulting from the selected remedial design must be below levels listed in Air Guide 1. Preliminary modeling results to determine off-gas concentrations from various remedial technologies indicate that several compounds will exceed Air Guide 1 levels. The selected remedial alternative will be augmented with off-gas treatment to ensure that off-gas concentrations are below Air Guide 1 limits (Table 5).

TABLE 2

EPA Toxicity Characteristic Constituents and Regulatory Levels for Determination of Soils as Hazardous Waste

Constituent	Regulatory Level (mg/l)
Vinyl Chloride	0.2
1,1-Dichloroethene	0.7
Trans-1,2-dichloroethene	n.s.
1,1,1-Trichloroethane	n.s
Trichloroethene	0.5
1,1,2-Trichloroethane	n.s.
Tetrachloroethene	0.7
Toluene	n.s.
Ethylbenzene	n.s.

n.s. - No Standard

TABLE 3

New York State Groundwater and Drinking Water Standards

Constituent	Groundwater Standard (ug/l)[1]	Drinking Water Standard (ug/l)[2]
Vinyl Chloride	5.0	2.0
1,1-Dichloroethene	n.s.	5.0
Trans-1,2-dichloroethene	n.s.	5.0
1,1,1-trichloroethane	n.s.	5.0
Trichloroethene	10.0	5.0
1,1,2-trichloroethane	n.s.	5.0
Tetrachloroethene	n.s.	5.0
Toluene	n.s.	5.0
Ethylbenzene	n.s.	5.0

[1] - Class GA groundwater Standards per 6 NYCRR, Chapter X Parts 703
[2] - New York State Department of Health drinking water standard
n.s. - no standard

TABLE 4

Specified SPDES Discharge Limits

Contaminant	SPDES Permitted Limit
Tetrachloroethene	4.6 ppb
Toluene	33.0 ppb
Trans-1,2-dichloroethene	30.0 ppb
1,1,1-trichloroethane	20.0 ppb
Trichloroethene	20.0 ppb
pH (range)	6.0 - 9.0

TABLE 5

Air Guide 1
Ambient Guideline Concentration (AGC)

Contaminant	AGC (ug/m^3)
Toluene	7,500
1,1,1-trichloroethane	38,000
Trichloroethene	900
Tetrachloroethene	1,116
Vinyl Chloride	0.40

3.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

3.1 Introduction

The purpose of this section is to present the analyses that have been performed in order to:

- Develop remedial action objectives specifying contaminants and media of interest appropriate for the site,

- Develop general response actions for each medium requiring evaluation,

- Identify remedial technologies potentially applicable to each general response action,

- Evaluate technologies and eliminate inapplicable technologies based on effectiveness, implementability, and/or relative costs.

3.2 Development of Remedial Action Objectives

Remedial action objectives consist of medium-specific goals for protecting human health and the environment utilizing the determined ARARs. The goals specify the contaminants of concern, the potential exposure routes and potential environmental receptors.

For the Pawling site the three mediums requiring remedial activities are groundwater, soil, and air. VOCs are presently located in the groundwater and soil but may be transferred to the air by potential remedial activities.

The remedial action human health objectives are to prevent human ingestion and/or inhalation of VOCs above MCLs. The environmental protection objectives are to prevent the migration of existing contamination to unaffected areas and to remove contamination from existing impacted zones. Table 6," Remedial Action Objectives, General Response Actions, and Process Options", presents the individual objectives in relation to the impacted medium.

3.3 Development of General Response Actions

Appropriate general response actions for remediation of groundwater, soil and air at the Pawling site have been identified in Table 6. These general response actions are described in the following paragraphs.

TABLE 6 – REMEDIAL ACTION OBJECTIVES, GENERAL RESPONSE ACTIONS, AND PROCESS OPTIONS

Media	Remedial Action Objectives	General Response Actions	Remedial Technology Types	Process Options
Soil	For Human Health: Prevent ingestion/direct contact with soil having VOCs in excess of recommended doses.	No Action/Institutional Actions:	No Action/Institutional Options:	
		No action	Fencing	
		Access restrictions	Deed Restrictions	
		Containment Actions:	Containment Technologies:	
		Containment	Capping	Clay cap, synthetic membrane
	For Environmental Protection: Prevent migration of VOCs that would result in ground-water contamination in excess of maximum contaminant levels		Vertical barriers	Slurry wall,sheet piling
			Horizontal barriers	Liners, grout injection
		Excavation/Treatment Actions:	Removal Technologies:	
		Excavation/off-site treatment/disposal	Excavation	Solids excavation
		Excavation/on-site treatment/disposal	Treatment Technologies:	
		In situ treatment	Physical treatment	Solidification, vapor extraction
			Chemical treatment	Soil flushing
			Biological	Cultured micro-organisms
			Thermal treatment	Incineration
Groundwater	For Human Health: Prevent ingestion/direct contact with water having VOCs in excess of recommended doses.	No Action/Institutional Actions:	No Action/Institutional Options:	
		No action	Monitoring	Sampling of monitoring wells
		Monitoring		
		Containment Actions:	Containment Technologies:	
		Containment	Vertical barriers	Slurry wall
	For Environmental Protection: Prevent migration of VOC contaminant plume and restore aquifer to less than ARARs for VOCs	Collection/Treatment Actions:	Extraction Technologies:	Wells, Interceptor trench
		Collection/treatment/discharge	Groundwater collection/pumping	
		In situ groundwater treatment	Treatment Technologies:	
			Physical treatment	Air stripping, carbon adsorption
			Chemical treatment	Neutralization, precipitation
			Biological treatment	Above ground biodegradation
			In situ treatment	Nutrient injection, air sparging
			Disposal Technologies:	
			Discharge to treatment facility	
			Discharge to surface water	

TABLE 6 - REMEDIAL ACTION OBJECTIVES, GENERAL RESPONSE ACTIONS, AND PROCESS OPTIONS CON'T

Air	For Human Health: Prevent inhilation of air containing VOCs in excess of Air Guide 1 levels.	No Action	No Action	
		Treatment/ Disposal	Thermal Destruction	On-site incineration
	For Environmental Protection: Prevent the discharge of VOC contaminants from remedial systems in excess of Air Guide 1 levels.		Adsorption	Carbon Adsorption
			Disposal	Off-site regeneration On-site carbon regeneration

3.3.1 General Response Actions for Groundwater

The following general response actions are considered potentially appropriate for groundwater at the Pawling site.

- No Action: No action is included as a baseline general response against which other actions can be measured.

- Institutional Actions: Institutional Actions, such as fencing or deed restrictions, could potentially be feasible to limit access to the contaminated areas and monitor groundwater contamination characteristics over time.

- Containment: Containment of contaminated groundwater is potentially feasible.

- Collection: Collection of groundwater via recovery wells and/or trenches is potentially feasible, and would require treatment and disposal of the extracted water.

- Treatment: Treatment of groundwater is feasible, and would require extraction followed by above ground treatment.

- Discharge: On-site discharge is feasible, and would require extraction and effective treatment.

- In situ Treatment: In situ treatment of groundwater is potentially feasible. This would involve treatment of the groundwater in place and would require some groundwater extraction.

3.3.2 General Response Actions for Soil

The following general response actions are considered potentially appropriate for soils at the Pawling site:

- No Action: No action is included as a baseline general response against which other actions can be measured.

- Institutional Actions: Institutional Actions could potentially be feasible to limit access to the contaminated areas and monitor soil contamination characteristics over time.

- Containment Actions: Containment actions could potentially be feasible to limit the contamination migration.

- Excavation Actions: Excavation actions could be potentially feasible. This would involve removing the contaminated soil, treatment and disposal of soil either on or off of the site.

- In situ Actions: In situ actions could be potentially feasible. These actions would remove or destroy contamination from the soil without removal of the soil.

3.3.3. General Response Actions for Air

The following general response actions are considered potentially appropriate for air at the Pawling site:

- No Action: No action is included as a baseline general response against which other actions can be measured.
- Treatment:Treatment of air off-gas from remedial technologies is feasible.

3.4 Identification of Potential Remedial Technology Types and Processes

Technology types and associated processes that are potentially applicable for the Pawling site have been identified in Tables 7, 8, and 9, and an "Initial Screening of Technologies - Groundwater, Soil and Air." Each of these technologies will be evaluated according to technical implementablity only.

Three technical factors eliminated some remedial technologies and processes based on implementability of the potential remedial technologies and processes. These were:

- Chemical Characteristics - The chemical composition of the detected VOCs includes many chlorinated solvents. These solvents have unique characteristics that eliminate some remedial technologies and processes.
- Fractured Bedrock - The Pawling site geology consists of a multiple aquifer system, one of which is fractured bedrock. The fractured bedrock presents a technical barrier to implementing some of the remedial technologies and processes.
- Wetlands Destruction - The Pawling site is located on the edge of a wetlands. This is a barrier to the remedial technologies that would require the destruction of the wetlands.

Tables 7, 8 and 9 detail this initial screening based on technical implementability.

TABLE 7 – INITIAL SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS – SOIL

SOIL GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	DISCRIPTION	SCREENING COMMENTS
No Action	None	Not Applicable	No Action	Required for consideration
Institutional Actions	Access restrictions	Deed restrictions	Deeds for property in the area of influence would include restrictions on wells and construction activities	Potentially applicable
		Fencing	Place fencing around entire area of influence	Potentially applicable
	Monitoring	Soil monitoring	Continue to monitor VOC concentrations of soils in area of influence	Potentially applicable
Containment Actions	Capping	Clay capping	Compacted clay covered with soil and vegetation in areas of contamination	Potentially applicable
		Synthetic membrane	Impermeable synthetic liner covered with soil and vegetation in areas of contamination	Potentially applicable
		Multi-layer capping	Combination of compacted clay and impermeable liner cap	Potentially applicable
	Vertical Barriers	Slurry Walls	Trench around areas of contamination is filled with soil (or cement) bentonite slurry	Not feasible because of fractured bedrock and wetlands
		Sheet piling	Sheet piling is driven around area of contamination	Not feasible because of fractured bedrock and wetlands
	Horizontal Barriers	Grout injection	Pressure injection of grout in a patern of drilled holes	Not feasible because of fractured bedrock and wetlands

Legend [shaded box] – Technologies that have been screened out. (Shaded: Vertical Barriers, Slurry Walls, Sheet piling, Horizontal Barriers, Grout injection)

SOIL

GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	DISCRIPTION	SCREENING COMMENTS
Excavation/ Off-site treatment/ Disposal	Excavation	Solids Removal	Excavation of contaminated material with heavy equipment	Not feasible because of wetlands destruction
	Physical treatment	Solidification	Mixing of contaminated soil with cement slurry	Not feasible because of wetlands destruction
	Chemical treatment	Soil flushing	Mixing of soil with surfactant and treatment of liquids	Not feasible because of wetlands destruction
	Biological treatment	Cultured micro-organisms	Mixing of soil with micro-organisms under the proper environment	Not feasible because of wetlands destruction
	Thermal treatment	Incineration	Thermal destruction of contaminants using an approved rotary kiln incinerator	Not feasible because of wetlands destruction
	Land disposal	Secure landfill	Disposal of contaminated soil in secure landfill	Not feasible because of wetlands destruction and Land ban on anticipated contaminants
Excavation/ On-site treatment/	Excavation	Solids Removal	Excavation of contaminated material with heavy equipment	Not feasible because of wetlands destruction
	Physical treatment	Encapsulation	Placement of soil in secure cell on site	Not feasible because of wetlands destruction
	Chemical treatment	Soil flushing	Mixing of soil with surfactant and treatment of liquids	Not feasible because of wetlands destruction
	Biological treatment	Cultured micro-organisms	Mixing of soil with micro-organisms under the proper environment	Not feasible because of wetlands destruction
		Above ground soil venting	Construction of secure soil cell with network of vapor extraction piping connected to an extraction blower	Not feasible because of wetlands destruction
	Thermal treatment	On-site Incineration	Construction of on-site incinerator	Not feasible because of wetlands destruction and incinerator siting restrictions

SOIL

GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	DISCRIPTION	SCREENING COMMENTS
In situ-treatment	Physical treatment	Vapor extraction	Network of vapor extraction wells connected to a vapor extraction blower	Potentially applicable
		Air sparging/ vapor extraction	Network of air injection and vapor extraction wells	Potentially applicable
	Chemical treatment	Surfactant flushing	Series of injection and recovery wells to introduce chemical surfactants and collect the associated groundwater	Potentially applicable
	Biological treatment	Bioremediation	Series of injection and recovery wells to introduce nutrients and oxygen to the saturated soils and collect the associated groundwater	Not feasible due to the chlorinated contaminants
	Thermal treatment	Steam injection	Series of injection wells to introduce steam to the subsurface and strip the contaminants	Potentially applicable
		Thermal/ Radio frequency heating	Radio frequency electrodes placed along the ground-surface heat the subsurface and volatilize and/or destroy contaminants	Potentially applicable

TABLE 8 – INITIAL SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS – GROUNDWATER

GENERAL RESPONSE ACTIONS	TECHNOLOGY	PROCESS OPTIONS	DESCRIPTION	SCREENING COMMENTS
No Action	None	Not applicable	No action	Potential downgradient receptors necessitates remedial action
Institutional Actions	Monitoring	Groundwater monitoring	Ongoing monitoring of wells	Not applicable (see above)
Containment	Vertical barriers	Slurry wall	Trench around areas of contamination is filled with cement-bentonite slurry	Installation would cause damage to wetlands
Collection Treatment Discharge	Groundwater extraction	Overburden wells	Groundwater extraction with a series of overburden wells	Potentially applicable
		Bedrock wells	Groundwater extraction with a series of bedrock wells	Potentially applicable;however would cause downward migration of VOCs from overburden source area into fractured bedrock
	Physical treatment	Air stripping	Mixing large volumes of air with water to remove VOCs	Potentially applicable
		Carbon adsorption	Adsorption of VOCs onto activated carbon	Potentially applicable
	Biological	Bioreactor	Biodegradation of VOCs within bioreactor cell	Potentially applicable
	In situ treatment	In situ biological	System of injection and extraction wells introduce bacteria and nutrients to degrade VOCs.	Limited success in biodegradation of chorinated hydrocarbons
		Air sparging	Forced air injection into groundwater to degrade VOCs	Potentially applicable
	On-site discharge	Local river	Discharge of treated groundwater to Swamp River	Potentially applicable
	Off-site discharge	Treatment plant	Discharge of treated groundwater to local wastewater treatment plant	Not applicable
		Pipeline to river	Discharge of treated groundwater to offsite river	Not applicable

Legend [shaded box] –Technologies that are screened out.

TABLE 9 – INITIAL SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS – AIR

GENERAL RESPONSE ACTIONS	TECHNOLOGY	PROCESS OPTIONS	DESCRIPTION	SCREENING COMMENTS
No Action	None	Not applicable	No action	Potential high VOC concentrations from remedial actions
Treatment	Thermal destruction	On-site vapor incinerator	Construct on-site incinerator	Not feasible
	Adsorption	Carbon Adsorption	Use of carbon to adsorb VOCs	Potentially applicable
Disposal	Off-site	Off-site incineration	Off-site incineration of carbon	Potentially applicable
		Off-site regeneration	Off-site regeneration of carbon	Potentially applicable
	On-site	On-site regeneration	On-site regeneration of carbon	Potentially applicable

Legend [shaded box] –Technologies that are screened out.

3.5 Evaluation of Remedial Technologies and Processes Based on Effectiveness, Implementability, and/or Relative Costs

3.5.1 Introduction

The remedial action technologies and associated process options (presented in Tables 7, 8, and 9) that are not eliminated from the screening process by the previous criterion (technical implementability) are to be further evaluated. The remaining remedial actions and processes were evaluated based on three criteria, as applicable to the site conditions:

- Effectiveness
- Implementability
- Relative Cost.

Effectiveness: The process options are evaluated on their effectiveness relative to other processes considering 1) their ability to achieve the remedial action objectives, 2) how proven and reliable the process is with respect to contaminants of concern.

Many of the process options within the treatment technology groups are new and in developmental stages. These processes have been evaluated based on vendor information, limited laboratory and full scale tests. On site process options which would provide significant reduction in toxicity, mobility and volume were given special consideration.

Implementability: Implementability encompasses the technical and institutional feasibility of implementing a process option. The technical feasibility will be used to eliminate certain process options that are ineffective and clearly not applicable to the site conditions. The deciding factors for this issue are:

- Difficulty in constructing and operating the process option.
- Potentially adverse health and environmental impact created during implementation.
- Potential material handling difficulties.
- Adverse effects of the chemicals and other materials used by the processes.

Cost: Cost plays a limited role at this stage of the screening process. Process options that are an order of magnitude or greater in unitized cost were screened out if the option did not offer any greater effectiveness, or reliability and provided no greater health or environmental protection. The cost comparison is generally limited to process options, under a particular technology type. Costs are only discussed where they affect the screening process.

The screening of the various technologies and options by media are presented in the following sections.

3.5.2 Remedial Technology Screening For Soil

Technically implementable remedial technologies and associated processes for contaminated soil (saturated and unsaturated) are evaluated in the following sections based on the specified criteria. Table 10, "Evaluation of Technologies and Process Options - Soil" summarizes the evaluations.

- No Action: The no action process has been retained to act as a baseline from which to analyze the other remedial processes. The no action response is not acceptable because it does not meet any of the remedial action goals.

- Institutional Action: Deed Restrictions, involves annotating the property deed to alert prospective purchasers to the conditions of the property. This option does not directly address the contaminants found on-site. This option would limit future exposure by restricting property use.

Effectiveness: This option effectively minimizes the potential direct contact exposure scenario.

Implementability: This option could be implemented with nominal legal actions.

Relative Cost: This option would have very low costs.

Conclusion: This option is not feasible because it will not reduce the contamination.

- Institutional Action: Fencing, involves enclosing all contaminated areas of the site by a chain link fence.

Effectiveness: This option effectively minimizes the potential direct contact exposure scenario.

Implementability: This option could be implemented with common fence construction practice and wetlands permits.

Relative Cost: This option would have very low costs.

Conclusion: This option is not feasible because it will not reduce the contamination.

TABLE 10 – EVALUATION OF PROCESS OPTIONS FOR SOIL REMEDIATION

SOIL GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	COST
No Action	None	Not Applicable	Does not achieve remedial action objectives	Not acceptable to public.	None
Institutional Actions	Access restrictions	Deed restrictions	Effectiveness depends on continued future implementation. Does not reduce contamination.	Legal requirements and authority.	Negligible cost.
		Fencing	Effectiveness depends on continued future implementation. Does not reduce contamination.	Conventional construction. Potential large area of coverage.	Low capital, low O&M.
	Monitoring	Soil monitoring	Useful for documenting conditions. Does not reduce contamination or risk.	Alone, not acceptable to public.	Low capital, low O&M.
Containment Actions	Capping	Clay capping	Effective for unsaturated not saturated soils. Does not reduce contamination or risk.	Not feasible due to wetlands destruction.	Moderate capital, low O&M.
		Synthetic membrane	Effective for unsaturated not saturated soils. Does not reduce contamination or risk.	Not feasible due to wetlands destruction.	Moderate capital, low O&M.
		Multi-layer capping	Effective for unsaturated not saturated soils. Does not reduce contamination or risk.	Not feasible due to wetlands destruction.	Moderate capital, low O&M.
In situ-treatment	Physical treatment	Vapor extraction	Effective for unsaturated not saturated soils. Alone, does not reduce bulk of contamination.	Easily implemented. Discharge permits required.	Moderate capital, low O&M.
		Air sparging/ vapor extraction	Effective and reliable for both saturated and unsaturated soils.	Easily implemented. Discharge permits required.	Moderate capital, low O&M.
	Chemical treatment	Surfactant flushing	Effective for saturated soils.	Easily implemented. Groundwater control necessary.	Moderate capital, high O&M.
	Thermal treatment	Steam injection	Effective but not needed due to the contaminants high volatility	Easily implemented.	Moderate capital, high O&M.
		Thermal/ Radio frequency heating	Unproven technology. Not necessary due to contaminants high volatility.	Easily implemented.	Moderate capital, moderate O&M.

- Institutional Action: Monitoring. Monitoring of soil conditions would involve periodic sampling of the subsurface to document any contaminant migration or change.

  Effectiveness: This option does nothing to effectively minimize the potential contact with contamination.

  Implementability: This option could be implemented with common sampling practices and wetlands permits.

  Relative Cost: This option would have very low costs.

  Conclusion: This option by itself is not feasible because it will not reduce the contamination or associated risks. It may be included with another remedial process.

- Insitu-treatment: Vapor Extraction. Utilizes a network of soil vapor extraction points to draw air from the unsaturated soils. The vapor extraction blower draws air from the unsaturated soils inducing a vacuum in the soil pore spaces. This vacuum will draw VOCs adsorbed on the soil into the pore spaces and out of the extraction point.

  Effectiveness: This option will effectively reduce the volume of contamination in the unsaturated soils and prevent any additional migration of VOCs in the unsaturated soils.

  Implementability: This option could be implemented with common construction techniques.

  Relative Cost: This option would have moderate capital costs and low operation and maintenance costs.

  Conclusion: This technology is retained for further consideration.

- Insitu-treatment: Air Sparging/ Vapor Extraction. Air sparging consists of a network of sparge points placed with screened intervals below the groundwater table. Compressed air is introduced to the groundwater through the sparge points. The air rises to the top of the groundwater table collecting VOCs from the saturated soils. The VOC laden air is then collected by use of a vapor extraction system as described above.

  Effectiveness: Air Sparging has been shown effective for the removal of VOCs from saturated soils.

Implementability: Air Sparging can be implemented using common drilling and construction techniques. Care must be taken to operate the air sparging system with the vapor extraction system and groundwater control system to prevent the migration of contaminants due to the air sparging.

Relative Cost: Air sparging can be implemented with moderate to low capital costs and maintained with low operation and maintenance costs.

Conclusion: This technology is retained for further consideration.

- Surfactant Flushing. This option involves construction of injection and extraction wells. Surfactants are injected at the upgradient side of the contaminant plume and extracted at the downgradient side. Chemical surfactants strip the soil of the contaminants and allow it to be collected in the downgradient extraction wells.

Effectiveness: This option could be effective for the treatment of saturated soils.

Implementability: This option could be implemented using common well drilling and construction practices.

Relative Cost: This option has low capital costs but requires high operation and maintenance costs due to the chemical addition.

Conclusion: This technology is eliminated due to the existence of more economical technologies with the same effectiveness.

- Steam Injection. Steam injection involves a network of steam injection points and a source of high pressure steam. Steam is put into the soils to volatilize the contaminants.

Effectiveness: This option could be effective for the treatment of soils.

Implementability: This option could be implemented using common well drilling and construction practices.

Relative Cost: This option has moderate capital costs but requires high operation and maintenance costs due to the steam production.

Conclusion: This technology is eliminated due to the existence of more economical technologies with the same effectiveness.

- Thermal Radio Frequency Heating. Involves placement of electrodes along the surface of the contaminated area at the Pawling site. These electrodes when activated would heat the subsurface by means of radio frequency emissions. This increase in soil temperature would then drive the VOCs from the soil into the pore spaces and to the surface .

  Effectiveness: This option is not a proven technology and has only been observed in test conditions.

  Implementability: This option could be implemented using common construction practices.

  Relative Cost: This option has moderate capital costs but requires moderate operation and maintenance costs due to the needed electricity.

  Conclusion: This technology is eliminated due to it unproven effectiveness and reliability.

3.5.3 Technology Screening for Groundwater

Technically implementable remedial technologies and associated processes for contaminated groundwater are evaluated in the following sections based on the three specified criteria. Table 11, "Evaluation of Technologies and Process Options - Groundwater" summarizes the evaluations.

- No Action. No action has been retained to act as a baseline from which to analyze the other remedial processes. The no action response is not acceptable because it does not meet any of the remedial action goals.

- Collection Implementing Overburden Wells: Consists of constructing recovery wells in the overburden aquifer zone for the removal of contaminated concentrated groundwater. This action will directly address the most concentrated contamination on the site and eliminate the possibility of pulling contamination into the bedrock aquifer. This option would reduce contamination by direct removal of groundwater.

  Effectiveness: This option effectively controls overburden groundwater and removes contaminated groundwater.

TABLE 11 - EVALUATION OF TECHNOLOGIES AND PROCESS OPTIONS - GROUNDWATER

GENERAL RESPONSE ACTIONS	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	COST
	Groundwater extraction	Overburden wells	Effective for contaminant capture.		Moderate capital, very low O&M.
Collection Treatment Discharge	Physical treatment	Air stripping	Effective for removal of contaminants from water stream.	Easily implemented.	Moderate capital, low O&M.
		Carbon adsorption	Effective for removal of contaminants from water stream.	Easily implemented.	Moderate capital, high O&M.
	Biological	Bioreactor	Effective for destruction of some of the contaminants in the water stream.	Requires secondary treatment of water prior to discharge.	Moderate capital, moderate O&M.
	In situ treatment	Air sparging	Effective for removal of contaminants.	Easily implemented. Needs air collection system and groundwater control.	Moderate capital, low O&M.
	On-site discharge	Local river	Effective and reliable discharge method.	SPDES permit required.	Low capital, very low O&M.

Implementability: The construction of recovery well in the overburden aquifer can be accomplished with conventional drilling techniques. Pumps to remove the water from the well can also be implemented using conventional pumps and practices modified for the specific contaminants.

Cost: The relative cost for implementing and maintaining the wells is minimal.

Conclusion: This technology is retained for further consideration.

- Treatment of Groundwater Using Air Stripping: Air stripping is an effective means of removing VOCs from water. Air stripping is a mass transfer process in which volatile constituents in water are transferred to the gas phase (air). Air stripping is frequently accomplished by either a packed tower or air diffuser set up.

The packed tower consists of a tower filled with a packing and attached to an air blower at the base of the tower. The contaminated stream enters the top of the tower as the air enters the bottom. The counter current flow strips the VOCs from the water and exhausts them through the top of the tower.

Diffused air type of strippers operate by passing air from a blower through diffusers that are placed in a contaminated water stream. The air bubbling through the stream strips the VOCs from the water and exhausts them through the top of the stripper. Both air stripping technologies operate on the same properties with much the same efficiencies. The differences remain in the size and configuration of the units physical components.

Effectiveness: Air stripping is a well documented and effective technology to remove VOCs from water streams. Air stripping is applicable for all the contaminants at the Pawling site.

Implementability: Air stripping can be implemented using any number of vendors and common construction techniques.

Relative Cost: Air stripping can be implemented with moderate capital costs and maintained with low maintenance costs.

Conclusion: This technology is retained for further consideration.

- Treatment of Groundwater Using Carbon Adsorption. The process of adsorption onto carbon involves contacting a water waste stream with carbon, usually by flow through packed bed reactors. The carbon selectively adsorbs VOCs by a molecular attraction phenomenon between the VOC molecules and internal pores of carbon granules. Adsorption depends on strength of molecular attraction between adsorbent and adsorbate, molecular weight, surface area, and contact time. Once the micro pore surfaces are saturated with VOCs, the carbon must be either replaced with virgin carbon or removed for thermal regeneration.

  Effectiveness: Carbon adsorption is a well documented and effective technology for the removal of VOCs from groundwater. Carbon adsorption is applicable for all the contaminants at the Pawling site.

  Implementability: This process can be implemented on-site using available vendors and common construction practices. Spent carbon can be either disposed of in an incinerator facility or regenerated and reused.

  Relative Cost: The capital costs involved with carbon adsorption are moderate but maintenance and disposal costs are much higher than other technically feasible processes.

  Conclusion: This technology will not be retained for further consideration based on its high maintenance and disposal costs.

- Treatment of Groundwater Using a Bioreactor: The bioreactor process uses a microbial population to metabolize organic constituents in a waste stream by means of a passing the waste stream over a fixed film of cultured microorganisms. The bioreactor unit consists of a a honeycomb-like structure (the medium) sealed inside an engineered enclosure. Bacteria growing on the medium adsorb biodegradable organic contaminants from the water and convert them to inert substances such as carbon dioxide and water. An air blower attached to the base of the unit supplies oxygen to the microbial population and nutrients are added to enhance the bacterial growth.

  Effectiveness: Bioreactors are an effective technology on non-chlorinated compounds such as toluene.

  Implementability: This technology can be implemented using bioreactor vendors and common construction technologies. Due to the bacterial populations sensitivity the reactor requires a lengthy start up time (6 weeks) and regular monitoring to insure the proper biological environment (temperature, pH, dissolved oxygen and nutrients).

Relative Cost: The reactor can be implemented with moderate capital costs and operated with moderate maintenance costs.

Conclusion: This technology is retained for further consideration.

- Insitu Treatment of Groundwater Using Air Sparging: Air sparging consists of a network of sparge points placed with screened intervals below the groundwater table. Compressed air is introduced to the groundwater through the sparge points. The air rises to the top of the groundwater table collecting VOCs from the groundwater. The VOC laden air is either allowed to naturally leave the unsaturated soils or is collected by a soil venting system.

Effectiveness: Air Sparging has been shown effective for the removal of VOCs from groundwater.

Implementability: Air Sparging can be implemented using common drilling and construction techniques. Care must be taken to operate the air sparging system with a soil vapor collection system and ground water control system to prevent the migration of contaminants due to the air sparging.

Relative Cost: Air sparging can be implemented with moderate to low capital costs and maintained with low operation and maintenance costs.

Conclusion: This technology is retained for further consideration.

- On-Site Discharge to Local River: Involves piping effluent waters from the treatment system to a local river.

Effectiveness: This is an effective option to discharge the treated groundwater generated at the site.

Implementability: This option can be implemented using common construction techniques. Special care must be taken and permits obtained when the discharge piping crosses a wetlands area.

Relative Cost: This discharge option could be implemented with relatively very low costs.

Conclusion: This technology is retained for further consideration.

3.5.4 Summary of Technology Screening

The results of the remedial technology screening determined that the following technologies are applicable for the Pawling site and will be considered in selecting remedial alternatives:

Soil

- Monitoring
- Vapor Extraction
- Air Sparging/Vapor Extraction

Groundwater

- Groundwater collection by Pumping Overburden Wells
- Groundwater Treatment using Air Stripping
- Groundwater Treatment Using a Bioreactor
- Insitu Treatment of Groundwater Using Air Sparging
- On-site Discharge to Local River

Air

- Carbon Adsorption with On-site regeneration.

4.0 TREATABILITY INVESTIGATIONS

Treatability studies were conducted on several of the feasible technologies in order to establish the design and operating parameters for optimization of the technology performance. The following testing was performed:

- Pump testing of both the overburden and upper bedrock aquifers to determine the optimum pumping rates and hydraulic capture zones, and

- Pilot testing of groundwater treatment using air stripping.

Results of these tests are contained in the "Phase II Groundwater Investigation and Remedial Design Report, December 31, 1990.

New York State Department of Environmental Conservation
Division of Water
Bureau of Wastewater Facilities Design

PAWLING CORP NY000 4618

PAWLING (V) DUTCHESS CO

Approved by: Joseph T. Kelleher P.E., JUN 17 1991

Recommended by: James M. Harrington PE

APR 1991
Received
Div. of Water
Bur. Wastewater
Facilities Design

REMEDIAL SYSTEM DESIGN
PAWLING CORPORATION
157 CHARLES COLMAN BLVD.
PAWLING, NEW YORK

February 26, 1991

Submitted to:

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Environmental Manager
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ATTACHMENT

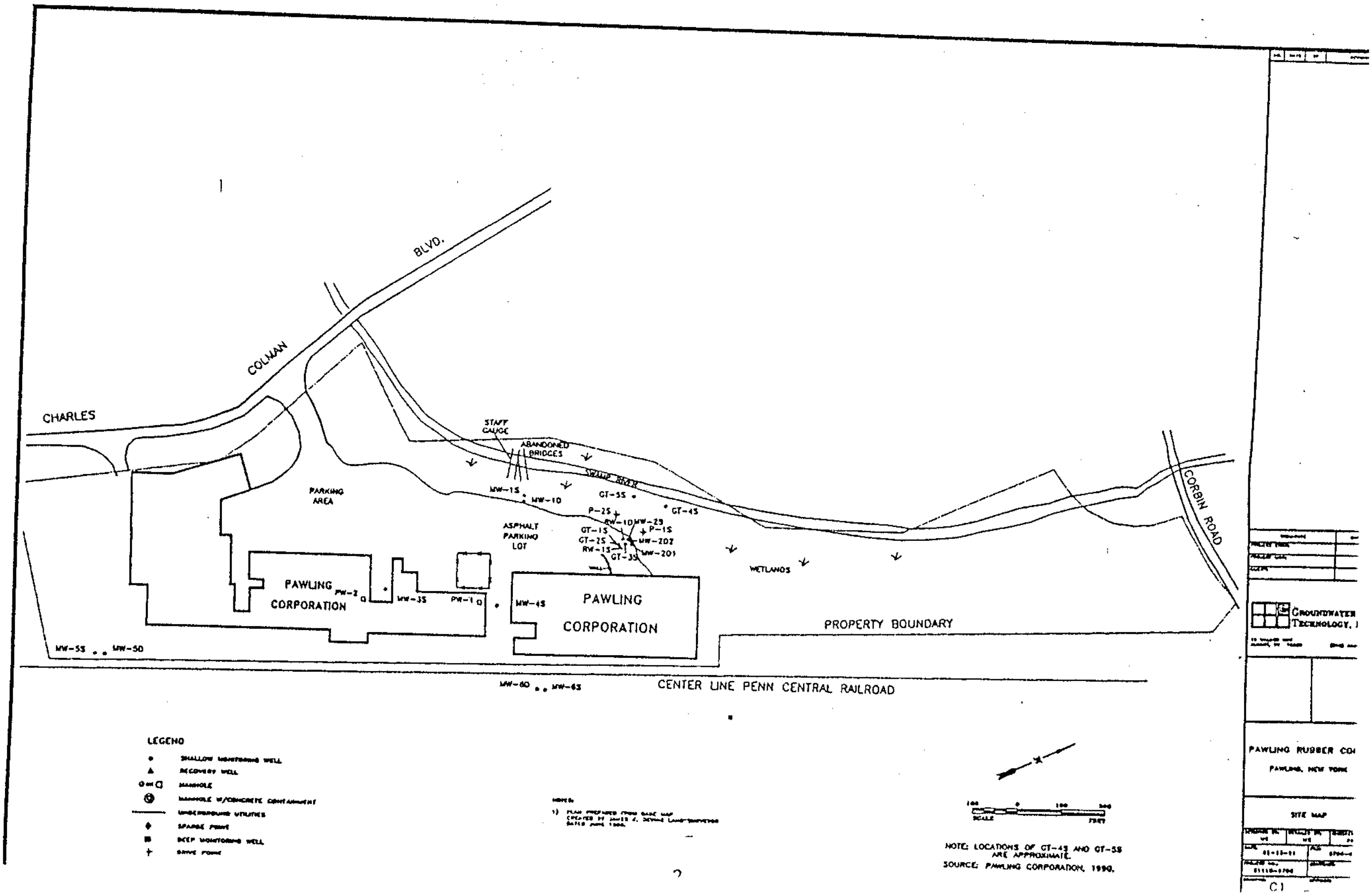
1.0 INTRODUCTION

Groundwater Technology, Inc. (Groundwater Technology) was contracted by Pawling Corporation to design and install a remedial system for the facility located in Pawling, New York. (Figure 1, Site Map). Background information and results of prior groundwater investigations are contained in the January 3, 1991 "Groundwater Investigation and Pre-Remedial Design Report, Pawling Corporation". The remedial system for this site was selected by means of a limited Feasibility Study submitted to the New York State Department of Environmental Conservation (NYS DEC) on December 31, 1990. The limited Feasibility Study outlined the decision process to arrive at the preferred remedial alternative. The accepted remedial option was option #1, which included the following remedial technologies:

- Groundwater Extraction from Overburden Recovery Wells,
- Air Stripping,
- Carbon Adsorption,
- Air Sparging,
- Soil Venting, and
- Remedial System Off-Gas Treatment with Solvent Recovery.

All of the above technologies will be integrated to provide a comprehensive remediation strategy for the Pawling site. Each technology, its associated equipment and its configuration in the overall remedial design are given in the following sections.

FIGURE 1
Site Map



2.0 GROUNDWATER RECOVERY SYSTEM

2.1 Recovery Wells

Two additional overburden recovery wells (RW-2S and RW-3S) will be installed on the northern edge of the Pawling Corporation parking lot, as shown on Figure 2, Remedial System Site Layout. The recovery wells will be constructed of 6-inch stainless steel well screen (0.020-inch slotted) and casing. The wells will be screened from 3 feet below grade to the top of bedrock, approximately 20 feet below grade. A silica sand pack will be placed in the annulus between the well screen and the borehole. A bentonite seal will be placed above the sand pack. Following installation, the wells will be finished with a traffic approved road box. Soil sample descriptions and well construction details will be recorded on well logs prepared by the field geologist.

2.2 Pumps

A multiple well pneumatic pumping system will be deployed to recover groundwater from the three recovery wells on site. The system is powered and controlled by compressed air, and has the following components:

- Air-operated ejector vessels
- Bellows liquid level control
- Pneumatic control panel
- In line flow meters.

The system is designed to recover approximately 3 gallons per minute (gpm) from each of the three recovery wells for a total system flow of approximately 9 gpm. The system will use 11 cubic feet of air a minute (cfm) at a pressure of 25 pounds per square inch (psi).

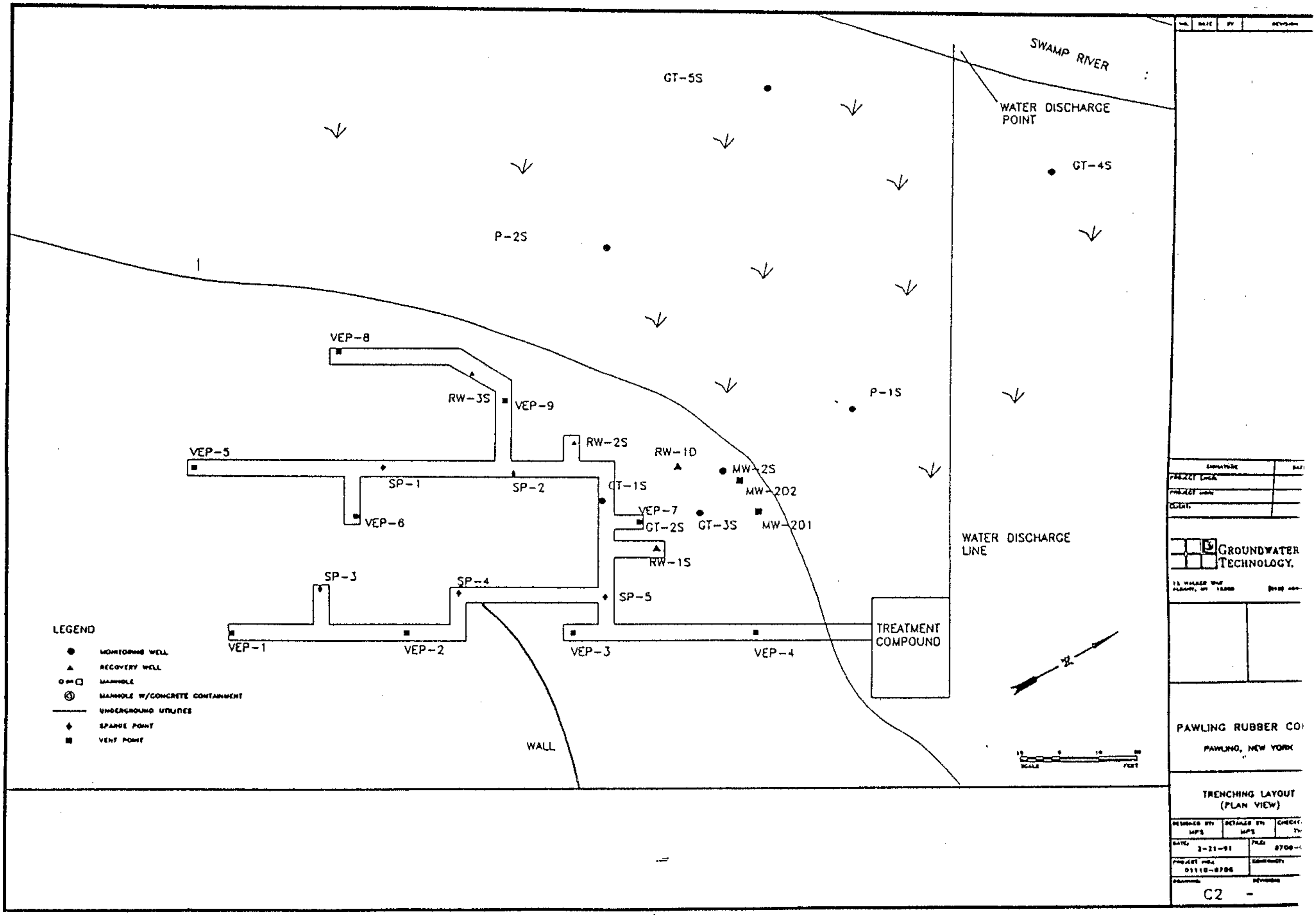
Air-operated ejector vessels: Each well will contain an ejector vessel. The ejector vessel is a cylindrical hollow pressure vessel with two inlet and one discharge check valves. The ejector vessel is constructed of carbon steel and the valves are constructed of 304 stainless steel. The ejector is located in the well at the desired depth of drawdown by use of a winch.

The ejector has two operating cycles, fill and discharge. The fill cycle occurs without any pressure on the vessel. This allows the vessel to gravity fill. When the vessel is full the vessel is pressurized by the air line and the water in the vessel is forced up through the discharge check valve into the discharge line. At the end of the discharge cycle the vessel is allowed to depressurize, vent and fill again. Flow rates from the vessel are controlled by adjusting the fill and discharge cycle times.

Bellows liquid level control (BBLC): Each well will contain one BBLC at the well head. The BBLC controls the ejector pumping rate by restricting the high pressure air supply from the control panel. A bubbler line indicates the column of water that is above the ejector vessel by sensing backpressure that is created as water accumulates over the ejector. The bubbler line is mounted approximately 3/8 inches above the intake for the ejector. If the bubbler line senses sufficient amount of water above the ejector (approx. 10 inches) it allows the pump to function at full capacity. At water levels less than 10 inches above the ejector intake the BBLC partially or completely restricts the high pressure discharge air to the pump. A gauge on the face of the BBLC indicates the water level above the intake in inches of water. The BBLC will be mounted level to the wall of the recovery well road box.

Pneumatic control panel: A pneumatic control panel that will regulate the three recovery well ejectors will be mounted inside the equipment compound. The panel has a single air supply hose that supplies

FIGURE 2
Remedial System Site Layout



compressed air from the air compressor and air dryer which are described further in Section 4.2. The control panel will regulate the air pressure to the wells and signal the wells for the proper fill and empty cycles. Complete pump specifications are included in Appendix A, Ejector Pump Specifications.

In line flow meters: 1/2 inch Mastermeter water flow meters will be installed inside the equipment compound. The meters will accurately measure the flow rate from each well and totalize the overall volume of extracted groundwater.

The piping layout is shown in Figure 3, Groundwater Extraction and Sparge System Piping and Instruction Diagram.

2.3 Trenching and Piping:

All lines will be installed in trenches at least 3.5 feet below grade. All lines installed in the trenches will be bedded on 6-inches of clean coarse sand prior to backfilling. A 6-inch lift of sand will also be installed above the pipes (Figure 4, Trench Construction Detail). The trench will be backfilled and tamped in 1-foot lifts to grade with native soils. In locations where the trenches are located in roadways or parking lots the top 6-inches of fill will be a compacted crusher run base provided for repaving. Repaving will be conducted during the summer by Pawling Corporation. The 1 1/2-inch Nitrile PVC blend pump discharge lines will be wrapped with explosion proof heat tape and insulation wherever they are buried less than 3.5 feet below grade to protect them from freezing during winter months. Figure 2, Remedial System Site Layout shows the anticipated layout of the trenches on the site.

All lines that will transport impacted water from the well to the treatment compound will be pressure tested prior to being buried. The pressure test will be performed by sealing off the line, installing a pressure gauge in the line and injecting compressed air to 10 psi. The air pressure in the line will be monitored for any changes and the line and all associated fittings will be visually inspected for any leaks. The pressure test will be maintained for a duration of 2 hours.

2.4 Well Completion:

Each recovery well head will be enclosed in a traffic rated steel 2 foot square road box concreted into place. The road box lid will be bolted closed and have gaskets to seal it from water intrusion. Each road box will house the pump, bellows liquid level controller, water flow adjustment valve, and an explosion proof junction box required for heat taping water lines. The floor of the roadbox will be filled with gravel to drain any moisture that may enter the road box.

FIGURE 3
Groundwater Extraction and Sparge System Piping and Instrumentation Diagram, P1

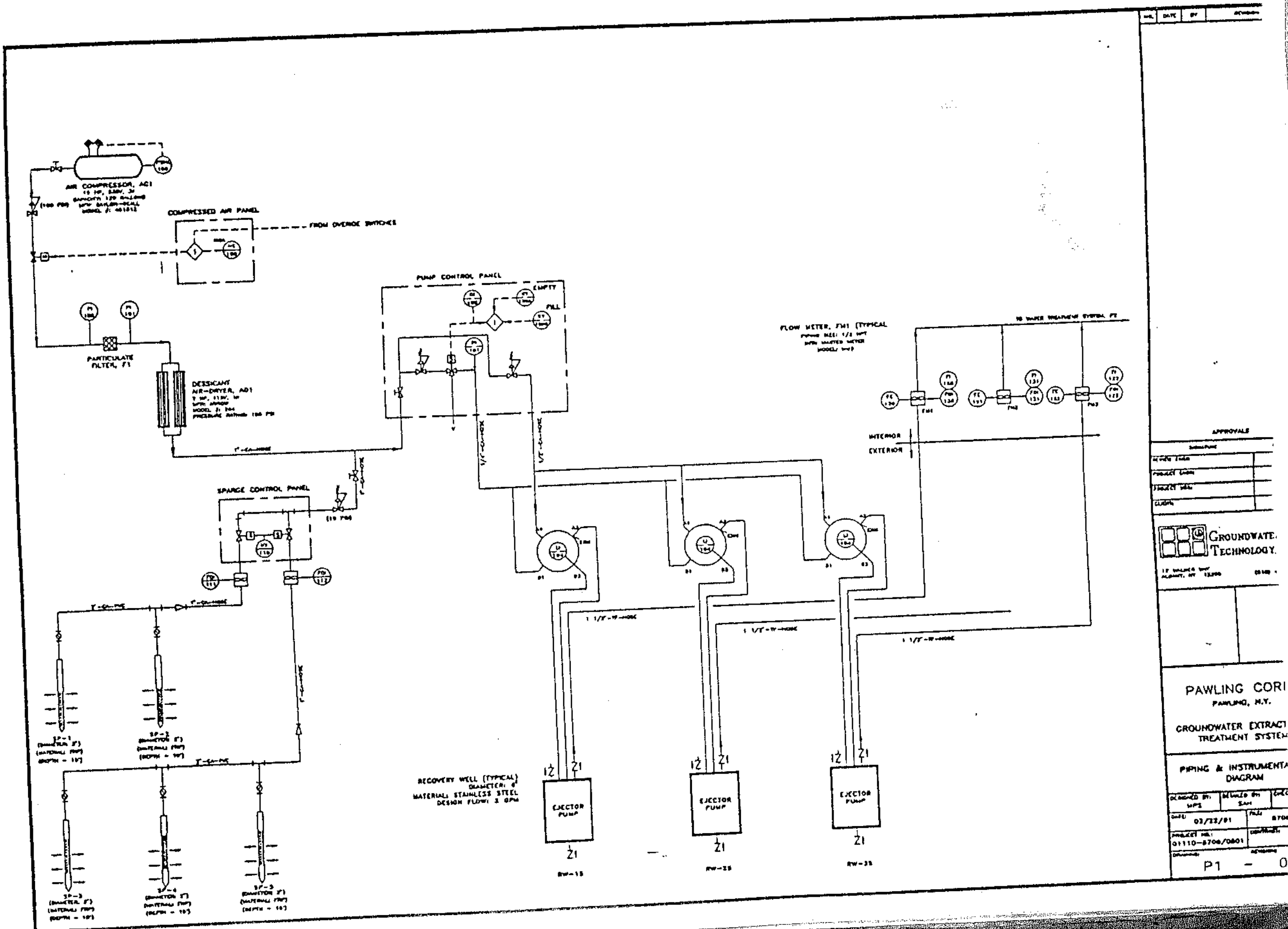
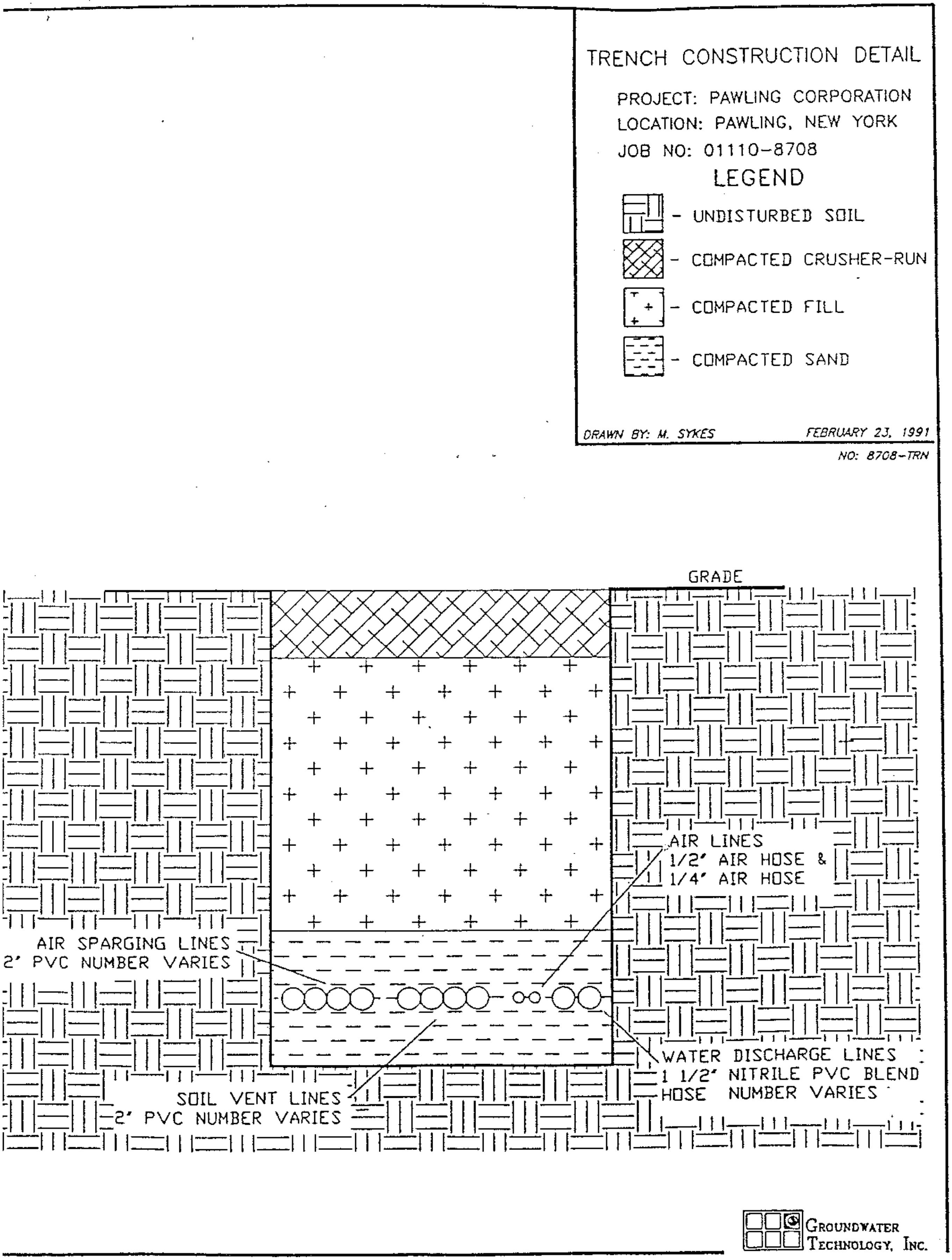


FIGURE 4
TRENCH CONSTRUCTION DETAIL



3.0 GROUNDWATER TREATMENT SYSTEM

3.1 Air Stripper:

An air stripper will be used to remove volatile organic compounds (VOCs) from the water stream. The air stripper is designed to treat a flowrate of 10 gpm at the anticipated contaminant levels. Increase flow rates can be treated by adding an additional 2 Hp blower.

The following contaminant levels in groundwater (from the pump test conducted in June, 1990) have been used for the air stripper design basis:

- Toluene - 170,000 ppb
- TCE - 57,000 ppb
- PCE - 460 ppb
- Vinyl Chloride - 4,800 ppb
- 1,1,1 TCA - 52 ppb
- 1,2 DCE - 37,000 ppb

The air stripper is a 12 stage diffused air bubble aeration system. The manufacturer is Lowry Engineering. The specified model for the groundwater treatment system is model # 12-2-454. This model is designed to remove 99% of the contaminants in the water stream. The stripper has 2 - 1.5Hp, 230 volt, explosion proof, regenerative blowers that are designed to introduce 140 cfm each of air into the water stream. The bubble action of the introduced air strips the VOCs from the water and transports them out of the air stripper to the off-gas treatment.

The unit is constructed of a high density polyethylene, stainless steel anchor bolts and teflon aerators. There are 12 aerators (1 for each stage). Each stage is separated by a polyethylene baffle that prevents any short circuiting of the system. The unit inlet is 1.5 inches in diameter and is equipped with an instantaneous flow gauge that will indicate the influent liquid flow rate. The unit has a water outlet of 3.0 inches and 2 air outlets of 3.0 inches each. All inlets and outlets are equipped with National Pipe Threads (NPT).

The unit's overall dimensions are 84.25 inches long x 28.25 inches wide x 32.5 inches high. The stripper lid can be removed and all aerators can be easily removed to provide cleaning and maintenance of the unit. Complete air stripper specifications are included with Appendix B, Air Stripper Specifications.

The air stripper will be mounted on a wooden platform approximately 30 inches high to allow water to gravity drain from the air stripper to the transfer sump. The two air blowers will be mounted below the air stripper. Explosion proof pressure flow switches will be used to shut down the remedial system when the backpressure on the blowers reaches a predetermined pressure (approx. 48 inches of water pressure). This will prevent overheating and excessive maintenance for the blowers, and the discharge of untreated groundwater.

3.2 Transfer Pump:

Water from the air stripper will be piped to a 210 gallon transfer equalization tank. The transfer tank will be constructed of high density polyethylene and will be equipped with an air tight lid, a vent to the atmosphere, and the appropriate fittings to mount the transfer pump probes. The water sump will allow for equalized pumping through the carbon polishing system.

Water will be pumped via 1 Hp, 230 volt alternating current (VAC), explosion proof single impeller pump from the water sump though one sediment filter and 2 liquid phase granular activated carbon (GAC) units in series. The units will serve as a tertiary treatment prior to discharge. The pump will be activated by a 1 inch diameter float probe placed in the water sump after the air stripper; an additional high float will shut down the remedial system if there is a failure with the transfer pump. Complete pump specifications are included in Appendix C, Transfer Pump Specifications.

3.3 Sediment Filters:

A sediment filter and housing will be installed after the transfer pump to remove any sediment or iron particles that would be in the water stream after the air stripping system. The unit will be constructed of carbon steel and pressure rated to 250 psi. The filter housing will contain one pleated paper cartridge 44-inches high and 6-inches in diameter. The cartridge will be rated to remove particles greater than 5 microns and capable of entrapping up to 16 lbs of sediment prior to change out. A pressure gauge located on the top of the filter housing will indicate the need for cartridge change outs. At the present time it is expected that one change out per month will be needed. Complete specifications for the sediment filter and housing are included in Appendix D, Sediment Filter Specifications.

The sediment filter and housing will keep the carbon polishing units from clogging with particulates and will increase the useful life of the carbon units.

3.4 Carbon Polishing Units:

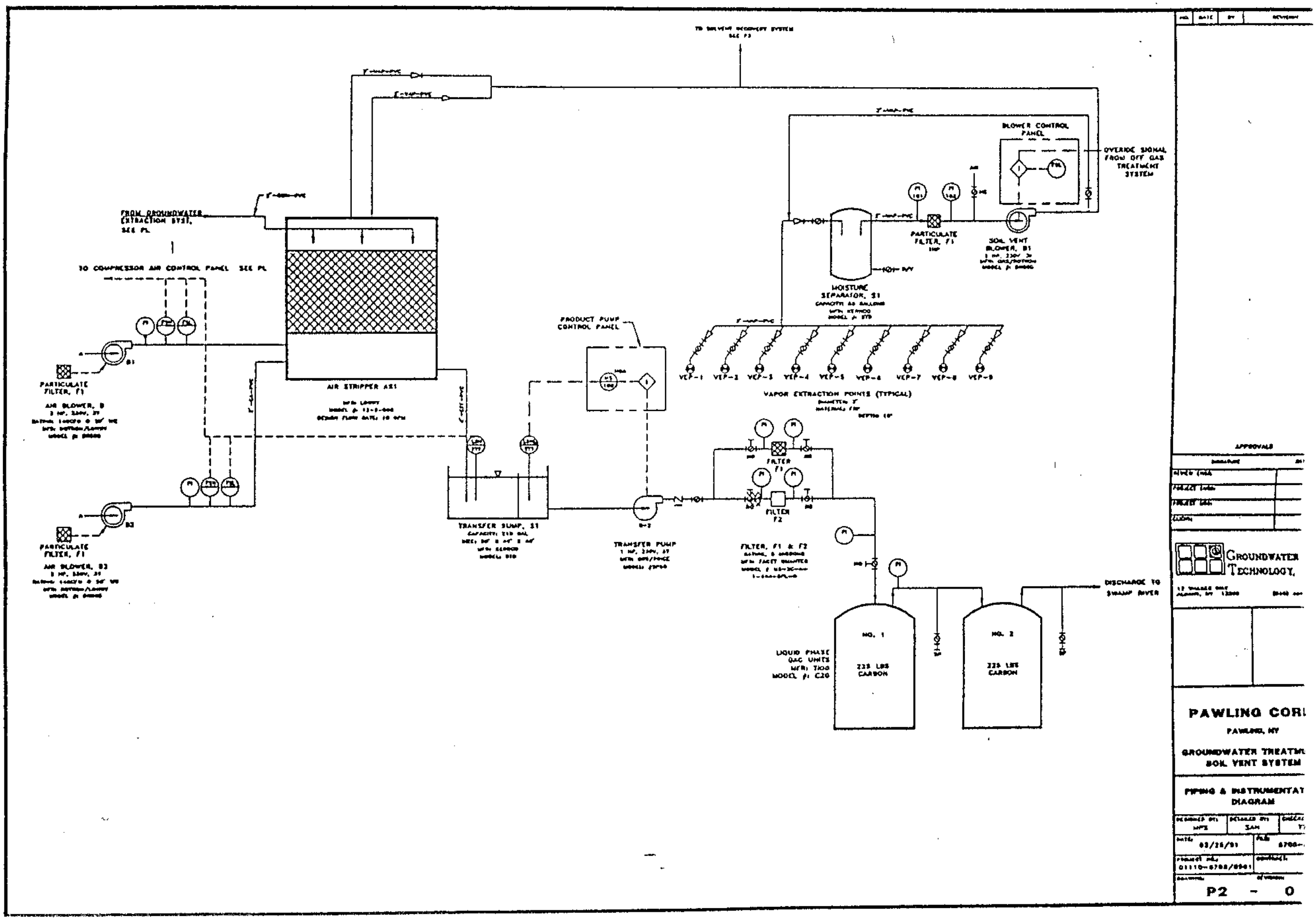
Two liquid phase GAC units will be installed after the sediment filter. Discharge from the air stripper will be piped through both units as a treatment backup to insure a water discharge within the acceptable discharge limits. Any residual VOCs remaining in the water stream after the air stripper will be adsorbed by the carbon. Each of the units will contain 225 lbs of liquid phase GAC in a steel drum enclosure. The units will be equipped with pressure gauges before, between and after the units to monitor the need for a change out. Each of the units will operate with pressures up to 10 psi. Pressures greater than 5 psi are not expected due to the sediment filter upstream of the GAC units. Sampling between the two units will indicate the time of breakthrough of the carbon unit without discharging water exceeding the permitted limits.

3.5 Discharge Piping:

Effluent from the carbon polishing system will discharge to the Swamp River approximately 150 feet north of the equipment compound. The discharge pipe will be constructed of 2 inch carbon steel pipe. The pipe will be mounted on concrete pedestals spaced approximately 12 feet apart. These pedestals will carry the discharge pipe to the Swamp River and minimize any impact to the wetlands area that surrounds the discharge point. Discharge water may be recycled for steam generation and plant procesees.

The discharge line will be externally insulated and heat taped to prevent freezing of the line during the winter months. The heat tape will be controlled from a plug assembly located inside the treatment compound. The treatment system piping is shown on Figure 5, Groundwater Treatment and Soil Vent System Piping and Instrumentation Diagram. Final disign of the discharge piping will be based upon final approval of the wetlands permit.

FIGURE 5
Groundwater Treatment and Soil Vent System Piping and Instrumentation Diagram



4.0 AIR SPARGING SYSTEM

4.1 Sparge Points:

Sparge points will be installed throughout the impacted area of the site in order to enhance volatilization of the VOCs from the groundwater and soils below the groundwater table. The air will be bubbled into the groundwater from the sparge points. The injected air will act as a stripping device removing VOCs from the impacted water. This injected air will also be used to provide an oxygen source for the microbial population associated with the impacted water. This will help to speed the natural biodegradation process. Each point will deliver 3 - 5 cfm of air to the water table. The sparge points will be constructed of 2 inch fiberglass reinforced plastic (FRP) well riser with 1 foot of FRP well screen on the bottom of the point (Figure 3, Groundwater Extraction and Sparge System Piping and Instrumentation Diagram). The points will be installed using a hollow stem auger drill rig. The bottom of the sparge point will be placed approximately 6 feet below the surface of the groundwater.

An electronic timer and solenoid will allow intermittent airflow to the impacted area. The timer will be programmable to allow for varied air flow intervals. Field conditions will set the time durations and intervals.
It is anticipated at this time that 5 sparge points will be installed. Each of the sparge points will be individually valved and controlled by a pressure regulator located in the treatment compound. A field soil vent radius of influence test will be performed prior to installation to insure the effective areas of influence.

4.2 Air Compressor:

A 15 Horsepower (Hp), 230 VAC, electric air compressor capable of producing 52 cfm compressed air at 100 psi will be installed to operate the pumping, sparging and off-gas treatment systems. The air compressor will be equipped with a fan cooled aftercooler that cools the compressed air and condenses some of the water vapor in the compressed air. This condensate will be removed by a water separator. The compressor will be mounted on a 200 gallon compressed air storage tank to allow for the steady operation of the compressor and keep storage of air for any peak operation needs. Complete air compressor specifications are included in Appendix E, Air Compressor Specifications.

Desiccant Air Dryer: A desiccant air dryer and filters will be installed after the air compressor to remove moisture, residual oil and particles from the air stream. This air dryer conditions the operating air to provide more efficient operation with lower operating maintenance.

4.3 Piping:

Compressed air will be piped via 2 inch schedule 80 PVC pipe to the sparge points. All lines will be installed in a trenches at least 3.5 feet below grade. All lines installed in the trenches will be bedded on 6-inches of clean coarse sand prior to backfilling. A 6-inch lift of sand will also be installed above the pipes (Figure 4, Trench Construction Detail). The trench will be backfilled and tamped in 1-foot lifts to grade with native soils. In locations where the trenches are located in roadways or parking lots the top 6-inches of fill will be a compacted crusher run base provided for repaving.

5.0 SOIL VENT SYSTEM

5.1 Vapor Extraction Points:

It is anticipated that 9 Vapor Extraction Points (VEPs) will be installed in the impacted zone of the site (Figure 2, Remedial System Site Layout). The VEPs will be constructed of FRP well screen from 10 feet below grade to a depth of approximately 3 feet below grade. Actual well screen depths will vary upon VOC concentrations detected in soils during drilling. The VEPs will extract existing VOCs from the soil and any additional VOCs that are produced from sparging activities.

The actual number, spacing and location of VEPs will be determined after a field radius of influence (ROI) test. The ROI test is performed by attaching a soil vent blower to an existing monitoring well that is properly screened above the water table. This simulates the same conditions that occur when the soil vent system is attached to a series of VEPs (wells screened in the vadose zone to remove vapors). During the ROI field test stainless steel vapor probes are placed at several different distances (3, 10, 15, 25, and 30 feet) away from the VEP at a depth of approximately 5 feet below grade. These probes will be used to monitor the conditions existing in the subsurface under the vacuum extracting conditions.

Vacuum measurements are recorded at each of the stainless steel probes while the vacuum blower is extracting vapors from the VEP. These vacuum measurements recorded over a series of different vacuum blower extraction rates will determine exactly what vacuum rate will influence what area around the VEP.

5.2 Piping:

Each VEP will be piped via 2 inch, schedule 40, PVC piping to a 4-inch, schedule 40, PVC header pipe located in the treatment compound. Each VEP will be individually controlled by a ball valve located near the header pipe.

All lines will be installed in trenches at least 3.5 feet below grade. All lines installed in the trenches will be bedded on 6-inches of clean coarse sand prior to backfilling. A 6-inch lift of sand will also be installed above the pipes (Figure 4, Trench Construction Detail). The trench will be backfilled and tamped in 1-foot lifts to grade with native soils. In locations where the trenches are located in roadways or parking lots the top 6-inches of fill will be a compacted crusher run base provided for repaving.

5.3 Moisture Reduction Tank:

A 55 gallon moisture reduction tank will be installed in line after the soil vent header pipe and before the soil vent blower to reduce the moisture in the vapor stream. The tank allows water vapor to condensate in the tank and collect in the bottom. A manually operated drain valve will be at the bottom of the tank to remove the collected moisture during routine maintenance visits.

5.4 Soil Vent Blower:

At the present time it is expected that a 2 Hp, 230 volt regenerative soil vent blower will be installed to extract up to 120 cfm of vapor from the impacted soils via the soil vent network. The blower will be capable of producing a vacuum on the system of up to -60 inches of water column (approx. 2.2 psi). The soil vent blower size may change depending on the results of the field (ROI) test.

The soil vent blower will be rated for Class 1, Division 1, Group D, hazardous locations with explosion proof motor starter and power cord assembly. The blower is equipped with a particulate filter to remove any sand or dirt particulate that may be present in the vapor stream before it reaches the blower. Two vacuum gauges mounted on the blower inlet pipes before and after the particulate filter indicate the vacuum in the line and the need for the filter to be cleaned. Complete specifications for the soil vent blower are included in Appendix F, Soil Vent Blower Specifications.

The soil vent blower will be equipped with an override system that will automatically shut down the soil vent system in the event that the off-gas treatment system becomes inoperable.

6.0 OFF-GAS TREATMENT

6.1 System Description:

An automatic solvent recovery system will be installed to remove VOCs from the two remedial air streams created by the remedial system (air stripper and soil vent). The solvent recovery unit is completely automatic and will effectively remove 95% of all VOCs from the air effluent. The VOCs will then be condensed to liquid form and collected. After collecting sufficient quantities, according to the manufacturer, the solvents can then be properly transported and disposed. The solvent recovery system uses vapor phase GAC adsorption to collect the solvents from the effluent stream, and steam stripping of the GAC to collect the captured solvent. The solvent recovery has two operating cycles:

- Adsorption
- Desorption

Two GAC vessels in the system allow adsorption of VOCs from the air stream on a continuous basis. One carbon vessel will be in the adsorption cycle while the other vessel is being desorbed.

The solvent recovery system is a packaged system that will be skid mounted on two steel skids for ease of installation. The system will be equipped with a control panel that will automatically operate all the functions of the recovery system and shut down the system in case of any malfunction. A schematic diagram of the off-gas treatment system is shown on Figure 6, Off-Gas Treatment System Piping and Instrumentation Diagram. Complete specifications for the off-gas treatment system are included in Appendix G, Off-Gas Treatment "Solvent Recovery System" Specifications.

6.2 Adsorption Cycle:

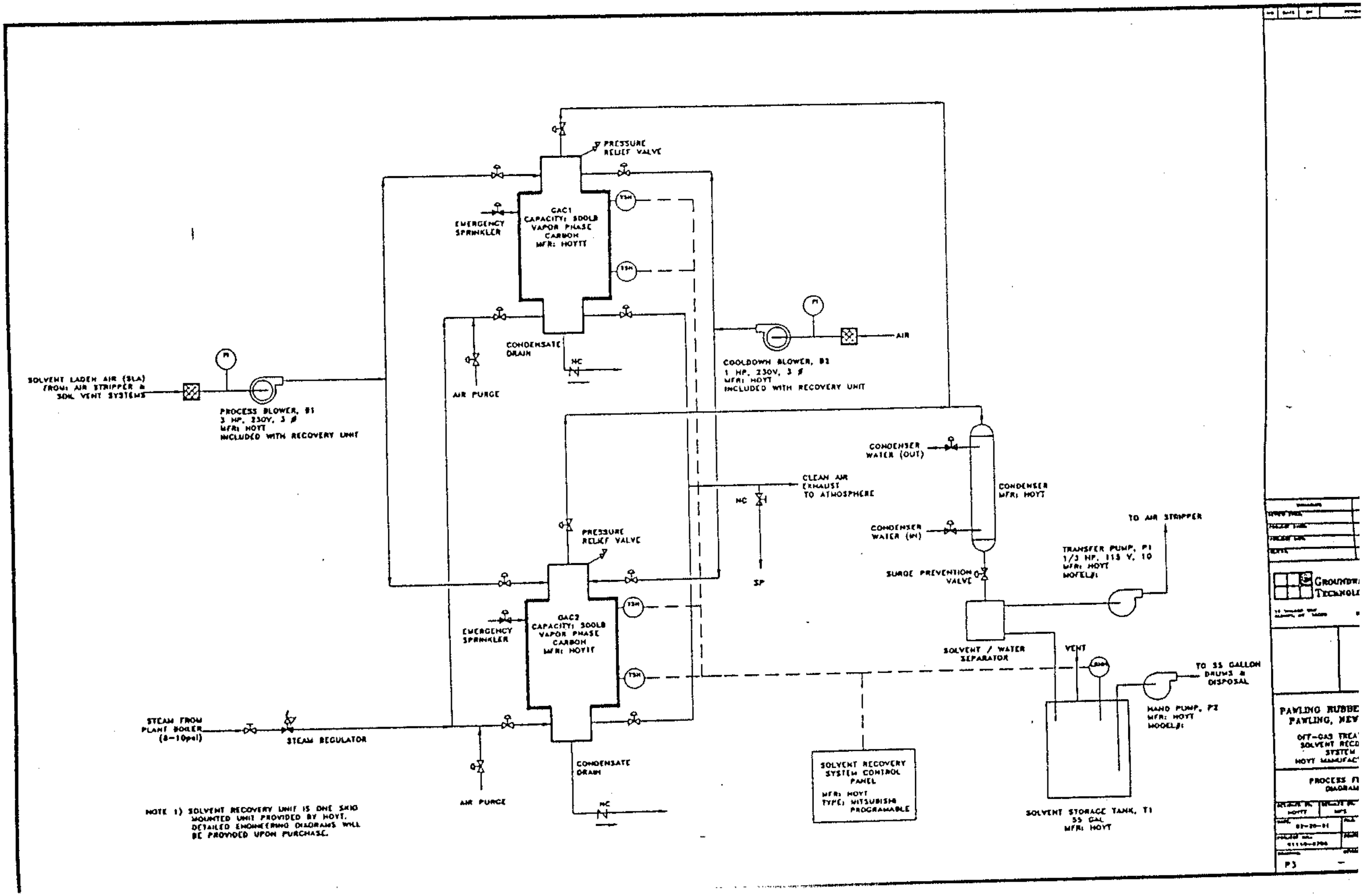
During the adsorption cycle, solvent laden air (SLA) from the air stripper and the soil vent system is blown through one 500 lb GAC adsorption unit via a 3 HP, 230 volt electric process blower rated for Class I, Division 1, Group D, hazardous locations. The blower pushes the SLA across the GAC in the absorber tank allowing the GAC to adsorb the VOCs present in the air stream. Treated air leaves the bottom of the adsorption tank through an exhaust damper into the exhaust piping and out the exhaust stack. A valved port will be provided on the effluent line inside the treatment compound for sampling purposes. The carbon bed collects the VOCs and at a predetermined time the flow of SLA is automatically switched to the other 500 lb carbon vessel.

6.3 Desorption Cycle:

Once a carbon vessel is loaded with the VOCs and the timer has directed the SLA to the alternate carbon vessel the desorption cycle begins. Low pressure steam (8-10 psi) generated in the boiler to constructed in the treatment compound flows back up through the carbon bed. The steam collects the VOCs from the carbon bed and carries them through a piping network to a condenser. The steam condenser allows the steam/solvent mixture to become a water/solvent mixture. This water/solvent mixture is piped to a separator tank that will separate the water and solvent. Water from the separator will be pumped back to the air stripper inlet to be re-treated. Solvent from the separator will be stored in two 55 gallon drums until it is ready to be packaged and transported out of the treatment area. The collected solvent potentially will be recycled by Pawling Corporation in their production processes. Any unrecycled solvent will be transported to a permitted incineration facility.

A purge stream of approximately 2 cfm of dry compressed air flows across the bed after the steam has stripped the carbon bed. This will force any remaining VOCs to the condenser and begin the cooldown process of the carbon bed. After the purge, a 1 HP blower blows ambient air across the carbon bed finishing the cooling process.

FIGURE 6
Off-Gas Treatment System Piping and Instrumentation Diagram



7.0 OVERALL SYSTEM CONTROLS AND OVERRIDES

7.1 Groundwater Pumping and Treatment System:

The groundwater pumping and treatment system will be controlled from 4 separate control panels:

- Pump control panel,
- Air stripper control panel,
- Solvent recovery control panel, and
- Sparge system control panel.

These four panels will be located in the control room of the treatment compound. The panels will monitor several operating parameters and interrupt operations if an alarm condition is detected in the operating parameters. These controls are to be installed to provide the best insurance for proper treatment and safety of operation of the remedial systems.

Alarm conditions that will stop the groundwater pumping are:

- low pressure in the air stripper blowers,
- high pressure in the air stripper blowers,
- soil vent system shut down,
- abnormally high water level in the transfer sump, and
- any shut down period in the solvent recovery system.

If any of these conditions exist the air supply to the groundwater pumps would be stopped and water would no longer be pumped from the wells. This control system is to insure that groundwater will not be pumped if the treatment system is inadequate. A light will be installed in an obvious location on the treatment building to insure the rapid detection of such conditions. A manual start up of the groundwater pumping and treatment system would be required after correcting the alarm condition.

7.2 Air Sparging and Soil Venting Systems:

The air sparging system will be controlled via the air stripper control panel. The air sparging compressed air line is connected to the pump compressed air line. This control system will shut down the sparging system whenever the pumping system is not operating. This is important because air sparging needs to be performed with hydraulic control of the groundwater at the site.

The soil vent system will be controlled via the off-gas treatment control panel. The soil vent system will shut down only when the off-gas treatment system has an alarm condition. This will insure the treatment of vapors from the soil vent system.

If the soil vent system is inoperable, the sparge system and pumping system would shut down via the sparge system control panel. This will insure that vapors produced from the sparge system will not be created if the soil vent system in not prepared to collect them.

7.3 Off-Gas Treatment System:

The off-gas treatment system will be equipped with a control panel that will monitor the operations of the system and shut down the solvent recovery, groundwater pumping, air sparging, and soil venting systems in the event of an alarm situation. These alarm situations are:

- abnormally high solvent level in the storage tank,
- abnormally high water level in the condensate water tank,
- abnormally high temperature in the carbon bed, and
- any improper valve condition.

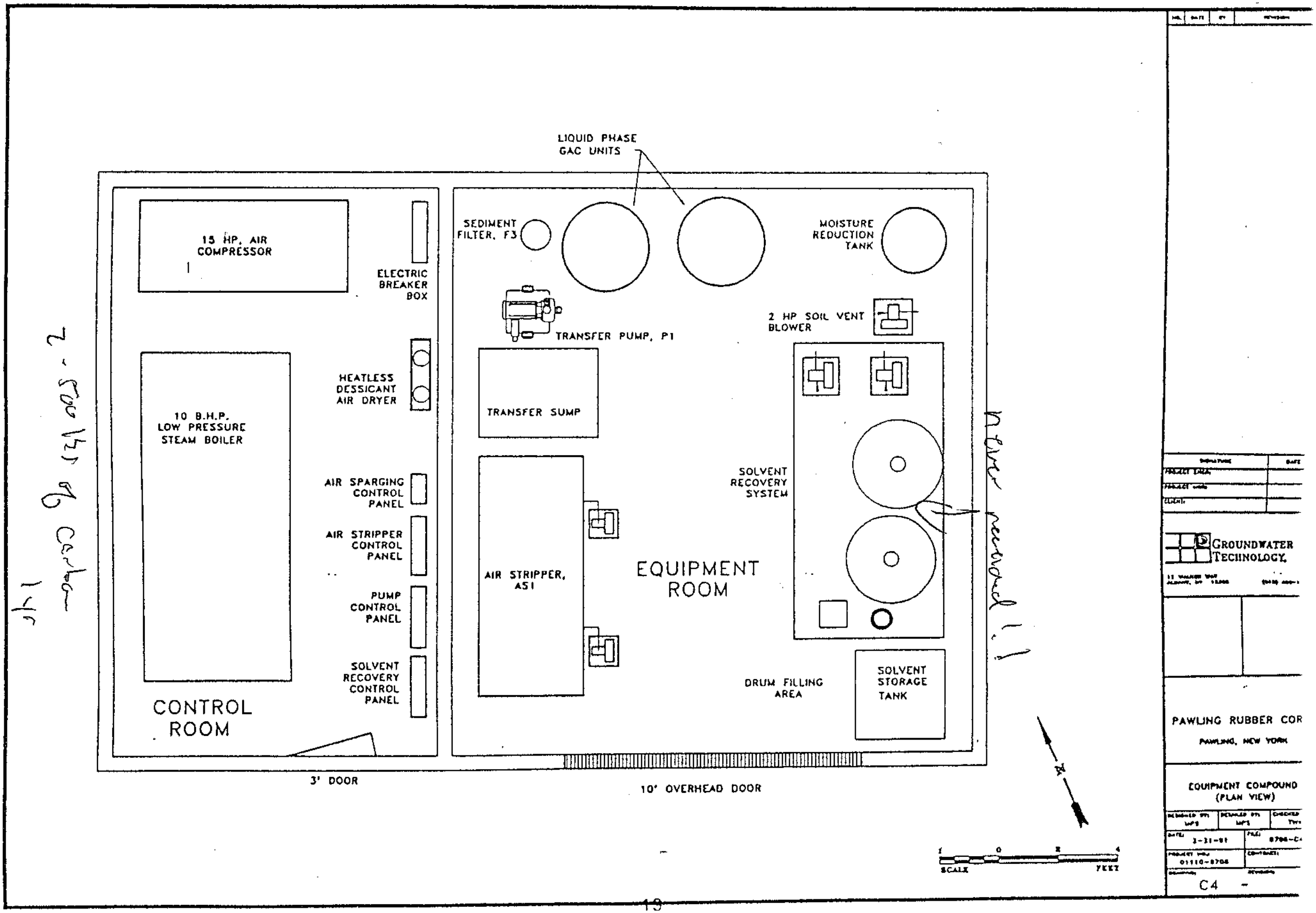
In the event of an alarm condition the control panel will shut down the remediation systems, and contact Groundwater Technology and/or Pawling Corporation via a remote monitoring phone line and a computer modem. This control panel will then specify the specific alarm condition via a computer print out and an alarm light on the panel. This specification of the particular alarm condition will allow for the most efficient correction of the condition.

In the event of an abnormally high temperature in the carbon bed or the remote possibility of a fire in the carbon bed the controller will automatically shut down the remedial systems and open an emergency water valve flooding the carbon bed with water. This water will be released through a condensate drain at the bottom of the carbon bed and be stored in a tank until the problem is assessed and corrected. The controller will notify Groundwater Technology and/or Pawling Corporation of this condition via the phone line and modem.

7.4 Treatment Compound:

A 20 foot x 30 foot treatment compound will be constructed on site to house all the remedial equipment and its associated controls (Figure 7, Equipment Building Plan View). The compound will be constructed to protect the equipment from adverse weather conditions and vandalism. The building will be divided into two operating rooms, an equipment room and a control room (Figure 8, Hazardous Class Locations). The two rooms will be separated by a 6 inch wall with 3/4 inch fire code sheet rock. The overall building construction will be determined at a later date and included with this report as an addendum when it has been approved by the local building inspector.

FIGURE 7
Equipment Building Plan View



PAWLING RUBBER
SITE NUMBER: 314002
PAWLING, NY, DUTCHESS COUNTY

New York State Superfund
Record of Decision

March 1992

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road, Albany, New York 12233
THOMAS C. JORLING, *Commissioner*

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location
Pawling Rubber
157 Charles Colman Boulevard
Pawling, NY 12564
Site Code: 314002
Funding Source: Responsible Party

Statement of Purpose
This document describes the remedial alternatives considered for the inactive hazardous waste disposal site at Pawling Rubber, Site Code 314002, and identifies the New York State Department of Environmental Conservation's (NYSDEC) preferred remedial alternative developed in accordance with the New York State Environmental Conservation Law (NYSECL), and consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC Section 9601, et., seq. as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Exhibit A identifies the documents that comprise the Administrative Record for the site. The documents in the Administrative Record are the basis for the Record of Decision.

Assessment of the Site
Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action described in this Record of Decision (ROD), present a current or potential threat to public health welfare, and the environment.

Statement of Basis
This decision is based upon the Administrative Record for the Pawling Rubber site and the comments received from the pubilc. A copy of the Record is available for public review and/or copying at the following locations:

NYSDEC, Region 3
21 South Putt Corners Road
New Paltz, NY 12561

Pawling Village Hall
9 Memorial Avenue
Pawling, NY 12564

Pawling Free Library
11 Broad Street
Pawling, NY 12564

Description of the Remedy
This operable unit is the first of two planned for the site. The first operable unit addresses the source of the contamination by treating the contaminated soil and groundwater in the

unconsolidated overburden. The function of this operable unit is to remediate the contamination source and to prevent additional off-site migration. The second operable unit will involve continued study and possible remediation of the bedrock aquifer. The proposed remedy for the Pawling Rubber site consists of the following:

* Overburden groundwater extraction through pumping from recovery wells;
* Groundwater treatment by air stripping and granular activated carbon adsorption polish;
* Treatment of contaminated soils in the saturated and unsaturated zones by air sparging and soil ventilation;
* Off-gas treatment by solvent recovery (on-site carbon regeneration);
* Off-site destruction of waste solvent by incineration.

Declaration

The selected remedy is protective of human health and the environment complies with Federal and New York State requirements that are legally applicable, or relevant and appropriate requirements (ARARs) to the remedial action. This remedy utilizes permanent solutions, alternative treatment and resource recovery technologies to the maximum extent practicable for this site.

3-24-92
Date

Edward O. Sullivan
Commissioner
Office of Environmental Remediation

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RECORD OF DECISION

Pawling Rubber; Pawling, Dutchess County, Site Number 3-14-002

I. PROBLEM STATEMENT

A series of investigations discovered high levels of tetrachloroethene (PCE), trichloroethene (TCE) and toluene in the area of a landfill on the site. Vinyl chloride at 4,800 ppb (parts per billion), trans 1,2 dichloroethene at 20,000 ppb, TCE at 41,000 ppb, PCE at 42 ppb and toluene 170,000 ppb, were detected in the 1990 groundwater investigation. No significant levels were detected in the soil. The soil gas survey conducted in 1990 showed TCE at 270 ppm (parts per million), PCE at 2 ppm, and toluene at 110 ppm. The compounds detected on site are mostly volatile organic compounds (VOCs), which volatilize quickly when exposed to the atmosphere. The site is on a plateau of bedrock, and adjacent to the site is a New York State (NYS) Regulated Wetland which contains the Swamp River. There is no evidence of extensive off-site migration of contamination. The Corbin Road municipal supply well, which is only used under drought conditions, is ¼ mile from the site, and is not presently affected by the site.

II. GOALS FOR THE REMEDIAL ACTIONS

The goals for the remedial action are to:

1. Eliminate the source of contamination, and the prevent of off-site migration of the contamination. The source is the high concentration plume in the groundwater.

2. Restore groundwater quality at the site to meet NYS standards within a period of five years from commencement of remedial action.

   Groundwater monitoring wells will be sampled to determine the effectiveness of the remedial action. After the first year of the remedial action, the monitoring wells data will be evaluated. If the results of the evaluation suggest that the clean-up goal will not be obtained, the remedial action will be modified accordingly.

   The New York State Groundwater Standards for the contaminants of concern:

vinyl chloride	2 ppb
tetrachloroethene (PCE)	5 ppb
trichloroethene (TCE)	5 ppb
1,2 dichloroethene	5 ppb
toluene	5 ppb

3. Remediation of contaminated soil.

   The levels of contamination detected in the soil are below clean-up action goals, therefore no soil clean-up goals is required. The air sparging system recommended as one of the remedial actions will strip the contaminants in the saturated zone and unsaturated zones.

The soil clean-up goals for the site have been determined to be the following:

vinyl chloride	0.15 ppm
trichloroethene (TCE)	1.0 ppm
1,2 dichloroethene	0.5 ppm
toluene	1.5 ppm

III. SITE LOCATION AND DESCRIPTION

The site is located at latitude 41° 34' 07" and longitude 73° 35' 53", on USGS map Pawling, NY quadrangle (Figure 1). The plant site is ten acres and the size of the contamination area is approximately ½ acre (Figure 2). The site is on plateau and the low lying area to the North and West is a regulated wetland and the Swamp River. The grade difference between the wetland and site is approximately 10 feet.

The site is owned and operated by the Pawling Corporation. The site address is: 157 Charles Colman Boulevard, Pawling, NY 12564.

The New York State Department of Environmental Conservation Inactive Hazardous Waste Site Registry description is located in Exhibit B.

IV. SITE HISTORY

The Pawling Corp. formerly the Pawling Rubber Company is a rubber and plastic manufacturer. The site was placed on the New York State Inactive Hazardous Waste Disposal Site Registry in 1983 as a class 2a. A class 2a site is defined as a temporary classification assigned to sites that have inadequate and/or insufficient data for inclusion in any of the other classifications.

During the 1960's to the early 1970's some of the waste materials from this facility were disposed in landfills on the site. One landfill was used for construction and demolition material, scrap rubber and scrap machinery. This landfill was tested and found not to contain hazardous waste. The second landfill was used for disposing waste liquid solvents. The solvents were disposed in pits and ignited. The pits were filled with soil after each such burning episodes.

The contamination problem was discovered in June 1987 by the NYSDEC Division of Water that the site's non-contact cooling water violated a State Pollution Discharge Elimination System (SPDES) permit #NY-004618. The violation was the non-contact cooling water which exceeded limits of heavy metals, halogenated organic solvents and organic solvents. In May 1988 an Order on Consent was signed between the NYSDEC Division of Water and Pawling Corp.

The Order on Consent called for the following:

- ★ Investigations to define the extent, degree and source of contamination,
- ● Methods of removing the contamination,
- ★ Methods of treating the recovered groundwater,
- ● Description of the point of discharge of the recovered groundwater,
- ● Schedule of implementation.

The site classification was changed from 2a to 2 in July 1989. A class 2 site is defined as a significant threat to the public health or environment; action required. Pawling Corporation has voluntarily conducted remedial investigation of the site and has furnished the NYSDEC with the following reports:

Groundwater Investigation Report: March 3, 1988, April 19, 1988, September 2, 1988

Amended Groundwater Investigation, February 1, 1989

Limited Feasibility Study, December 31, 1990

Groundwater Investigation and Pre-Remedial Design Report,January 3, 1991

A state-funded Phase I Investigation was performed and completed in June 1988. The Pawling Corp.'s investigation reports and the state-funded investigation report are part of the Administration Record (Exhibit A) and is available for public review in the repositories. The locations of the repositories are stated in the Declaration of the Record of Decision. In April 1991 a public meeting was held in the Village of Pawling on the proposed remedial action; a thirty day comment period was offer to the public.

There has been 18 monitoring wells and two drive points installed on site. A drive point is a one inch inside diameter stainless steel pipe which is driven below the water table. The drive point is not screened. The purpose of the drive point is to measure groundwater levels and collect groundwater samples. The drive points were placed in the wetland. Pawling Corporation also conducted a soil-gas survey and has collected and analyzed surface water, soil and sediment samples. Some of the field work was overseen by the Department. A pilot pump test and air stripper test has been conducted to ascertain the performance of the air stripping alternative.

The 1988 investigations showed the presence of contamination in the groundwater. The 1988 investigations also showed that a not-in-service Corbin Road municipal well, which is ¼ mile away, for the Village of Pawling may have been impacted by the site.

V. CURRENT SITE STATUS

A series of investigations discovered high levels of tetrachloroethene (PCE), trichloroethene (TCE) and toluene in the area of a landfill on the site. Vinyl chloride at 4,800 ppb, trans 1,2 dichloroethene at 20,000 ppb, TCE at 41,000 ppb, PCE at 42 ppb and toluene at 170,000 ppb, were detected in a 1990 groundwater investigation. A portable gas chromoatograph was used to detected chlorinated hydrocarbons and toluene of soils during the well installation. The highest levels detected by the gas chromoatograph were 3,009 ppm of chlorinated hydrocarbons and 1,100 ppm of toluene.

The remedial design for the selected remedial action was completed in June 1991. The remedial action for the site was begun in September 1991. Prior to construction of the remedial action, a field test was conducted to determine the effective range of air sparging and vacuum vapor extraction system. The locations of wells for the sparging and extraction system were determined based upon a soil gas survey conducted for the "Groundwater Investigation and Pre-Remedial Design Report." From the results of this field test, the original design of the air sparging and vacuum vapor extraction system was changed; the system is smaller than planned.

The construction of the selected remedial action started on October 1, 1991. The construction started with the installation of the trench and the pipe network for the air sparging and vapor vacuum extraction system. This phase of construction was overseen by the Department. The next phase of the construction was the installation of the equipment shed which will house the air stripper, carbon units, pumping equipment and electrical equipment. The last phase of construction will be the connection of the equipment, the piping and the electricity. The completion of the construction phase took place on February 21, 1992.

The Village of Pawling well on Corbin Road which is ¼ mile from the site, has been sampled by the Pawling Corp in June 1991. The sampling results showed no detectable contamination.

VI. <u>ENFORCEMENT STATUS</u>

The site was placed on the New York State Inactive Hazardous Waste Disposal Site Registry in 1983 and was classified 2 - Significant threat to the public health or environment - Action required. The site was listed for violating New York State Groundwater Standards and for confirmed hazardous waste disposal. The responsible party is the Pawling Corporation. An Order on Consent was signed with the Division of Water in 1986 to investigate and to remediate the site.

VII. <u>SUMMARY OF SITE RISKS</u>

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 and the New York State Environmental Conservation Law directs the Department to protect human health and the environment from current and potential exposure to hazardous waste.

There have been four carcinogens and one non-carcinogen detected at the Pawling site in the groundwater. These contaminants toxicity, mobility, persistence and concentration warrant concerns for human health and the environment.

<u>Exposure Assessment</u>:

Currently the groundwater at the site is only used for non-contacted cooling water. The site borders a NYS regulated wetland and the Swamp River. The site may be impacting the Village of Pawling, Corbin Road municipal well. Currently this well is not being used by the village.

In developing the hypothetical exposure scenarios for groundwater at this site, it was assumed that nearby residents would be exposed by ingestion to water contaminated at the highest concentrations found on site.

Toxicity Assessment:

Four carcinogens and one non-carcinogen were detected in the groundwater. The equations are listed on Table 1 and contaminants detected are listed on Table 2. Table 1, equation 1 is used by the USEPA to established chronic toxicity criteria for the ingestion of water. The highest levels detected were used in the equation as the levels ingested by a 70kg. adult.

For non-carcinogen effects, Minimum Effective Doses (MEDs) and USEPA Reference Dose Values (RFDs) are used. MED is the minimum incremental carcinogenic response observed. The RFD is the estimate of a daily exposure to the human population to be without an appreciable risk of deleterious effects during a lifetime. For carcinogen effects, USEPA Risk Specific Doses (RSDs) and USEPA Carcinogenic Potency Factors (CPFs) are used. RSD were developed by the USEPA to evaluate environmental concentrations under intake assumptions which correspond to excess lifetime cancer risks of carcinogens. The CPF was developed by USEPA Carcinogen Assessment Group to evaluate cancer risks. The toxic assessment for the site is represented on Table 2.

Summary of Risk Characterization:

Given the proximity of the wetland and Swamp River and the possibility of impacting of the Village of Pawling, Corbin Road well, there are high risks from the current and potential exposure, unless the Remedial Action is implemented.

VIII. EVALUATION OF REMEDIAL ALTERNATIVES

A. RESPONSE ACTIONS FOR THE PAWLING SITE

The following general response actions were considered for addressing groundwater contamination at the Pawling site.

1GW. No Action: No action is included as a baseline general response against which other actions can be measured.

2GW. Institutional Actions: Institutional Actions, such as fencing or deed restrictions, could potentially be feasible to limit access to the contaminated areas and monitor groundwater contamination characteristics over time.

3GW. Containment: Containment of contaminated groundwater.

4GW. Collection: Collection of groundwater via recovery wells and/or trenches would require treatment and disposal of the extracted water.

5GW. Treatment: Treatment of groundwater would require extraction followed by above ground treatment.

6GW. Discharge: On-site discharge would require extraction, injection wells and effective treatment.

7GW. In-Situ Treatment: In-situ treatment of groundwater. This would involve treatment of the groundwater in place and would require some groundwater extraction.

The following general response actions were considered for contaminated soils at the Pawling site:

1S. No Action: No action is included as a baseline general response against which other actions can be measured.

2S. Institutional Actions: Institutional Actions would limit access to the contaminated areas and monitor soil contamination characteristics over time.

3S. Containment Actions: Containment actions to limit the contamination migration.

4S. Excavation Actions: Excavation actions would involve removing the contaminated soil, treatment and disposal of soil either on or off the site.

5S. In-Situ Actions: In-situ actions would remove or destroy contamination from the soil without removal of the soil.

The following general response actions were considered for treating air impacts at the Pawling site:

1A. No Action: No action is included as a baseline general response against which other actions can be measured.

2A. Treatment: Treatment of air off-gas from remedial technologies is feasible.

B. TECHNOLOGY SCREENING FOR GROUNDWATER

Technically implementable remedial technologies and associated processes for contaminated groundwater which were evaluated and found feasible and effective.

1. Collection Utilizing Overburden Wells. Consists of constructing recovery wells in the overburden aquifer zone for the removal of contaminated groundwater.

2. Treatment of Groundwater Using Air Stripping. Air stripping is an effective means of removing VOCs from water. Air stripping is a mass transfer process in which volatile constituents in water are transferred to the gas phase (air). Air stripping is frequently accomplished by either packed tower or air diffuser set up.

   The packed tower consists of a tower filled with a packing and attached to an air blower at the base of the tower. The contaminated stream enters the top of the tower as the air enters the bottom. The counter current flow strips the VOCs from the water and exhausts them through the top of the tower.

Diffused air type strippers operate by passing air from a blower through diffusers that are placed in a contaminated water stream. The air bubbling through the stream strips the VOCs from the water and exhausts them through the top of the stripper. Both air stripping technologies operate on the same properties with much the same efficiencies. The differences remain in the size and configuration of the units physical components.

3. Treatment of Groundwater Using a Bioreactor. The bioreactor process uses a microbial population to metabolize organic constituents in a waste stream by means of passing the waste stream over a fixed film of cultured microorganisms. The bioreactor unit consists of a honeycomb-like structure (the medium) sealed inside an engineered enclosure. Bacteria growing on the medium adsorb biodegradable organic contaminants from the water and convert them to inert substances such as carbon dioxide and water. An air blower attached to the base of the unit supplies oxygen to the microbial population and nutrients are added to enhance the bacterial growth.

4. In-situ Treatment of Groundwater Using Air Sparging. Air sparging consists of a network of sparge points placed with screened intervals below the groundwater table. Compressed air is introduced to the groundwater through the sparge points. The air rises to the top of the groundwater table collecting VOCs from the groundwater. The VOC laden air is either allowed to naturally leave the vadose zone soils or is collected by a soil venting system.

5. On-site Discharge to Local River. Involves piping effluent waters from the treatment system to a local river.

C. REMEDIAL TECHNOLOGY SCREENING FOR SOIL

Technically, implementable remedial technologies and associated processes for contaminated soil in the unsaturated or vadose zone (above the water table) and saturated zone (below the water table) which were evaluated and found feasible and effective.

1. In-situ Treatment Vapor Extraction. Utilizes a network of soil vapor extraction points which are connected to a vapor extraction blower. The blower draws air from the vadose zone inducing a vacuum in the soil pore spaces. This vacuum will draw VOCs adsorbed on the soil into the pore spaces and out of the extraction point.

2. In-situ Treatment Air Sparging/Vapor Extraction. Air sparging consists of a network of sparge points placed with screened intervals below the groundwater table. Compressed air is introduced to the groundwater through the sparge points. The air rises to the top of the saturated zone and collecting the VOCs from the vadose zone within the soil. The VOC laden air is then collected by use of a vapor extraction system as described above.

D. TECHNOLOGY SCREENING FOR AIR

Technology implementable remedial technologies and associated processes for contaminated air discharges from remedial systems which were evaluated and found feasible and effective.

1. Treatment of Air Discharge Using Carbon Adsorption. The process of adsorption onto carbon involves contacting an air waste stream with carbon, usually by flow through packed bed reactors. The carbon selectively adsorbs VOCs by a molecules and internal pores of carbon granules. Adsorption depends on strength of molecular attraction between adsorbant and adsorbate, molecular weight, surface area, and contact time. Once the micro pore surfaces are saturated with VOCs, the carbon must be either replaced with virgin carbon or regenerated.

2. On-site Disposal. Regeneration. On-site disposal by regeneration would include installation of a solvent recovery system capable of collecting VOCs from waste air streams and regenerating the carbon. The regeneration process would include low pressure steam stripping of the VOCs from the carbon, collection of the VOCs from the steam stripping process and the disposal of the collected concentrated liquid VOCs.

IX. CITIZEN PARTICIPATION

To inform the local community and to provide a mechanism for citizens to make the Department aware of their concerns, a citizen participation program has been implemented. In accordance with the Citizen Participation (CP) Plan developed for this project, the following goals have been accomplished:

- ★ Information repositories have been established;
- ★ Documents and reports associated with the project have been placed into the repositories;
- ● A "contact list" of interested parties (e.g. local citizens, media, public interest groups, government agencies, economic agencies, etc.) has been created;
- ★ Periodic meetings with village and town boards and the Rotary Club to discuss status of project;
- ★ A legal notice of the completion of the RI/FS and the preferred remedial action was published in the Pawling News Chronicle and Harlem Valley Times from March 3, 1991 to April 3, 1991;
- ● A public notice of the completion of the RI/FS and the preferred remedial action was distributed to the contact list;
- ★ A public comment period was established from April 4, 1991 to May 4, 1991 and a public meeting was held on April 4, 1991 to discuss the RI/FS and the preferred remedial action. A fact sheet summarizing the preferred

action was distributed at the public meeting. The minutes of the public meeting are part of the Administrative Record for the project and are in the document repositories for public inspection;

A summary of the comments/questions received during the April 4, 1991 public meeting and the comment period, as well as the responses to those comments, are included in Exhibit C. A public notice of the selected remedy and a brief summary of the remedial program will be issued to the contact list.

X. DETAILED ANALYSIS OF SELECTED REMEDIAL ACTION

Comparison of the various remedial alternatives was done in the Limited Feasibility Study. Based upon the comments received from the public, the series of Groundwater Investigation Reports, the Limited Feasibility Study, and the criteria for selecting an alternative which meet the applicable, or relevant and appropriate requirements (ARARs), the following remedial actions were recommended:

- ★ Overburden groundwater extraction through pumping from recovery wells;
- ● Groundwater treatment by air stripping and granular activated carbon adsorption polish;
- ● Contaminated soils treatment, in the vadose and saturated zones, by air sparging and soil ventilation;
- ★ Off-gas treatment by solvent recovery (on-site carbon regeneration);
- ★ Off-site destruction of waste solvent by incineration.

The Remedial Action was evaluated for the following criteria:

1. Implementability,
2. Short-term effectiveness,
3. Long-term effectiveness.

1. Implementablility

Groundwater and Soil

Air Sparging/vapor extraction system can be implemented using common drilling and construction techniques. Care must be taken to operate the air sparging system with the vapor extraction system and groundwater control system to prevent the migration of contaminants due to air sparging.

Groundwater

Air stripping can be implemented using any number of vendors and common construction techniques.

Air

Regeneration at an on-site facility can be easily implemented by construction of carbon treatment and regeneration system available from vendors and arranging the proper shipment of collected liquid VOCs to an approved facility. Several approved waste haulers are available in the area.

2. Short-term Effectiveness

The selected remedial action would reduce the future risk by controlling groundwater migration and reducing VOCs concentrations and mass. The selected remedial action would also hasten the reduction of VOCs concentrations and mass in soils.

3. Long-term Effectiveness

The selected alternative effectively reduce the volume of contamination in the vadose and saturated zone in soils and prevent any additional migration of VOCs in the soils and groundwater. Air Sparging/Vapor Extraction has been shown effective for the removal of VOCs from vadose and saturated zones in soils. Air stripping is a well documented and effective technology to remove VOCs from water streams. Air stripping is applicable for all the contaminants at the Pawling site. Regeneration is a proven technology for destruction of VOCs.

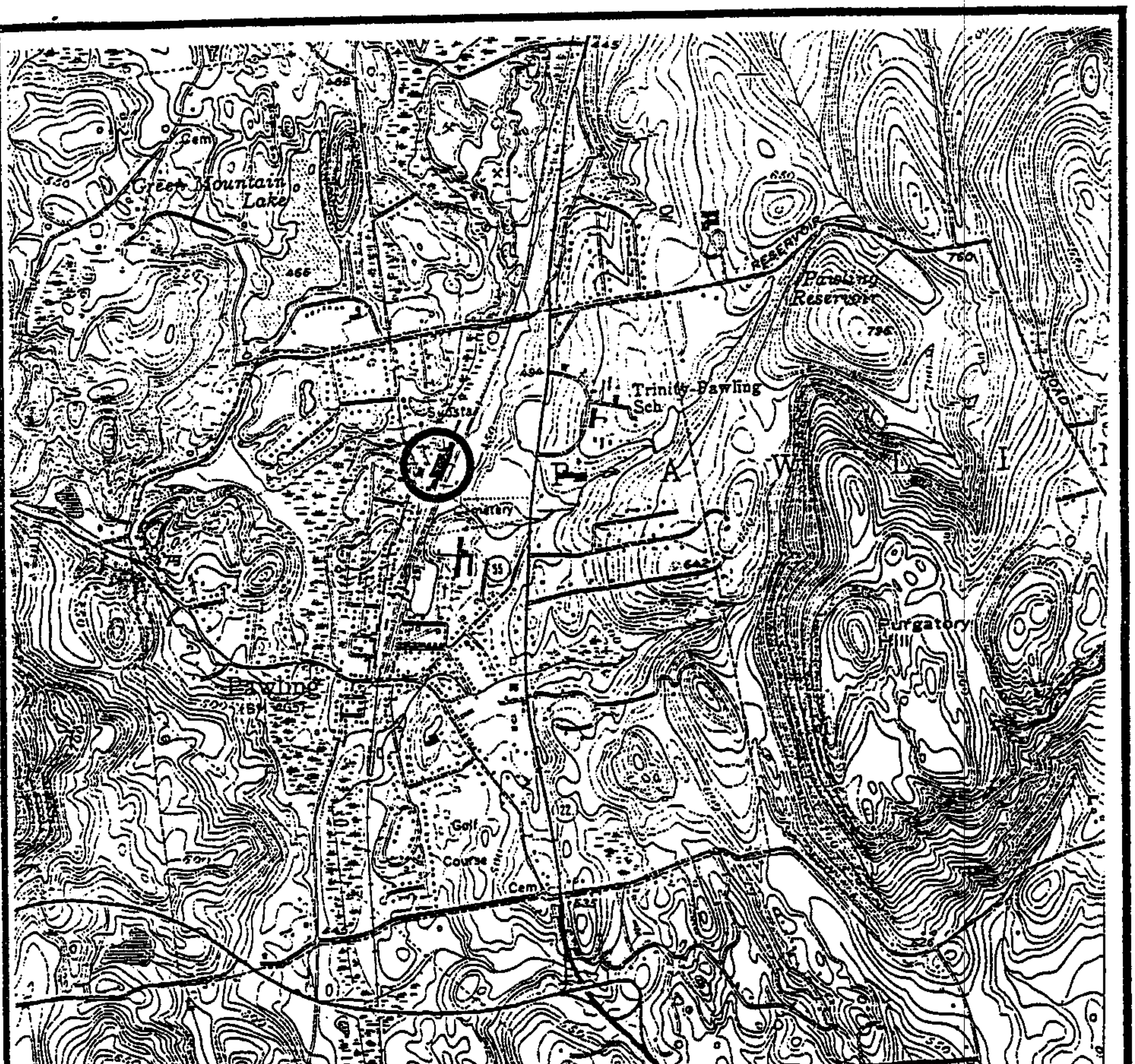
The selected alternative results in a remedial program which is both protective of human health and environment and which recognizes the unique problems presents at the site. To achieve the clean-up goal, groundwater monitoring wells will be sampled periodically to determine the effectiveness of the remedial action. After the first year of the remedial action, the monitoring wells data will be evaluated. If the results of the evaluation suggest that the clean-up goal will not be achieved within a five year period, the remedial action will be modified accordingly.

FIGURE 1

SITE LOCATION MAP

PAWLING CORPORATION

PAWLING, NY



SOURCE: U.S.G.S. 7.5 MIN. PAWLING QUAD, 1971.

SCALE: 1" = 2083'

0 0.5

FIGURE 2
SITE PLAN

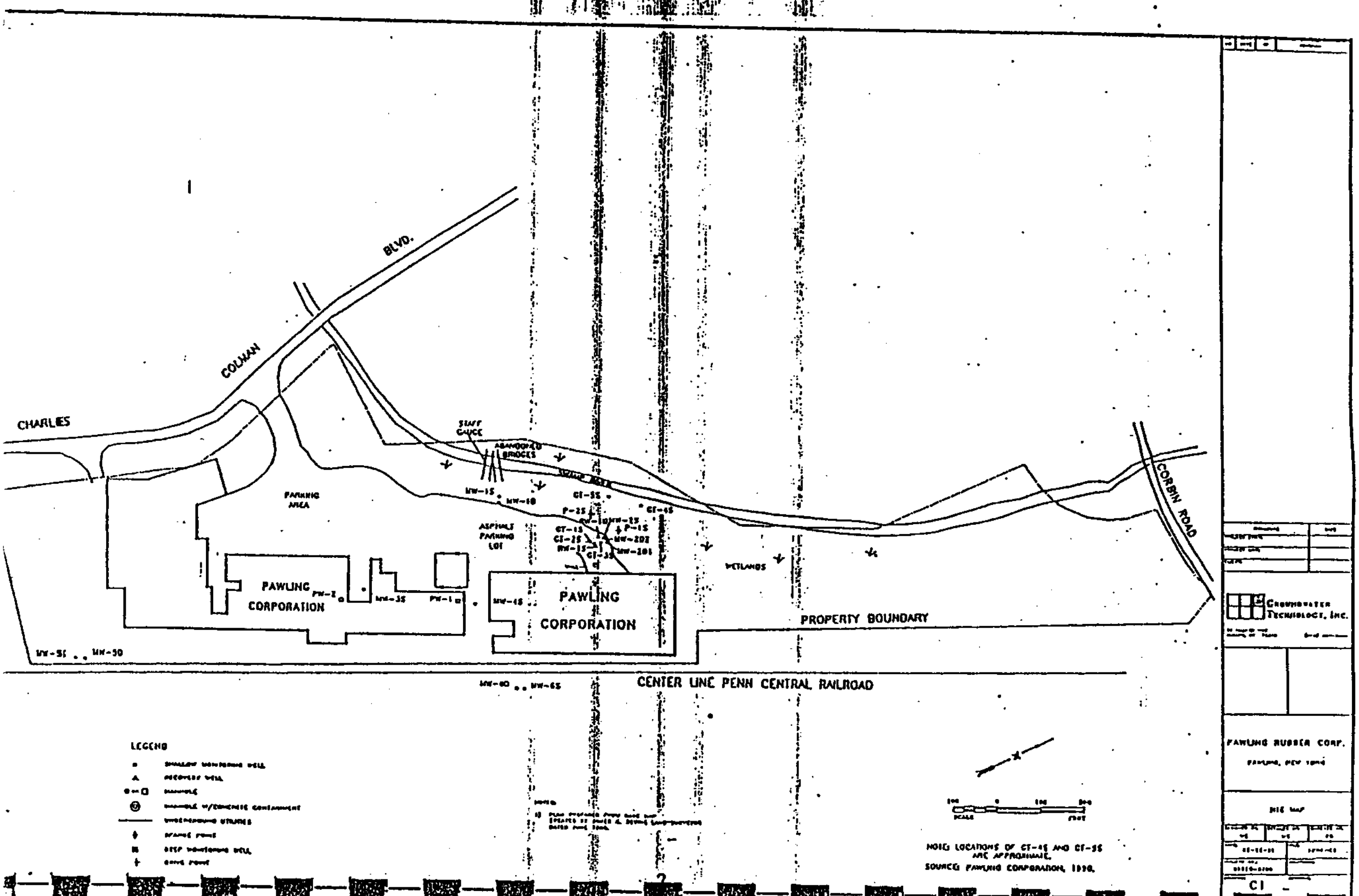


TABLE 1

POTENTIAL EXPOSURE ROUTES

PAWLING RUBBER CO., DUTCHESS COUNTY, SITE NO. 314002
POTENTIAL EXPOSURE ROUTES OF THE PAWLING RUBBER SITE
GROUNDWATER: INGESTION OF DRINKING WATER AIR: INHALATION (DEPENDENT OF THE EFFLUENT LEVELS OF THE REMEDIAL ACTION) SURFACE WATER: INGESTION OF DRINKING WATER CONSUMPTION OF CONTAMINATED BIOTA

INTAKE ASSUMPTION FOR SELECTED ROUTES OF EXPOSURE
SURFACE WATER & GROUNDWATER (INGESTION) 2 LITERS/DAY FOR 70 KG ADULT / 70 YR EXPOSURE PERIOD (EQ. 1) AIR (INHALATION) 20 M^3 AIR/DAY FOR 70 KG ADULT / 70 YR EXPOSURE PERIOD (EQ. 2)

TABLE 2

TOXIC ASSESSMENT CHART

PAWLING RUBBER CO., DUTCHESS COUNTY, SITE NO. 314002
SUMMARY OF ANALYTICAL DATA

	HIGHEST LEVELS DETECTED ON SITE (PPM)	NYS GW STANDARDS (PPM)	LEVELS IN WATER INTAKE PER DAY (PPM/DAY)	WATER CONCENTRATION FOR HUMAN EXPOSURES FOR: CONSUMPTION FISH ONLY (PPM)	CONSUMPTION WATER & FISH (PPM)
VC	4.8	2.0E-03	1.4E-01	5.20E-01	2.00E-03
T1,2-DCE	20	5.0E-03	5.7E-01	1.85E-03	3.30E-05
TCE	41	5.0E-03	1.20	8.00E-02	2.70E-03
PCE	4.0E-02	5.0E-03	1.0E-03	8.85E-03	8.00E-04
TOLUENE	170	5.0E-03	4.9	42.4	1.43

VC = VINYL CHLORIDE
T1,2-DCE = TRANS 1,2-DICHLOROETHENE
TCE = TRICHLOROETHENE
PCE = TETRACHLOROETHENE

	NON-CARCINOGENIC EFFECTS		*CARCINOGENIC EFFECTS* ORAL RSD	
	MED (PPM)	RFD. (PPM/DAY)	CPF (PPM/DAY)	WATER (PPM)
VC	228		2.3	
T1,2-DCE	189		6.0E-01	5.8E-04
TCE	9.5		1.1E-02	3.2E-03
PCE	1460	2.0E-02	5.1E-02	6.9E-03
TOLUENE	2690	3.0E-01		

MED = MINIMUM EFFECTIVE DOSE
RFD = USEPA REFERENCE DOSE VALUE
RSD = USEPA RISK SPECIFIC DOSE
CPF = USEPA CARCINOGENIC POTENCY FACTOR

EXHIBIT A

List of Documents in the Administrative Record

Groundwater Investigation Report, prepared by Groundwater Technology, Inc.(GTI), March 3, 1988, and April 19, 1988.

Phase I Investigation Report, prepared by Gibbs & Hill, Inc., June 1988.

Groundwater Investigation Report, prepared by GTI September 19, 1988.

Amended Groundwater Investigation Report, prepared by GTI, February 1, 1989.

Limited Feasibility Study Report, prepared by GTI, December 31, 1990.

Groundwater Investigation and Pre-Remedial Design Report, prepared by GTI, January 3, 1991.

Remedial System Design, prepared by GTI, February 16, 1991.

Air Sparging Technology Case Studies prepared by GTI, July 1991.

EXHIBIT B. EXERPT FROM THE REGISTRY OF INACTIVE HAZARDOUS WASTE DISPOSAL SITES

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION
INACTIVE HAZARDOUS WASTE DISPOSAL REPORT

CLASSIFICATION CODE: 2 REGION: 3 SITE CODE: 314002
EPA ID: NYD001354349

NAME OF SITE : Pawling Rubber Company
STREET ADDRESS: 157 Charles Colman Blvd.
TOWN/CITY: Pawling COUNTY: Dutchess ZIP: 12564

SITE TYPE: Open Dump- Structure- Lagoon- Landfill-X Treatment Pond-
ESTIMATED SIZE: Acres

SITE OWNER/OPERATOR INFORMATION:
CURRENT OWNER NAME....: Pawling Rubber Company
CURRENT OWNER ADDRESS.: 157 Charles Colman Blvd., Pawling, NY
OWNER(S) DURING USE...: Pawling Rubber Company
OPERATOR DURING USE...: Pawling Rubber Company
OPERATOR ADDRESS......: 157 Charles Colman Blvd., Pawling, NY
PERIOD ASSOCIATED WITH HAZARDOUS WASTE: From unknown To early 70s

SITE DESCRIPTION:
Pawling Rubber is a rubber manufacturing plant. An inactive landfill on site is covered by a paved parking lot. The property is in a wetlands area. A low area is landfilled using construction materials, blocks, boards, scrap rubber and scrap machinery. A low area adjacent to the parking lot is filled in with soil. A brook, which is piped under the parking lot and through the landfill area, joins the Swamp River running north through the wetlands along the west side of the property. A Phase I investigation is complete.
Pawling Rubber is under a consent order with the Division of Water (DOW) to complete an investigation and for remediation of the site. The company has completed the hydrogeological study of the site for the DOW, which showed that there is contamination of the surficial aquifer with perchloroethylene, trichloroethylene, and toluene. The source of these solvents is a landfill area, and a trench area, where solvents were burned in open trenches. This contamination is in excess of the NYS groundwater quality standards.
The responsible party has installed two monitoring wells in wetlands. Sampling was conducted in December 1990 which revealed groundwater standards exceeded for perchloroethylene at 37 and 25 ppb. A limited feasibility study has been completed and remedial alternatives are being considered.

HAZARDOUS WASTE DISPOSED: Confirmed-X Suspected-

TYPE	QUANTITY (units)
Perchloroethylene (F001)	Unknown
Trichloroethylene (F001)	"
Toluene (F005)	"

ANALYTICAL DATA AVAILABLE:
Air- Surface Water-X Groundwater-X Soil-X Sediment-

CONTRAVENTION OF STANDARDS:
Groundwater-X Drinking Water-X Surface Water- Air-

LEGAL ACTION:

TYPE..: State- Federal-
STATUS: Negotiation in Progress- Order Signed-

REMEDIAL ACTION:

Proposed-X Under design- In Progress- Completed-
NATURE OF ACTION: Remediation

GEOTECHNICAL INFORMATION:
SOIL TYPE: Silt and clay
GROUNDWATER DEPTH:

ASSESSMENT OF ENVIRONMENTAL PROBLEMS:

The groundwater is contaminated with chlorinated solvents. Further investigation has been conducted to determine the extent of contamination and remedial alternatives, which are being considered.

ASSESSMENT OF HEALTH PROBLEMS:

EXHIBIT C
Responsiveness Summary

The Responsiveness Summary for the April 4, 1991 public meeting on the Pawling Rubber Inactive Hazardous Waste Disposal Site (314002) is attached here and includes the following information:

1). Minutes of the public meeting with comments/ questions and responses provided during the meeting.

2). Written comments and responses provided during the public comment period.

3). Minutes of an April 23, 1991 meeting with Pawling Rubber and Pawling Village officials on the remediation project.

4). Record of activities which took place as a result of comments received at both the April 4 and April 23, 1991 meetings and during the comment period.

1. Minutes of the April 4, 1991 Public Meeting
With Comments & Responses Provided During the Meeting

MINUTES OF PUBLIC MEETING

PAWLING CORPORATION

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

April 4, 1991
7:30 pm

Village of Pawling
Village Hall - Meeting Room
3 Memorial Drive
Pawling, New York 12564

The meeting began with Roger Smith, President of Pawling Corporation, introducing the evening's speakers: Susan Thompson, Regulatory Affairs Manager at Pawling Corporation, Wendy Leonard, Senior Hydrologist, Groundwater Technology, Inc., and Michael Sykes, Project Engineer, Groundwater Technology, Inc. Roger then explained what would occur over the course of the meeting and stated that the audience should kindly refrain from asking questions until after all of the speakers were through.

Susan Thompson then took the floor to explain the history of Pawling Corporation and to detail the events that led up to tonight's meeting. The Corporation has been located at 157 Charles Coleman Boulevard in the Village of Pawling since 1946, producing rubber, silicone, and plastic products. The 21.5 acre site includes wetlands with Swamp River running through the property. Pawling Corporation was the sixth occupant of the building and, in 1984, Pawling Rubber Corporation changed it's name to Pawling Corporation to reflect the diverse materials the corporation was producing.

In 1987, the Village of Pawling found it necessary to construct a new well, with Corbin Road being the site for that new well. The well was installed, but the Department of Health needed to perform a series of tests before the water could be deemed safe to drink. During this testing process, they discovered chlorine solvents present in the water. The NYSDEC was brought in to determine the source of contamination. Pawling Corporation was first on the list to check as a source of contamination, although several other places were also investigated. The source of contamination was found not to be from our storm drain.

On February 24, 1988, a consent was signed by the NYSDEC mandating Phase 1 of a groundwater investigation. At this time, Pawling Corporation retained the services of Groundwater Technology, Inc., in an effort to satisfy the conditions of the consent order. The overall objectives of the groundwater investigation were to delineate the concentration and extent of any metal or solvent contamination in the groundwater, to evaluate the pathways of groundwater flow, to determine if any upgradient sources were impacting the groundwater at Pawling Corporation, and to provide information which would be required for a design of a site remediation system, if necessary.

The overall work scope designed to achieve these objectives consisted etc., then they will begin drilling, pipe installation, construction of required buildings and, finally, installation of the pumping system. Once this is all completed, the solvent system, air stripper, and solvent recovery system would be installed. When the entire process passes the final inspection, the system can be started up; this will probably occur in the middle of August 1991. The system is designed to discontinue operation if anything goes wrong anywhere in the system. If this were to occur, representatives from Pawling Corporation and/or Groundwater Technology, Inc., would be immediately notified.

Sue Thompson then opened the floor to questions from the audience. Jeff Asher began by asking what exactly was meant by the term "contaminates" and which solvents we were specifically concerned with. Sue answered that the predominate solvents found were toluene and trichloroethylene. Jeff then asked if any benzyme was found and Sue informed him that Pawling Corporation had tested for it and none was found. Jeff then asked why the "no action" alternative was not chosen since the Corporation was not yet mandated to correct this problem. Sue's response was that since Pawling Corporation is aware, their objective is to clean it up so that future generations are not affected by it.

Luther Jackson then suggested that routine public meetings be arranged in order to keep everyone abreast of the progress of this intense and complicated process. Sue stated that this is definitely possible and she had already been speaking to the Mayor about this. She added that the goal of Pawling Corporation was to keep all channels of communication open.

Rita Asher commented that the newspaper stated that this entire cleanup process was going to take ten years to complete itself. Her question was what did Pawling Corporation anticipate as their drop-off levels in this time? Wendy Leonard answered this by first stating that she was not aware of where the ten year time frame came from, but that the process should take about five years, according to the NYSDEC. She also reminded everyone that this figure was an approximate one in that Pawling Corporation wanted to avoid giving anyone false hopes. Wendy added that quarterly reports would be sent to the state and that they would be available to the public.

A concerned resident then brought up the possibility of how this entire process would affect residents of the Village of Pawling. The resident stated that the Village had been having quite a few problems and, in his opinion, this was driving the Village into the ground. He also commented that the well-being of the Village and it's residents relied heavily upon Pawling Corporation as a source of employment. He expressed his concern about the cost of this cleanup, however, Roger quickly informed him that the entire cost would be paid for by Pawling Corporation, not the village.

Next, a woman asked what would happen to the bedrock throughout this process. Sue commented that if we are aggressively cleaning the overburden, this will force some of the water into the bedrock. Wendy then added that the bedrock water is actually coming up and discharging into the stream. Roger then added that testing will be done on the bedrock and it may be possible that we will have to drill down into the bedrock after Phase I.

John Lappas stood and commented that Pawling Corporation recognized this problem, "took the bull by the horns" and is to be commended on the action they are taking without being mandated to do so.

Another village resident then questioned the possibility of making all information regarding the cleanup process available to our school children. Roger exclaimed that he would be happy to do this and that anyone interested should contact Sue Thompson.

Mark Chipkin stated that he, too, wanted to commend Pawling Corporation for taking action before a consent order was issued. The first request he had was clarification regarding a newspaper article that claimed that the village was testing its wells, but was not finding solvents. He wanted to know why the third well was pulled and Sue explained that we were not sure of the direction of the groundwater flow in the cracks. Normally, the flow goes into the stream and this means we are responsible. However, sometimes the flow can go into a North/Northwest direction. Little is known about the flow direction, therefore, we cannot determine this.

Mark then asked if we weren't using this well because solvents were found, but Roger explained to him that he would have to ask the village officials about this.

Mark stated that he was still concerned about the other two wells and wanted to know if the NYSDEC had checked them for the same contaminants. A man from the audience answered "yes" they had been checked.

The next step, Wendy explained, was to begin evaluating the many different remedies that could be used. All alternatives were given careful thought and investigative research and only two (2) seemed possible and acceptable based on their short term and long term effectiveness, implementability, cost, state and community acceptance, and overall security of health and environment.

The Air Sparging/Vent System is the preferred remedial alternative by the NYSDEC and Pawling Corporation. This procedure begins with an air stripper being used to remove the VOCS from the groundwater in the well field. The air stripper is a 12-stage diffused air bubble aeration system. The solvents would rather be in the air bubble, thereby, stripping the VOCS from the water and transporting them into a solvent recovery system. The next step is to pipe the discharged water from the air stripper through two (2) liquid phase carbon units as a treatment backup.

Next, sparge points are installed in the contaminated area that inject air into the ground to enhance volatilization of the VOCS from the groundwater and soils below the groundwater table. Air is then bubbled into the groundwater and this acts as a stripping device because it takes the VOCS out of the groundwater. The injected air also acts as an oxygen source for the microbial population associated with the groundwater. This helps to speed up the natural biodegradation process.

The soil vent system then draws all the soil gases from the pore spaces above the surficial water table and feeds the air through a solvent recovery system so that the organics in the air stream are absorbed. This still leaves us with VOCS present in the two remedial air streams created by the air stripper and the soil vent. To remove them, an automatic solvent recovery system must be installed and this unit is 95% effective in removing the VOCS (this percentage does meet the states limits). The VOCS are then condensed to liquid form and stored in two 55 gallon drums until they are packaged and sent to the treatment area. The solvent potentially will be recycled by Pawling Corporation and any unrecycled solvent will be transported to a permitted incineration facility.

It was then explained to the audience that this alternative is preferred and accepted by the NYSDEC and Pawling Corporation, with implementation beginning in June of 1991. After tonight's meeting, Pawling Corporation will begin to obtain building plans, building permits, of a site inspection, aerial photo review, background data review, soil borings, soil sample analysis, soil gas survey, installation of groundwater monitoring wells in both overburden and bedrock, groundwater gauging and sampling, overburden and bedrock pumping tests, and steam water and sediment sampling.

Phase 1 of the investigation included the installation of well couplets installed next to each other. Initially, Sue explained, we had three (3) well couplets. During the investigation, however, we found that the water flowed North and Northwest, therefore, only two (2) couplets were necessary. In the Northern area, we discovered the contamination. Lead was found down below, but it was below the background levels and the NYSDEC agreed that no further action would be taken against Pawling Corporation regarding this matter.

The results of these investigations found groundwater containing dissolved concentrations of volatile organic compounds (VOCS) towards the north end of the parking lot. This was a result of burning solvent waste in the late 1960's when there were no regulations regarding disposal of waste. Lead was detected above groundwater drinking limits in an upgradient well which suggested that there was a high background level or that an off-site source contributed to the lead levels in the groundwater. For this reason, further remedial investigation concerning lead was discontinued.

Pawling Corporation took the initiative prior to a consent order mandating initiation of a Remedial Investigation/Feasibility Study so that the environment would not be further jeopardized. Although, as mentioned above, this procedure is not mandated by the NYSDEC, all work is being done under their guidance and approval.

What the Remedial Investigation found is that Pawling Corporation has a plume of contaminated water that feeds into Swamp River. This plume is from the overburden and bedrock. Wendy Leonard, Senior Hydrologist for Groundwater Technology, Inc., began by explaining that the company's goal was to select the best remedy and be able to explain it to the citizens of Pawling so they would be able to understand the process and results.

The first objective was to determine what impacted medias had been affected. It was found that the soil and groundwater had definitely been affected and the possibility of air contamination also needed to be considered.

Mark then directed a question for Keith Brown, NYSDEC representative. Mark voiced his concern about the homes in the area and wanted to know if Pawling Corporation had been checking individual wells. He felt that if there were cracks, the contamination could leak into homeowners wells and this was a health concern. Keith stated that the NYSDEC does not handle the water quality because it simply is not their expertise. He explained that it would have to be the local Health Department's responsibility to test the wells and that they had already been contacted regarding this. Mark then reiterated the importance of the public knowing to have their water checked as soon as possible.

Mark's next concern was with reference to the waterlands and not be able to test them as it would affect the vegetation in the area. He explained that he, too, wanted to protect the waterlands, but asked Pawling Corporation to please consider a way of testing safely, as children play their routinely.

Mark then wanted to know what the acceptable level of toluene was. Sue stated that she was not sure, and although toluene is not cancer-causing, it can kill you. Mark then questioned the acceptable level of chlorinated substances and Sue explained that she would have to get back to him regarding the answer.

Sandor Deak then wanted to know if Swamp River was connected to the New York Water System and Sue informed him that it was not. He then expressed his concern about not being involved in the decisions that Pawling Corporation was making, but Sue explained that we have a Draft Citizen Participation Plan, which includes phone numbers and addresses so that citizens can contact knowledgeable people regarding questions they may have.

Sandor also expressed his concern that maybe Pawling Corporation was trying to take a less expensive route. Roger informed him that the corporation had already spent $300,000 on this investigation so far, and that they would probably spent another $400,000 capital, in addition to the cost of monitoring the project (approximately $84,000 for five years).

The meeting was brought to an end with a man from the audience thanking Pawling Corporation and all of the evening's speakers for making their expertise available to the public and answering the publics questions.

RECEIVED
MAY 6 1991
NYS - DEC
REGION 3-NEW PALTZ

May 1, 1991

Sandor Kopecsi-Derk
RFD #1, Box 642
Pawling, N.Y. 12564
Phone: 914-855-9342

Mr. Keith Browne
Environmental Engineer
Region 3
New York State Environmental Conservation
21 South Putt Corners Road
New Paltz, New York 12461-1696

~~Re: Suggestions of Remedies after Public Hearing in Pawling~~

Dear Mr. Browne,

Regarding the public-hearing held about the
[illegible]inated grounds, swamps and groundwater supply
Village and Town of Pawling, I respectfully submit
suggestions about the problems to be solved as far as
[illegible] them:

1) Set up a Pollution Committee of equal numbers of
[illegible]sentatives of the 1) Village 2) of the Town of Pawling
[illegible]the DEC 4) the Pawling Corporation and 5) The Greater
[illegible]ork Water System to direct and monitor the remedial
of the contaminated areas.

2) Pawling Corporation being named the main ~~[illegible]~~

source of pollution please decide if it was negligent in causing and remedying the contamination. The fact of contamination was known for years and years.

3) Please decide what are the resources profits etc. of Pawling Corporation and what parts of these should use Pawling Corporation to remedy the damage it did to the Pawling area and possibly to the Greater New York Water System

4) Set up a timetable for the remedial efforts being planned and the goals of each stage.

5) Investigate if there are any health impairment of people who lived or are living in the contaminated areas.

6) There are several houses in the contaminated area which are known as not connected to the central water system (168-170 Charles Colman Blvd) Compell the Village of Pawling to set up and provide a definite and certified record of those houses which are connected and those which are not connected to the central water system, in contrast to the existing lawful instructi Prosecute the officials who neglected their duties. Do the same about the contaminated areas of the Town of Pawling.

7) Recompensate the Village of Pawling for one and possibly two waterwells which were dug, paid for and abandoned by the village in the polluted

area.

Decide what would be the long term effects for Pawling, if Pawling Corporation would be compelled to leave the Pawling area.

Thanking you, I am,

Sincerely yours,

Sandor Kopecsi-Deak
taxpayer

New York State Department of Environmental Conservation
Region 3
21 South Putt Corners Road
New Paltz, NY 12561-1696
914-255-5453

Thomas C. Jorling
Commissioner

May 13, 1991

MR SANDOR KOPEOCI-DEAK
RFD #1, BOX 642
PAWLING NY 12569

RE: Pawling Rubber
Site NO.: 314002

Dear Mr. Kopeoci-Deak:

Thank you for your letter of May 1, 1991 on the proposed remedial project at Pawling Corporation. The Department appreciates your comments.

The following are the responses to your suggestions:

1. The purpose of the April 4, 1991 Informational Meeting at the Village Hall, was to inform all concerned parties of the situation at the Pawling Corporation site. The Department and the New York State Department of Health will be directing and monitoring the remedial project. Comments received from concerned parties will be incorporated into the work plan as appropriate.

2. Pawling Corporation has assumed the responsibility of remediating the contamination associated with their former operating practices.

3. The same as 2.

4. The Department has established clean-up goals and a time table for remediation. The clean-up goals are the New York State Groundwater Standards. The Pawling Corporation was given a timeframe of five years to meet the clean-up goals.

5. The route of exposure which could effect residents from the site is groundwater. The County and New York Departments of Health have been requested to monitor local drinking water supplies.

6. There is only one home on Charles Colman Boulevard which is using a private well. All others are connected to the central water system. The New York State Department of Health will conduct a door by door

S. Kopeoci-Deak
May 13, 1991
Page two

survey of the area to verify residents water source and collect water samples if necessary.

7. This issue is between the Village of Pawling and the Pawling Corporation.

If you want any additional information or would like to submit any additional comments, please contact me at (914) 255-5453.

Thank you for your cooperation in this matter.

Sincerely,

Keith Browne

Keith Browne
Environmental Engineer
Region 3

KB/di

cc: E. O'Dell

3. Minutes of an April 23, 1991 Meeting with Pawling Corporation and Pawling Village Officials

Meeting
Pawling Corporation Groundwater
Remediation Project

April 23, 1991

Present:	Earl M. Slocum	Village Official
	John T. Lappas	Village Official
	Bart Clark	Slayton Engineer
	Michael Keupp	Village Official
	Ron Gainer	Slayton Engineer
	Traci Perlman	Pawling Corporation
	Susan R. Thompson	Pawling Corporation

Update: Pawling Corporation

In response to comments made during the April 4, 1991, Public Meeting, Susan Thompson reported that three main concerns have been addressed.

Ms. Reed Asher had suggested an educational program be developed for local school children. Pawling Corporation has contacted the Pawling grade school, high school, and Trinity Pawling. Preliminary arrangements have been made with both the grade school and Trinity Pawling. Ms. Boka, Pawling High School, will be called again.

A suggestion to establish a repository in the Town Hall was made by Mr. Jim Tanner. All reports regarding Pawling Corporation have been copied and left at the Town Hall for citizen review.

Mr. Mark Chipkin was concerned that local residents might be on private wells and thus were in danger. Groundwater Technology, an engineering firm retained by Pawling Corporation, did an extensive search early in the investigation to determine if there were private wells in the immediate vicinity. Their findings concluded that local residents were on municipal water supply. In order to confirm this information, a questionnaire was mailed to those in the immediate area to confirm GTI's findings. To date, 13 questionnaires have been sent. Pawling Corporation has received 9 responses, all confirming the use of municipal water supply.

Update: Department of Environmental Conservation

Several "new players" have been identified at the Department of Environmental Conservation. These divisions now have expressed interest in the project. This may change the timetable which was proposed by Pawling Corporation because of the evaluation time required by these departments. Pawling Corporation has requested a contact list from Mr. Keith Browne, DEC project manager, so that all may be informed in a timely fashion and delays, hopefully, will be minimal.

The April 10, 1991, correspondence from Keith Browne was discussed and is attached. Response to the letter was discussed at the meeting. A written response will be sent to Mr. Browne and copies sent to Mr. Keupp.

Groundwater Remediation Project Overview

Pawling Corporation discussed briefly the proposed site remediation measures.

Questions

Mayor Slocum asked about the possibility of Pawling Corporation testing the abandoned well on Corbin Road. Although studies to date have focused on the area of contamination, flow pattern of the waters below, and measures to clean up the site, future studies may include testing the Corbin Road well and installing additional overburden wells on the opposite side of the Swamp River. The village agreed to assist in whatever way possible. Pawling Corporation will contact Groundwater Technology and request that a sampling program be prepared for the overburden well on Corbin Road. All collected information will be forwarded to both the DEC and Mr. Keupp for evaluation.

The future water supply needs of the village were discussed. Ron Gainer agreed that the village had drilled a new well on Reservoir Road, however, the well failed to yield the amount of water which had been expected. The village will look at either using the Corbin Road abandoned well or search for alternative sites to supply the Village's water supply needs.

Well Log Data for the Corbin Road shallow well was obtained several years ago from the Dutchess County Health Department by Pawling Corporation (enclosed). It was noted that although monitoring wells are known to exist at the site, no information can be found regarding studies which may have been done. The Village agreed to share any information that they have and Pawling Corporation will do the same.

The goals of the Village and Pawling Corporation seem to be identical: the health and safety of all in the Town and Village of Pawling as well as the protection of the environment. The meeting ended with all agreeing to continue the open lines of communication which currently exist.

4. Record of Follow-up Activities

Pawling Corporation carried out several additional citizen participation activities as a follow-up on comments received during the public comment period. The following record is a list of the comments provided to Pawling Corporation and the activities which took place in response.

Q - Could a document repository be established in the Town Hall?

R - A repository has been established in the Pawling Town Hall. The repository contains the Administrative Record for the project.

Q - Could Pawling provide information regarding the clean-up process to area schools?

R - An educational program has been developed which will be presented to the grade school, the high school and Trinity Pawling.

Q - Are all residents who are potentially affected by the site connected to the municipal water system?

R - Although an earlier study suggested that the local residents were on municipal water supply, Pawling Corporation conducted a written survey of 29 residences. The results of the survey, confirmed by village records, indicate one resident on a private water system with the remaining 28 on a municipal system.

The New York State Department of Health (NYSDOH), in conjunction with Pawling Corporation, sampled the residence with a private water supply. No contamination was detected.

Q - Mayor Slocum asked if Pawling Corporation could test the abandoned well on Corbin Road.

R - Pawling Corporation prepared and conducted a sampling program for the overburden well on Corbin Road.

GROUNDWATER AND SOIL REMEDIAL SYSTEM
START UP AND FIRST QUARTERLY REPORT
(MARCH THROUGH JUNE - 1992)
PAWLING CORPORATION
157 CHARLES COLMAN BLVD.
PAWLING, NEW YORK

August 26, 1992

Submitted to:

Ms. Susan R. Thompson
Regulatory Affairs Manager
Pawling Corporation
157 Charles Colman Blvd.
Pawling, New York 12564-1188

1st report after start of system

49rep/Pawling\51046W85.Rem

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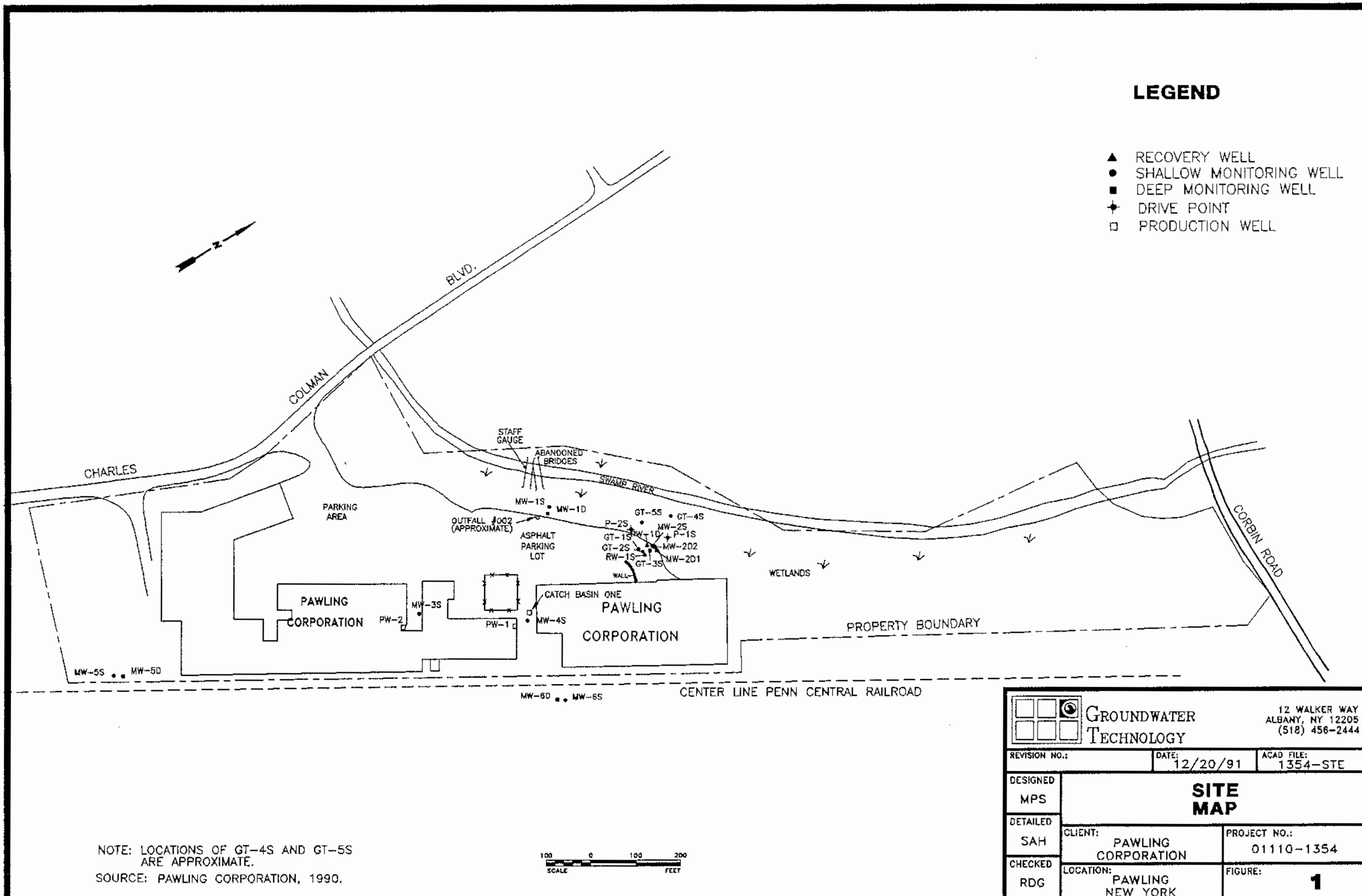
APPENDICES

1.0 INTRODUCTION

The Pawling Corporation site located in Pawling, New York is on the New York State Inactive Hazardous Waste list specified as a Class 2 (Figure 1). A remedial plan was outlined and submitted to the New York State Department of Environmental Conservation (NYS DEC) entitled "Work Plan for Subsurface Remedial Design and Implementation, Pawling Corporation", dated May 25, 1989. The work plan was approved by the NYS DEC Division of Hazardous Waste Remediation prior to initiation.

The results of this work plan were utilized to select and design a remedial system for this site. An engineering report, "Remedial System Design, Pawling Corporation", dated February 26, 1991, was prepared and submitted to the NYS DEC for approval prior to system installation. The design report was approved on June 17, 1991. The approved system consisted of groundwater extraction wells, air stripper and liquid phase carbon water treatment, air sparging, soil vapor extraction and vapor phase carbon off-gas treatment.

This status report details the pilot test results, baseline conditions, remedial system installation and first quarter operational information for the soil, air and groundwater treatment systems installed at this site.


LEGEND
RECOVERY WELL
SHALLOW MONITORING WELL
DEEP MONITORING WELL
DRIVE POINT
PRODUCTION WELL
N
CHARLES
COLMAN
BLVD.
CORBIN ROAD
STAFF GAUGE
ABANDONED BRIDGES
SWAMP RIVER
PARKING AREA
OUTFALL #002 (APPROXIMATE)
ASPHALT PARKING LOT
MW-1S
MW-1D
GT-5S
GT-4S
P-2S
MW-2S
GT-1S
RW-1D
P-1S
GT-2S
MW-2D2
RW-1S
MW-2D1
GT-3S
WALL
WETLANDS
CATCH BASIN ONE
PAWLING CORPORATION
MW-3S
PW-2
PW-1
MW-4S
PAWLING CORPORATION
PROPERTY BOUNDARY
MW-5S
MW-5D
MW-6D
MW-6S
CENTER LINE PENN CENTRAL RAILROAD
NOTE: LOCATIONS OF GT-4S AND GT-5S ARE APPROXIMATE.
SOURCE: PAWLING CORPORATION, 1990.
100 0 100 200
SCALE FEET
GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444
REVISION NO.:
DATE: 12/20/91
ACAD FILE: 1354-STE
DESIGNED MPS
DETAILED SAH
CHECKED RDG
SITE MAP
CLIENT: PAWLING CORPORATION
PROJECT NO.: 01110-1354
LOCATION: PAWLING NEW YORK
FIGURE: 1

2.0 REMEDIAL SYSTEM PILOT TESTS

Air sparging and soil vapor extraction (SVE) pilot testing was performed prior to system installation in order to correctly locate the sparge and vent points and to determine the required equipment specifications for air flow, vacuum and pressure. Groundwater pump testing had previously been performed and the results are documented in the "Groundwater Investigation Pre-remedial Design Report, Pawling Corporation", dated January 3, 1991.

2.1 Test Protocol

The pilot testing consisted of three components: a vent test, a sparge test and a combined sparge/vent test. The vent and sparge tests were performed first to define the individual equipment specifications and to determine the most effective operational conditions of these systems. The combined test documented actual field response to the selected pressure and vacuum to verify the predicted response. Each of these tests are described below.

2.1.1 Soil Vapor Extraction Test

The SVE test was performed by attaching a soil vacuum blower to the pilot test vent well (GT-2S) and running the test at three vacuum settings, 21, 35 and 44 inches of water and 34, 38, and 41 cfm, respectively. Each vacuum setting was a phase of the test which defined a ROI and an off-gas Volatile Organic Compound (VOC) concentration. These data allowed selection of the vacuum which provided maximum radius of influence and proper blower sizing. Each phase was run until stabilization occurred.

2.1.2 Air Sparge Test

The air sparge test was performed by connecting a compressed air line to the top of a newly installed sparge point (SP-1). Section 3.2 describes the construction details of the sparge point. The test was performed at three pressures, 4 psi, 5 psi and 8 psi (10%, 40% and 115% over the pressure needed for the air to overcome the 8.5 foot water column). All points were monitored for pressure and VOCs. Dissolved oxygen (DO) and depth to water (DTW) were recorded in the monitoring wells at the end of each pressure setting as removal of the pressure caps interfered with the pressure readings. Each pressure test was until stabilization occurred. The induced responses to various air flows allowed for the selection of an air flow which provided the greatest radius of influence without over-pressurization.

2.1.3 Air Sparge/Soil Vapor Extraction Test

The last phase of pilot testing was implementation of a combination air sparge/SVE test. This test was conducted to record field response under actual operating conditions and to ensure that the responses obtained from the individual SVE and air sparging tests matched the combined response test. The combination test was run at 8 psi and 42 inches of vacuum, which were the maximum levels recorded during the SVE and sparge tests. The objective of this test was to ensure that a net vacuum could be monitored across the site under maximum operating conditions so that all sparge vapors were contained.

2.1.4 Monitoring Network

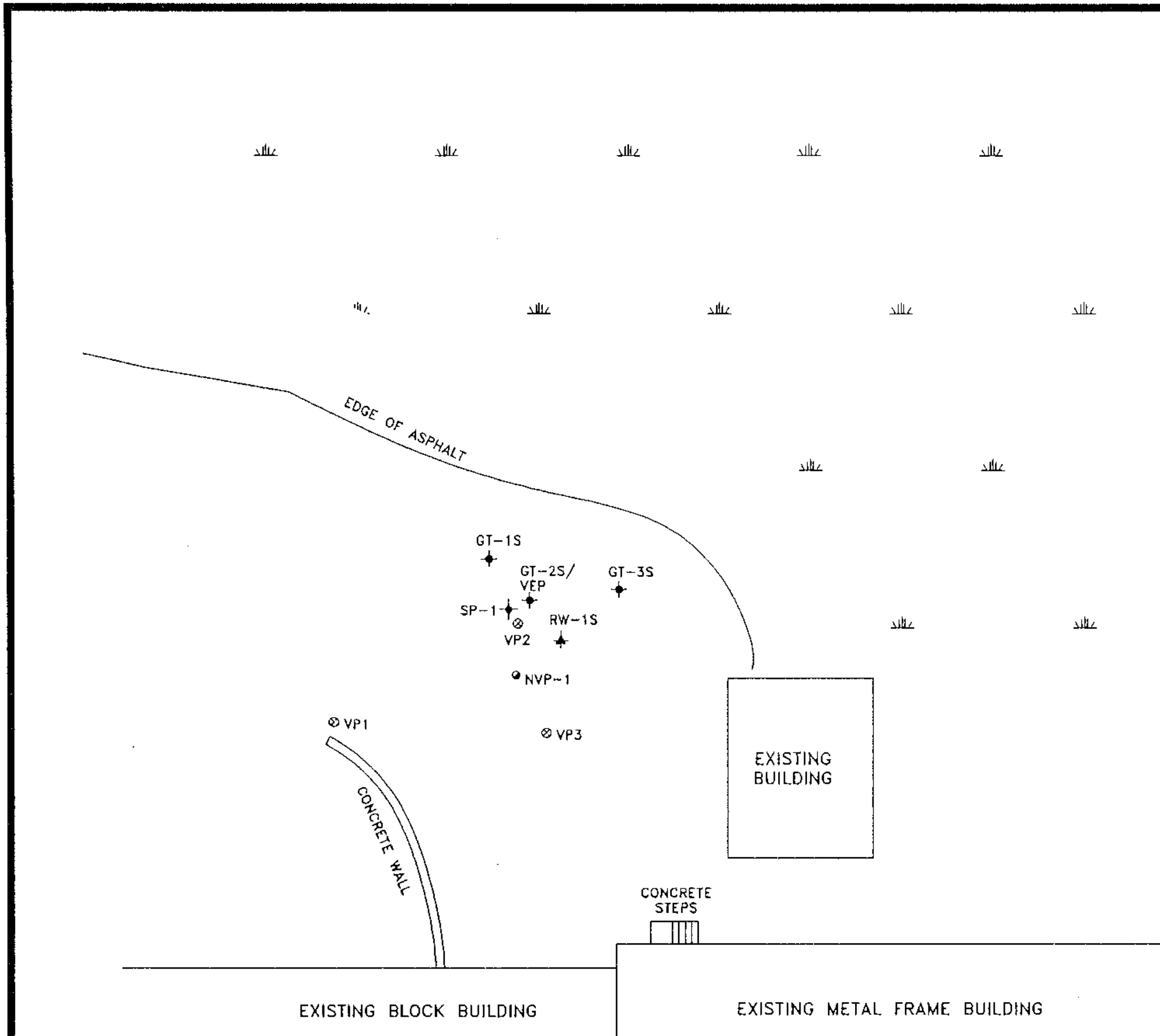
The monitoring network utilized for the pilot tests consisted of five existing monitor wells, a nested probe screened at two intervals in the unsaturated zone, and three 0.25 inch stainless steel probes manually installed to a depth of 3 feet.

Monitoring points were selected to provide multi-directional data at varying distances from the test well. The distances were chosen based upon prior knowledge of soil permeability values, as the radius of influence is directly related to permeability. Additionally, monitoring points were installed to provide information concerning potential vertical difference in response both in the unsaturated and saturated zones. Figure 2 shows the layout of the pilot test monitoring array.

2.2 Soil Vapor Extraction Test Results

Vacuum in the subsurface generally decreases exponentially with distance. To calculate an effective radius of influence and to determine anisotropic response, the natural log (ln) of the vacuum was plotted versus distance. Linear regression was performed to determine the best fit lines and to evaluate correlation coefficients with different data sets to assist in defining anisotrophy in the subsurface at the site. Table 1 depicts the results of the linear regression.

The data for this site indicated that a point at 14.5 feet exhibited an anomalous reading, therefore this point was eliminated from subsequent analysis. Figure 3 also shows the determined best fit lines and the determined ROI for each vacuum setting. A vacuum of 0.1 inches of water was selected to define a significant response (ROI).



GROUNDWATER TECHNOLOGY		12 WALKER WAY ALBANY, NY 12205 (518) 456-2444
REVISION NO.:	DATE: 4/24/92	ACAD FILE: WL-7
DESIGNED	**PILOT TEST LAYOUT 9/10/91**	
DETAILED MET	CLIENT:	PROJECT NO.:
CHECKED WL	LOCATION: NEW YORK	FIGURE: **2**

TABLE 1

LINEAR REGRESSION CORRELATION COEFFICIENTS

Vacuum	All data points	Without 14.5 foot point
21"	0.62	0.92
35"	0.87	0.97
44"	0.88	0.95

The determined ROI for each vacuum was plotted versus each vacuum setting to select the vacuum above which not greater ROI was observed. The maximum ROI obtained was 27 feet at 35 inches of water vacuum (Figure 3). VOC effluent concentrations at each vacuum setting were also evaluated. The vacuum which produced the highest effluent VOC concentration was selected for the design. This value also correlated with the most effective vacuum ROI. Figure 3 shows these results. The pilot test results indicated that the design parameters for this site should be a vacuum of 35 inches of water at 38 cfm air flow per point.

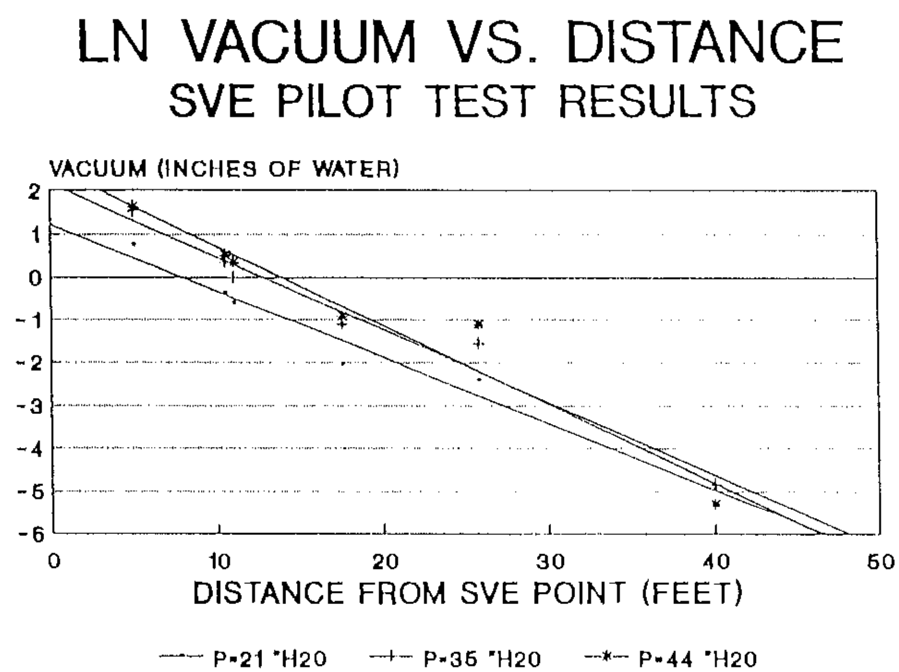
The data was further evaluated through use of a Groundwater Technology, Inc. developed air flow model which utilized the pilot test vacuum versus distance results and calculated the area through which sufficient air could be drawn to remove a selected percentage of the contaminants over a desired time period. This model determined that for an anticipated removal rate for tetrachloroethylene of 99% and 365 days of operation the design spacing for the vent points at this site was 20 feet. The air flow model provides a more conservative ROI and therefore this distance was utilized for system design.

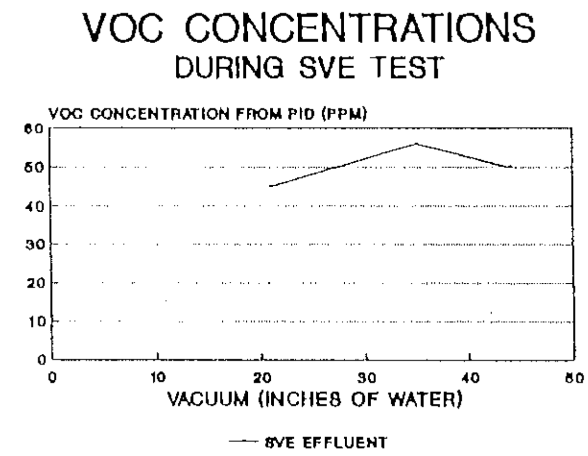
2.3 Air Sparge Test Results

The air sparge test ROI was evaluated through several parameters:

- observed distance indicating increased dissolved oxygen
- observed distance indicating rising water elevations
- observed distance indicating increased VOC concentrations
- observed distance indicating pressure response.

A pressure versus distance graph was evaluated to select the pressure which provided the maximum ROI without over pressurization (Figure 4). The determined ROIs were 11.5, 15 and 16 feet for 4, 5 and





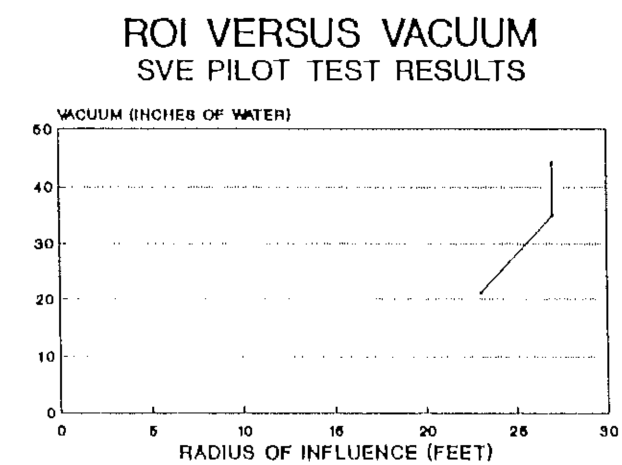


Figure 3

SVE PILOT TEST RESULTS

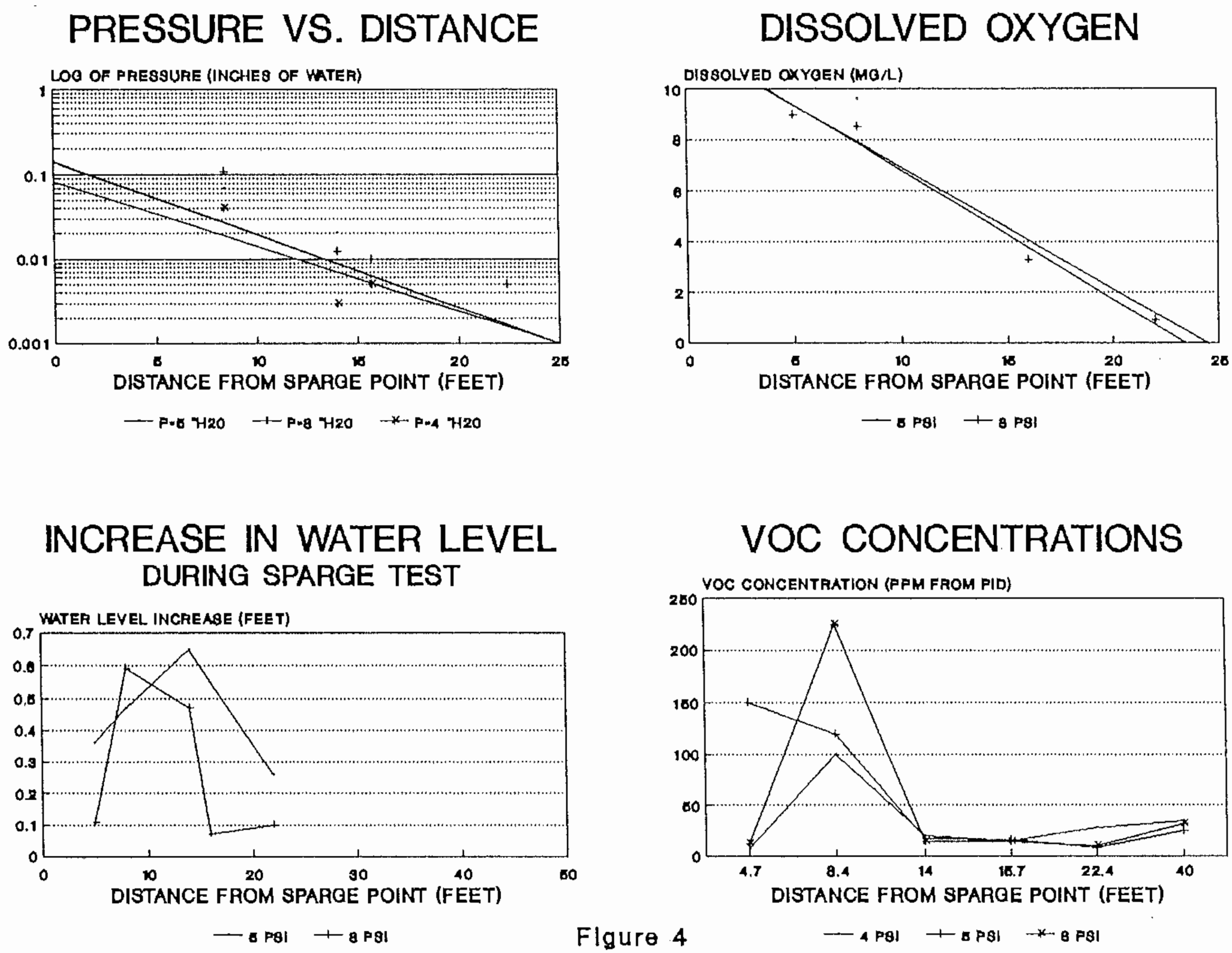


Figure 4
AIR SPARGING PILOT TEST RESULTS

8 psi, respectively. The ROI for each test pressure was plotted to select the pressure above which no increase in radius of response was observed (Figure 5). The determined ROI was 16 feet at the maximum pressure of 8 psi.

The graphs of the other test parameters were compared to the pressure response (Figure 4). Table 2 shows the determined ROI for each of these parameters. VOC and pressure increases indicate the lowest ROI at 14-16 feet. The ROI exhibited by DO and groundwater increases during the air sparge pilot test was 22 feet.

TABLE 2

AIR SPARGE RADIUS OF INFLUENCE DETERMINATION

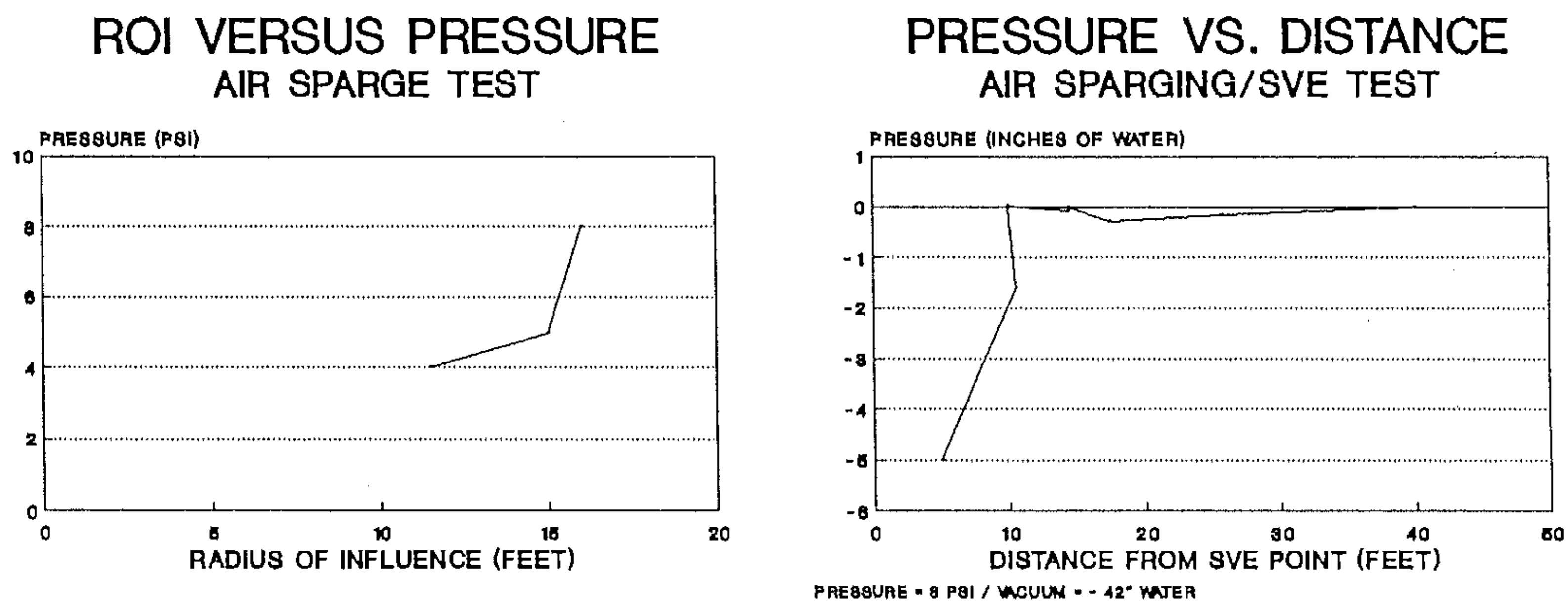
PARAMETER	MAXIMUM RADIUS OF INFLUENCE (FEET)
Pressure Response	16
Dissolved Oxygen	22
Increase in Water Level	22
Increase in VOCs	14

2.4 Air Sparge/Soil Vapor Extraction Test Results

The air sparge/SVE test determined that net vacuum was maintained at 35 feet from the SVE point. The results are shown in Figure 5. These data document the capture of the air sparge off-gases within the design SVE ROI of 20 feet.

Figure 5

AIR SPARGE ROI AND AIR SPARGE/SVE RESULTS



3.0 FINAL SYSTEM CONFIGURATION

3.1 System Overview

The final system layout and selected equipment, as determined through the pilot testing, are shown in Figure 6 and Table 3. The system consists of four major components: 1) groundwater extraction through overburden pumping wells and treatment through air stripper and carbon polish, 2) unsaturated soil treatment through a soil vapor extraction system, 3) saturated soil treatment through an air sparge system, and 4) off-gas treatment through vapor phase carbon. A description of the remedial point construction and each component of the remedial system are presented in the following sections.

TABLE 3

SYSTEM LAYOUT AND FINAL SYSTEM SPECIFICATIONS

ORIGINAL DESIGN LAYOUT	FINAL LAYOUT
8 SVE Points 5 Air Sparge Points 3 Recovery Wells	1 Air Sparge/SVE Point 1 Air Sparge Point 6 SVE Points 2 Overburden Recovery Wells 1 Bedrock Recovery Well (not operational in this phase)

FINAL SYSTEM DESIGN SPECIFICATIONS	EQUIPMENT
SVE - 175 scfm @ 35" vacuum (based on total ROI of 7 SVE points)	5 Hp, 460 Volt, Regenerative Blower 210 scfm @35" vacuum 2-30 gallon moisture separators 2 - 1,800 lb vapor paks
AIR SPARGE - 24 scfm @ 8-10 psi (12 scfm per point)	15 Hp, 460 Volt, 52 scfm @ 100 psi (28 scfm for pumping system) Air dryer Timer
GROUNDWATER RECOVERY - 2 wells @ 2 gpm (overburden recovery only)	2 - 1.5' long 4-gallon ejectors 2 - ejector controllers 2 - water meters
GROUNDWATER TREATMENT - 99%+ Removal of Organics 4 gpm	1 - ESI© 7 tray air stripper 2 - Hadley© 200 lb liquid phase carbon absorbers → 2 ~~Pre~~ 10 micron Pre Filters
OVERRIDE PROTECTION	Programmable controller

As shown in Table 3, the final system configuration was slightly different than the design layout due to subsurface variations. Site hydrogeologic conditions and saturated and unsaturated contamination identified during remedial installation were utilized to appropriately modify the design layout. During the air sparge and SVE point installation, the saturated thickness was determined to be less than the design thickness, and two small for effective air sparging. The number of air sparge points installed was therefore less than the original estimate. Additionally, the third recovery well was not installed due to lack of an overburden water table at this location.

The final monitor point system consisted of:

- one sparge point (SP-1)
- one combined sparge/soil vent point (SV-1)
- six vapor extraction points (VP-1 through VP-5) plus one existing monitor well (GT-2S/VP-6)
- two overburden recovery wells (RW-1S and RW-2S)
- one bedrock recovery well (RW-1D) (presently not a pumping well)

Monitor points were also installed to monitor the effectiveness of the remedial system. The points installed consisted of two monitor wells (GT-6S and GT-7S) and one nested vapor probe (NVP-1).

3.2 Remedial and Monitor Point Construction

During the period from September 9 through 19, 1991, a Mobile B-61 hollow stem auger drill rig with split spoon sampling capabilities was utilized to install the remedial points. Additionally, an air rotary technique was utilized at selected locations where auger refusals were encountered due to the presence of boulders. Monitoring wells and vapor extraction points were constructed of two-inch diameter, PVC screen and riser with flush-threaded joints. Sparge points were constructed of two-inch diameter FRP screen and riser, with flush-threaded joints. The overburden recovery wells were constructed of six-inch diameter stainless steel screen and riser. Well construction details are summarized in Table 4. The complete well logs are included in Appendix A.

Split spoon soil samples were collected at the locations believed to contain elevated levels of volatile organic compounds, as delineated during the previous phases of investigation. Split spoon soil samples were screened in the field using a Photoionization Detector (PID - HNU with a 11.7 ev lamp) and one soil sample from each drilling location was sent to the laboratory for analysis according to the EPA Method 8240. Section 4.3 details the soil sampling results.

TABLE 4

REMEDIAL AND MONITOR POINT CONSTRUCTION DETAIL

WELL ID	TOTAL DEPTH (FT BELOW GRADE)	WELL MATERIAL	DIAMETER (INCH)	SCREENED INTERVAL (FT BELOW GRADE)
RW-1S	14	ST. STEEL	6	6-14
RW-2S	12	ST. STEEL	6	2-12
RW-1D	42	CARBON STEEL	6	28-42
SP-1	16.3	FRP	2	14.3-16.3
SV-1	13.5	FRP - SP PVC - VEP	2	12-13 3-9.5
VEP-1	13	PVC	2	3-13
VEP-2	14	PVC	2	3-14
VEP-3	7	PVC	2	2-7
VEP-4	12	PVC	2	2-12
VEP-5	5.3	PVC	2	2.3-5.3
GT-6S	16	PVC	2	3-16
GT-7S	12.2	PVC	2	2.2-12.2
NVP-1	9	PVC	2	5-9 2-4

KEY:
PVC - Polyvinyl Chloride
FRP - Fiber Reinforced Plastic
SP - Sparge Point
VEP - Vapor Extraction Point
NVP - Nested Vapor Point

3.3 Groundwater Extraction System

An Ejector System® multiple well pneumatic pumping system with U-3000 controllers and WETB 5" by 18" long ejectors was deployed to recover groundwater from two recovery wells on site (RW-1S and RW-2S). The system is powered and controlled by compressed air, and has the following components:

- Air-operated ejector vessels
- Bellows liquid level control
- Pneumatic control panel
- In line flow meters

The system is designed to recover approximately 2 gallons per minute (gpm) from each of the recovery wells. The system will consume approximately 11 cubic feet of air a minute (cfm) at a pressure of 25 pounds per square inch (psi).

Air-operated ejector vessels:

Each well contains an ejector vessel. The ejector vessel is a cylindrical hollow pressure vessel with two inlet and one discharge check valves. The ejector vessel is constructed of carbon steel and the valves are constructed of 304 stainless steel. The ejector is located in the well at a depth of approximately 8 feet below grade.

The ejector has two operating cycles, fill and discharge. The fill cycle occurs without any pressure on the vessel. This allows the vessel to gravity fill. When the vessel is full the vessel is pressurized by the air line and the water in the vessel is forced up through the discharge check valve into the discharge line. At the end of the discharge cycle the vessel is allowed to depressurize, vent and fill again. Flow rates from the vessel are controlled by adjusting the fill and discharge cycle times.

Bellows liquid level control (BBLC):

Each well contains one BBLC at the well head. The BBLC controls the ejector pumping rate by restricting the high pressure air supply from the control panel. A bubbler line indicates the column of water that is above the ejector vessel by sensing backpressure that is created as water accumulates over the ejector. The bubbler line is mounted approximately 3/8 inches above the intake for the ejector. If the bubbler line senses sufficient amount of water above the ejector (approximately 10 inches) it allows the pump to function at full capacity. At water levels less than 10 inches above the ejector intake the BBLC partially or completely restricts the high pressure discharge air to the pump. A gauge on the face of the BBLC indicates the water level above the intake in inches of water. The BBLC is mounted level to the wall of the recovery well road box.

In Line Flow Meters:

½-inch Master meter water flow meters were installed inside the equipment compound. For each of the recovery wells the meters will accurately measure flow rate from each well and totalize the overall volume of extracted groundwater.

Trenching and Piping:

All lines were installed in trenches approximately 3.0 feet below grade. All lines installed in the trenches were bedded on 6-inches of clean, coarse sand prior to backfilling. A 6-inch lift of sand was also installed above the pipes. The trenches were backfilled and tamped in 1-foot lifts to grade with native soils. All trenches were located in the parking lots, therefore, the top 6-inches of fill was a compacted crusher run sub-base for repaving. Repaving will be conducted during the fall of 1992 by Pawling Corporation.

All lines were pressure tested prior to being buried. The pressure test was performed by sealing off the line, installing a pressure gauge in the line and injecting compressed air to 10 psi. The air pressure in the line was monitored for any changes and the line and all associated fittings were visually inspected for any leaks. The pressure test was maintained for a duration of 1 hour. All lines passed the pressure test.

The groundwater extraction piping layout is shown in Figure 7, Groundwater Extraction and Sparge System Piping and Instrumentation Diagram.

Well Completion:

Each recovery well head was enclosed in a traffic rated steel 2-foot square road box concreted into place. The road box lid is bolted closed and has gaskets to seal it form water intrusion. Each road box houses the pump, bellows liquid level controller, water flow adjustment valve, and an explosion proof junction box required for heat taping water lines. The floor of the road box is filled with gravel to drain any moisture that may enter the road box.

3.4 Groundwater Treatment System

Air Stripper:

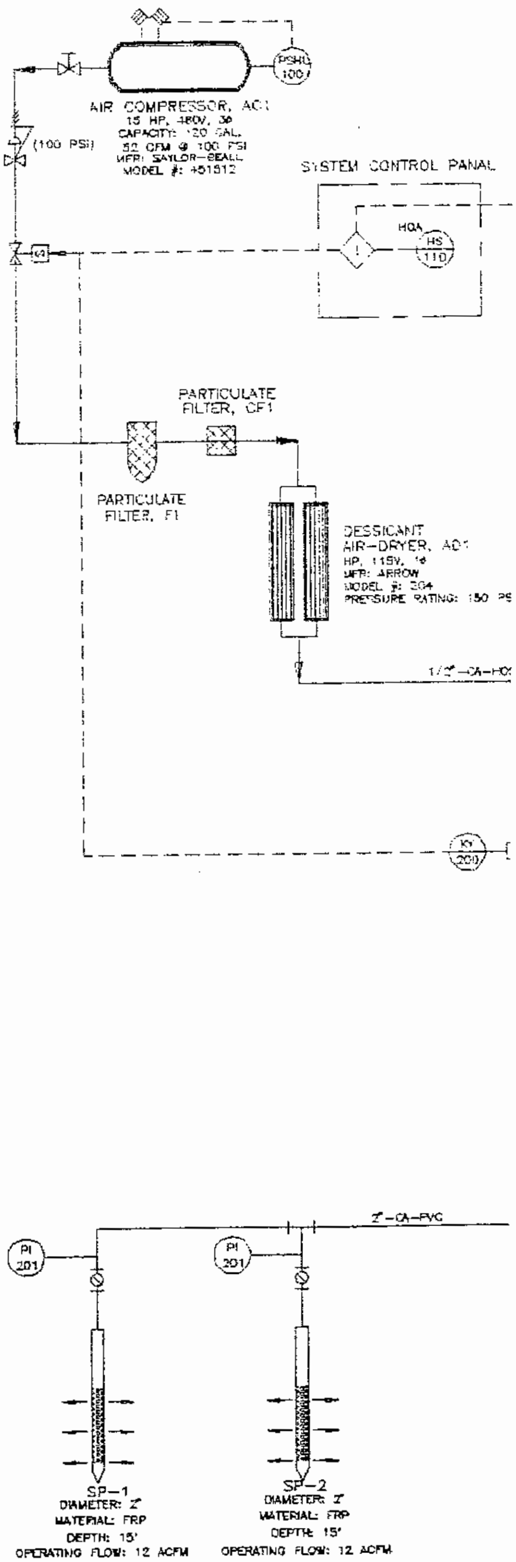
An Ejector System, Inc. (ESI) Low Profile Cascade air stripper, Model STRP-A6, is used to remove VOCs from the water system. The air stripper contains 7 stacked aeration trays each with a series of baffles and bubblers. The air stripper is designed to treat a flow rate of 4 gpm at the anticipated contaminant levels with a maximum design flow rate of 10 gpm. The ESI Cascade System comes equipped with automatic level control and shut-off.

Transfer Pump:

Water from the air stripper is piped to a 210 gallon transfer equalization tank. The transfer tank is constructed of high density polyethylene and is equipped with an air tight lid, a vent to the atmosphere, and the appropriate fittings to mount the transfer pump probes. The water pump allows for equalized pumping through the carbon polishing system.

Sediment Filters:

Two sediment filter housings were installed after the transfer pump to remove any sediment or iron particulates larger than 10 microns that would be in the water stream after the air stripping system. The units are constructed of carbon steel and pressure rated to 250 psi. The filter housings each contain



NO.	DATE	BY	REVISION
1	12/4/91	MPS	SYSTEM CONTROL PANAL
2	12/4/91	MPS	INFLUENT PIPING
3	3/5/92	MPS	CONSTRUCTION DETAIL

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518)456-2444

PAWLING CORP.

PAWLING, N.Y.

GROUNDWATER EXTRACTION/ SPARGE SYSTEM

PIPING & INSTRUMENTATION DIAGRAM

DESIGNED BY:	DETAILED BY:	CHECKED BY:
MPS	SAH/MET	TWK

DRAWING DATE:	ACAD FILE:
11/06/91	5104-P2
PROJECT NO.: 01110-5104	CONTRACT:
DRAWING: P2	REVISION: 3

several filter cartridges. A pressure gauge located on the top of each filter housing will indicate the need for cartridge change outs. During the first three months of operation one change out per month was needed.

The sediment filters and housings keep the carbon polishing units from clogging with particulates and increase the useful life of the carbon units.

Carbon Polishing Units:

Two liquid phase Hadley GAC units were installed after the sediment filters. Discharge from the filter units is piped through both GAC units as a treatment backup to insure a water discharge within the acceptable discharge limits. Any residual VOCs remaining in the water stream after the air stripper are adsorbed by the carbon. Each of the units contain 200 lbs of liquid phase GAC in a pressure rated fiberglass tank. The units are equipped with pressure gauges before, between and after the units to monitor the need for a change out. Each of the units can operate with pressures up to 150 psi.

Discharge Piping:

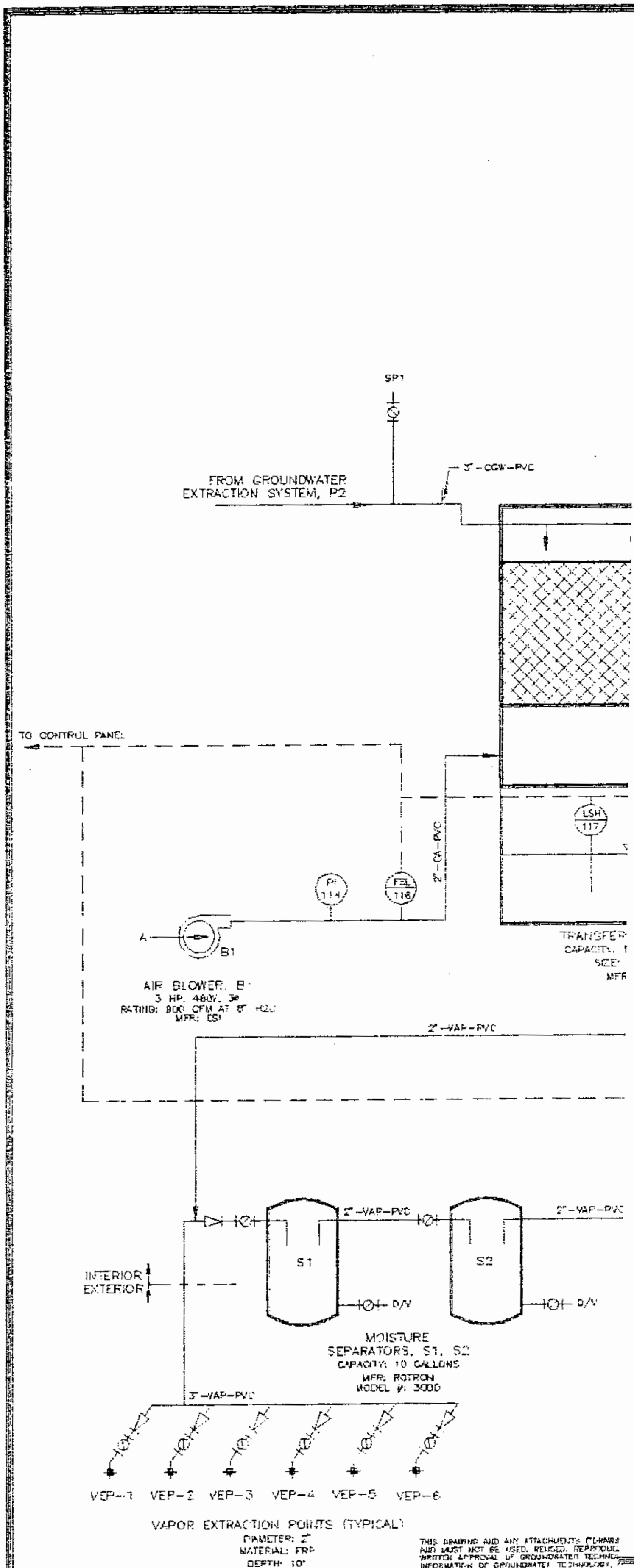
Effluent from the carbon polishing system is discharged to the Swamp River approximately 150 feet north of the equipment compound. The discharge pipe was constructed of 2-inch carbon steel pipe. The pipe was mounted on wooden pilings spaced approximately 12 feet apart. These pilings carry the discharge pipe to the Swamp River minimizing any impact to the wetlands area that surrounds the discharge point.

The discharge line is externally insulated and heat taped to prevent freezing of the line during the winter months. The heat tape is controlled from a plug assembly and thermostat located inside the treatment compound. The treatment system piping is shown on Figure 8, Groundwater Treatment and Soil Vent System Piping and Instrumentation Diagram.

3.5 Soil Vapor Extraction System

Vapor Extraction Points:

Six (6) Vapor Extraction Points (VEPs), plus one monitor well, were installed in the impacted zone of the site (Figure 6, Remedial System Site Layout). The VEPs extract existing VOCs from the soil and any additional VOCs that are produced from sparging activities. The number, spacing and location of VEPs was determined after a field radius of influence (ROI) test (Section 2.1). Section 3.2 details the VEPs construction.



			REVISION
			AIRSTRIPPER
2.	12/4/91	MPS	DIFERENTIAL PRESSURE SWITCH
3.	12/4/91	MPS	MOISTURE SEPARATOR
4.	1/1/92	MPS	VAPOR PHASE CARBON

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205 (518)456-2444

PAWLING CORP.

PAWLING, NY

GROUNDWATER TREATMENT/ SOIL VENT SYSTEM

PIPING & INSTRUMENTATION DIAGRAM

DESIGNED BY:	DETAILED BY:	CHECKED BY:
MPS	MET	

DRAWING DATE: 1/1/92	ACAD FILE: 1354-P4
PROJECT NO.: 01110-1354	CONTRACT:
DRAWING: **P3**	REVISION: **4**

Piping:

Each VEP was piped via 2-inch, Schedule 80, PVC piping to a 4-inch, Schedule 80 PVC header pipe located in the treatment compound. Each VEP is individually controlled by a ball valve located near the header pipe.

All lines were installed in trenches approximately 3 feet below grade. All lines installed in the trenches were bedded on 6-inches of clean coarse sand prior to backfilling. A 6-inch lift of sand was also installed above the pipes. The trench was backfilled and tamped in 1 foot lifts to grade with native soils. In locations where the trenches were located in roadways or parking lots the top 6-inches of fill was a compacted crusher run base provided for repaving.

Moisture Separators:

Two 30-gallon moisture separators, Model MS 300 D, were installed in line after the soil vent header pipe and before the soil vent blower to reduce the moisture in the vapor stream. The separators allow water vapor to condensate and collect. A manually operated drain valve is located on the bottom of the separators to remove the collected moisture during routine maintenance visits. Two site glasses were installed to monitor the increase in water without interrupting the vapor extraction system.

Soil Vapor Extraction Blower:

A 5 Hp, 480 volt regenerative soil vent blower, Model DR 707, was installed to extract up to 210 cfm (at 35" vacuum) of vapor from the impacted soils via the soil vent network. The blower will be capable of producing a vacuum on the system of up to -60 inches of water column (approximately 2.2 psi).

The soil vapor extraction blower is rated for Class 1, Division 1, Group D, hazardous locations. The blower is equipped with a particulate filter to remove any sand or dirt particulate that may be present in the vapor stream before it reaches the blower. Two vacuum gauges mounted on the blower inlet pipes before and after the particulate filter indicate the vacuum in the line and the need for the filter to be cleaned.

The soil vapor extraction blower is equipped with an override system that automatically shuts down the soil vent system in the event that the off-gas treatment system becomes inoperable. Figure 8 shows the Soil Vapor Extraction Piping and Instrumentation Diagram.

3.6 Air Sparging System

Sparge Points:

Two sparge points were installed in the impacted area of the site. Each point can deliver 5-12 cfm of air to the water table. The sparge point construction is detailed in Section 3.2. The bottom of each sparge point is approximately 6 feet below the surface of the groundwater.

An electronic timer and solenoid valve allow intermittent airflow of the impacted area. The timer is programmable to allow for varied air flow intervals. Several different durations and intervals have been evaluated during this start-up.

Air Compressor:

A 15 Hp, 460 volt Saylor Beall, Model 4515 20, electric air compressor capable of producing 52 cfm compressed air at 100 psi was installed to operate the pumping and sparging systems. The air compressor is equipped with a fan cooled aftercooler that cools the compressed air and condenses some of the water vapor in the compressed air. This condensate is removed by a water separator. The compressor is mounted on a 200-gallon compressed air storage tank to allow for the steady operation of the compressor and keep storage of air for any peak operation needs.

Desiccant Air Dryer: A desiccant air dryer, Model 204, and particulate filters were installed after the air compressor to remove moisture, residual oil and particulates from the air stream. The air dryer conditions the operating air to provide more efficient operation with lower operating maintenance.

Piping:

Compressed air is piped via 1-inch Schedule 80 PVC pipe to the sparge points. All lines were installed in trenches approximately 3 feet below grade. All lines installed in the trenches were bedded on 6-inches of clean coarse sand prior to backfilling. A 6-inch lift of sand was also installed above the pipes. The trench was backfilled and tamped in 1-foot lifts to grade with native soils. In locations where the trenches were located in roadways or parking lots the top 6-inches of fill was compacted crusher run base provided for repaving. Piping which is above ground in the compound is galvanized steel. Figure 7 shows the Sparge System Piping and Instrumentation Diagram.

4.0 INITIAL SUBSURFACE CONDITIONS

The effectiveness of the installed remedial system will be evaluated relative to the initial subsurface conditions. This section presents the baseline groundwater gradient, groundwater quality and soil quality which were identified prior to start up of the remedial system.

4.1 Groundwater Gradient

A complete groundwater gauging round was performed on March 9, 1992 prior to remedial system start-up to document the initial site conditions. The gauging data are included in Appendix B. The overall site overburden and bedrock groundwater flow directions were similar to previous gaugings and indicated flow to the north toward the Swamp River. The gradients were slightly lower than previously measured, 0.35 % and 0.34 %, respectively for the overburden and deep bedrock aquifers.

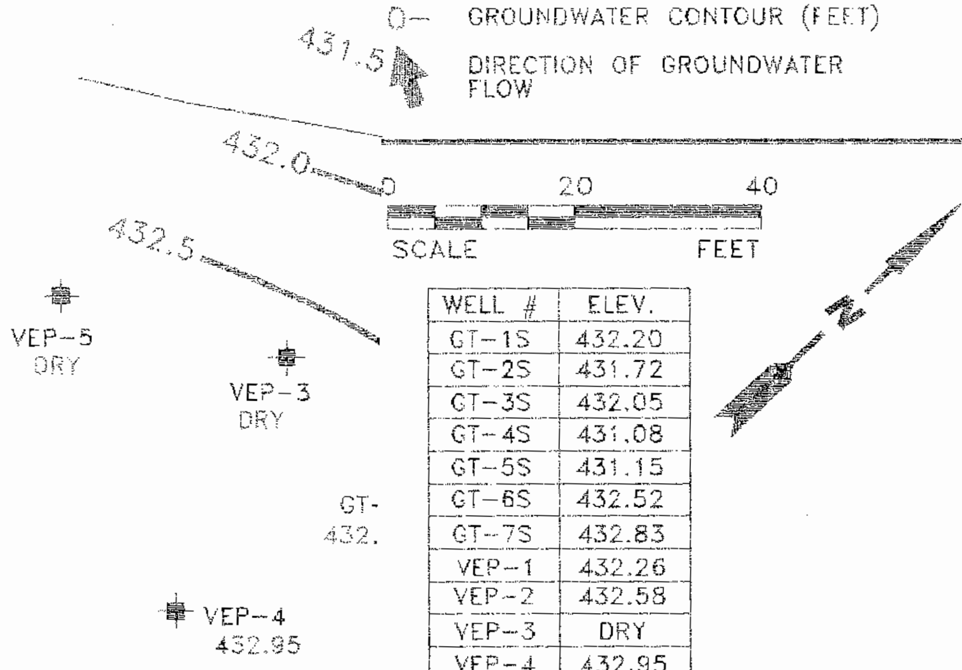
A contour map of the overburden groundwater elevations is shown in Figure 9. The gradient across this area, as measured between VEP-4 and GT-4S was 1 %. The additional monitor points determined that the overburden aquifer is not existent in the area around VEP-3 and VEP-5 due to the presence of a bedrock mound.

A comparison of the groundwater elevations in the deep bedrock and the overburden indicates that an upward vertical gradient of approximately 0.18 feet is still present across the site with the exception of the area around MW-2D1 where a downward gradient of 0.71 feet was observed. A comparison of the deep and shallow bedrock elevations, as measured at MW-2D1 and MW-2D2, shows that there is only a 0.01 foot upward vertical gradient within the bedrock; however, a comparison between MW-2D2 and RW-1D indicated an upward vertical gradient of 0.15 feet. It is not clear at this time what is causing these differences in vertical gradients.

4.2 Groundwater Quality

Groundwater samples were collected from select wells on March 10, 1992 in order to document concentrations of dissolved level VOCs prior to system start-up. Complete laboratory results as well as a table of all historical laboratory results are included in Appendix C. Figure 10 shows a contour map of the total VOC concentrations. The major portion of the plume is situated between GT-7S and RW-1S, where detected concentrations were 299,000 - 526,000 parts per billion (ppb). GT-4S and GT-5S denote the downgradient edge of the plume; detected concentrations at these locations were 21 and 31 ppb.

The specific VOCs which were detected included toluene, trichloroethene (TCE), trans -1, 2 - dichloroethylene (trans-1,2 - DEC), methylene chloride, vinyl chloride, and carbon tetrachloride. Table 5 shows the concentrations which were detected in each well. These compounds have all been previously



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- 1 NESTED VAPOR POINT
- 1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- 30— GROUNDWATER ELEVATION (FEET)
- 0— GROUNDWATER CONTOUR (FEET)
- DIRECTION OF GROUNDWATER FLOW

WELL #	ELEV.
GT-1S	432.20
GT-2S	431.72
GT-3S	432.05
GT-4S	431.08
GT-5S	431.15
GT-6S	432.52
GT-7S	432.83
VEP-1	432.26
VEP-2	432.58
VEP-3	DRY
VEP-4	432.95
VEP-5	DRY
RW-1S	431.75
RW-2S	431.55
SP-1	431.61
MW-2S	431.67

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: 3/9/92	DATE: 4/24/92	ACAD FILE: 1354STE1

GROUNDWATER CONTOUR MAP

CLIENT: PAWLING CORPORATION	PROJECT NO.: 01110-1354
LOCATION: PAWLING NEW YORK	FIGURE NO.:

Table 5

VOC Concentrations in Groundwater
March, 1992

Parameters	RW-15	%	RW-15 June 1990	%	GT-7S	%	RW-2S	GT-4S	GT-5S	GT-6S
Toluene	240,000	80	170,000	75.5	440,000	84	48,000		10	
TCE	34,000	11.5	41,000	18	59,000	11	2,000		7	130
Trans-1,2 DCE	19,000	6.5	9,600	4.5	16,000	3	8,400	21	9	51
Vinyl Chloride	6,100	2	4,800	2			3,200			
Methylene Chloride					11,000	2				
Carbon Tetrachloride									5	3
1,1 1-TCA			7							
1,1 2-TCA			12							
PCE			42							
Ethylbenzene			22							
TOTAL VOCs	299,100	100	225,483	100	526,000	100	61,600	21	31	184

Note: All results are expressed in ug/L

detected on-site with the exception of methylene chloride and carbon tetrachloride.

The percentages of each compound (in relation to the total detected VOCs) for GT-7S and RW-1S are also shown in Table 5. Toluene constituted approximately 80% of the dissolved VOCs; TCE approximately 11% and trans-1, 2 - DCE approximately 5%.

The June 1990 VOC concentrations detected in RW-1S are also shown in Table 5. The total VOCs were slightly higher in 1992 than in 1990 (299,100 vs. 225,483 ppb, respectively). The individual percentages of detected VOCs were similar, with the exception that low levels of several other VOCs had previously been identified in 1990. The dilution and higher detection limits reported for the 1992 data may have masked the detection of these compounds during the 1992 sampling.

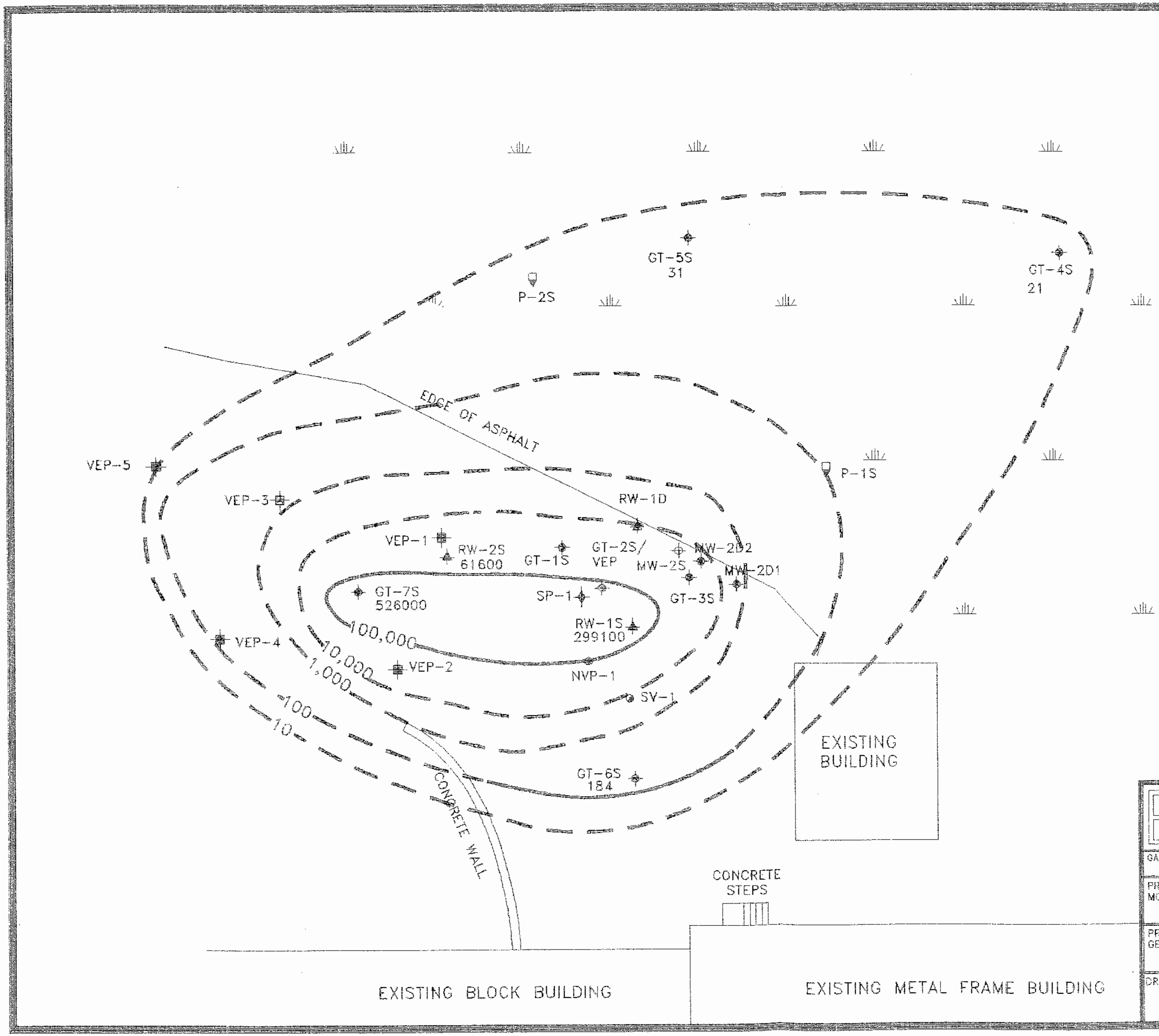
A more detailed comparison of the ratios of toluene, chlorinated compounds, and vinyl chloride and trans -1, 2 DCE, (two breakdown products), was performed to aid in evaluating contaminant degradation and removal (Figures 11 a, b, and c). At GT-7S, the assumed source area, the vinyl chloride and trans -1, 2 DCE concentrations (DCE) were very low, 0 and 3 % of the total chlorinated compounds, respectively. Slightly downgradient, at RW-1S the concentrations of this breakdown compounds constituted 10 and 15% of the total chlorinated compounds. At the edge of the plume, at GT-5S, the percentages were 0 and 30%. These ratios will be evaluated throughout the remediation process.

A groundwater sample was also collected from the upper bedrock aquifer, RW-1D, in order to document the initial concentrations prior to system start-up. Total detected VOCs were 3,680 ppb. This compares to 1,804 ppb in June 1990. Toluene constituted 73% of the total VOCs, and vinyl chloride and trans -1, 2 DCE constituted the remaining 27%. No other chlorinated VOCs were detected.

4.3 Soil Quality

During remedial point installation soil sampling was performed to further delineate the subsurface extent of VOC impacts. A summary of the monitored intervals, PID readings and laboratory analytical results are presented in Table 6 (Summary of Soil Monitoring Results). The complete soil laboratory analytical reports are presented in Appendix C.

As indicated in Table 6, soil screening, using the PID, indicated elevated (above 100 ppmv) volatile organic levels at the locations of NVP-1, SP-1, VEP-1 and GT-7S. Concentrations of approximately 50 ppmv were detected at the locations of SV-1 and VEP-3. Toluene was the compound detected at the highest concentration, of 7,580 ppb and 1,990 ppb, at the locations of NVP-1 and SP-1. PID results exhibited much higher concentrations than the laboratory data.



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- 21– TOTAL VOLATILE ORGANIC COMPOUNDS (VOCS) IN ppb
- 1000– TOTAL VOCS CONTOUR IN ppb

0 20 40
SCALE FEET

N

WELL ID NO.	TOTAL VOCS (ppb)	TOTAL CHLORINATED (ppb)
GT-4S	21	21
GT-5S	31	21
GT-6S	184	184
GT-7S	526,000	86,000
RW-1S	299,100	59,100
RW-2S	61,600	13,600

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ALBANY, NY 12205
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GAUGING DATE: 3/10/92 | DATE: 8/6/92 | ACAD FILE: 5104VOC2

PROJECT MGR.: WL

PROJECT GEO.: WL

DRAWN BY: MET

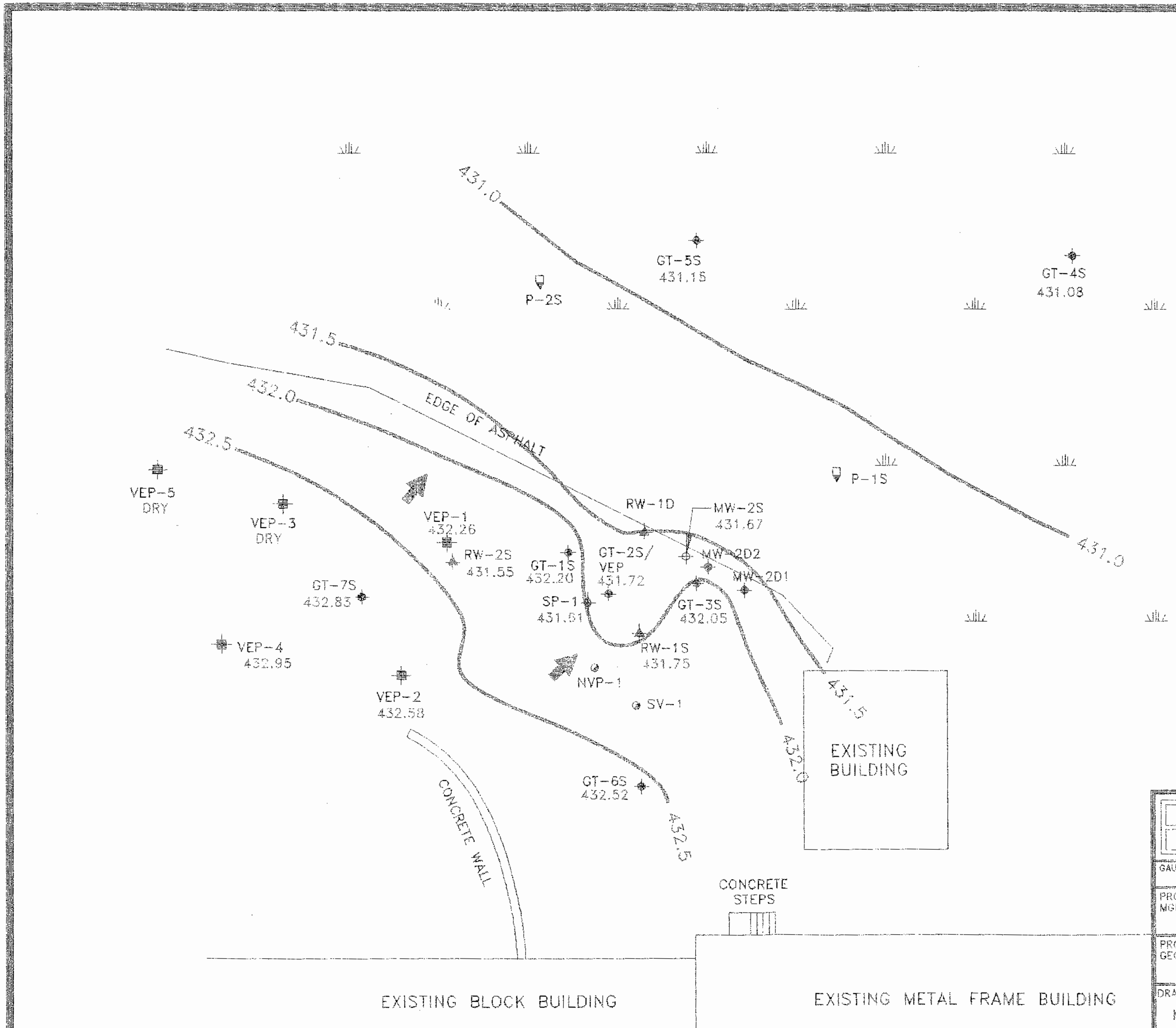
TOTAL VOCs IN GROUNDWATER [OVERBURDEN AQUIFER]

CLIENT: PAWLING CORPORATION

PROJECT NO.: 01110-1354

LOCATION: PAWLING NEW YORK

FIGURE NO.:



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- 430.80— GROUNDWATER ELEVATION (FEET)
- 432.0— GROUNDWATER CONTOUR (FEET)
- DIRECTION OF GROUNDWATER FLOW

0 20 40
SCALE FEET

N

WELL #	ELEV.
GT-1S	432.20
GT-2S	431.72
GT-3S	432.05
GT-4S	431.08
GT-5S	431.15
GT-6S	432.52
GT-7S	432.83
VEP-1	432.26
VEP-2	432.58
VEP-3	DRY
VEP-4	432.95
VEP-5	DRY
RW-1S	431.75
RW-2S	431.55
SP-1	431.61
MW-2S	431.67

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE: 3/9/92
DATE: 4/24/92
ACAD FILE: 1354STE1

PROJECT MGR.: WL

GROUNDWATER CONTOUR MAP

PROJECT GEO.: WL
CLIENT: PAWLING CORPORATION
PROJECT NO.: 01110-1354
DRAWN BY: MET
LOCATION: PAWLING NEW YORK
FIGURE NO.:

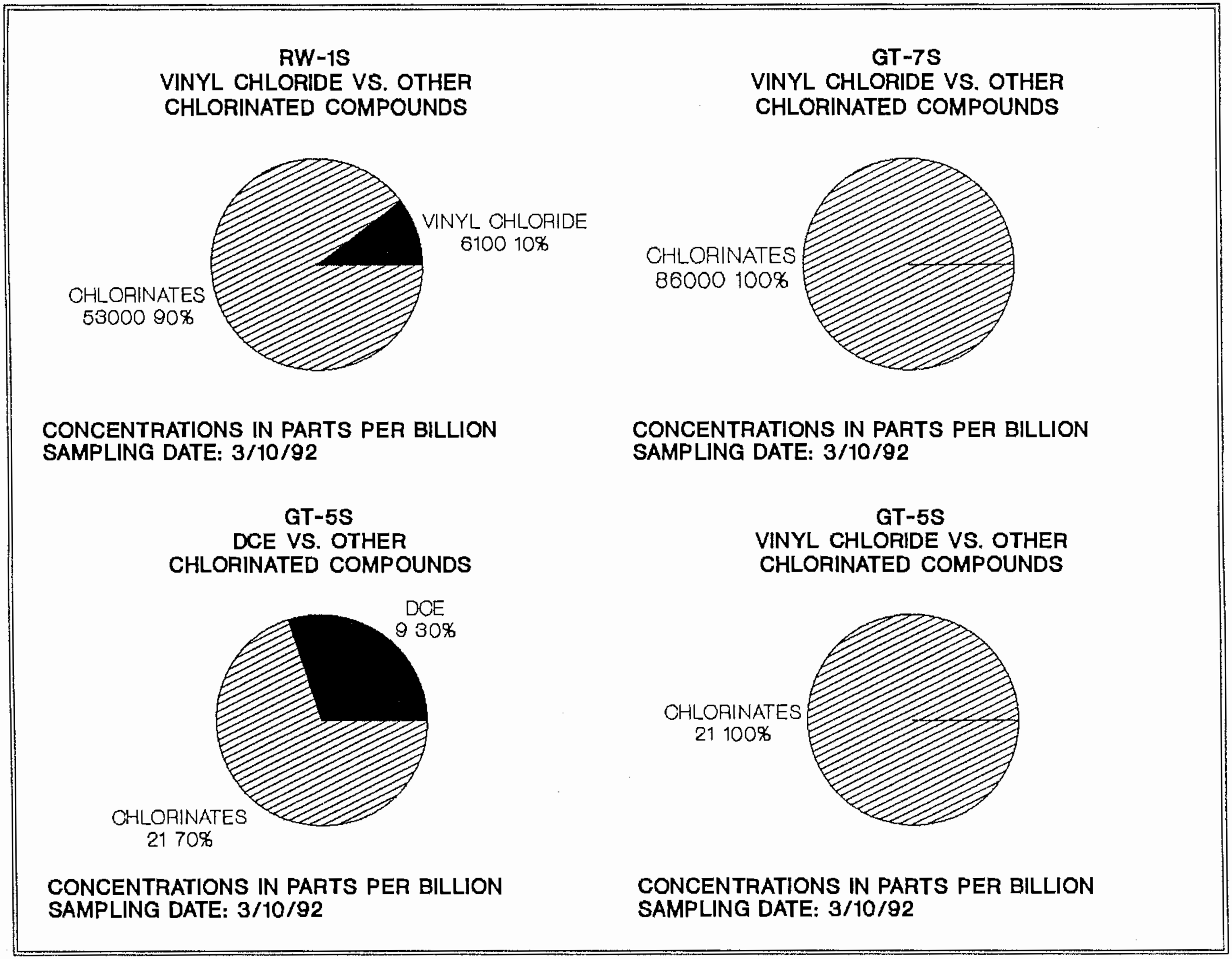


Figure 11b Ratios of VOCs in Groundwater

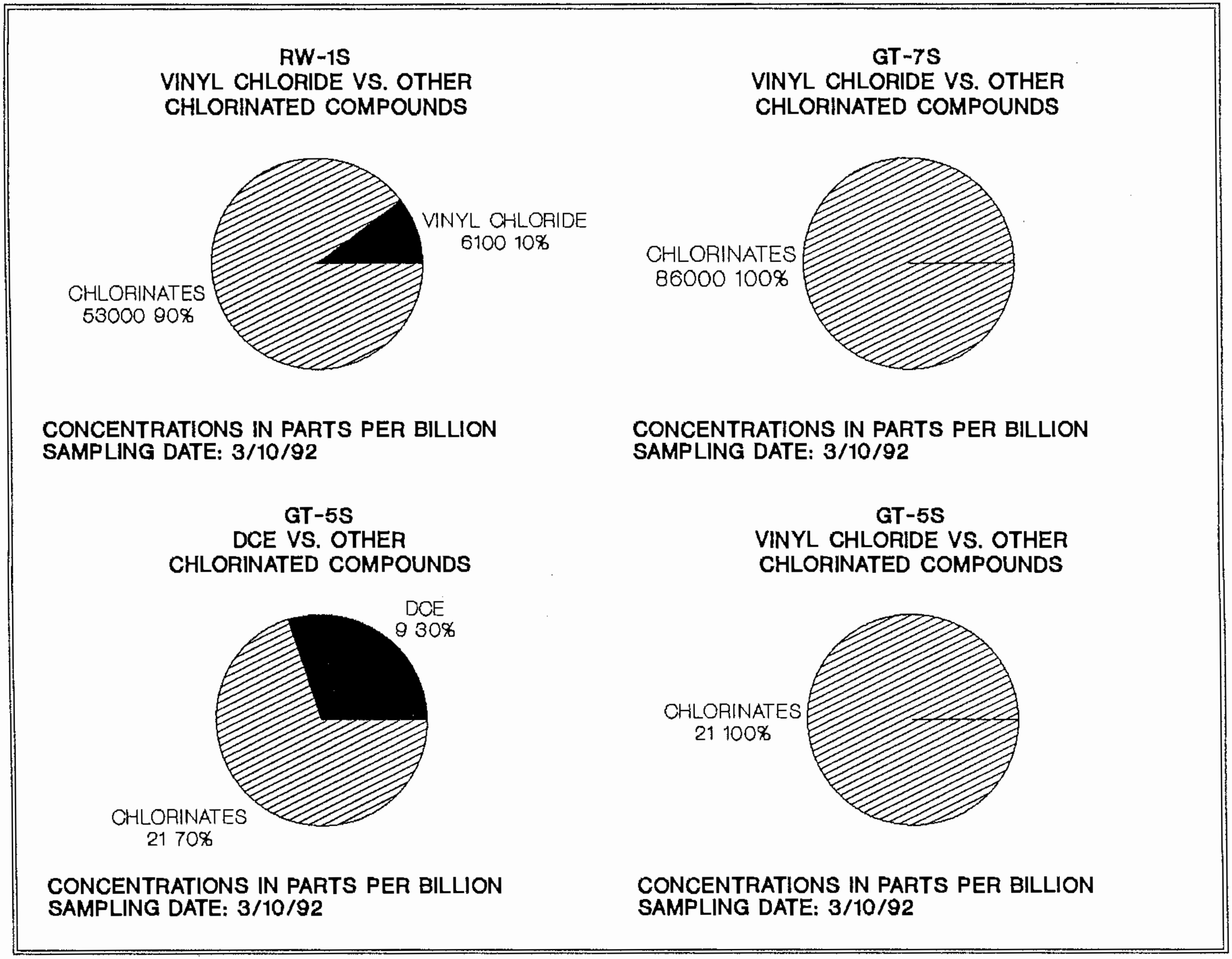


Figure 11b Ratios of VOCs in Groundwater

TABLE 6

SUMMARY OF SOIL MONITORING RESULTS

WELL ID	INTERVAL (FT)	PID READING (PPMV)	LABORATORY ANALYTICAL RESULTS (ppb) (EPA 8240)
NVP-1	8-10	190	Methylene Chloride 34 ppb Acetone 31 ppb 1,2-Dichloroethene 24 ppb Trichloroethene 615 ppb Toluene 7,580 ppb
SP-1	16-18	150	Methylene Chloride 290 ppb Acetone 340 ppb 1,2-Dichloroethene 190 ppb Trichloroethene 210 ppb Toluene 1,990 ppb
GT-6S	3-5	0	
	4-6	0	
	6-8	0	
	8-10	0	Trichloethene 8 ppb
	10-12	0	
	12-14	2	
	14-16	0	
RW-2S	NO SAMPLES TAKEN		
SV-1	8-10	7	1,2-Dichloroethene 20 ppb
	13-13.5	55	
VEP-1	8-10	16	Not Detected
	10-12	101	
	12-13	107	
	@ 13	75	
VEP-2	0.5-2	2	
	2-4	0	
	4-6	2	
	6-8	1	
	8-10	1	
	10-12	1	
	12-14	10	Not Detected

5.0 CONTAMINANT DISTRIBUTION

The effectiveness of the installed remedial system will be evaluated relative to the cleanup of the identified VOCs in the subsurface. VOCs released to the subsurface can be present in any of four phases: dissolved in groundwater (dissolved phase), adsorbed onto soil particles (adsorbed phase), layers of non-aqueous phase liquids (liquid phase), or as vapors (vapor phase). This section details the identified phases, extent and estimated volume of VOCs which are present in the subsurface at this site and which define the baseline conditions for evaluating remedial effectiveness.

5.1 Methodologies for Calculating Contaminant Volumes

5.1.1 Dissolved Phase

Overburden Aquifer

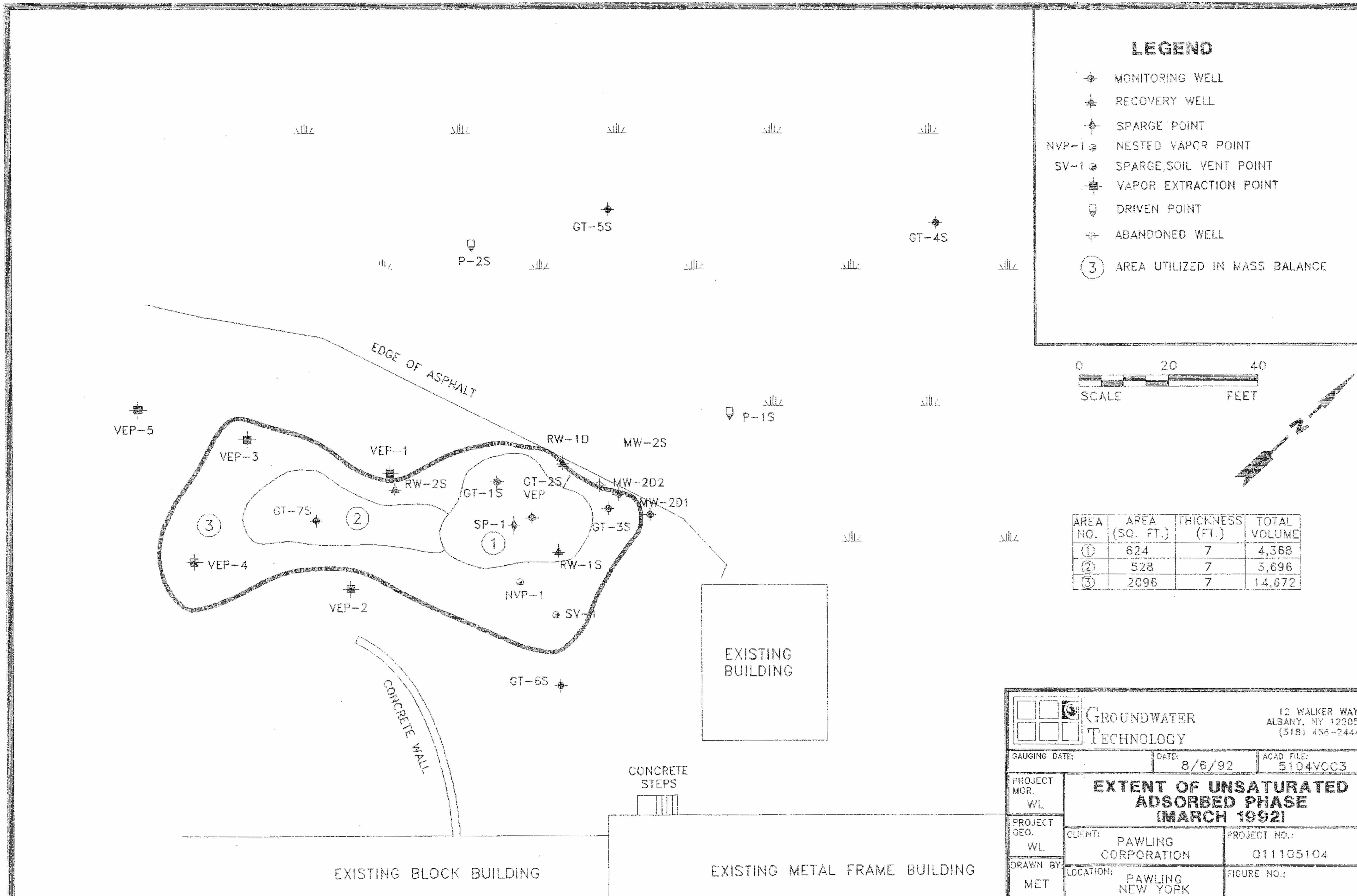
The areal extent of the dissolved phase was identified by the initial (March 1992) groundwater sampling. The results are portrayed on the Total VOCs in Groundwater (Overburden Aquifer) map (Figure 10). The areas between contoured intervals, the average concentration between contour lines and the saturated thickness, as shown on the cross sections (Figures 12 and 13), were utilized to calculate the total volume of VOCs present in the dissolved phase. Appendix D contains the calculations.

Bedrock Aquifer

An attempt was made to estimate the volume of VOCs in the bedrock. Much less data are available concerning subsurface conditions, therefore, a range of values was produced utilizing different impacted areas and porosities. Appendix D contains the calculations.

5.1.2 Adsorbed Phase

The field screening VOC data from soil samples were utilized to define the areal extent of the adsorbed phase. Figures 14 and 15 shows the defined areas of adsorbed phase VOCs in the saturated and unsaturated zones. The unsaturated and saturated zones were delineated separately because they are remediated by different technologies. For calculation of the contaminant volumes the total areas were divided into subareas based upon different VOC concentrations. The cross sections were utilized to determine the impacted thicknesses. Appendix D contains the contaminant loading calculations.



AREA NO.	AREA (SQ. FT.)	THICKNESS (FT.)	TOTAL VOLUME
①	624	7	4,368
②	528	7	3,696
③	2096	7	14,672

GROUNDWATER TECHNOLOGY

12 WALKER WAY
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(518) 456-2444

GAUGING DATE: | DATE: 8/6/92 | ACAD FILE: 5104VOC3

PROJECT MGR.: WL

PROJECT GEO.: WL

DRAWN BY: MET

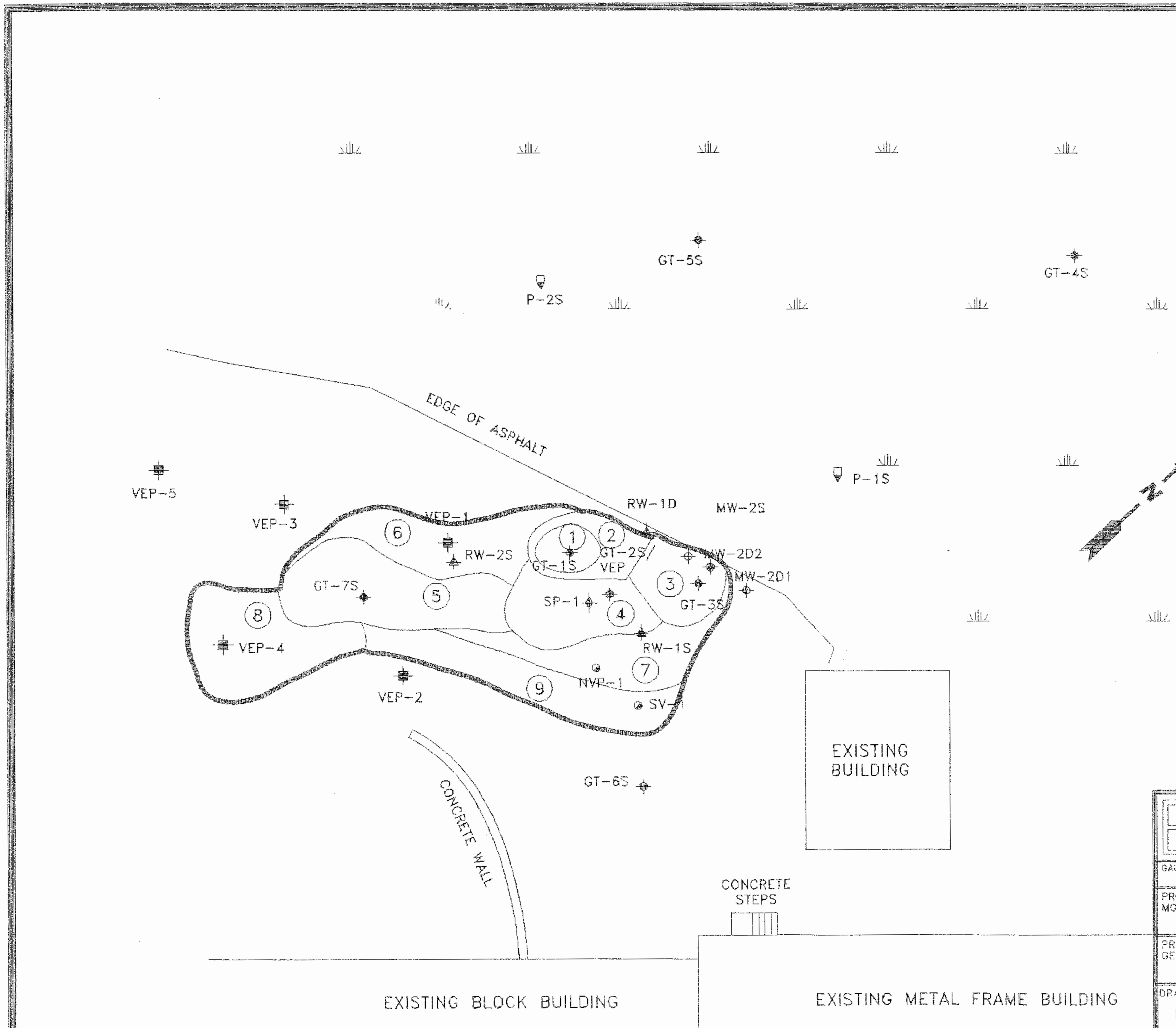
EXTENT OF UNSATURATED ADSORBED PHASE (MARCH 1992)

CLIENT: PAWLING CORPORATION

PROJECT NO.: 011105104

LOCATION: PAWLING NEW YORK

FIGURE NO.:



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- (3) AREA UTILIZED IN MASS BALANCE

SCALE 0 20 40 FEET

AREA NO.	AREA (SQ. FT.)	THICKNESS (FT.)	TOTAL VOLUME
①	112	4	448
②	160	7	1,120
③	224	11	2,464
④	352	7.5	2,640
⑤	528	4	2,112
⑥	448	5	2,240
⑦	432	1	432
⑧a	512	2	1,024
⑧b	512	2	1,024
⑨	448	5	2240

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE: | DATE: 8/6/92 | ACAD FILE: 5104VOC4

PROJECT MGR. WL

EXTENT OF SATURATED ADSORBED PHASE (MARCH 1992)

PROJECT GEO. WL

CLIENT: PAWLING CORPORATION

PROJECT NO.: 011105104

DRAWN BY: MET

LOCATION: PAWLING NEW YORK

FIGURE NO.:

5.2 Contaminant Volumes

Overburden

The calculated contaminant volumes determined for this site are shown in Table 7. The saturated adsorbed phase contained the highest amount of VOCs, 1774 pounds. The unsaturated adsorbed phase contained 700 pounds, while the dissolved phase contained only 45 pounds. The total VOCs identified in the subsurface were 2,519 pounds. Figure 16 shows the relative distribution of the phases. The vapor phase and liquid phase were nonexistent or negligible.

Bedrock

The contaminant mass calculations for the bedrock aquifer provided the following range of estimates of dissolved phase VOCs; 2 to 25 pounds. Due to the low porosity and small surface area of contaminant contact with the rock, it is assumed that the absorbed phase VOC volume is small. These numbers are rough estimates but do provide a good indication of the relative contaminant loading in the bedrock.

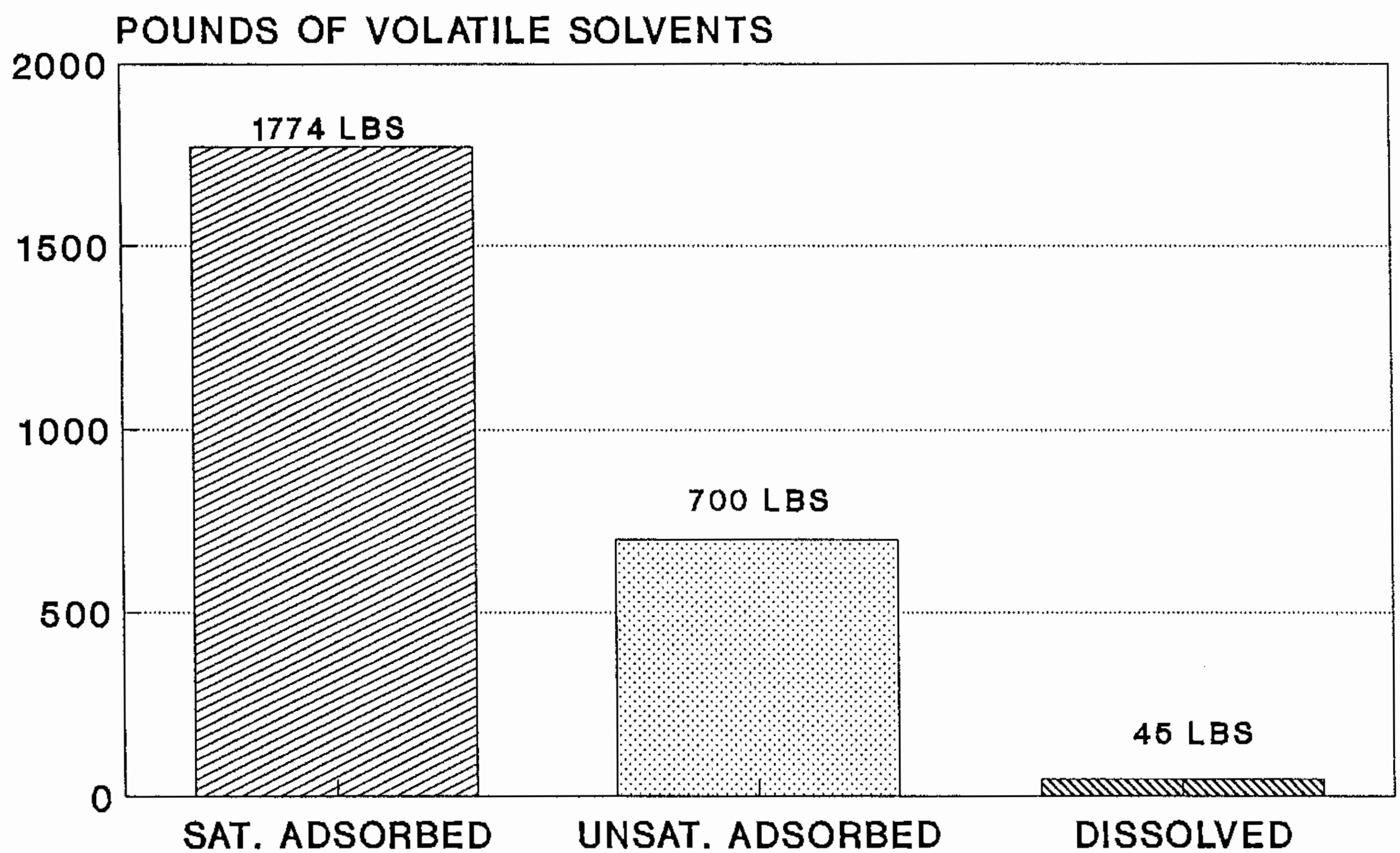
TABLE 7

CONTAMINANT DISTRIBUTION IN THE OVERBURDEN

PHASE	AMOUNT (pounds)	PERCENTAGE OF TOTAL
Dissolved Phase	45	1.8
Unsaturated Adsorbed Phase	700	27.8
Saturated Adsorbed Phase	1,774	70.4
Liquid Phase	Negligible	Negligible
Total VOCs	2,519	100

Figure 16

CONTAMINANT DISTRIBUTION



6.0 REMEDIAL SYSTEM PERFORMANCE

The remedial system has been in operation since March 9, 1992. During this initial 3 months of operation each of the individual remedial systems (groundwater extraction, groundwater treatment, soil vapor extraction, and air sparging) have been operated and data associated with the operation has been collected. This section presents the initial start-up data and first 3 months of system performance.

6.1 Groundwater Extraction System

6.1.1 Operation Summary

The groundwater extraction system was started on March 11, 1992. During the first month of operation the system ran only intermittently while the programmable overide protection system was tested and debugged. The system ran continuously during the rest of the monitoring period with one down time period experienced from May 11 to May 21 due to a problem with the air stripper transfer pump.

6.1.2 Verification of Hydraulic Control

In order to verify hydraulic control and complete capture of the overburden dissolved plume, groundwater gauging was performed. The groundwater elevations were contoured and flow lines plotted. Figure 17 shows the resultant map. Impacted groundwater is being captured as designed.

6.1.3 Flow Rates/Total Gallons Extracted

The initial start-up flow rates for RW-1S and RW-2S were 1.7 gpm and 0 gpm, respectively. The average flow rates observed over this monitoring period were 1.0 gpm and 0.3 gpm, respectively. The flow rates are lower than the pilot test design flow rate of 2 gpm. This is due to the fact that there is limited recharge to the overburden aquifer in this area. This is evidenced particularly at RW-2S which is dry most of the time except after a rainfall event. The bedrock high appears to affect the overburden groundwater table, as discussed in section 4.1.

Over this monitoring period a total of 77,030 gallons of water have been extracted from the subsurface. Table 8 shows the gallons extracted from each well over time.

6.1.4 Extracted VOC Concentrations/Removal Rate

The dissolved concentrations being extracted from the subsurface were evaluated through collection and sampling of water entering the air stripper (A/S influent). Sampling was performed on March 11, 1992. A triplicate sampling was performed to quantify the variation in the results. The detected concentrations are shown in Table 9. There was quite a range in concentrations between the three samples, particularly for TCE.

Table 8
PUMPING SYSTEM DATA SHEET

RECORDING DATE	TOTALIZER (GALLONS) RW-1	TOTALIZER (GALLONS) RW-2	GALLONS PUMPED SINCE LAST RECORDING RW-1	GALLONS PUMPED SINCE LAST RECORDING RW-2	TOTAL GALLONS PUMPED SINCE LAST RECORDING	TOTAL LITERS PUMPED SINCE LAST RECORDING	TOTAL DISSOLVED CONCENTRATION mg/l	TOTAL mg REMOVED SINCE LAST RECORDING	TOTAL LBS REMOVED SINCE LAST RECORDING	**CUMULATIVE LBS REMOVED**
03/11/92	680	120	680	120	800	3,028	154.07	466,513.87	1.03	**1.03**
03/12/92	1,030	330	350	210	560	2,120	154.07	326,559.71	0.72	**1.75**
03/20/92	1,170	430	140	100	240	908	154.07	139,954.16	0.31	**2.06**
03/20/92	1,410	610	240	180	420	1,590	154.07	244,919.78	0.54	**2.60**
04/10/92	1,980	720	570	110	680	2,574	154.07	396,536.79	0.88	**3.47**
04/24/92	27,030	920	25,050	200	25,250	95,571	154.07	14,724,343.92	32.50	**35.98**
05/26/92	44,520	1,410	17,490	490	17,980	68,054	154.07	10,484,899.15	23.15	**59.12**
06/03/92	48,190	2,760	3,670	1,350	5,020	19,001	154.07	2,927,374.51	6.46	**65.59**
06/11/92	60,800	3,060	12,610	300	12,910	48,864	154.07	7,528,367.52	16.62	**82.20**
06/12/92	61,420	3,130	620	70	690	2,612	154.07	402,368.21	0.89	**83.09**
06/26/92	69,060	3,870	7,640	740	8,380	31,718	154.07	4,886,732.75	10.79	**93.88**
06/27/92	70,500	3,920	1,440	50	1,490	5,640	154.07	868,882.08	1.92	**95.80**
06/29/92	72,990	4,040	2,490	120	2,610	9,879	154.07	1,522,001.49	3.36	**99.16**

Table 9

Dissolved Concentrations from Groundwater Extraction System
March 11, 1992

Sample	Toluene (ug/l)	TCE (ug/l)	Trans -1,2-DCE (ug/l)	Vinyl Chloride (ug/l)	Total VOCs (ug/l)
A/S Influent #1	130,000	5,200	10,100	3,400	148,700
A/S Influent #2	99,000	2,600	7,900	< 10,000	109,500
A/S Influent #3	170,000	23,000	11,000	< 10,000	204,000
Mean	133,000	10,267	9,667	N/A	154,067
Standard Deviation	35,595	11,104	1,595	N/A	47,478

The mean total VOC concentration was utlized to calculate the pounds of VOCs removed from the subsurface during this monitoring period. A total of 99.16 pounds have been removed through the groundwater extraction system. Table 8 shows the removal rates over time. As the removal rate is based upon the influent concentration, which did show a range from 109,500 to 214,000 ug/l, the actual pound removal may be 70.5 to 131 pounds. These values are higher than the initial estimate of dissolved phase VOCs due to additional dissolution of VOCs from the adsorbed phase.

6.2 Groundwater Treatment System

The air stripper removal efficiency was evaluated through comparison of influent and effluent water quality to the air stripper. The removal efficiencies ranged from 99.54 to 100 %, depending upon the compound.
Table 10 shows the removal efficiencies by compound.

The removal efficiency of the entire treatment system, carbon polish plus air stripper, was 100 %. The VOC effluent concentrations sampled monthly to meet discharge requirements showed non detectable levels. Table 11 shows the sampling dates. The analytical laboratory data are included in Appendix D.

Based upon the initial analytical data and air stripper removal efficiency, the carbon polish has been loaded with less than 0.1 pounds of VOCs. Each carbon cannister should be able to remove approximately 20 pounds of VOCs.

Table 10

Air Stripper Effluent Concentrations and Percent Removal Efficiency

March 11 Sampling	Toluene (ug/l)	% Removal	TCE (ug/l)	% Removal	Trans-1,2-DCE (ug/l)	% Removal	Vinyl Chloride (ug/l)	% Removal
A/S Eff #1	74	99.94	8	99.85	11	99.89	< 10	100
A/S Eff #2	99	99.9	12	99.54	17	99.78	< 10	N/A
A/S Eff #3	110	99.9	12	99.95	16	99.85	< 10	N/A

Table 11

Total Groundwater Treatment System Effluent Concentrations

Date	VOC Concentrations
3/11	ND
4/25	ND
5/30	ND
6/27	ND

ND = Non detectable

Table 12

Comparison of Design and Actual SVE RO1

Monitor Point	Distance from VEP (ft)	Design Vacuum (inches w.c.)	Measured Vacuum (inches w.c.) SVE only (Av)	Measure Vacuum (in wc) with Air Sparge
GT-6S	15	0.67	1.4	1.4
GT-7S	20	0.3	8.2	8

6.3 Soil Vapor Extraction System

6.3.1 System Operation

The SVE system was started on March 9, 1992 and maintained continual operation throughout this monitoring period. The air flow rate recorded before the blower was 108 cfm. This compares to design air flow rate of 175 scfm. The rate is lower than the design value, undoubtedly due to the close spacing of vapor extraction points, which, in combination, are withdrawing more air than can recharge the subsurface, thus producing an overall flow rate lower than the potential rate. The operational vacuum throughout the monitoring period was 50 inches of water. This vacuum is higher than the design value of 35 inches because it was decided that a higher vacuum would increase the vapor removal rate.

6.3.2 Verification of Radius of Influence

The radius of influence (ROI) of the SVE system was measured in the field by recording vacuum readings at several monitor points. The results are shown in Table 12. These results show that greater vacuum has been oberved than the pilot test estimated. The combination of multiple vapor extraction points is creating a greater vacuum response in the subsurface.

If the observed readings are extrapolated to the 0.1 inch water column effective ROI, the actual SVE system has a ROI of 32 feet (versus the pilot test value of 27 feet). The verification of the actual ROI ensures that all unsaturated soils are adequately being vented.

Vacuum readings were also recorded at the monitoring points during air sparging operation. The vacuum readings decreased only slightly, indicating that net vacuum was maintained during sparging, ensuring the that all air sparge vapors are being captured.

6.3.3 Extracted VOC Concentrations and Removal Rates

The VOC concentrations extracted by the entire SVE system ranged from 8 to 38 ppmv as recorded with a PID with a 11.7 head. FID data were also collected. Originally the FID values were much greater than measured by the PID due to the presence of methane. After two months of operation, the two instruments recorded similar VOC levels, with the FID showing slightly higher levels ranging from 20 to 32 ppmv. Table 13 reports all of the VOC levels recorded. Air samples were collected and analyzed in the laboratory on several dates. Table 14 shows the analytical results. The detected concentrations are significantly lower than the corresponding field readings. The identified compounds and their percent of the total VOCs were: toluene 40 - 75 %, TCE 25 - 34 % and trans-1,2-DCE 0 - 29 %, varying with the sampling date. These three compounds were the only detected VOCs.

Table 13
SOIL VAPOR EXTRACTION OPERATION DATA

SAMPLING DATE	TOTAL VOCs PID	TOTAL VOCs FID	TOTAL VOCs (ppmv)	AIR VELOCITY (fpm)	AIR FLOW (cfm)	AVG. DAILY POUNDS REMOVED	DAYS OF SYSTEM OPERATION	TOTAL LBS REMOVED SINCE LAST SAMPLING	CUMULATIVE POUNDS
03/09/92	8	86	8	4200	205.8376	0.6216	0.017	0.0104	0.0104
03/12/92	7.9		7.9	4200	205.8376	0.6139	3.000	1.8416	1.8520
03/20/92	12.2	66	12.2	4000	196.0358	0.9028	7.375	6.6585	8.5104
03/20/92	13	66	13	4000	196.0358	0.9620	0.083	0.0801	8.5906
03/20/92	13.4	54	13.4	4000	196.0358	0.9916	0.042	0.0413	8.6319
03/20/92	24	74	24	4000	196.0358	1.7761	0.208	0.3694	9.0013
03/27/92		74	24	3800	186.2340	1.6873	7.000	11.8109	20.8122
04/10/92		52	24	4000	196.0358	1.7761	14.000	24.8652	45.6774
04/24/92	38		38	2100	102.9188	1.4764	14.000	20.6692	66.3465
05/08/92	16.7		16.7	3600	176.4323	1.1123	14.000	15.5718	81.9183
05/26/92	10		10	3600	176.4323	0.6660	18.000	11.9886	93.9069
06/03/92		20	20	3600	176.4323	1.3321	7.396	9.8517	103.7586
06/03/92		28	28	3600	176.4323	1.8649	0.063	0.1166	103.8751
06/03/92		32	32	3500	171.5314	2.0721	0.083	0.1726	104.0477
06/03/92		29	29	3600	176.4323	1.9315	0.083	0.1609	104.2086
06/12/92	12		12	2200	107.8197	0.4884	9.000	4.3958	108.6044
06/26/92	11.2		11.2	3200	156.8287	0.6631	14.000	9.2830	117.8874

Note: 4/10/92 – AIR FLOW DATA WAS ESTIMATED

Figure 17
SVE SYSTEM REMOVAL

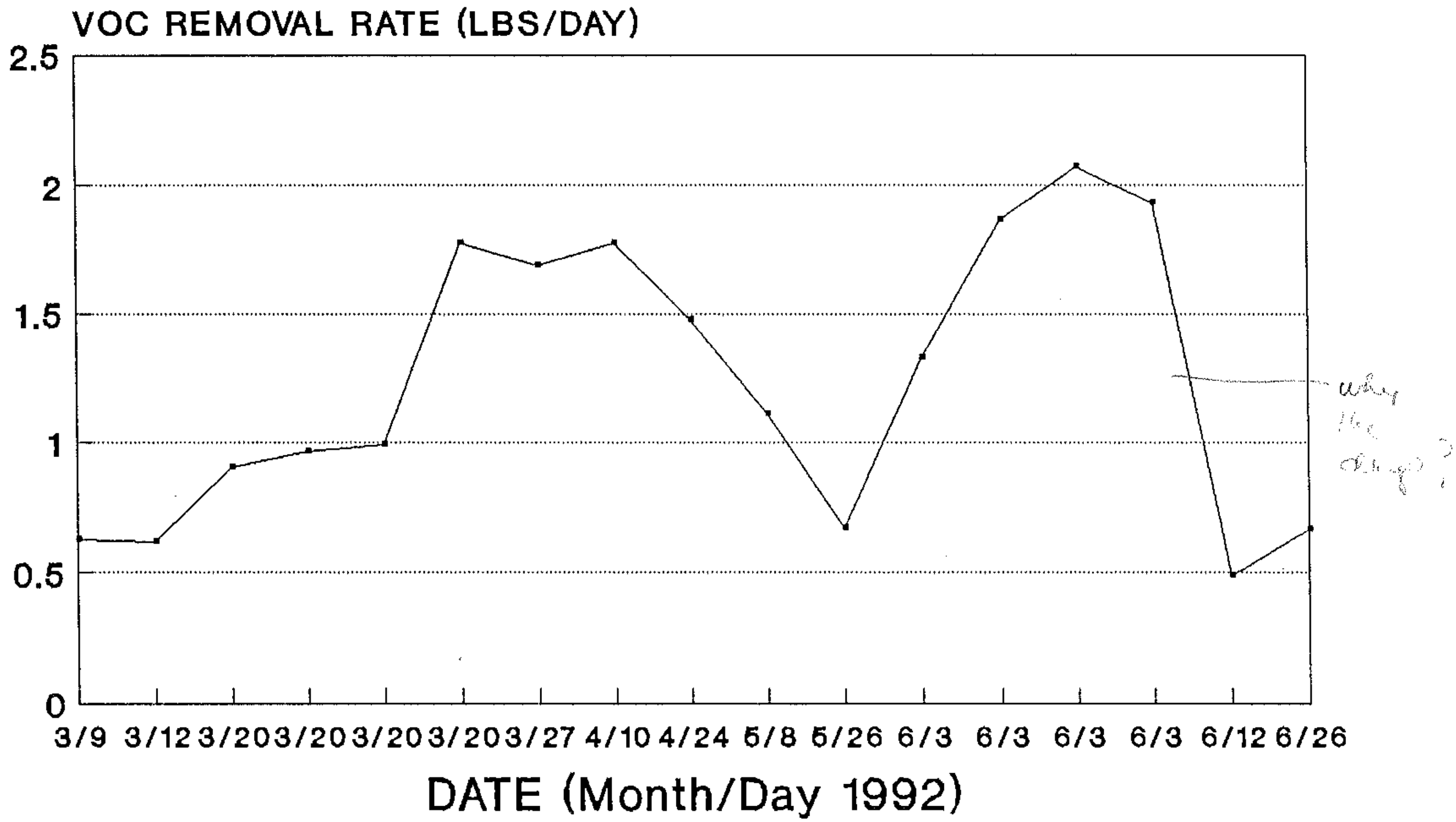


Table 14

Laboratory Results of Total VOCs in SVE Effluent

(ug/l)

Date	Vent	Vent and Sparge
Sept. 11, 1991	1,565	2,015
March 11, 1992	140	123
June 3, 1992	43	53

The VOC data collected from the field and the measured flow rate were used to calculate the pounds of VOCs removed from subsurface. The total through June 26, 1992 was 118 pounds. Table 13 shows the calculated pounds throughout the monitoring period. Please note that the air flow specified on this table is the total system air flow which includes bleed air.

A trend of the daily VOC removal rate is shown in Figure 18. The daily pound removal rate has ranged from 0.5 to slightly higher than 2 pounds. These values almost exclusively reflect unsaturated adsorbed removal, as the air sparge system was operational for only short times during this monitoring period. However, the increases observed on March 20 and June 3 were due to the air sparge system being operational.

6.3.4 Individual Vapor Extraction Point Operation

A summary of the individual vapor extraction point operation is shown in Table 15. These data represent SVE operation only as the sparge system was not in operation. Individual vacuum, VOC levels and air flow are shown on this table. The vacuum data shows that the initial vacuums were below the design vacuum, but after continued system operation all points exhibited the design vacuum reponse (35 inches w.c.). The VOC data indicates that VEP-6 and VEP-3 are withdrawing the highest VOC levels with maximum reported PID concentrations of 70 and 27 ppmv, respectively. The other points are extracting low levels of volatiles, approximately 1 to 2 ppmv. These data correlate with the contaminant distribution data which determined that the majority of the VOCs were not in the unsaturated soil.

6.3.5 Carbon Dioxide and Oxygen Utilization

In order to provide an indication of the biological activity and degradation occurring on site, carbon dioxide and oxygen concentrations were measured in the extracted SVE air stream. The carbon dioxide was measured

Table 15

Individual Vapor Extraction Point Operational Data

	VEP-1	VEP-2	VEP-3	VEP-4	VEP-5	VEP-6	SV-1
Vacuum (in wc) Date 3/11	45	41	40	41	40	41	NM
Vacuum (in wc) Date 3/27	37	37	36	36	36	37	37
Vacuum (in wc) Date 4/24	NM	NM	NM	NM	NM	NM	NM
Vacuum (in wc) Date 5/8	NM	NM	NM	NM	NM	NM	NM
VOC Concentration (ppmw) Date 3/11	1.6	1.8	1.1	0.7	0.5	4.5	2.0
VOC Concentration (ppmw)* Date 3/27	9	17	10	4.4	4.0	70	25
VOC Concentration (ppmw) Date 4/24	2.7	24	27	0.9	0.5	68	0
VOC Concentration (ppmw) Date 5/8	0.7	0.8	13.2	1.5	1.0	7.5	0.3
Air Flow (cfm) Date 3/11	NM	NM	NM	NM	NM	NM	NM
Air Flow (cfm) Date 3/27	18.7	11	12	7.7	13.2	8.8	2.2
Air Flow (cfm) Date 4/24	18.7	21.5	22	22	21.5	19.8	22
Air Flow (cfm) Date 5/8	24.6	26.4	31.7	22.9	25	25	21

NM = Not measured
* = Measured with a PD except for 3/27.
in wc = inches water column

utilizing draeger tubes; the oxygen concentration was measured utilizing an explosimeter. Table 16 shows the reported values.

The oxygen levels show a 0.5 and 0.7 decrease from background levels, indicating oxygen utilization by bacteria. The carbon dioxide percentages were 0.17 and 0.27 percentage points above ambient air background levels, also indicating bacterial activity. With the measured data it is not possible to determine whether the bacterial activity is from degradation of VOCs or natural soil organic material.

Table 16

Oxygen and Carbon Dioxide Percentages in SVE Effluent

Date	SVS Effluent 0_2	Ambient Air	SVS Effluent $C0_2$	Ambient Air
4/24/92	20.90%	21.4	0.20%	0.03
5/8/92	20.20%	20.9	0.30%	0.03
6/3/92	20.90%	NM	NM	NM

6.4 Air Sparge System

6.4.1 Operation Summary

The air sparge system was operating only intermittently during this monitoring period. Groundwater extraction system down time and the need to verify the actual air injection rates were the cause of the intermittent operation. The system was in operation for 21 days and evaluation of the subsurface response was performed during these operating times.

6.4.2 Verification of Radius of Influence

The actual operational ROI was compared with the design ROI to verify effective system operation. The air sparge was operated at varying flows ranging from 12 to 24 cfm. At the end of each flow rate interval the dissolved oxygen concentration in the groundwater was monitored at varying distances. Table 17 shows the recorded values. The data indicate that at a flow rate of 20 cfm an effective ROI of 20 feet was measured (based upon an increase of at least 1 mg/l dissolved oxygen). This correlates with the design data, 24 cfm and 22 foot ROI. Additional dissolved oxygen data was collected to define background levels and to indicate the air sparge influence. Table 18 shows the results.

Table 17

Reverification of Air Sparge ROI - Increase in Dissolved Oxygen Concentrations (ug/l)

Air Flow Rate (cfm)	GT-1S (10 ft)	GT-6S (15 ft)	GT-3S (20 ft)
12	1.0	0.5	0
16	6.8	1.2	0.6
20	8.4	1.9	3.5
24	9.6	1.9	5.2

6.4.3 System Effectiveness

The SVE removal rate is the primary indicator of an effective air sparge system. As discussed in section 6.3.3, during several sparge system operation periods increases in the pounds removal rates of VOCs were observed. When the sparge system operates for a longer period, a better evaluation can be performed.

6.5 Off-Gas Treatment System

6.5.1 Total System Effluent Concentrations

A temporary vapor phase carbon was installed to treat the off-gas from the treatment system. The off-gas concentration from the total remedial system, after the vapor phase carbon, was monitored monthly to document the VOC levels emmitted into the atmosphere. Table 19 contains the monitoring results.

Table 19

Off-Gas Effluent Monitoring Results

Monitoring Date	PID/FID (ppmv)	Laboratory (ppmv)
3/11/92		ND
4/10/92	0	NM
5/8/92	0.2	NM
6/26/92	0	NM

NM = not measured

6.5.2 Evaluation of Total Loading to Vapor Phase Carbon Unit

The vapor phase carbon was temporarily installed in order to collect off-gas concentration data to better evaluate permanent off-gas treatment systems. In order to do this, the total pounds of VOCs emmitted from the SVE system and air stripper were combined and an estimate of the total amount of carbon used to treat these VOCs was obtained. The total amount of carbon utilized during this monitoring period was 1,800 pounds. The vapor phase carbon cannister contains 2,000 pounds, therefore the first cannister is 90 % spent. The monthly carbon utilization was approximately 600 pounds. These calculations are based upon a carbon loading rate of 12 % by weight. A cost analysis of continued useage of vapor phase carbon will be developed prior to selection of the permanent alternative.

6.6 Summary of Remedial System Effectiveness

Through June 1992, the remedial system at this site has removed 217 pounds of VOCs from the subsurface (118 pounds through soil vapor extraction and 99 pounds through groundwater extraction). The 217 pounds of the estimated 2,519 total pounds identified in the subsurface represents over 8 %.

To document the remedial effectiveness, a groundwater sampling round was performed on June 30, 1992. Concentrations decreased in GT-7S by 28 % and 94 % in GT-6S. Figure 19 shows the VOC contour map of the results. Additional data will need to be evaluated to document declining trends.

Table 18

DISSOLVED OXYGEN in mg/l

DATE	Status of Sparge System	GT-1S	GT-2S	GT-3S	GT-6S	GT-7S	RW-1S	RW-2S	RW-1D
11-Mar-92	Off	1.06	2.3	0.7	3.15	0.37			
24-Mar-92	On	6.4	5.8	0.7	3.65	0.45	0.75	1.9	
24-Apr-92	Off	0.46	0.37	0.34	3.53	0.41	0.41	1.55	
08-May-92	Off	0.3		0.36	0.69		0.4		
03-Jun-92	Off	0.39	0.36	0.4	2.34	0.3		1.85	0.26
03-Jun-92	On	0.32	0.34	0.3	2.26	0.51			0.19
03-Jun-92	On	0.24		0.65	2.15	0.52		0.49	0.15
03-Jun-92	On	0.3		0.26	2.44	0.52		0.21	0.22
26-Jun-92	On	8.85		3.9	4.25				

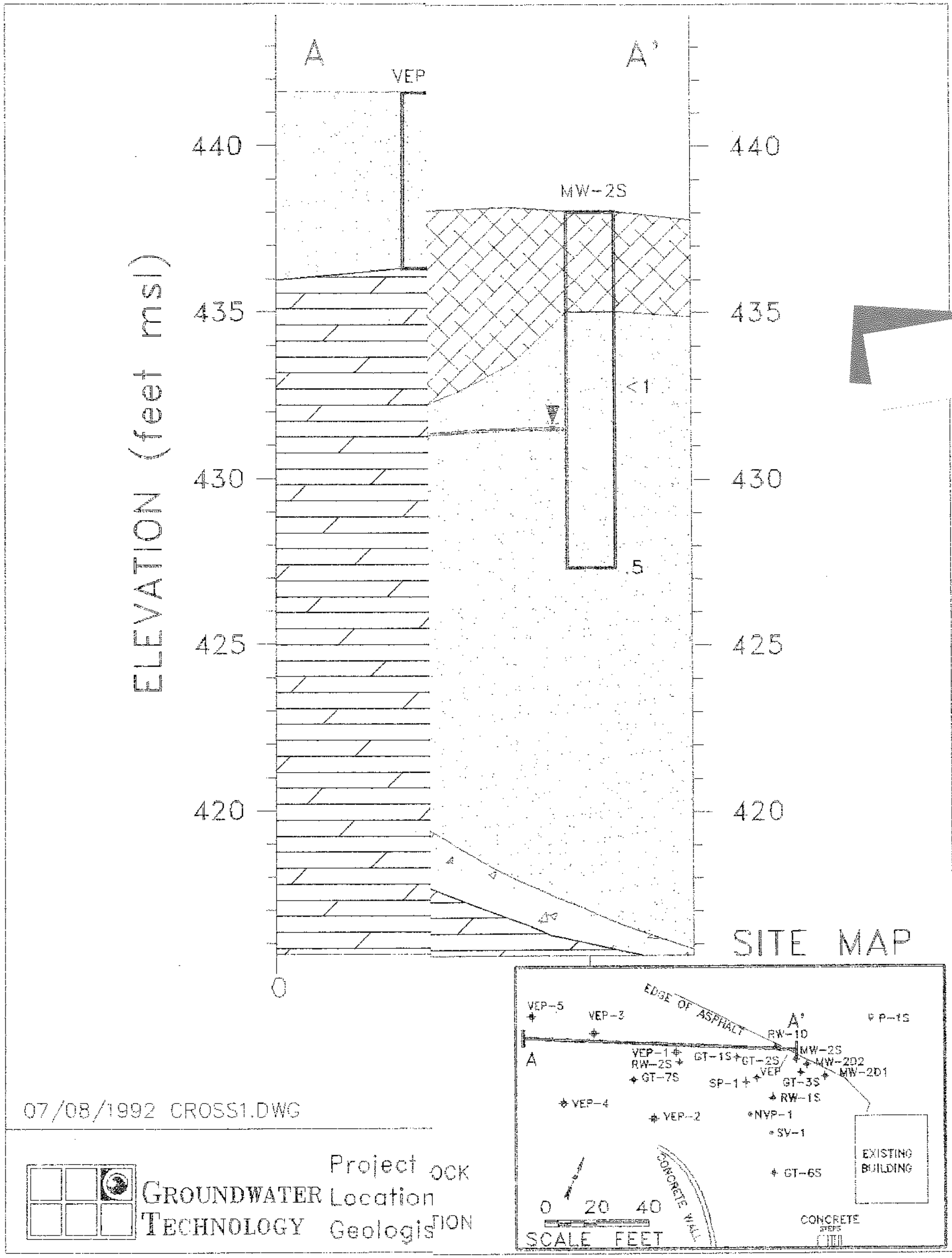

A
A'
VEP
MW-2S
440
435
430
425
420
ELEVATION (feet msl)
<1
.5
0
SITE MAP
EDGE OF ASPHALT
VEP-5
VEP-3
A'
RW-1D
P-1S
A
VEP-1
RW-2S
GT-7S
GT-1S
GT-2S
VEP
MW-2S
MW-2D2
MW-2D1
GT-3S
SP-1
RW-1S
VEP-4
VEP-2
NVP-1
SV-1
GT-6S
CONCRETE WALL
EXISTING BUILDING
CONCRETE STEPS
0 20 40
SCALE FEET
07/08/1992 CROSS1.DWG
GROUNDWATER TECHNOLOGY
Project
Location
Geologis

TABLE 6

SUMMARY OF SOIL MONITORING RESULTS

WELL ID	INTERVAL (FT)	PID READING (PPMV)	LABORATORY ANALYTICAL RESULTS (ppb) (EPA 8240)
VEP-3	2-4	30	
	4-6	50	
	6-8	60	Methylene Chloride 24 ppb Trichloroethene 4 ppb
VEP-4	2-4	0	
	4-6	0	
	6-8	0	
	8-10	0	
	10-12	NOT MEASURED	Methylene Chloride 16 ppb Trichloroethene 6 ppb
VEP-5	2-4	5	Methylene Chloride 38 ppb 1,2-Dichloroethene 16 ppb Trichloroethene 41 ppb
	8-10	NOT MEASURED	Methylene Chloride 14 ppb Acetone 31 ppb Trichloroethene 7 ppb Toluene 140 ppb
GT-7S	@ 7	250	No Samples Taken

KEY:

LAB ID	FIELD ID
GT-GS	GT-6S
SP-5	SP-1
SV-2	VEP-1
SV-3	VEP-2
SV-4	VEP-3
SV-5	VEP-4
SV-6	VEP-5
SV-7	GT-7S

Cross sections were developed to more clearly present the field screening results, both from the remedial installation and prior subsurface explorations. Figures 12 and 13 show cross sections running north-south and east-west across the study area. The highest concentrations were below the water table in the area around GT-1S. These cross sections show that the areal and vertical extent of subsurface soil impact has been indentified. The cross sections were additionally utilized to define the adsorbed phase mass loading which is discussed in Section 5.0.

GROUNDWATER AND SOIL REMEDIAL SYSTEM
START UP AND FIRST QUARTERLY REPORT
(MARCH THROUGH JUNE - 1992)
PAWLING CORPORATION
157 CHARLES COLMAN BLVD.
PAWLING, NEW YORK

August 26, 1992

Submitted to:

Ms. Susan R. Thompson
Regulatory Affairs Manager
Pawling Corporation
157 Charles Colman Blvd.
Pawling, New York 12564-1188

49rep/Pawling\5104GWS.Rem

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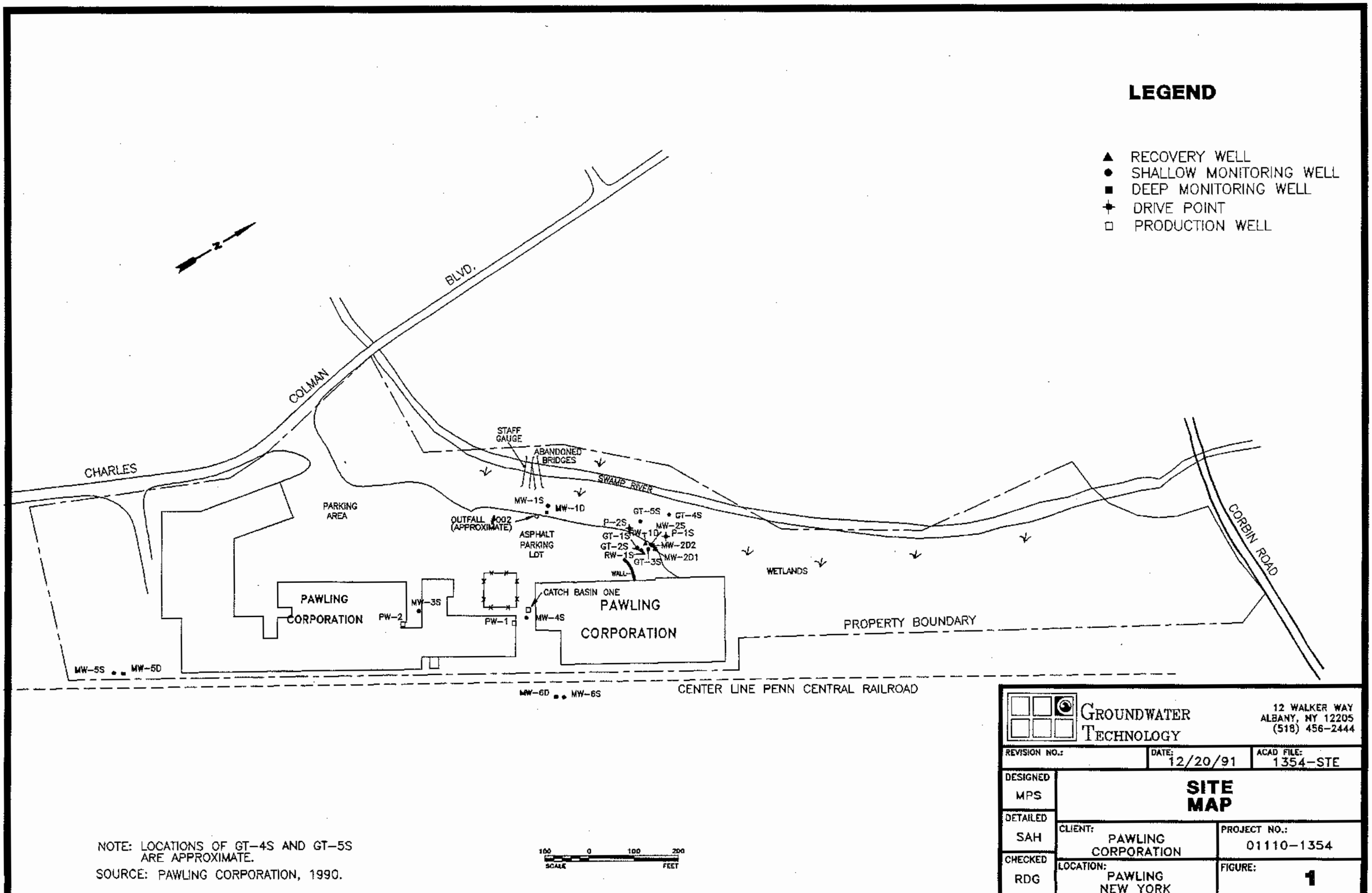
A Drilling Logs
B Gauging Data
C Laboratory Data
D Contaminant Distribution Calculations

1.0 INTRODUCTION

The Pawling Corporation site located in Pawling, New York is on the New York State Inactive Hazardous Waste list specified as a Class 2 (Figure 1). A remedial plan was outlined and submitted to the New York State Department of Environmental Conservation (NYS DEC) entitled "Work Plan for Subsurface Remedial Design and Implementation, Pawling Corporation", dated May 25, 1989. The work plan was approved by the NYS DEC Division of Hazardous Waste Remediation prior to initiation.

The results of this work plan were utilized to select and design a remedial system for this site. An engineering report, "Remedial System Design, Pawling Corporation", dated February 26, 1991, was prepared and submitted to the NYS DEC for approval prior to system installation. The design report was approved on June 17, 1991. The approved system consisted of groundwater extraction wells, air stripper and liquid phase carbon water treatment, air sparging, soil vapor extraction and vapor phase carbon off-gas treatment.

This status report details the pilot test results, baseline conditions, remedial system installation and first quarter operational information for the soil, air and groundwater treatment systems installed at this site.



LEGEND
RECOVERY WELL
SHALLOW MONITORING WELL
DEEP MONITORING WELL
DRIVE POINT
PRODUCTION WELL
N
COLMAN BLVD.
CHARLES
CORBIN ROAD
SWAMP RIVER
STAFF GAUGE
ABANDONED BRIDGES
PARKING AREA
OUTFALL 002 (APPROXIMATE)
ASPHALT PARKING LOT
MW-1S
MW-1D
GT-5S
GT-4S
P-2S
MW-2S
GT-1S
RW-1D
P-1S
GT-2S
MW-2D2
RW-1S
MW-2D1
GT-3S
WALL
WETLANDS
CATCH BASIN ONE
PAWLING CORPORATION
MW-3S
PW-2
PW-1
MW-4S
PAWLING CORPORATION
PROPERTY BOUNDARY
MW-5S
MW-5D
MW-6D
MW-6S
CENTER LINE PENN CENTRAL RAILROAD
NOTE: LOCATIONS OF GT-4S AND GT-5S ARE APPROXIMATE.
SOURCE: PAWLING CORPORATION, 1990.
100 0 100 200
SCALE FEET
GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444
REVISION NO.:
DATE: 12/20/91
ACAD FILE: 1354-STE
DESIGNED MPS
DETAILED SAH
CHECKED RDG
SITE MAP
CLIENT: PAWLING CORPORATION
PROJECT NO.: 01110-1354
LOCATION: PAWLING NEW YORK
FIGURE: 1

2.0 REMEDIAL SYSTEM PILOT TESTS

Air sparging and soil vapor extraction (SVE) pilot testing was performed prior to system installation in order to correctly locate the sparge and vent points and to determine the required equipment specifications for air flow, vacuum and pressure. Groundwater pump testing had previously been performed and the results are documented in the "Groundwater Investigation Pre-remedial Design Report, Pawling Corporation", dated January 3, 1991.

2.1 Test Protocol

The pilot testing consisted of three components: a vent test, a sparge test and a combined sparge/vent test. The vent and sparge tests were performed first to define the individual equipment specifications and to determine the most effective operational conditions of these systems. The combined test documented actual field response to the selected pressure and vacuum to verify the predicted response. Each of these tests are described below.

2.1.1 Soil Vapor Extraction Test

The SVE test was performed by attaching a soil vacuum blower to the pilot test vent well (GT-2S) and running the test at three vacuum settings, 21, 35 and 44 inches of water and 34, 38, and 41 cfm, respectively. Each vacuum setting was a phase of the test which defined a ROI and an off-gas Volatile Organic Compound (VOC) concentration. These data allowed selection of the vacuum which provided maximum radius of influence and proper blower sizing. Each phase was run until stabilization occurred.

2.1.2 Air Sparge Test

The air sparge test was performed by connecting a compressed air line to the top of a newly installed sparge point (SP-1). Section 3.2 describes the construction details of the sparge point. The test was performed at three pressures, 4 psi, 5 psi and 8 psi (10%, 40% and 115% over the pressure needed for the air to overcome the 8.5 foot water column). All points were monitored for pressure and VOCs. Dissolved oxygen (DO) and depth to water (DTW) were recorded in the monitoring wells at the end of each pressure setting as removal of the pressure caps interfered with the pressure readings. Each pressure test was until stabilization occurred. The induced responses to various air flows allowed for the selection of an air flow which provided the greatest radius of influence without over-pressurization.

2.1.3 Air Sparge/Soil Vapor Extraction Test

The last phase of pilot testing was implementation of a combination air sparge/SVE test. This test was conducted to record field response under actual operating conditions and to ensure that the responses obtained from the individual SVE and air sparging tests matched the combined response test. The combination test was run at 8 psi and 42 inches of vacuum, which were the maximum levels recorded during the SVE and sparge tests. The objective of this test was to ensure that a net vacuum could be monitored across the site under maximum operating conditions so that all sparge vapors were contained.

2.1.4 Monitoring Network

The monitoring network utilized for the pilot tests consisted of five existing monitor wells, a nested probe screened at two intervals in the unsaturated zone, and three 0.25 inch stainless steel probes manually installed to a depth of 3 feet.

Monitoring points were selected to provide multi-directional data at varying distances from the test well. The distances were chosen based upon prior knowledge of soil permeability values, as the radius of influence is directly related to permeability. Additionally, monitoring points were installed to provide information concerning potential vertical difference in response both in the unsaturated and saturated zones. Figure 2 shows the layout of the pilot test monitoring array.

2.2 Soil Vapor Extraction Test Results

Vacuum in the subsurface generally decreases exponentially with distance. To calculate an effective radius of influence and to determine anisotropic response, the natural log (ln) of the vacuum was plotted versus distance. Linear regression was performed to determine the best fit lines and to evaluate correlation coefficients with different data sets to assist in defining anisotrophy in the subsurface at the site. Table 1 depicts the results of the linear regression.

The data for this site indicated that a point at 14.5 feet exhibited an anomalous reading, therefore this point was eliminated from subsequent analysis. Figure 3 also shows the determined best fit lines and the determined ROI for each vacuum setting. A vacuum of 0.1 inches of water was selected to define a significant response (ROI).

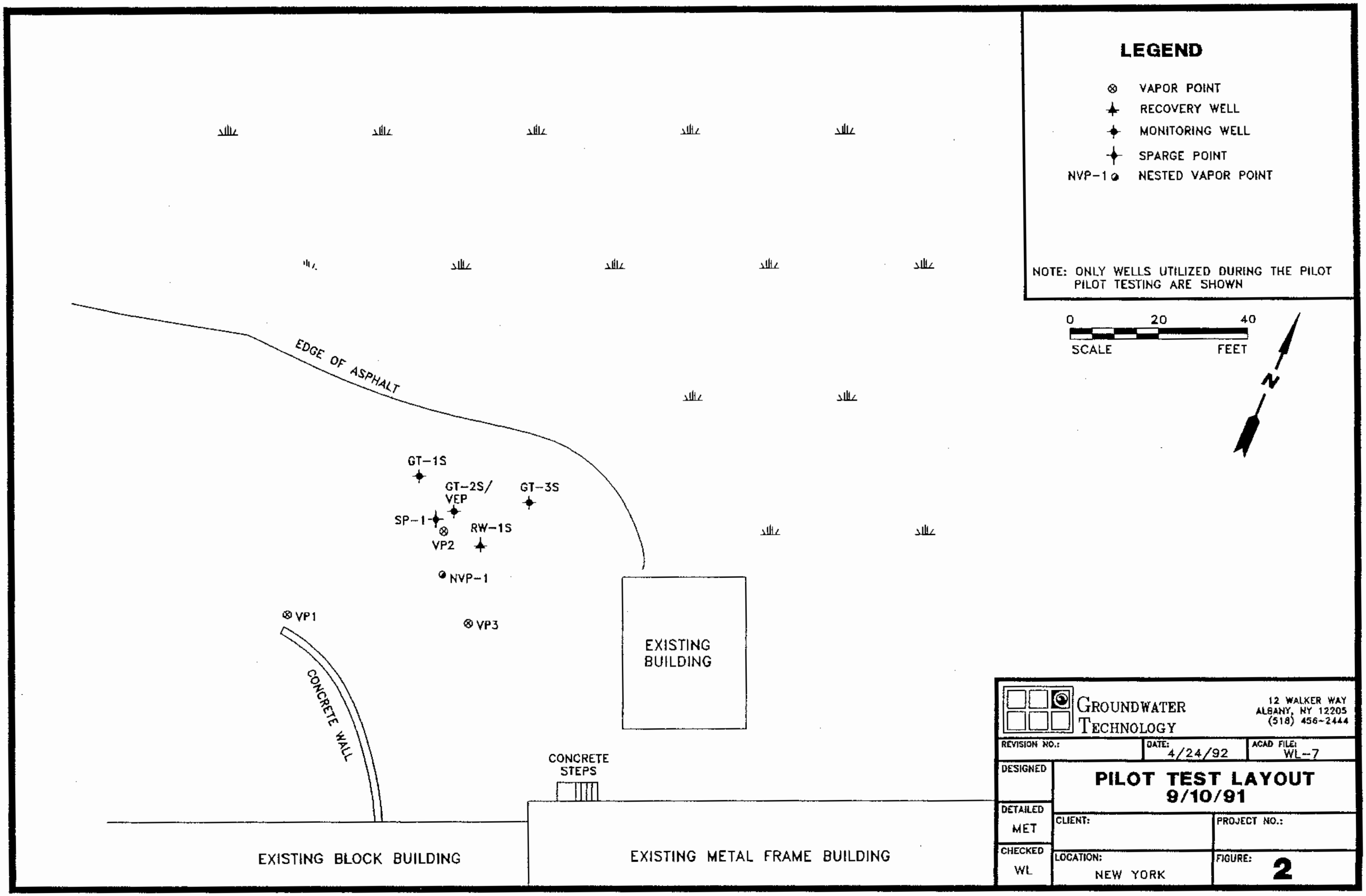

LEGEND
VAPOR POINT
RECOVERY WELL
MONITORING WELL
SPARGE POINT
NVP-1
NESTED VAPOR POINT
NOTE: ONLY WELLS UTILIZED DURING THE PILOT PILOT TESTING ARE SHOWN
0
20
40
SCALE
FEET
N
EDGE OF ASPHALT
GT-1S
GT-2S/ VEP
GT-3S
SP-1
VP2
RW-1S
NVP-1
VP1
VP3
CONCRETE WALL
EXISTING BUILDING
CONCRETE STEPS
EXISTING BLOCK BUILDING
EXISTING METAL FRAME BUILDING
GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444
REVISION NO.:
DATE: 4/24/92
ACAD FILE: WL-7
DESIGNED
PILOT TEST LAYOUT
9/10/91
DETAILED
MET
CLIENT:
PROJECT NO.:
CHECKED
WL
LOCATION:
NEW YORK
FIGURE:
2

TABLE 1

LINEAR REGRESSION CORRELATION COEFFICIENTS

Vacuum	All data points	Without 14.5 foot point
21"	0.62	0.92
35"	0.87	0.97
44"	0.88	0.95

The determined ROI for each vacuum was plotted versus each vacuum setting to select the vacuum above which not greater ROI was observed. The maximum ROI obtained was 27 feet at 35 inches of water vacuum (Figure 3). VOC effluent concentrations at each vacuum setting were also evaluated. The vacuum which produced the highest effluent VOC concentration was selected for the design. This value also correlated with the most effective vacuum ROI. Figure 3 shows these results. The pilot test results indicated that the design parameters for this site should be a vacuum of 35 inches of water at 38 cfm air flow per point.

The data was further evaluated through use of a Groundwater Technology, Inc. developed air flow model which utilized the pilot test vacuum versus distance results and calculated the area through which sufficient air could be drawn to remove a selected percentage of the contaminants over a desired time period. This model determined that for an anticipated removal rate for tetrachloroethylene of 99% and 365 days of operation the design spacing for the vent points at this site was 20 feet. The air flow model provides a more conservative ROI and therefore this distance was utilized for system design.

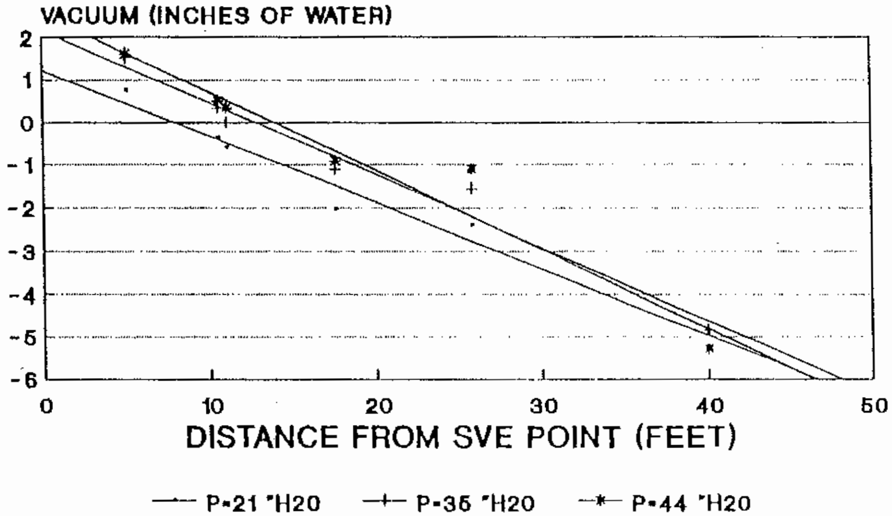
2.3 Air Sparge Test Results

The air sparge test ROI was evaluated through several parameters:

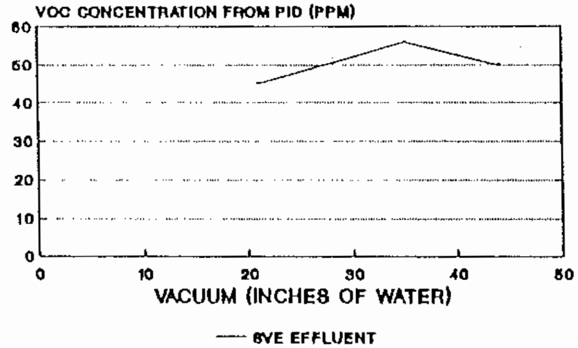
- observed distance indicating increased dissolved oxygen
- observed distance indicating rising water elevations
- observed distance indicating increased VOC concentrations
- observed distance indicating pressure response.

A pressure versus distance graph was evaluated to select the pressure which provided the maximum ROI without over pressurization (Figure 4). The determined ROIs were 11.5, 15 and 16 feet for 4, 5 and

LN VACUUM VS. DISTANCE
SVE PILOT TEST RESULTS



VOC CONCENTRATIONS
DURING SVE TEST



ROI VERSUS VACUUM
SVE PILOT TEST RESULTS

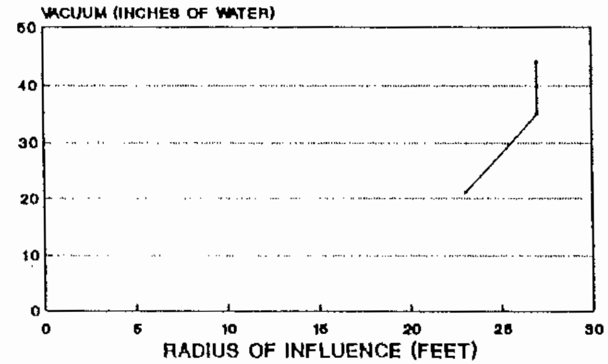


Figure 3

SVE PILOT TEST RESULTS

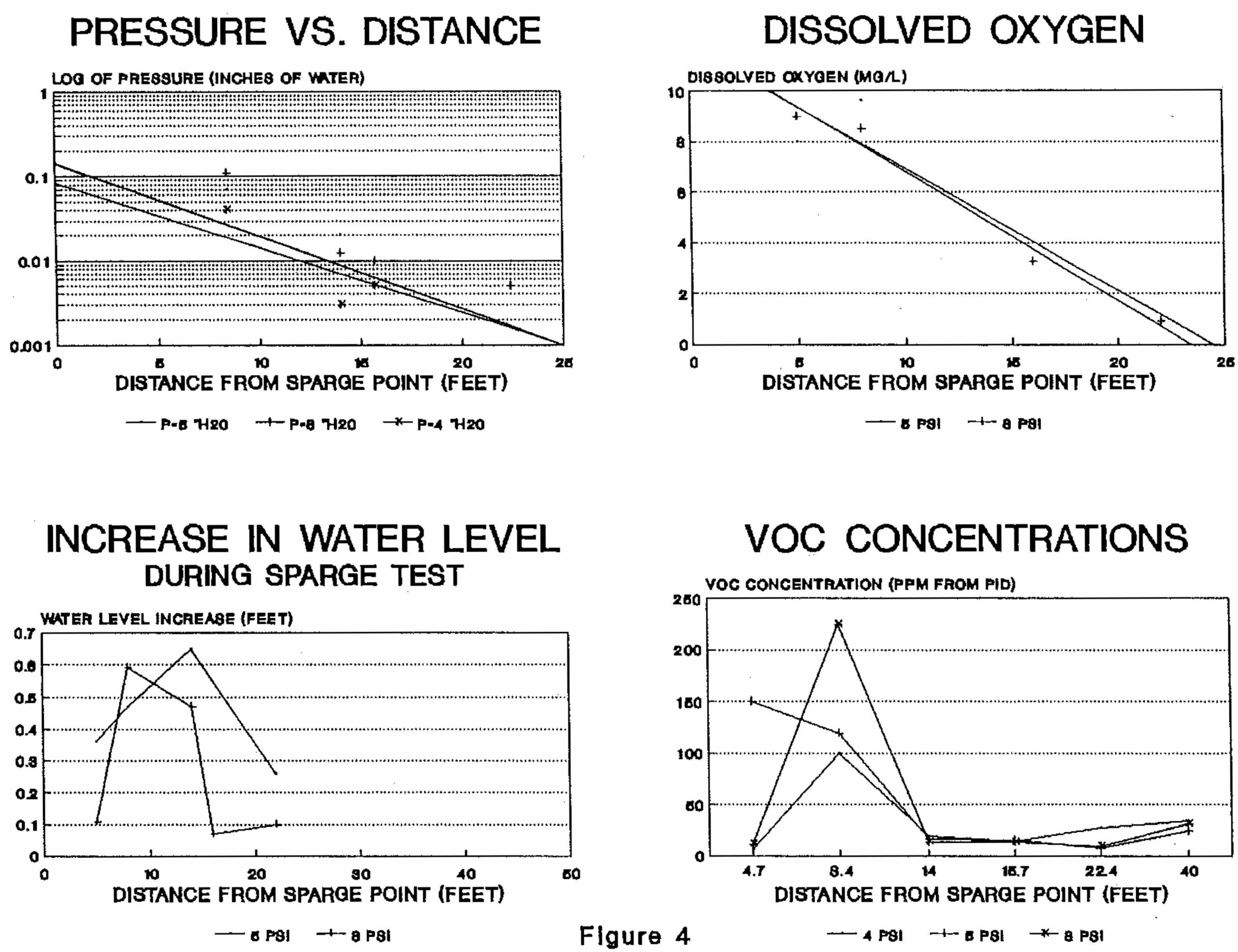


Figure 4

AIR SPARGING PILOT TEST RESULTS

8 psi, respectively. The ROI for each test pressure was plotted to select the pressure above which no increase in radius of response was observed (Figure 5). The determined ROI was 16 feet at the maximum pressure of 8 psi.

The graphs of the other test parameters were compared to the pressure response (Figure 4). Table 2 shows the determined ROI for each of these parameters. VOC and pressure increases indicate the lowest ROI at 14-16 feet. The ROI exhibited by DO and groundwater increases during the air sparge pilot test was 22 feet.

TABLE 2

AIR SPARGE RADIUS OF INFLUENCE DETERMINATION

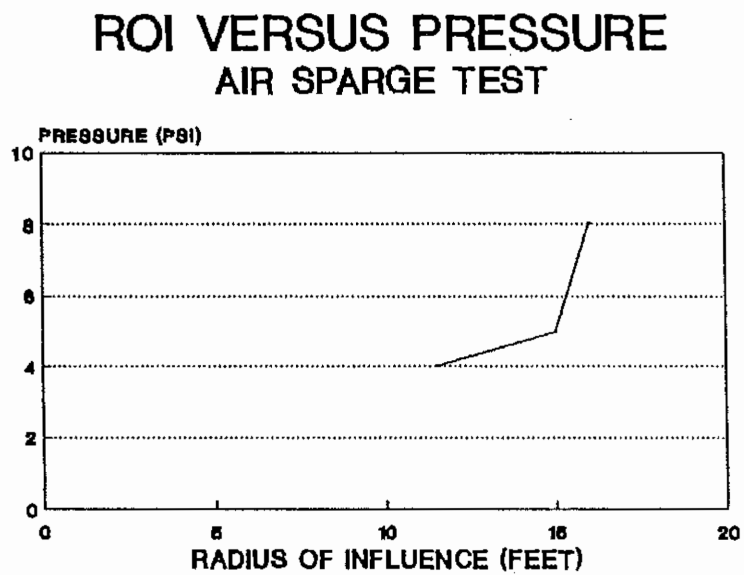
PARAMETER	MAXIMUM RADIUS OF INFLUENCE (FEET)
Pressure Response	16
Dissolved Oxygen	22
Increase in Water Level	22
Increase in VOCs	14

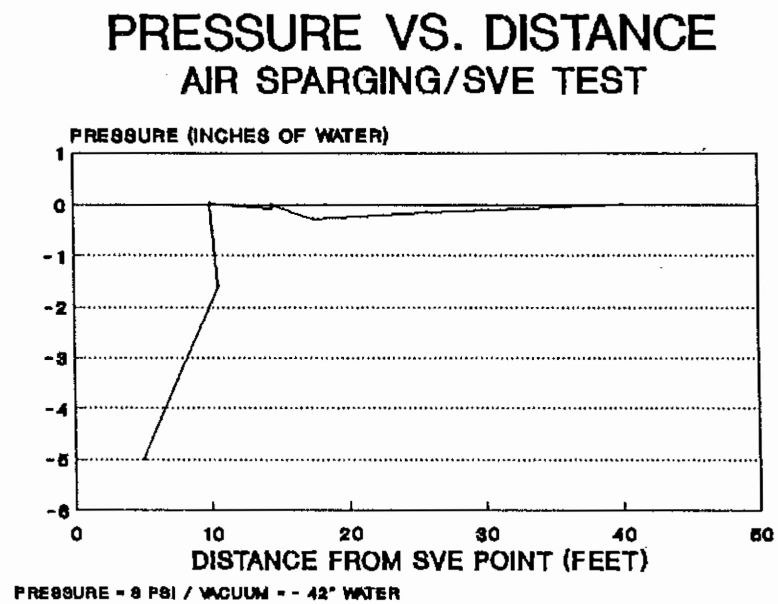
2.4 Air Sparge/Soil Vapor Extraction Test Results

The air sparge/SVE test determined that net vacuum was maintained at 35 feet from the SVE point. The results are shown in Figure 5. These data document the capture of the air sparge off-gases within the design SVE ROI of 20 feet.

Figure 5

AIR SPARGE ROI AND AIR SPARGE/SVE RESULTS





3.0 FINAL SYSTEM CONFIGURATION

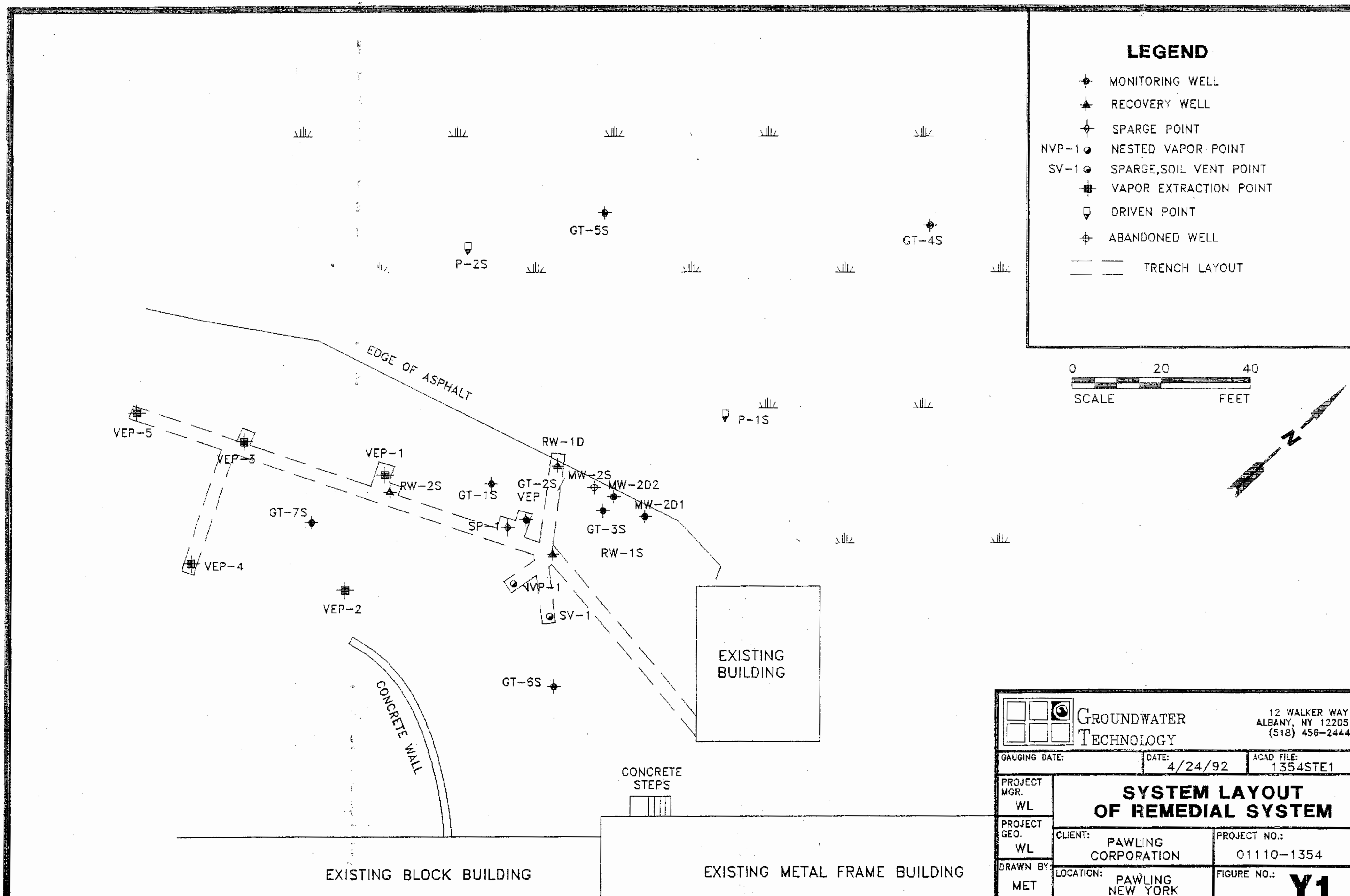
3.1 System Overview

The final system layout and selected equipment, as determined through the pilot testing, are shown in Figure 6 and Table 3. The system consists of four major components: 1) groundwater extraction through overburden pumping wells and treatment through air stripper and carbon polish, 2) unsaturated soil treatment through a soil vapor extraction system, 3) saturated soil treatment through an air sparge system, and 4) off-gas treatment through vapor phase carbon. A description of the remedial point construction and each component of the remedial system are presented in the following sections.

TABLE 3

SYSTEM LAYOUT AND FINAL SYSTEM SPECIFICATIONS

ORIGINAL DESIGN LAYOUT	FINAL LAYOUT
8 SVE Points 5 Air Sparge Points 3 Recovery Wells	1 Air Sparge/SVE Point 1 Air Sparge Point 6 SVE Points 2 Overburden Recovery Wells 1 Bedrock Recovery Well (not operational in this phase)
FINAL SYSTEM DESIGN SPECIFICATIONS	**EQUIPMENT**
SVE - 175 scfm @ 35" vacuum (based on total ROI of 7 SVE points)	5 Hp, 460 Volt, Regenerative Blower 210 scfm @35" vacuum 2-30 gallon moisture separators 2 - 1,800 lb vapor paks
AIR SPARGE - 24 scfm @ 8-10 psi (12 scfm per point)	15 Hp, 460 Volt, 52 scfm @ 100 psi (28 scfm for pumping system) Air dryer Timer
GROUNDWATER RECOVERY - 2 wells @ 2 gpm (overburden recovery only)	2 - 1.5' long 4-gallon ejectors 2 - ejector controllers 2 - water meters
GROUNDWATER TREATMENT - 99%+ Removal of Organics 4 gpm	1 - ESI® 7 tray air stripper 2 - Hadley® 200 lb liquid phase carbon absorbers → 2 10 micron Pre Filters
OVERRIDE PROTECTION	Programmable controller



GROUNDWATER TECHNOLOGY

12 WALKER WAY
ALBANY, NY 12205
(518) 458-2444

GAUGING DATE:	DATE: 4/24/92	ACAD FILE: 1354STE1

PROJECT MGR.: WL

PROJECT GEO.: WL

DRAWN BY: MET

SYSTEM LAYOUT OF REMEDIAL SYSTEM

CLIENT: PAWLING CORPORATION

PROJECT NO.: 01110-1354

LOCATION: PAWLING NEW YORK

FIGURE NO.: **Y1**

As shown in Table 3, the final system configuration was slightly different than the design layout due to subsurface variations. Site hydrogeologic conditions and saturated and unsaturated contamination identified during remedial installation were utilized to appropriately modify the design layout. During the air sparge and SVE point installation, the saturated thickness was determined to be less than the design thickness, and two small for effective air sparging. The number of air sparge points installed was therefore less than the original estimate. Additionally, the third recovery well was not installed due to lack of an overburden water table at this location.

The final monitor point system consisted of:

- one sparge point (SP-1)
- one combined sparge/soil vent point (SV-1)
- six vapor extraction points (VP-1 through VP-5) plus one existing monitor well (GT-2S/VP-6)
- two overburden recovery wells (RW-1S and RW-2S)
- one bedrock recovery well (RW-1D) (presently not a pumping well)

Monitor points were also installed to monitor the effectiveness of the remedial system. The points installed consisted of two monitor wells (GT-6S and GT-7S) and one nested vapor probe (NVP-1).

3.2 Remedial and Monitor Point Construction

During the period from September 9 through 19, 1991, a Mobile B-61 hollow stem auger drill rig with split spoon sampling capabilities was utilized to install the remedial points. Additionally, an air rotary technique was utilized at selected locations where auger refusals were encountered due to the presence of boulders. Monitoring wells and vapor extraction points were constructed of two-inch diameter, PVC screen and riser with flush-threaded joints. Sparge points were constructed of two-inch diameter FRP screen and riser, with flush-threaded joints. The overburden recovery wells were constructed of six-inch diameter stainless steel screen and riser. Well construction details are summarized in Table 4. The complete well logs are included in Appendix A.

Split spoon soil samples were collected at the locations believed to contain elevated levels of volatile organic compounds, as delineated during the previous phases of investigation. Split spoon soil samples were screened in the field using a Photoionization Detector (PID - HNU with a 11.7 ev lamp) and one soil sample from each drilling location was sent to the laboratory for analysis according to the EPA Method 8240. Section 4.3 details the soil sampling results.

TABLE 4

REMEDIAL AND MONITOR POINT CONSTRUCTION DETAIL

WELL ID	TOTAL DEPTH (FT BELOW GRADE)	WELL MATERIAL	DIAMETER (INCH)	SCREENED INTERVAL (FT BELOW GRADE)
RW-1S	14	ST. STEEL	6	6-14
RW-2S	12	ST. STEEL	6	2-12
RW-1D	42	CARBON STEEL	6	28-42
SP-1	16.3	FRP	2	14.3-16.3
SV-1	13.5	FRP - SP PVC - VEP	2	12-13 3-9.5
VEP-1	13	PVC	2	3-13
VEP-2	14	PVC	2	3-14
VEP-3	7	PVC	2	2-7
VEP-4	12	PVC	2	2-12
VEP-5	5.3	PVC	2	2.3-5.3
GT-6S	16	PVC	2	3-16
GT-7S	12.2	PVC	2	2.2-12.2
NVP-1	9	PVC	2	5-9 2-4

KEY:
PVC - Polyvinyl Chloride
FRP - Fiber Reinforced Plastic
SP - Sparge Point
VEP - Vapor Extraction Point
NVP - Nested Vapor Point

3.3 Groundwater Extraction System

An Ejector System® multiple well pneumatic pumping system with U-3000 controllers and WETB 5" by 18" long ejectors was deployed to recover groundwater from two recovery wells on site (RW-1S and RW-2S). The system is powered and controlled by compressed air, and has the following components:

- Air-operated ejector vessels
- Bellows liquid level control
- Pneumatic control panel
- In line flow meters

The system is designed to recover approximately 2 gallons per minute (gpm) from each of the recovery wells. The system will consume approximately 11 cubic feet of air a minute (cfm) at a pressure of 25 pounds per square inch (psi).

Air-operated ejector vessels:

Each well contains an ejector vessel. The ejector vessel is a cylindrical hollow pressure vessel with two inlet and one discharge check valves. The ejector vessel is constructed of carbon steel and the valves are constructed of 304 stainless steel. The ejector is located in the well at a depth of approximately 8 feet below grade.

The ejector has two operating cycles, fill and discharge. The fill cycle occurs without any pressure on the vessel. This allows the vessel to gravity fill. When the vessel is full the vessel is pressurized by the air line and the water in the vessel is forced up through the discharge check valve into the discharge line. At the end of the discharge cycle the vessel is allowed to depressurize, vent and fill again. Flow rates from the vessel are controlled by adjusting the fill and discharge cycle times.

Bellows liquid level control (BBLC):

Each well contains one BBLC at the well head. The BBLC controls the ejector pumping rate by restricting the high pressure air supply from the control panel. A bubbler line indicates the column of water that is above the ejector vessel by sensing backpressure that is created as water accumulates over the ejector. The bubbler line is mounted approximately 3/8 inches above the intake for the ejector. If the bubbler line senses sufficient amount of water above the ejector (approximately 10 inches) it allows the pump to function at full capacity. At water levels less than 10 inches above the ejector intake the BBLC partially or completely restricts the high pressure discharge air to the pump. A gauge on the face of the BBLC indicates the water level above the intake in inches of water. The BBLC is mounted level to the wall of the recovery well road box.

In Line Flow Meters:

½-inch Master meter water flow meters were installed inside the equipment compound. For each of the recovery wells the meters will accurately measure flow rate from each well and totalize the overall volume of extracted groundwater.

Trenching and Piping:

All lines were installed in trenches approximately 3.0 feet below grade. All lines installed in the trenches were bedded on 6-inches of clean, coarse sand prior to backfilling. A 6-inch lift of sand was also installed above the pipes. The trenches were backfilled and tamped in 1-foot lifts to grade with native soils. All trenches were located in the parking lots, therefore, the top 6-inches of fill was a compacted crusher run sub-base for repaving. Repaving will be conducted during the fall of 1992 by Pawling Corporation.

All lines were pressure tested prior to being buried. The pressure test was performed by sealing off the line, installing a pressure gauge in the line and injecting compressed air to 10 psi. The air pressure in the line was monitored for any changes and the line and all associated fittings were visually inspected for any leaks. The pressure test was maintained for a duration of 1 hour. All lines passed the pressure test.

The groundwater extraction piping layout is shown in Figure 7, Groundwater Extraction and Sparge System Piping and Instrumentation Diagram.

Well Completion:

Each recovery well head was enclosed in a traffic rated steel 2-foot square road box concreted into place. The road box lid is bolted closed and has gaskets to seal it form water intrusion. Each road box houses the pump, bellows liquid level controller, water flow adjustment valve, and an explosion proof junction box required for heat taping water lines. The floor of the road box is filled with gravel to drain any moisture that may enter the road box.

3.4 Groundwater Treatment System

Air Stripper:

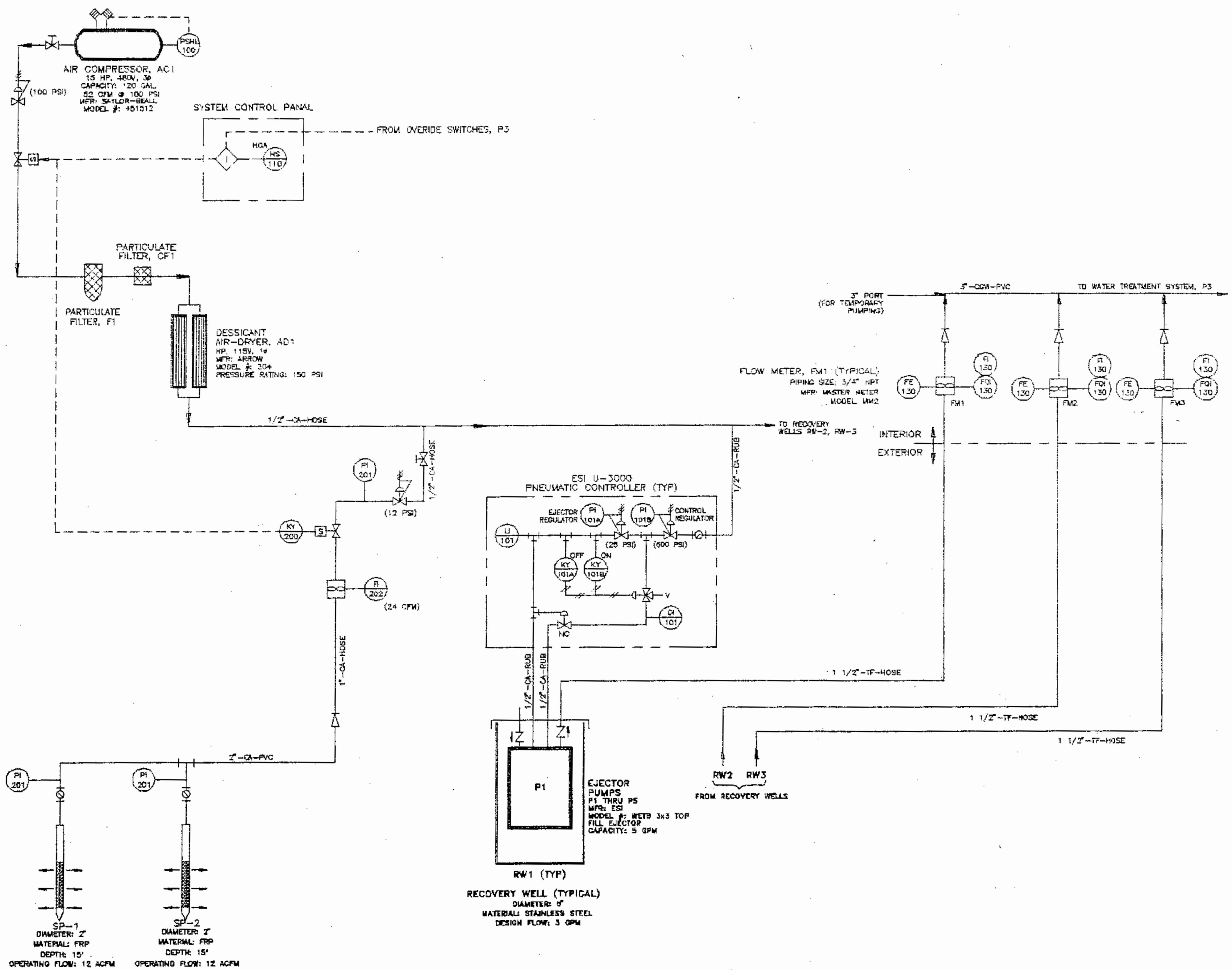
An Ejector System, Inc. (ESI) Low Profile Cascade air stripper, Model STRP-A6, is used to remove VOCs from the water system. The air stripper contains 7 stacked aeration trays each with a series of baffles and bubblers. The air stripper is designed to treat a flow rate of 4 gpm at the anticipated contaminant levels with a maximum design flow rate of 10 gpm. The ESI Cascade System comes equipped with automatic level control and shut-off.

Transfer Pump:

Water from the air stripper is piped to a 210 gallon transfer equalization tank. The transfer tank is constructed of high density polyethylene and is equipped with an air tight lid, a vent to the atmosphere, and the appropriate fittings to mount the transfer pump probes. The water pump allows for equalized pumping through the carbon polishing system.

Sediment Filters:

Two sediment filter housings were installed after the transfer pump to remove any sediment or iron particulates larger than 10 microns that would be in the water stream after the air stripping system. The units are constructed of carbon steel and pressure rated to 250 psi. The filter housings each contain



NO.	DATE	BY	REVISION
1	12/4/91	MPS	SYSTEM CONTROL PANAL
2	12/4/91	MPS	INFLUENT PIPING
3	3/3/92	MPS	CONSTRUCTION DETAIL

SIGNATURE		DATE
REVIEW ENGR:		
PROJECT ENGR:		
PROJECT MGR:		
CLIENT:		

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205 (518)456-2444

PAWLING CORP.
PAWLING, N.Y.

GROUNDWATER EXTRACTION/ SPARGE SYSTEM

PIPING & INSTRUMENTATION DIAGRAM

DESIGNED BY:	DETAILED BY:	CHECKED BY:
MPS	SAH/MET	TWK

DRAWING DATE: 11/06/91	ACAD FILE: 5104-P2
PROJECT NO.: 01110-5104	CONTRACT:
DRAWING: P2	REVISION: 3

several filter cartridges. A pressure gauge located on the top of each filter housing will indicate the need for cartridge change outs. During the first three months of operation one change out per month was needed.

The sediment filters and housings keep the carbon polishing units from clogging with particulates and increase the useful life of the carbon units.

Carbon Polishing Units:

Two liquid phase Hadley GAC units were installed after the sediment filters. Discharge from the filter units is piped through both GAC units as a treatment backup to insure a water discharge within the acceptable discharge limits. Any residual VOCs remaining in the water stream after the air stripper are adsorbed by the carbon. Each of the units contain 200 lbs of liquid phase GAC in a pressure rated fiberglass tank. The units are equipped with pressure gauges before, between and after the units to monitor the need for a change out. Each of the units can operate with pressures up to 150 psi.

Discharge Piping:

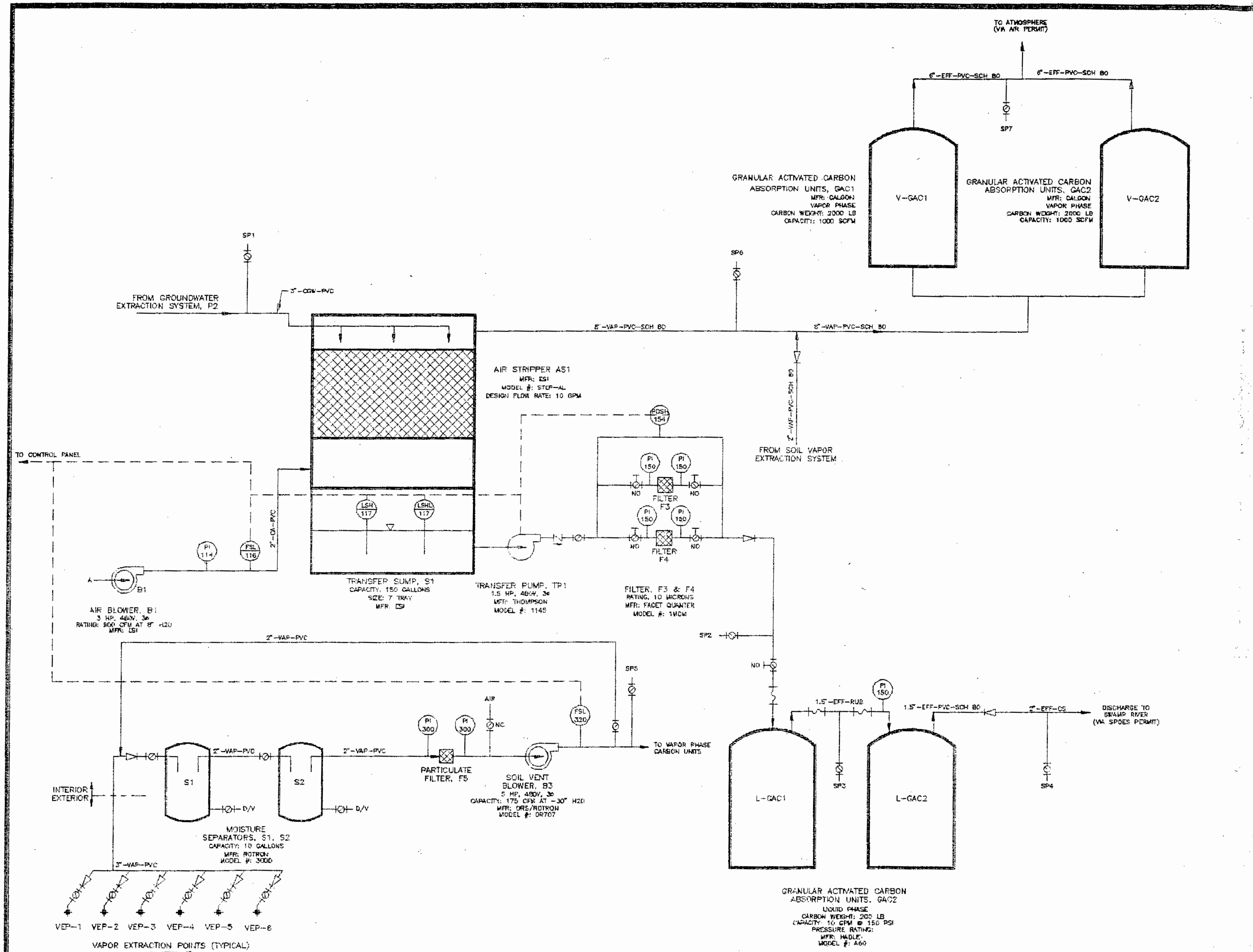
Effluent from the carbon polishing system is discharged to the Swamp River approximately 150 feet north of the equipment compound. The discharge pipe was constructed of 2-inch carbon steel pipe. The pipe was mounted on wooden pilings spaced approximately 12 feet apart. These pilings carry the discharge pipe to the Swamp River minimizing any impact to the wetlands area that surrounds the discharge point.

The discharge line is externally insulated and heat taped to prevent freezing of the line during the winter months. The heat tape is controlled from a plug assembly and thermostat located inside the treatment compound. The treatment system piping is shown on Figure 8, Groundwater Treatment and Soil Vent System Piping and Instrumentation Diagram.

3.5 Soil Vapor Extraction System

Vapor Extraction Points:

Six (6) Vapor Extraction Points (VEPs), plus one monitor well, were installed in the impacted zone of the site (Figure 6, Remedial System Site Layout). The VEPs extract existing VOCs from the soil and any additional VOCs that are produced from sparging activities. The number, spacing and location of VEPs was determined after a field radius of influence (ROI) test (Section 2.1). Section 3.2 details the VEPs construction.



NO.	DATE	BY	REVISION
1.	12/4/91	MPS	AIRSTRIPPER
2.	12/4/91	MPS	DIFERENTIAL PRESSURE SWITCH
3.	12/4/91	MPS	MOISTURE SEPARATOR
4.	1/1/92	MPS	VAPOR PHASE CARBON

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205 (518)456-2444

PAWLING CORP.
PAWLING, NY

GROUNDWATER TREATMENT/ SOIL VENT SYSTEM

PIPING & INSTRUMENTATION DIAGRAM

DESIGNED BY: MPS	DETAILED BY: MET	CHECKED BY:
DRAWING DATE: 1/1/92	ACAD FILE: 1354-P4	
PROJECT NO.: 01110-1354	CONTRACT:	
DRAWING: P3	REVISION: 4	

Piping:

Each VEP was piped via 2-inch, Schedule 80, PVC piping to a 4-inch, Schedule 80 PVC header pipe located in the treatment compound. Each VEP is individually controlled by a ball valve located near the header pipe.

All lines were installed in trenches approximately 3 feet below grade. All lines installed in the trenches were bedded on 6-inches of clean coarse sand prior to backfilling. A 6-inch lift of sand was also installed above the pipes. The trench was backfilled and tamped in 1 foot lifts to grade with native soils. In locations where the trenches were located in roadways or parking lots the top 6-inches of fill was a compacted crusher run base provided for repaving.

Moisture Separators:

Two 30-gallon moisture separators, Model MS 300 D, were installed in line after the soil vent header pipe and before the soil vent blower to reduce the moisture in the vapor stream. The separators allow water vapor to condensate and collect. A manually operated drain valve is located on the bottom of the separators to remove the collected moisture during routine maintenance visits. Two site glasses were installed to monitor the increase in water without interrupting the vapor extraction system.

Soil Vapor Extraction Blower:

A 5 Hp, 480 volt regenerative soil vent blower, Model DR 707, was installed to extract up to 210 cfm (at 35" vacuum) of vapor from the impacted soils via the soil vent network. The blower will be capable of producing a vacuum on the system of up to -60 inches of water column (approximately 2.2 psi).

The soil vapor extraction blower is rated for Class 1, Division 1, Group D, hazardous locations. The blower is equipped with a particulate filter to remove any sand or dirt particulate that may be present in the vapor stream before it reaches the blower. Two vacuum gauges mounted on the blower inlet pipes before and after the particulate filter indicate the vacuum in the line and the need for the filter to be cleaned.

The soil vapor extraction blower is equipped with an override system that automatically shuts down the soil vent system in the event that the off-gas treatment system becomes inoperable. Figure 8 shows the Soil Vapor Extraction Piping and Instrumentation Diagram.

3.6 Air Sparging System

Sparge Points:

Two sparge points were installed in the impacted area of the site. Each point can deliver 5-12 cfm of air to the water table. The sparge point construction is detailed in Section 3.2. The bottom of each sparge point is approximately 6 feet below the surface of the groundwater.

An electronic timer and solenoid valve allow intermittent airflow of the impacted area. The timer is programmable to allow for varied air flow intervals. Several different durations and intervals have been evaluated during this start-up.

Air Compressor:

A 15 Hp, 460 volt Saylor Beall, Model 4515 20, electric air compressor capable of producing 52 cfm compressed air at 100 psi was installed to operate the pumping and sparging systems. The air compressor is equipped with a fan cooled aftercooler that cools the compressed air and condenses some of the water vapor in the compressed air. This condensate is removed by a water separator. The compressor is mounted on a 200-gallon compressed air storage tank to allow for the steady operation of the compressor and keep storage of air for any peak operation needs.

Desiccant Air Dryer: A desiccant air dryer, Model 204, and particulate filters were installed after the air compressor to remove moisture, residual oil and particulates from the air stream. The air dryer conditions the operating air to provide more efficient operation with lower operating maintenance.

Piping:

Compressed air is piped via 1-inch Schedule 80 PVC pipe to the sparge points. All lines were installed in trenches approximately 3 feet below grade. All lines installed in the trenches were bedded on 6-inches of clean coarse sand prior to backfilling. A 6-inch lift of sand was also installed above the pipes. The trench was backfilled and tamped in 1-foot lifts to grade with native soils. In locations where the trenches were located in roadways or parking lots the top 6-inches of fill was compacted crusher run base provided for repaving. Piping which is above ground in the compound is galvanized steel. Figure 7 shows the Sparge System Piping and Instrumentation Diagram.

4.0 INITIAL SUBSURFACE CONDITIONS

The effectiveness of the installed remedial system will be evaluated relative to the initial subsurface conditions. This section presents the baseline groundwater gradient, groundwater quality and soil quality which were identified prior to start up of the remedial system.

4.1 Groundwater Gradient

A complete groundwater gauging round was performed on March 9, 1992 prior to remedial system start-up to document the initial site conditions. The gauging data are included in Appendix B. The overall site overburden and bedrock groundwater flow directions were similar to previous gaugings and indicated flow to the north toward the Swamp River. The gradients were slightly lower than previously measured, 0.35 % and 0.34 %, respectively for the overburden and deep bedrock aquifers.

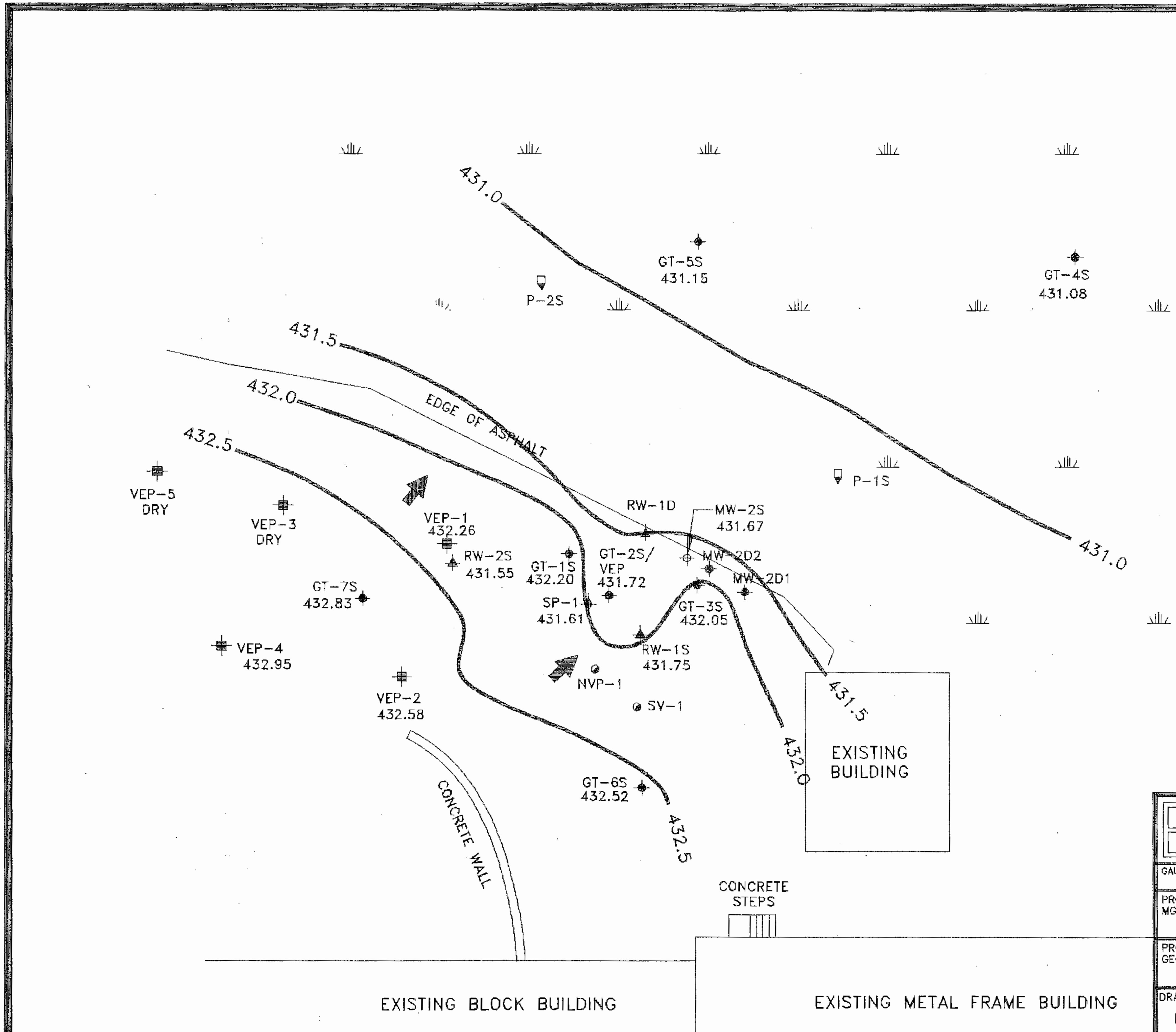
A contour map of the overburden groundwater elevations is shown in Figure 9. The gradient across this area, as measured between VEP-4 and GT-4S was 1 %. The additional monitor points determined that the overburden aquifer is not existent in the area around VEP-3 and VEP-5 due to the presence of a bedrock mound.

A comparison of the groundwater elevations in the deep bedrock and the overburden indicates that an upward vertical gradient of approximately 0.18 feet is still present across the site with the exception of the area around MW-2D1 where a downward gradient of 0.71 feet was observed. A comparison of the deep and shallow bedrock elevations, as measured at MW-2D1 and MW-2D2, shows that there is only a 0.01 foot upward vertical gradient within the bedrock; however, a comparison between MW-2D2 and RW-1D indicated an upward vertical gradient of 0.15 feet. It is not clear at this time what is causing these differences in vertical gradients.

4.2 Groundwater Quality

Groundwater samples were collected from select wells on March 10, 1992 in order to document concentrations of dissolved level VOCs prior to system start-up. Complete laboratory results as well as a table of all historical laboratory results are included in Appendix C. Figure 10 shows a contour map of the total VOC concentrations. The major portion of the plume is situated between GT-7S and RW-1S, where detected concentrations were 299,000 - 526,000 parts per billion (ppb). GT-4S and GT-5S denote the downgradient edge of the plume; detected concentrations at these locations were 21 and 31 ppb.

The specific VOCs which were detected included toluene, trichloroethene (TCE), trans -1, 2 - dichloroethylene (trans-1,2 - DEC), methylene chloride, vinyl chloride, and carbon tetrachloride. Table 5 shows the concentrations which were detected in each well. These compounds have all been previously



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- 430.80– GROUNDWATER ELEVATION (FEET)
- 432.0– GROUNDWATER CONTOUR (FEET)
- DIRECTION OF GROUNDWATER FLOW

WELL #	ELEV.
GT-1S	432.20
GT-2S	431.72
GT-3S	432.05
GT-4S	431.08
GT-5S	431.15
GT-6S	432.52
GT-7S	432.83
VEP-1	432.26
VEP-2	432.58
VEP-3	DRY
VEP-4	432.95
VEP-5	DRY
RW-1S	431.75
RW-2S	431.55
SP-1	431.61
MW-2S	431.67

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE: 3/9/92
DATE: 4/24/92
ACAD FILE: 1354STE1

GROUNDWATER CONTOUR MAP

PROJECT MGR.: WL
PROJECT GEO.: WL
DRAWN BY: MET
CLIENT: PAWLING CORPORATION
LOCATION: PAWLING NEW YORK
PROJECT NO.: 01110-1354
FIGURE NO.:

Table 5

VOC Concentrations in Groundwater
March, 1992

Parameters	RW-15	%	RW-15 June 1990	%	GT-7S	%	RW-2S	GT-4S	GT-5S	GT-6S
Toluene	240,000	80	170,000	75.5	440,000	84	48,000		10	
TCE	34,000	11.5	41,000	18	59,000	11	2,000		7	130
Trans-1,2 DCE	19,000	6.5	9,600	4.5	16,000	3	8,400	21	9	51
Vinyl Chloride	6,100	2	4,800	2			3,200			
Methylene Chloride					11,000	2				
Carbon Tetrachloride									5	3
1,1 1-TCA			7							
1,1 2-TCA			12							
PCE			42							
Ethylbenzene			22							
TOTAL VOCs	299,100	100	225,483	100	526,000	100	61,600	21	31	184

Note: All results are expressed in ug/L

detected on-site with the exception of methylene chloride and carbon tetrachloride.

The percentages of each compound (in relation to the total detected VOCs) for GT-7S and RW-1S are also shown in Table 5. Toluene constituted approximately 80% of the dissolved VOCs; TCE approximately 11% and trans-1, 2 - DCE approximately 5%.

The June 1990 VOC concentrations detected in RW-1S are also shown in Table 5. The total VOCs were slightly higher in 1992 than in 1990 (299,100 vs. 225,483 ppb, respectively). The individual percentages of detected VOCs were similar, with the exception that low levels of several other VOCs had previously been identified in 1990. The dilution and higher detection limits reported for the 1992 data may have masked the detection of these compounds during the 1992 sampling.

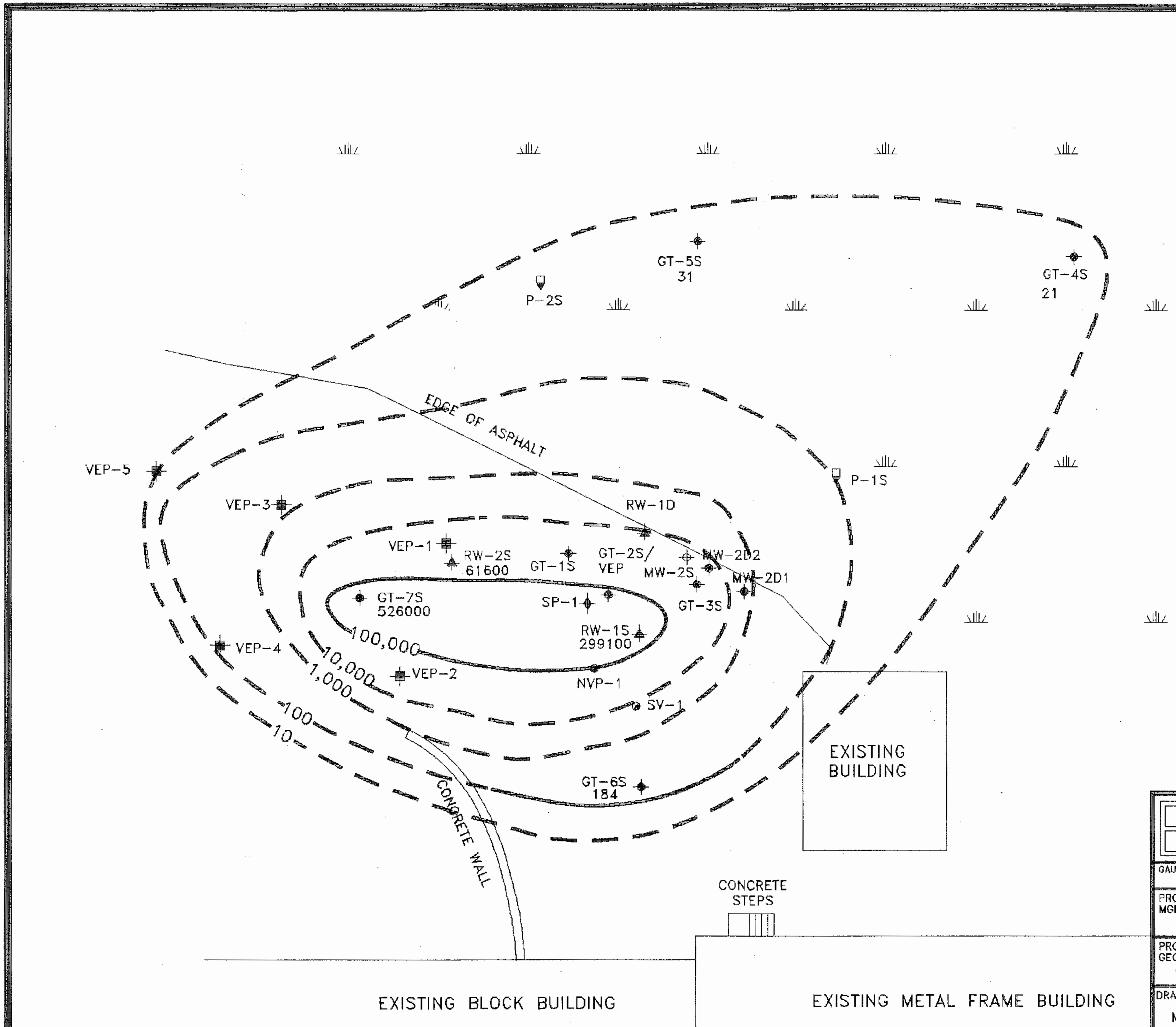
A more detailed comparison of the ratios of toluene, chlorinated compounds, and vinyl chloride and trans -1, 2 DCE, (two breakdown products), was performed to aid in evaluating contaminant degradation and removal (Figures 11 a, b, and c). At GT-7S, the assumed source area, the vinyl chloride and trans -1, 2 DCE concentrations (DCE) were very low, 0 and 3 % of the total chlorinated compounds, respectively. Slightly downgradient, at RW-1S the concentrations of this breakdown compounds constituted 10 and 15% of the total chlorinated compounds. At the edge of the plume, at GT-5S, the percentages were 0 and 30%. These ratios will be evaluated throughout the remediation process.

A groundwater sample was also collected from the upper bedrock aquifer, RW-1D, in order to document the initial concentrations prior to system start-up. Total detected VOCs were 3,680 ppb. This compares to 1,804 ppb in June 1990. Toluene constituted 73% of the total VOCs, and vinyl chloride and trans -1, 2 DCE constituted the remaining 27%. No other chlorinated VOCs were detected.

4.3 Soil Quality

During remedial point installation soil sampling was performed to further delineate the subsurface extent of VOC impacts. A summary of the monitored intervals, PID readings and laboratory analytical results are presented in Table 6 (Summary of Soil Monitoring Results). The complete soil laboratory analytical reports are presented in Appendix C.

As indicated in Table 6, soil screening, using the PID, indicated elevated (above 100 ppmv) volatile organic levels at the locations of NVP-1, SP-1, VEP-1 and GT-7S. Concentrations of approximately 50 ppmv were detected at the locations of SV-1 and VEP-3. Toluene was the compound detected at the highest concentration, of 7,580 ppb and 1,990 ppb, at the locations of NVP-1 and SP-1. PID results exhibited much higher concentrations than the laboratory data.



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- 21– TOTAL VOLATILE ORGANIC COMPOUNDS (VOCS) IN ppb
- 1000– TOTAL VOCS CONTOUR IN ppb

0 20 40
SCALE FEET

N

WELL ID NO.	TOTAL VOCS (ppb)	TOTAL CHLORINATED (ppb)
GT-4S	21	21
GT-5S	31	21
GT-6S	184	184
GT-7S	526,000	86,000
RW-1S	299,100	59,100
RW-2S	61,600	13,600

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE: 3/10/92 | DATE: 8/6/92 | ACAD FILE: 5104VOC2

PROJECT MGR.: WL

PROJECT GEO.: WL

DRAWN BY: MET

TOTAL VOCs IN GROUNDWATER [OVERBURDEN AQUIFER]

CLIENT: PAWLING CORPORATION

PROJECT NO.: 01110-1354

LOCATION: PAWLING NEW YORK

FIGURE NO.:

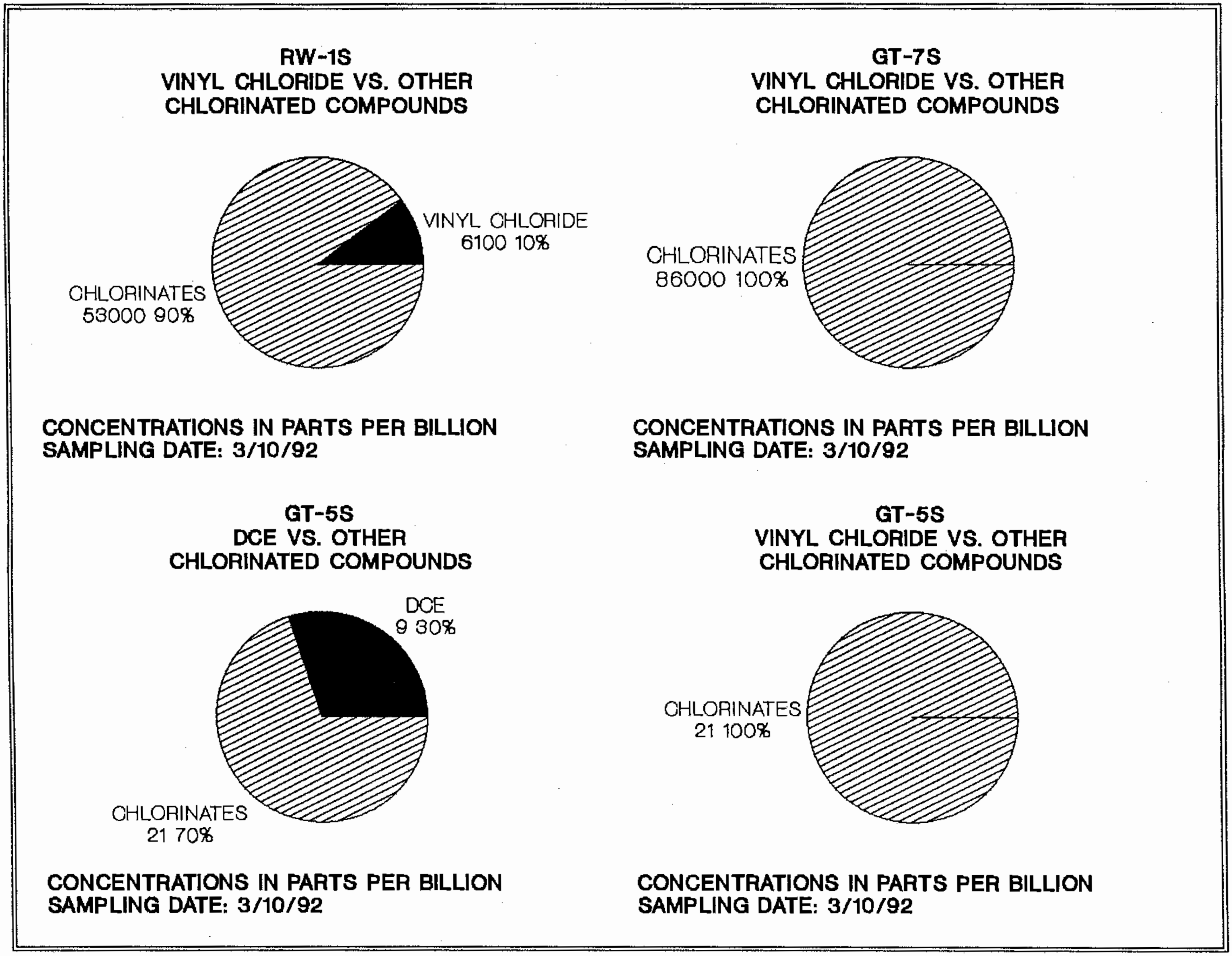


Figure 11b Ratios of VOCs in Groundwater

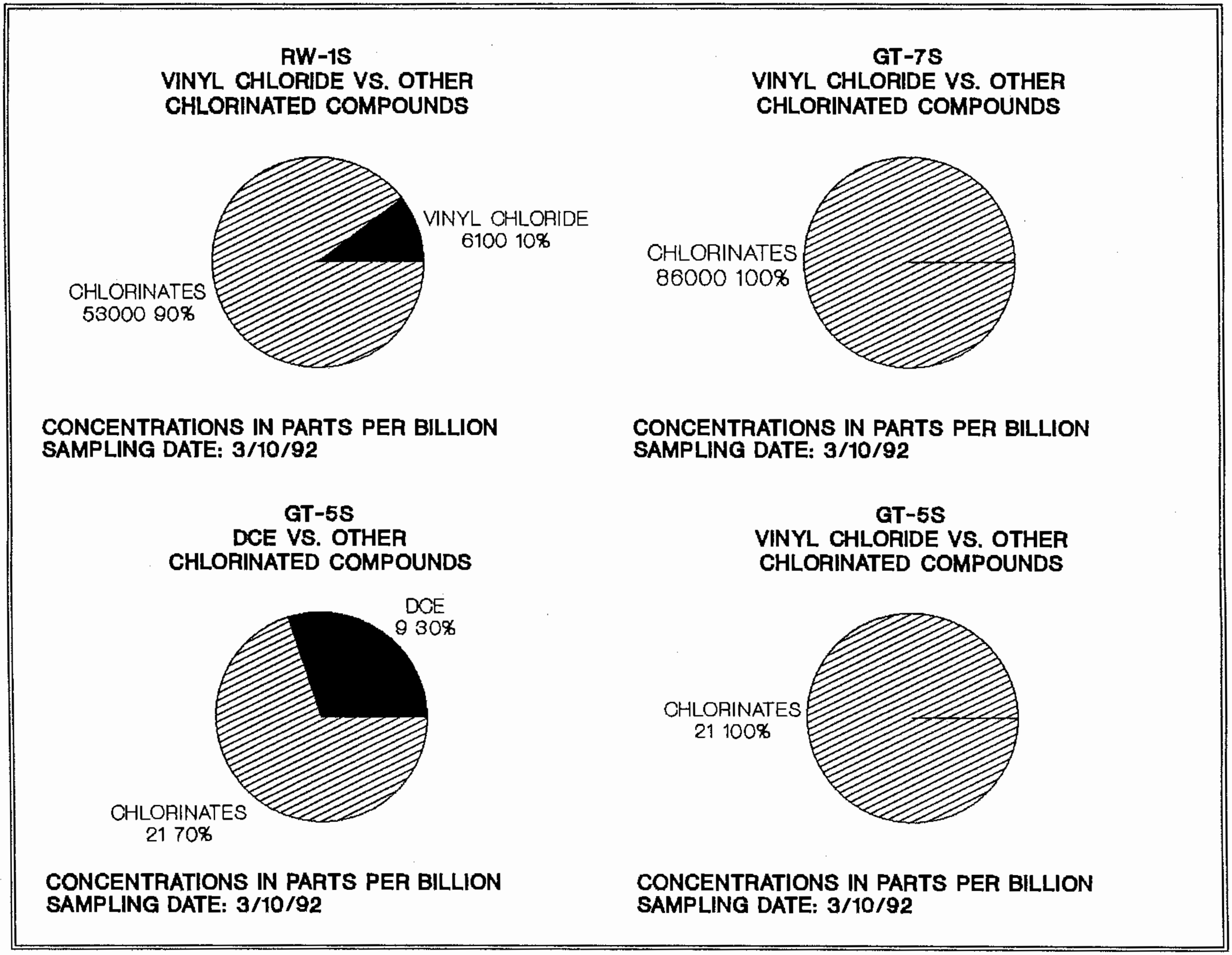


Figure 11b Ratios of VOCs in Groundwater

TABLE 6

SUMMARY OF SOIL MONITORING RESULTS

WELL ID	INTERVAL (FT)	PID READING (PPMV)	LABORATORY ANALYTICAL RESULTS (ppb) (EPA 8240)
NVP-1	8-10	190	Methylene Chloride 34 ppb Acetone 31 ppb 1,2-Dichloroethene 24 ppb Trichloroethene 615 ppb Toluene 7,580 ppb
SP-1	16-18	150	Methylene Chloride 290 ppb Acetone 340 ppb 1,2-Dichloroethene 190 ppb Trichloroethene 210 ppb Toluene 1,990 ppb
GT-6S	3-5	0	
	4-6	0	
	6-8	0	
	8-10	0	Trichloethene 8 ppb
	10-12	0	
	12-14	2	
	14-16	0	
RW-2S	NO SAMPLES TAKEN		
SV-1	8-10	7	1,2-Dichloroethene 20 ppb
	13-13.5	55	
VEP-1	8-10	16	Not Detected
	10-12	101	
	12-13	107	
	@ 13	75	
VEP-2	0.5-2	2	
	2-4	0	
	4-6	2	
	6-8	1	
	8-10	1	
	10-12	1	
	12-14	10	Not Detected

TABLE 6

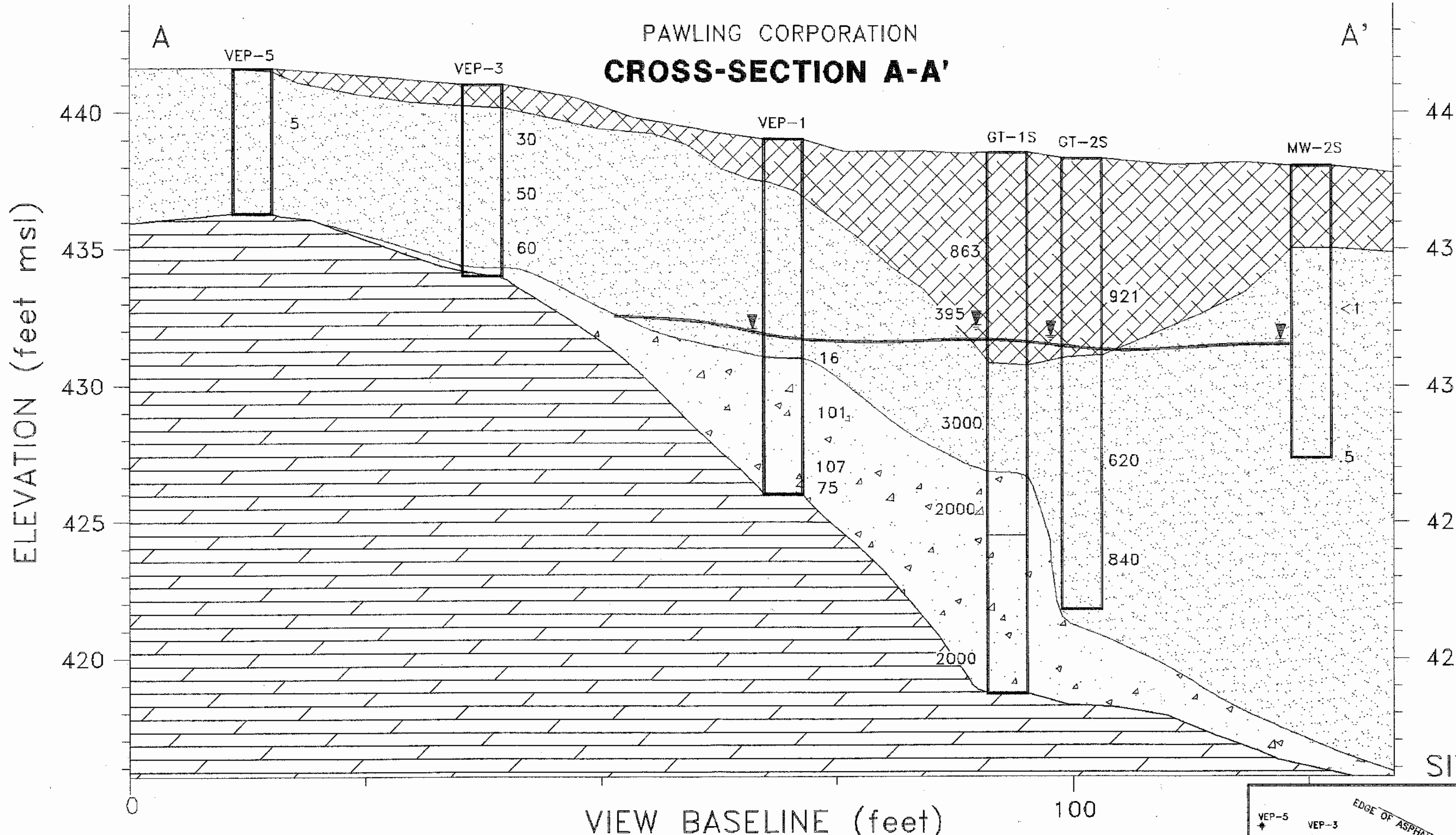
SUMMARY OF SOIL MONITORING RESULTS

WELL ID	INTERVAL (FT)	PID READING (PPMV)	LABORATORY ANALYTICAL RESULTS (ppb) (EPA 8240)
VEP-3	2-4	30	
	4-6	50	
	6-8	60	Methylene Chloride 24 ppb Trichloroethene 4 ppb
VEP-4	2-4	0	
	4-6	0	
	6-8	0	
	8-10	0	
	10-12	NOT MEASURED	Methylene Chloride 16 ppb Trichloroethene 6 ppb
VEP-5	2-4	5	Methylene Chloride 38 ppb 1,2-Dichloroethene 16 ppb Trichloroethene 41 ppb
	8-10	NOT MEASURED	Methylene Chloride 14 ppb Acetone 31 ppb Trichloroethene 7 ppb Toluene 140 ppb
GT-7S	@ 7	250	No Samples Taken

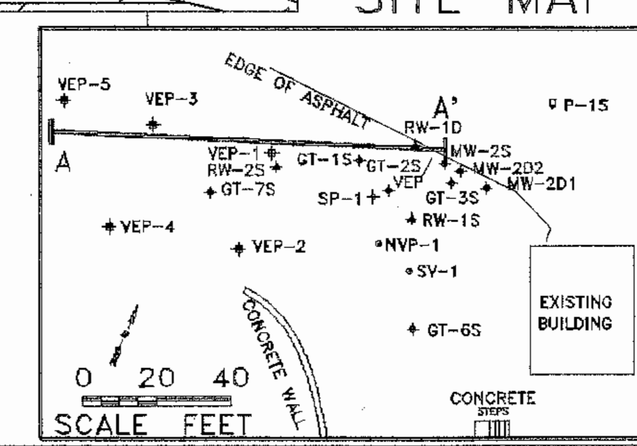
KEY:

LAB ID	FIELD ID
GT-GS	GT-6S
SP-5	SP-1
SV-2	VEP-1
SV-3	VEP-2
SV-4	VEP-3
SV-5	VEP-4
SV-6	VEP-5
SV-7	GT-7S

Cross sections were developed to more clearly present the field screening results, both from the remedial installation and prior subsurface explorations. Figures 12 and 13 show cross sections running north-south and east-west across the study area. The highest concentrations were below the water table in the area around GT-1S. These cross sections show that the areal and vertical extent of subsurface soil impact has been indentified. The cross sections were additionally utilized to define the adsorbed phase mass loading which is discussed in Section 5.0.



SITE MAP



LEGEND

FILL
SAND
BOULDERS
2000 PID READING
MARBLE BEDROCK
WATER ELEVATION

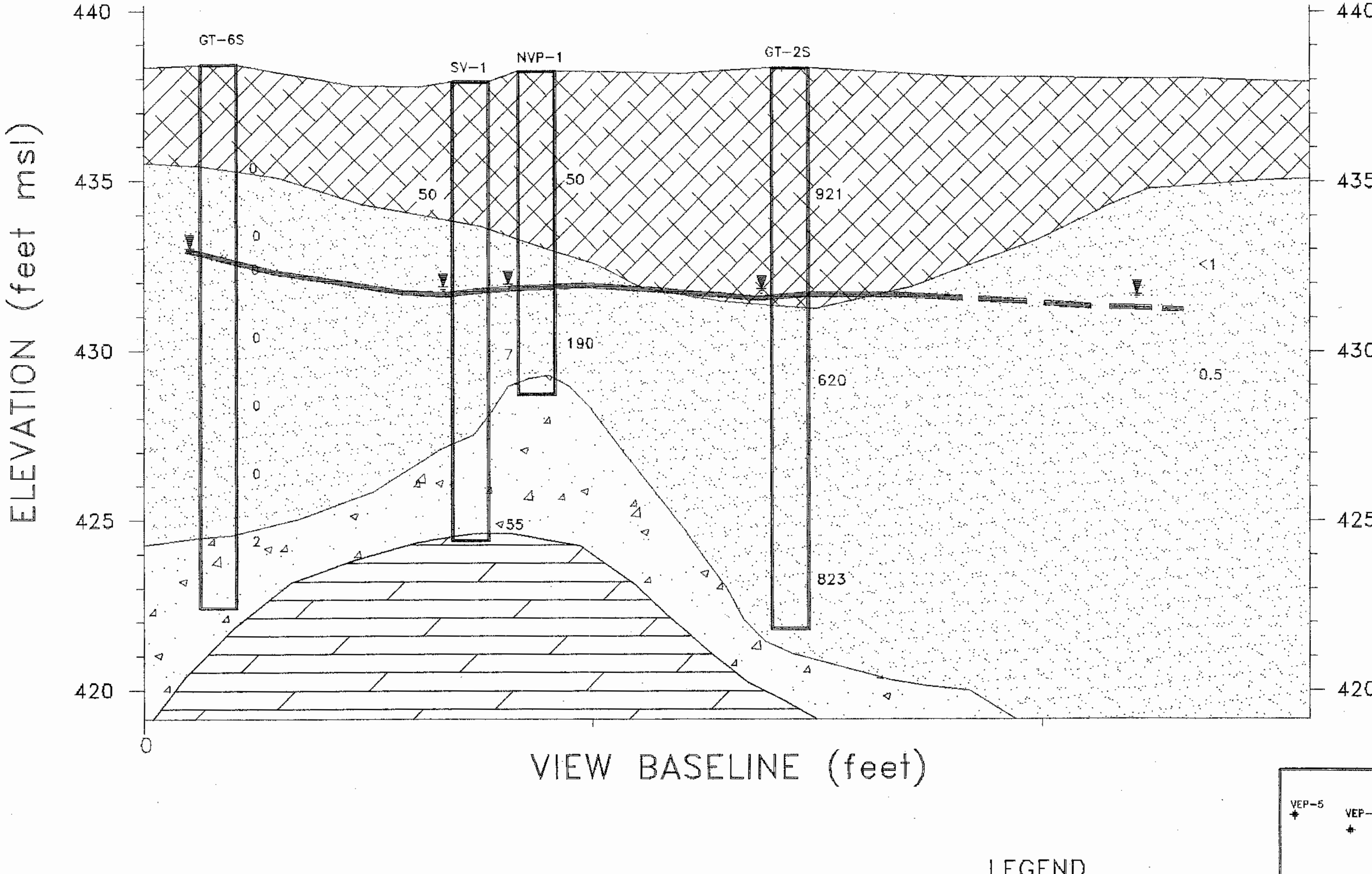
07/08/1992 CROSS1.DWG

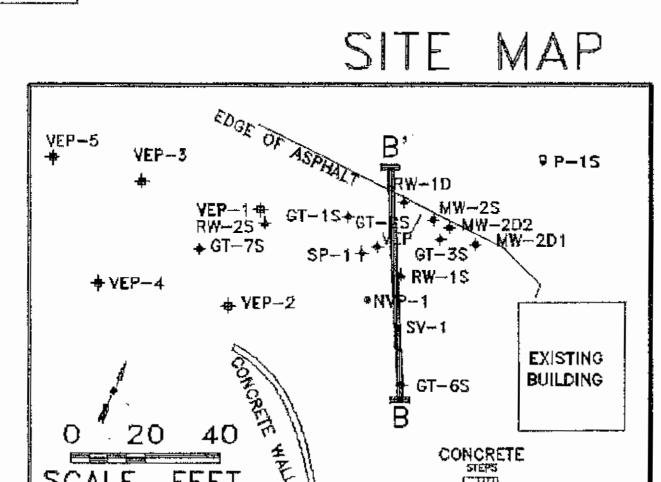
GROUNDWATER TECHNOLOGY

Project PAWLING
Location Pawling, New York
Geologist TMM
Owner PAWLING CO.
Project Number 011101354
Checked By WCL Date 7/17/92

PAWLING CORPORATION

CROSS-SECTION B-B'





07/08/1992 CROSS2.DWG

GROUNDWATER TECHNOLOGY

Project PAWLING	Owner PAWLING CO.
Location Pawling, New York	Project Number 011101354
Geologist TMM	Checked By WCL Date 8/6/92

5.0 CONTAMINANT DISTRIBUTION

The effectiveness of the installed remedial system will be evaluated relative to the cleanup of the identified VOCs in the subsurface. VOCs released to the subsurface can be present in any of four phases: dissolved in groundwater (dissolved phase), adsorbed onto soil particles (adsorbed phase), layers of non-aqueous phase liquids (liquid phase), or as vapors (vapor phase). This section details the identified phases, extent and estimated volume of VOCs which are present in the subsurface at this site and which define the baseline conditions for evaluating remedial effectiveness.

5.1 Methodologies for Calculating Contaminant Volumes

5.1.1 Dissolved Phase

Overburden Aquifer

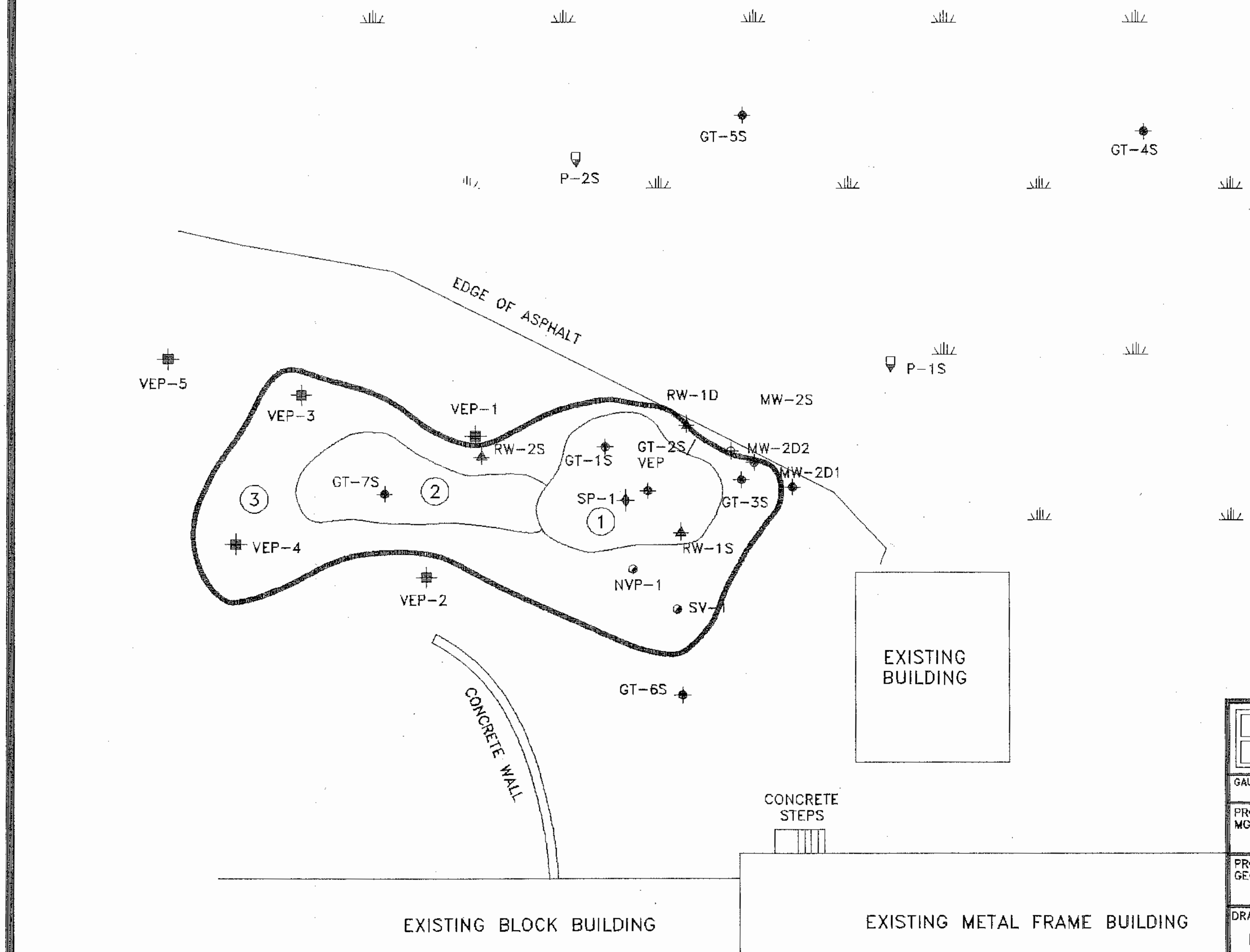
The areal extent of the dissolved phase was identified by the initial (March 1992) groundwater sampling. The results are portrayed on the Total VOCs in Groundwater (Overburden Aquifer) map (Figure 10). The areas between contoured intervals, the average concentration between contour lines and the saturated thickness, as shown on the cross sections (Figures 12 and 13), were utilized to calculate the total volume of VOCs present in the dissolved phase. Appendix D contains the calculations.

Bedrock Aquifer

An attempt was made to estimate the volume of VOCs in the bedrock. Much less data are available concerning subsurface conditions, therefore, a range of values was produced utilizing different impacted areas and porosities. Appendix D contains the calculations.

5.1.2 Adsorbed Phase

The field screening VOC data from soil samples were utilized to define the areal extent of the adsorbed phase. Figures 14 and 15 shows the defined areas of adsorbed phase VOCs in the saturated and unsaturated zones. The unsaturated and saturated zones were delineated separately because they are remediated by different technologies. For calculation of the contaminant volumes the total areas were divided into subareas based upon different VOC concentrations. The cross sections were utilized to determine the impacted thicknesses. Appendix D contains the contaminant loading calculations.



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- (3) AREA UTILIZED IN MASS BALANCE

AREA NO.	AREA (SQ. FT.)	THICKNESS (FT.)	TOTAL VOLUME
①	624	7	4,368
②	528	7	3,696
③	2096	7	14,672

GROUNDWATER TECHNOLOGY

12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE:

DATE: 8/6/92

ACAD FILE: 5104VOC3

PROJECT MGR.: WL

PROJECT GEO.: WL

DRAWN BY: MET

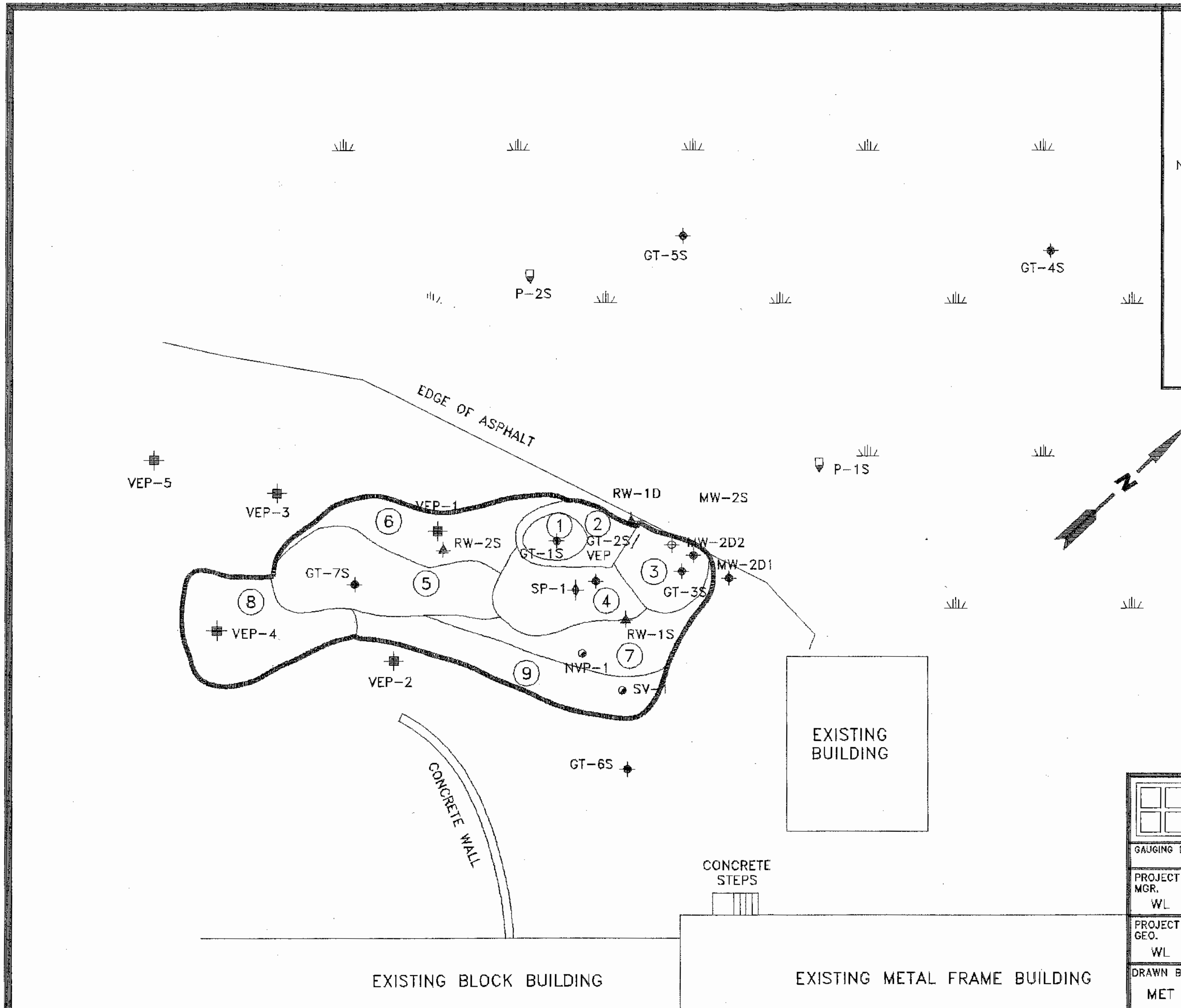
EXTENT OF UNSATURATED ADSORBED PHASE [MARCH 1992]

CLIENT: PAWLING CORPORATION

PROJECT NO.: 011105104

LOCATION: PAWLING NEW YORK

FIGURE NO.:



AREA NO.	AREA (SQ. FT.)	THICKNESS (FT.)	TOTAL VOLUME
①	112	4	448
②	160	7	1,120
③	224	11	2,464
④	352	7.5	2,640
⑤	528	4	2,112
⑥	448	5	2,240
⑦	432	1	432
⑧a	512	2	1,024
⑧b	512	2	1,024
⑨	448	5	2240

GROUNDWATER TECHNOLOGY
12 WALKER WAY
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GAUGING DATE:
DATE: 8/6/92
ACAD FILE: 5104VOC4
PROJECT MGR.: WL
PROJECT GEO.: WL
DRAWN BY: MET

EXTENT OF SATURATED ADSORBED PHASE (MARCH 1992)

CLIENT: PAWLING CORPORATION
PROJECT NO.: 011105104
LOCATION: PAWLING NEW YORK
FIGURE NO.:

5.2 Contaminant Volumes

Overburden

The calculated contaminant volumes determined for this site are shown in Table 7. The saturated adsorbed phase contained the highest amount of VOCs, 1774 pounds. The unsaturated adsorbed phase contained 700 pounds, while the dissolved phase contained only 45 pounds. The total VOCs identified in the subsurface were 2,519 pounds. Figure 16 shows the relative distribution of the phases. The vapor phase and liquid phase were nonexistent or negligible.

Bedrock

The contaminant mass calculations for the bedrock aquifer provided the following range of estimates of dissolved phase VOCs; 2 to 25 pounds. Due to the low porosity and small surface area of contaminant contact with the rock, it is assumed that the absorbed phase VOC volume is small. These numbers are rough estimates but do provide a good indication of the relative contaminant loading in the bedrock.

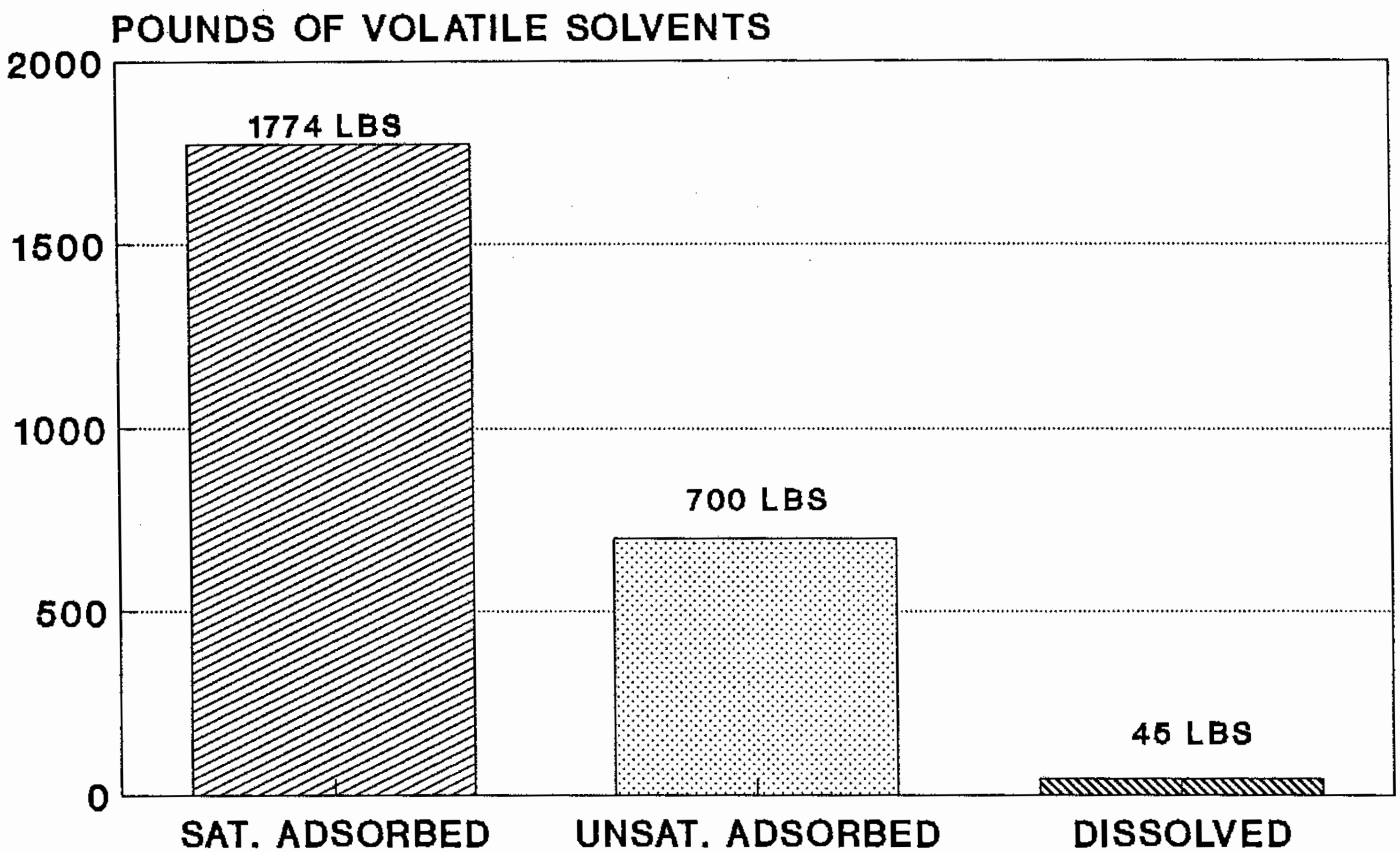
TABLE 7

CONTAMINANT DISTRIBUTION IN THE OVERBURDEN

PHASE	AMOUNT (pounds)	PERCENTAGE OF TOTAL
Dissolved Phase	45	1.8
Unsaturated Adsorbed Phase	700	27.8
Saturated Adsorbed Phase	1,774	70.4
Liquid Phase	Negligible	Negligible
Total VOCs	2,519	100

Figure 16

CONTAMINANT DISTRIBUTION



6.0 REMEDIAL SYSTEM PERFORMANCE

The remedial system has been in operation since March 9, 1992. During this initial 3 months of operation each of the individual remedial systems (groundwater extraction, groundwater treatment, soil vapor extraction, and air sparging) have been operated and data associated with the operation has been collected. This section presents the initial start-up data and first 3 months of system performance.

6.1 Groundwater Extraction System

6.1.1 Operation Summary

The groundwater extraction system was started on March 11, 1992. During the first month of operation the system ran only intermittently while the programmable overide protection system was tested and debugged. The system ran continuously during the rest of the monitoring period with one down time period experienced from May 11 to May 21 due to a problem with the air stripper transfer pump.

6.1.2 Verification of Hydraulic Control

In order to verify hydraulic control and complete capture of the overburden dissolved plume, groundwater gauging was performed. The groundwater elevations were contoured and flow lines plotted. Figure 17 shows the resultant map. Impacted groundwater is being captured as designed.

6.1.3 Flow Rates/Total Gallons Extracted

The initial start-up flow rates for RW-1S and RW-2S were 1.7 gpm and 0 gpm, respectively. The average flow rates observed over this monitoring period were 1.0 gpm and 0.3 gpm, respectively. The flow rates are lower than the pilot test design flow rate of 2 gpm. This is due to the fact that there is limited recharge to the overburden aquifer in this area. This is evidenced particularly at RW-2S which is dry most of the time except after a rainfall event. The bedrock high appears to affect the overburden groundwater table, as discussed in section 4.1.

Over this monitoring period a total of 77,030 gallons of water have been extracted from the subsurface. Table 8 shows the gallons extracted from each well over time.

6.1.4 Extracted VOC Concentrations/Removal Rate

The dissolved concentrations being extracted from the subsurface were evaluated through collection and sampling of water entering the air stripper (A/S influent). Sampling was performed on March 11, 1992. A triplicate sampling was performed to quantify the variation in the results. The detected concentrations are shown in Table 9. There was quite a range in concentrations between the three samples, particularly for TCE.

Table 8
PUMPING SYSTEM DATA SHEET

RECORDING DATE	TOTALIZER (GALLONS) RW-1	RW-2	GALLONS PUMPED SINCE LAST RECORDING RW-1	RW-2	TOTAL GALLONS PUMPED SINCE LAST RECORDING	TOTAL LITERS PUMPED SINCE LAST RECORDING	TOTAL DISSOLVED CONCENTRATION mg/l	TOTAL mg REMOVED SINCE LAST RECORDING	TOTAL LBS REMOVED SINCE LAST RECORDING	CUMULATIVE LBS REMOVED
03/11/92	880	120	680	120	800	3,028	154.07	466,513.87	1.03	**1.03**
03/12/92	1,030	330	350	210	560	2,120	154.07	326,559.71	0.72	**1.75**
03/20/92	1,170	430	140	100	240	908	154.07	139,954.16	0.31	**2.06**
03/20/92	1,410	610	240	180	420	1,590	154.07	244,919.78	0.54	**2.60**
04/10/92	1,980	720	570	110	680	2,574	154.07	396,536.79	0.88	**3.47**
04/24/92	27,030	920	25,050	200	25,250	95,571	154.07	14,724,343.92	32.50	**35.98**
05/26/92	44,520	1,410	17,490	490	17,980	68,054	154.07	10,484,899.15	23.15	**59.12**
06/03/92	48,190	2,760	3,670	1,350	5,020	19,001	154.07	2,927,374.51	6.46	**65.59**
06/11/92	60,800	3,060	12,610	300	12,910	48,864	154.07	7,528,367.52	16.62	**82.20**
06/12/92	61,420	3,130	620	70	690	2,612	154.07	402,368.21	0.89	**83.09**
06/26/92	69,060	3,870	7,640	740	8,380	31,718	154.07	4,886,732.75	10.79	**93.88**
06/27/92	70,500	3,920	1,440	50	1,490	5,640	154.07	868,882.08	1.92	**95.80**
06/29/92	72,990	4,040	2,490	120	2,610	9,879	154.07	1,522,001.49	3.36	**99.16**

Table 9

Dissolved Concentrations from Groundwater Extraction System
March 11, 1992

Sample	Toluene (ug/l)	TCE (ug/l)	Trans -1,2-DCE (ug/l)	Vinyl Chloride (ug/l)	Total VOCs (ug/l)
A/S Influent #1	130,000	5,200	10,100	3,400	148,700
A/S Influent #2	99,000	2,600	7,900	< 10,000	109,500
A/S Influent #3	170,000	23,000	11,000	< 10,000	204,000
Mean	133,000	10,267	9,667	N/A	154,067
Standard Deviation	35,595	11,104	1,595	N/A	47,478

The mean total VOC concentration was utlized to calculate the pounds of VOCs removed from the subsurface during this monitoring period. A total of 99.16 pounds have been removed through the groundwater extraction system. Table 8 shows the removal rates over time. As the removal rate is based upon the influent concentration, which did show a range from 109,500 to 214,000 ug/l, the actual pound removal may be 70.5 to 131 pounds. These values are higher than the initial estimate of dissolved phase VOCs due to additional dissolution of VOCs from the adsorbed phase.

6.2 Groundwater Treatment System

The air stripper removal efficiency was evaluated through comparison of influent and effluent water quality to the air stripper. The removal efficiencies ranged from 99.54 to 100 %, depending upon the compound.
Table 10 shows the removal efficiencies by compound.

The removal efficiency of the entire treatment system, carbon polish plus air stripper, was 100 %. The VOC effluent concentrations sampled monthly to meet discharge requirements showed non detectable levels. Table 11 shows the sampling dates. The analytical laboratory data are included in Appendix D.

Based upon the initial analytical data and air stripper removal efficiency, the carbon polish has been loaded with less than 0.1 pounds of VOCs. Each carbon cannister should be able to remove approximately 20 pounds of VOCs.

Table 10

Air Stripper Effluent Concentrations and Percent Removal Efficiency

March 11 Sampling	Toluene (ug/l)	% Removal	TCE (ug/l)	% Removal	Trans-1,2-DCE (ug/l)	% Removal	Vinyl Chloride (ug/l)	% Removal
A/S Eff #1	74	99.94	8	99.85	11	99.89	< 10	100
A/S Eff #2	99	99.9	12	99.54	17	99.78	< 10	N/A
A/S Eff #3	110	99.9	12	99.95	16	99.85	< 10	N/A

Table 11

Total Groundwater Treatment System Effluent Concentrations

Date	VOC Concentrations
3/11	ND
4/25	ND
5/30	ND
6/27	ND

ND = Non detectable

Table 12

Comparison of Design and Actual SVE RO1

Monitor Point	Distance from VEP (ft)	Design Vacuum (inches w.c.)	Measured Vacuum (inches w.c.) SVE only (Av)	Measure Vacuum (in wc) with Air Sparge
GT-6S	15	0.67	1.4	1.4
GT-7S	20	0.3	8.2	8

6.3 Soil Vapor Extraction System

6.3.1 System Operation

The SVE system was started on March 9, 1992 and maintained continual operation throughout this monitoring period. The air flow rate recorded before the blower was 108 cfm. This compares to design air flow rate of 175 scfm. The rate is lower than the design value, undoubtedly due to the close spacing of vapor extraction points,

which, in combination, are withdrawing more air than can recharge the subsurface, thus producing an overall flow rate lower than the potential rate. The operational vacuum throughout the monitoring period was 50 inches of water. This vacuum is higher than the design value of 35 inches because it was decided that a higher vacuum would increase the vapor removal rate.

6.3.2 Verification of Radius of Influence

The radius of influence (ROI) of the SVE system was measured in the field by recording vacuum readings at several monitor points. The results are shown in Table 12. These results show that greater vacuum has been oberved than the pilot test estimated. The combination of multiple vapor extraction points is creating a greater vacuum response in the subsurface.

If the observed readings are extrapolated to the 0.1 inch water column effective ROI, the actual SVE system has a ROI of 32 feet (versus the pilot test value of 27 feet). The verification of the actual ROI ensures that all unsaturated soils are adequately being vented.

Vacuum readings were also recorded at the monitoring points during air sparging operation. The vacuum readings decreased only slightly, indicating that net vacuum was maintained during sparging, ensuring the that all air sparge vapors are being captured.

6.3.3 Extracted VOC Concentrations and Removal Rates

The VOC concentrations extracted by the entire SVE system ranged from 8 to 38 ppmv as recorded with a PID with a 11.7 head. FID data were also collected. Originally the FID values were much greater than measured by the PID due to the presence of methane. After two months of operation, the two instruments recorded similar VOC levels, with the FID showing slightly higher levels ranging from 20 to 32 ppmv. Table 13 reports all of the VOC levels recorded. Air samples were collected and analyzed in the laboratory on several dates. Table 14 shows the analytical results. The detected concentrations are significantly lower than the corresponding field readings. The identified compounds and their percent of the total VOCs were: toluene 40 - 75 %, TCE 25 - 34 % and trans-1,2-DCE 0 - 29 %, varying with the sampling date. These three compounds were the only detected VOCs.

Table 13
SOIL VAPOR EXTRACTION OPERATION DATA

SAMPLING DATE	TOTAL VOCs PID	TOTAL VOCs FID	TOTAL VOCs (ppmv)	AIR VELOCITY (fpm)	AIR FLOW (cfm)	AVG. DAILY POUNDS REMOVED	DAYS OF SYSTEM OPERATION	TOTAL LBS REMOVED SINCE LAST SAMPLING	CUMULATIVE POUNDS
03/09/92	8	86	8	4200	205.8376	0.6216	0.017	0.0104	0.0104
03/12/92	7.9		7.9	4200	205.8376	0.6139	3.000	1.8416	1.8520
03/20/92	12.2	66	12.2	4000	196.0358	0.9028	7.375	6.6585	8.5104
03/20/92	13	66	13	4000	196.0358	0.9620	0.083	0.0801	8.5906
03/20/92	13.4	54	13.4	4000	196.0358	0.9916	0.042	0.0413	8.6319
03/20/92	24	74	24	4000	196.0358	1.7761	0.208	0.3694	9.0013
03/27/92		74	24	3800	186.2340	1.6873	7.000	11.8109	20.8122
04/10/92		52	24	4000	196.0358	1.7761	14.000	24.8652	45.6774
04/24/92	38		38	2100	102.9188	1.4764	14.000	20.6692	66.3465
05/08/92	16.7		16.7	3600	176.4323	1.1123	14.000	15.5718	81.9183
05/26/92	10		10	3600	176.4323	0.6660	18.000	11.9886	93.9069
06/03/92		20	20	3600	176.4323	1.3321	7.396	9.8517	103.7586
06/03/92		28	28	3600	176.4323	1.8649	0.063	0.1166	103.8751
06/03/92		32	32	3500	171.5314	2.0721	0.083	0.1726	104.0477
06/03/92		29	29	3600	176.4323	1.9315	0.083	0.1609	104.2086
06/12/92	12		12	2200	107.8197	0.4884	9.000	4.3958	108.6044
06/26/92	11.2		11.2	3200	156.8287	0.6631	14.000	9.2830	117.8874

Note: 4/10/92 – AIR FLOW DATA WAS ESTIMATED

Figure 17
SVE SYSTEM REMOVAL

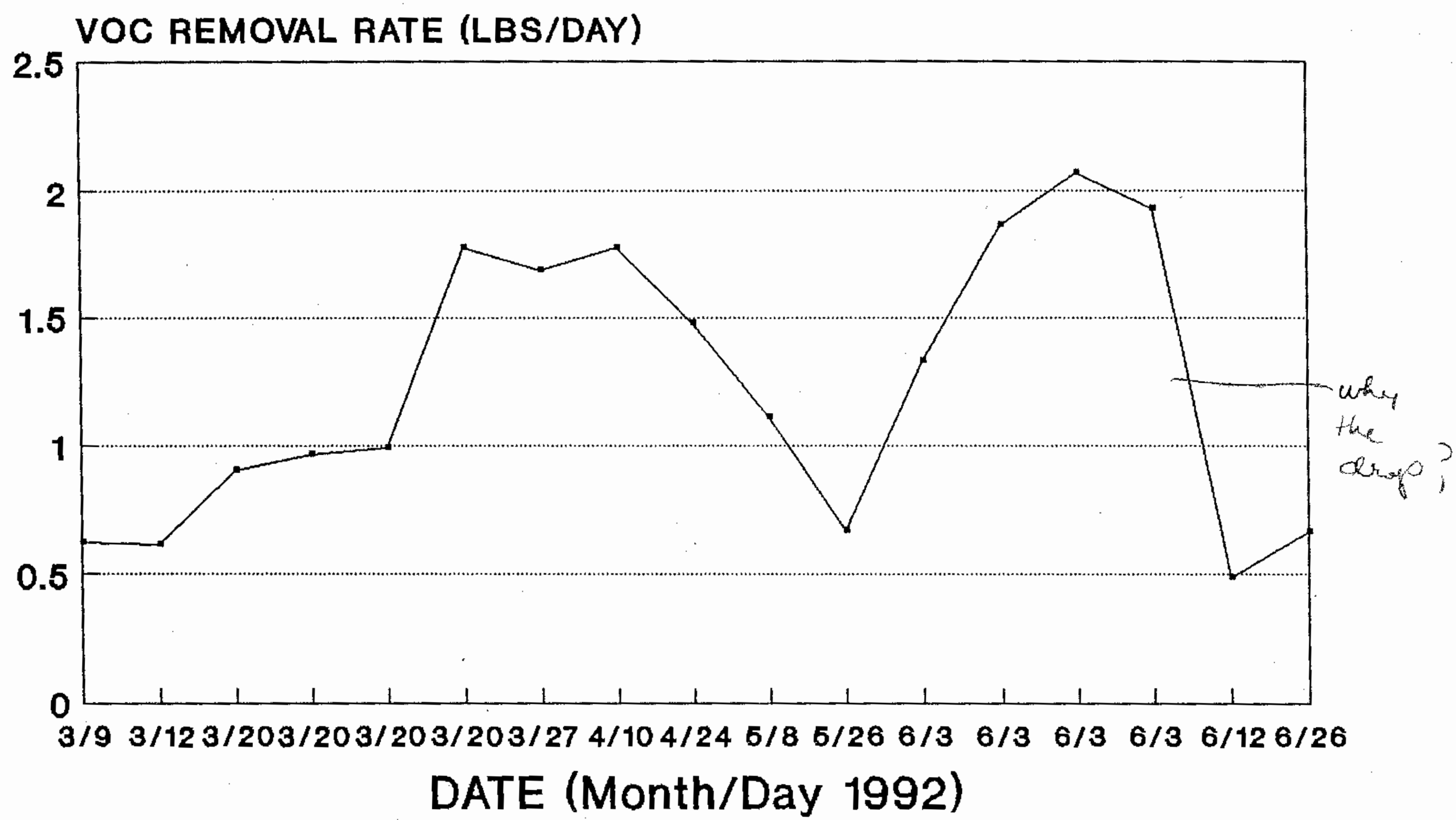


Table 14

Laboratory Results of Total VOCs in SVE Effluent

(ug/l)

Date	Vent	Vent and Sparge
Sept. 11, 1991	1,565	2,015
March 11, 1992	140	123
June 3, 1992	43	53

The VOC data collected from the field and the measured flow rate were used to calculate the pounds of VOCs removed from subsurface. The total through June 26, 1992 was 118 pounds. Table 13 shows the calculated pounds throughout the monitoring period. Please note that the air flow specified on this table is the total system air flow which includes bleed air.

A trend of the daily VOC removal rate is shown in Figure 18. The daily pound removal rate has ranged from 0.5 to slightly higher than 2 pounds. These values almost exclusively reflect unsaturated adsorbed removal, as the air sparge system was operational for only short times during this monitoring period. However, the increases observed on March 20 and June 3 were due to the air sparge system being operational.

6.3.4 Individual Vapor Extraction Point Operation

A summary of the individual vapor extraction point operation is shown in Table 15. These data represent SVE operation only as the sparge system was not in operation. Individual vacuum, VOC levels and air flow are shown on this table. The vacuum data shows that the initial vacuums were below the design vacuum, but after continued system operation all points exhibited the design vacuum reponse (35 inches w.c.). The VOC data indicates that VEP-6 and VEP-3 are withdrawing the highest VOC levels with maximum reported PID concentrations of 70 and 27 ppmv, respectively. The other points are extracting low levels of volatiles, approximately 1 to 2 ppmv. These data correlate with the contaminant distribution data which determined that the majority of the VOCs were not in the unsaturated soil. ?

6.3.5 Carbon Dioxide and Oxygen Utilization

In order to provide an indication of the biological activity and degradation occurring on site, carbon dioxide and oxygen concentrations were measured in the extracted SVE air stream. The carbon dioxide was measured

Table 15

Individual Vapor Extraction Point Operational Data

	VEP-1	VEP-2	VEP-3	VEP-4	VEP-5	VEP-6	SV-1
Vacuum (in wc) Date 3/11	45	41	40	41	40	41	NM
Vacuum (in wc) Date 3/27	37	37	36	36	36	37	37
Vacuum (in wc) Date 4/24	NM	NM	NM	NM	NM	NM	NM
Vacuum (in wc) Date 5/8	NM	NM	NM	NM	NM	NM	NM
VOC Concentration (ppmw) Date 3/11	1.6	1.8	1.1	0.7	0.5	4.5	2.0
VOC Concentration (ppmw)* Date 3/27	9	17	10	4.4	4.0	70	25
VOC Concentration (ppmw) Date 4/24	2.7	24	27	0.9	0.5	68	0
VOC Concentration (ppmw) Date 5/8	0.7	0.8	13.2	1.5	1.0	7.5	0.3
Air Flow (cfm) Date 3/11	NM	NM	NM	NM	NM	NM	NM
Air Flow (cfm) Date 3/27	18.7	11	12	7.7	13.2	8.8	2.2
Air Flow (cfm) Date 4/24	18.7	21.5	22	22	21.5	19.8	22
Air Flow (cfm) Date 5/8	24.6	26.4	31.7	22.9	25	25	21

NM = Not measured
* = Measured with a PD except for 3/27.
in wc = inches water column

utilizing draeger tubes; the oxygen concentration was measured utilizing an explosimeter. Table 16 shows the reported values.

The oxygen levels show a 0.5 and 0.7 decrease from background levels, indicating oxygen utilization by bacteria. The carbon dioxide percentages were 0.17 and 0.27 percentage points above ambient air background levels, also indicating bacterial activity. With the measured data it is not possible to determine whether the bacterial activity is from degradation of VOCs or natural soil organic material.

Table 16

Oxygen and Carbon Dioxide Percentages in SVE Effluent

Date	SVS Effluent O_2	Ambient Air	SVS Effluent CO_2	Ambient Air
4/24/92	20.90%	21.4	0.20%	0.03
5/8/92	20.20%	20.9	0.30%	0.03
6/3/92	20.90%	NM	NM	NM

6.4 Air Sparge System

6.4.1 Operation Summary

The air sparge system was operating only intermittently during this monitoring period. Groundwater extraction system down time and the need to verify the actual air injection rates were the cause of the intermittent operation. The system was in operation for 21 days and evaluation of the subsurface response was performed during these operating times.

6.4.2 Verification of Radius of Influence

The actual operational ROI was compared with the design ROI to verify effective system operation. The air sparge was operated at varying flows ranging from 12 to 24 cfm. At the end of each flow rate interval the dissolved oxygen concentration in the groundwater was monitored at varying distances. Table 17 shows the recorded values. The data indicate that at a flow rate of 20 cfm an effective ROI of 20 feet was measured (based upon an increase of at least 1 mg/l dissolved oxygen). This correlates with the design data, 24 cfm and 22 foot ROI. Additional dissolved oxygen data was collected to define background levels and to indicate the air sparge influence. Table 18 shows the results.

Table 17

Reverification of Air Sparge ROI - Increase in Dissolved Oxygen Concentrations (ug/l)

Air Flow Rate (cfm)	GT-1S (10 ft)	GT-6S (15 ft)	GT-3S (20 ft)
12	1.0	0.5	0
16	6.8	1.2	0.6
20	8.4	1.9	3.5
24	9.6	1.9	5.2

6.4.3 System Effectiveness

The SVE removal rate is the primary indicator of an effective air sparge system. As discussed in section 6.3.3, during several sparge system operation periods increases in the pounds removal rates of VOCs were observed. When the sparge system operates for a longer period, a better evaluation can be performed.

6.5 Off-Gas Treatment System

6.5.1 Total System Effluent Concentrations

A temporary vapor phase carbon was installed to treat the off-gas from the treatment system. The off-gas concentration from the total remedial system, after the vapor phase carbon, was monitored monthly to document the VOC levels emmitted into the atmosphere. Table 19 contains the monitoring results.

Table 19

Off-Gas Effluent Monitoring Results

Monitoring Date	PID/FID (ppmv)	Laboratory (ppmv)
3/11/92		ND
4/10/92	0	NM
5/8/92	0.2	NM
6/26/92	0	NM

NM = not measured

what happened to 6-4-92 Results?

10

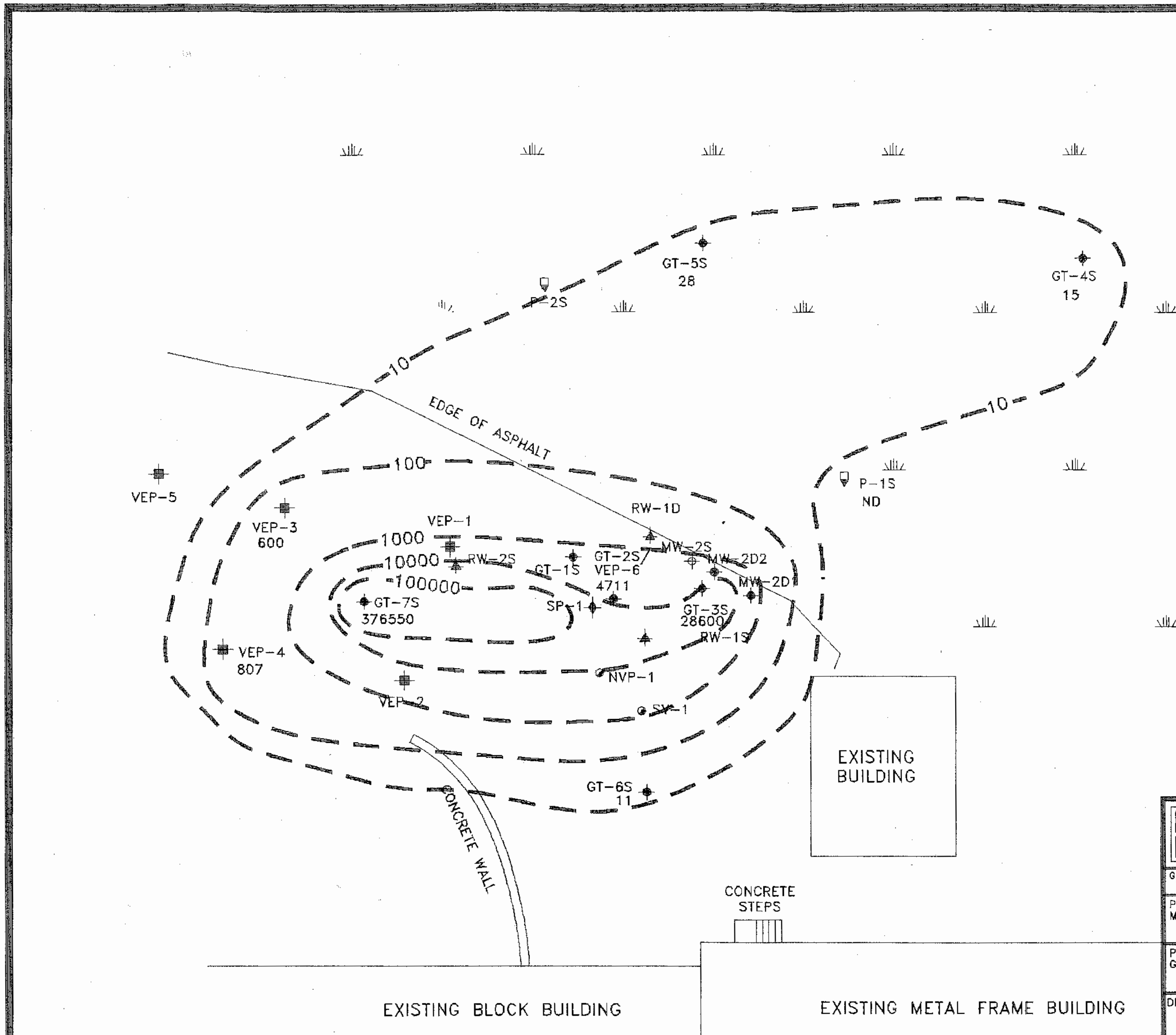
6.5.2 Evaluation of Total Loading to Vapor Phase Carbon Unit

The vapor phase carbon was temporarily installed in order to collect off-gas concentration data to better evaluate permanent off-gas treatment systems. In order to do this, the total pounds of VOCs emmitted from the SVE system and air stripper were combined and an estimate of the total amount of carbon used to treat these VOCs was obtained. The total amount of carbon utilized during this monitoring period was 1,800 pounds. The vapor phase carbon cannister contains 2,000 pounds, therefore the first cannister is 90 % spent. The monthly carbon utilization was approximately 600 pounds. These calculations are based upon a carbon loading rate of 12 % by weight. A cost analysis of continued useage of vapor phase carbon will be developed prior to selection of the permanent alternative.

6.6 Summary of Remedial System Effectiveness

Through June 1992, the remedial system at this site has removed 217 pounds of VOCs from the subsurface (118 pounds through soil vapor extraction and 99 pounds through groundwater extraction). The 217 pounds of the estimated 2,519 total pounds identified in the subsurface represents over 8 %.

To document the remedial effectiveness, a groundwater sampling round was performed on June 30, 1992. Concentrations decreased in GT-7S by 28 % and 94 % in GT-6S. Figure 19 shows the VOC contour map of the results. Additional data will need to be evaluated to document declining trends.



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- 15– TOTAL VOLATILE ORGANIC COMPOUNDS (VOCs) IN ppb
- 100– TOTAL VOCs CONTOUR IN ppb

WELL ID NO.	TOTAL VOCs (ppb)	TOTAL CHLORINATED (ppb)
VEP-3	600	600
VEP-4	807	657
VEP-6	4711	1811
GT-3S	28600	4600
GT-4S	15	15
GT-5S	28	28
GT-6S	11	11
GT-7S	376550	70380

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE: June 30 ~~8/6/92~~
DATE: 4/24/92
ACAD FILE: 5104-VOC

TOTAL VOCs IN GROUNDWATER (OVERBURDEN AQUIFER)

PROJECT MGR.: WL
PROJECT GEO.: WL
DRAWN BY: MET
CLIENT: PAWLING CORPORATION
PROJECT NO.: 01110-5104
LOCATION: PAWLING NEW YORK
FIGURE NO.:

Table 18

DISSOLVED OXYGEN in mg/l

DATE	Status of Sparge System	GT-1S	GT-2S	GT-3S	GT-6S	GT-7S	RW-1S	RW-2S	RW-1D
11-Mar-92	Off	1.06	2.3	0.7	3.15	0.37			
24-Mar-92	On	6.4	5.8	0.7	3.65	0.45	0.75	1.9	
24-Apr-92	Off	0.46	0.37	0.34	3.53	0.41	0.41	1.55	
08-May-92	Off	0.3		0.36	0.69		0.4		
03-Jun-92	Off	0.39	0.36	0.4	2.34	0.3		1.85	0.26
03-Jun-92	On	0.32	0.34	0.3	2.26	0.51			0.19
03-Jun-92	On	0.24		0.65	2.15	0.52		0.49	0.15
03-Jun-92	On	0.3		0.26	2.44	0.52		0.21	0.22
26-Jun-92	On	8.85		3.9	4.25				

PAWLING CORPORATION
GROUNDWATER REMEDIATION PROJECT

PROJECT UPDATE
DECEMBER 2004

Submitted To:

NYSDEC
21 South Putt Corners Road
New Paltz, New York 12561

Submitted By:

Susan R. Thompson
Pawling Corporation
157 Charles Colman Blvd.
Pawling, NY 12564

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RECOMMENDED REMEDIAL PLAN FOR BEDROCK AQUIFER, DEC. 2000

APPENDICES

1.0 BACKGROUND

The New York State Department of Environmental Conservation (NYSDEC) issued a consent order Case #3-1498/8712 to Pawling Corporation on February 24, 1988. This consent order alleged that non-contact cooling water discharged to the Swamp River through SPDES Permit #NY-000-4616 contained copper, zinc, and organic solvents. The NYSDEC also contended that storm water runoff from Pawling Corporation property, containing copper, lead, and iron in concentrations exceeding State ground water discharge limits, discharged into the ground water via a dry well.

The NYSDEC consent order required Pawling Corporation to perform a ground water investigation to identify the extent and source of the ground water contamination. Pawling Corporation contracted Groundwater Technology (GTI) (which later became Fluor Daniels, then IT Group which later was changed to Shaw Environmental) to perform the ground water investigation. A summary of the findings of this investigation are presented in a report titled "Ground Water Investigation, Pawling Corporation, Pawling, New York" dated September 2, 1988. Further delineation of potential upgradient sources was recommended as the final work step in the Preliminary Remedial Investigation.

1.1 Remedial Investigation

GTI reviewed background information and inspected the Pawling facility in May of 1988. Based on the information obtained, GTI installed borings into the overburden and bedrock at the Pawling Corporation facility in June of 1988. Monitoring locations were placed adjacent and down gradient to the suspected contaminant sources. Several of these borings were completed as monitor wells.

In June of 1988, the monitor wells were gauged and sampled. Water samples were also collected from production wells on site. Water and sediment samples from the stream were also collected during this monitor well sampling event. Some results exceeded the NYSDEC Water Quality Standards for toluene and 1,1,1-trichloroethene.

The objectives of the initial ground water study included:

1. delineation of the concentration and extent of metal and solvent contamination in the ground water
2. determination of upgradient source potential impact to the Pawling property
3. evaluation of pathways of contaminant migration
4. obtaining information required for site remediation design

The initial ground water study met most of these objectives, however, an additional upgradient well couplet was installed to determine if off-site sources were contributing to the ground water contamination observed on the site.

The study also indicated that the ground water at the facility had a north-northwesterly flow direction with a 0.60 % gradient in the overburden aquifer and a 0.55% gradient in the bedrock aquifer.

In June of 1988, ground water quality information collected from the Pawling Corporation monitor and production wells indicated generally low levels of Priority Pollutant Volatile Organics across the site, with high levels in the vicinity of MW-2S, MW-2D1 and MW-2D2. Toluene and chlorinated compounds comprised the VOC's found. The area determined to be of the highest pollution was an area suspected of trenching and burning. Solvents were alleged to have been burned in these trenches in the late 1960's.

1.2 Remedial Investigation and Feasibility Study

A remedial Plan was outlined and submitted to the NYSDEC entitled "Work Plan for Subsurface Remedial Design and Implementation, Pawling Corporation", dated May 25, 1989. This work plan was approved by the NYSDEC Division of Hazardous Waste prior to initiation.

The results of this work plan were utilized to select and design a remedial system for this site. An engineering report, "Remedial System Design, Pawling Corporation", dated February 26, 1991, was prepared and submitted to the NYSDEC. The plan was approved by the NYSDEC on June 17, 1991. The approved system consisted of groundwater extraction wells, air stripper and liquid phase carbon water treatment, air sparging, soil vapor extraction and vapor phase carbon off-gas treatment. The final monitor point system consisted of:

- one sparge point (SP-1)
- one combined sparge/soil vent points (VP-1 through VP-5) plus one existing monitor well (GT-2/VP-6)
- two overburden recovery wells (RW-1S and RW-2S)
- one bedrock recovery well (RW-1D) (presently not a pumping well)
- two bedrock monitoring wells (MW-2D1 and MW-2D2)

Monitor points were also installed to monitor the effectiveness of the remedial system. The points installed consisted of two monitor wells (GT-6S and GT-7S) and one nested vapor probe (NVP-1).

1.3 Ground Water Gradient

A complete ground water gauging round was performed on March 9, 1992 prior to remedial system start-up to document the initial site conditions. The overall site overburden and bedrock groundwater flow directions were similar to that of previous gaugings and indicated flow to the north toward Swamp River.

A comparison of the groundwater elevations in the deep bedrock and the overburden indicated that an upward vertical gradient of approximately 0.18 feet was present across the site.

1.4 Contaminant Volumes

The calculated contaminant volumes for the overburden were determined. The saturated phase contained the highest amount of VOC's, 1774 pounds. The unsaturated phase contained 700 pounds while the dissolved phase contained only 45 pounds. The total VOC's identified in the subsurface were found to be approximately 2,519 pounds.

The estimated contaminant mass calculations for the bedrock aquifer dissolved phase was 2 to 25 pounds. Due to the low porosity and small surface area of contaminant contact within the rock, it was assumed that the absorbed phase VOC volume was small.

1.5 Ground Water Recovery System

The groundwater extraction system, which include the air stripper, and the soil vent and air sparging system, was started on March 11, 1992 and is currently still in operation.

1.6 Dual Phase Extraction System

A Temporary Dual Phase Extraction System was installed on GT-7S in August of 1995 because it was thought that it would enhance remediation at the site. The system was temporary and ran from August 1995 until November 1995 and again the following summer. In November of 1998 a permanent installation of the DPE System was completed. The DPE has run on and off again due to mechanical difficulties. It has been in operation since September 2004.

Operation of the DPE on a more regular, year round basis was implemented to address the final "hot spot" on the site. Remediation of this GT-7S area is the last step necessary prior to obtaining clean closure for the site.

2.0 System Efficiency

The ground water treatment system has been in operation since March of 1992. No significant concentrations have been removed by the groundwater treatment system since the autumn of 1997. This data indicates that the ground water treatment system has been successful in removing the majority of VOC's from the ground water within the zone of influence for pumping wells RW-1S and RW-2S.

The Soil Vent Extraction (SVE) System has also been operational since March of 1992. Currently, the data indicates that asymptotic removal conditions have been achieved utilizing this current treatment equipment.

Operation of the DPE system in the area of GT-7S appears to be helping to decrease the VOC concentrations surrounding GT-7S. Continued operation of the DPE also appears to be helping to decrease VOC concentrations in RW-1S and RW-2S. RW-1S has shown VOC concentrations below method detection limits for quite some time. RW-2S has been at or below 26 ppb for quite some time with most results below the detection limit. Concentrations in RW-1D have also shown a steady decline, with a high level of 461 ppb in May of 2001 that decreased to very low levels in October of 2004 (see table 2).

The DPE had not been running for about nine months in 2004 due to constant system mechanical failures. All those issues were resolved and the system was placed back on line in September of 2004. Results pre-September showed a steady decline with a "spike" after the system was brought back up. With the system up and running, these levels are projected to decrease over the next few months.

3.0 Bedrock Remediation

In December of 2000, The IT Group submitted a proposal to the NYSDEC (see Section 1) titled "Recommended Remedial Plan for OU-2 Bedrock Aquifer, Pawling Corporation" in which IT Corporation recommended that a Natural Attenuation Monitoring Plan be implemented. The deep wells on site have been continuously monitored and lab results indicate that VOC levels are very low. The current data suggests that the overburden remediation systems have effectively cleaned up the bedrock as well due to the upward vertical gradient which has been identified on the site. Based upon these site conditions, lack of down gradient receptors and the desire to protect the Great Swamp, Pawling Corporation has requested that the NYSDEC approve the preparation of this approach.

PAWLING CORPORATION
INITIAL WELL RESULTS

WELLS	DEPTH	INITIAL DEPTH to WATER	TOTAL VOC's INITIAL CONTAMINATE LEVEL	Methylene Chloride ppb	trans 1,2 dichloro ethylene ppb	TCE ppb	toluene ppb	vinyl chloride
VEP-1	13.00	6.94	75-107 ppm					
VEP-2	14.00	6.72	10 ppm					
VEP-3	7.00	dry	30-60 ppm					
VEP-4	12.00	8.55	ND					
VEP-5	5.30	dry	5 ppm					
VEP-6		6.48	NA					
GT-1S		6.30	NA					
GT-2S			NA					
GT-3S		5.95	NA					
GT-4S		2.92	NA		21.00			
GT-5S		3.15	NA		9.00	7.00	10.00	
GT-6S	16.00	5.38	<1ppb		51.00	130.00		
GT-7S	12.20	7.27	526000.00	11000.00	16000.00	59000.00	440000.00	
P-1S		1.70						
P-2S		1.62						
SP-1S	16.30	6.18	NA					
SV-1V	13.50	6.12	NA					
NVP-1	9.00	dry	NA					
NVP-1D		6.25	NA					
MW-1S	17.00	9.10	BDL					
MW-2S	10.70		25763.9 ppb		14.00	94.00	22140.00	
MW-2D1	42.00	6.33	3970.00		880.00	90.00	3000.00	
MW-2D2	150.00	6.68	176.00		100.00	44.00	NA	
RW-1S	14.00	5.75	299100.00		19000.00	34000.00	240000.00	6100.00
RW-1D	42.00	6.71	3 PPB		680.00	300.00	2700.00	
RW-2S	12.00	6.65	20 ppm		8400.00	2000.00	48000.00	3200.00

WELLS	Sample Date	Toluene ppb	TCE ppb	111 TCA ppb	PCE ppb	Vinyl chloride ppb	cis 1,2 dichloro ethylene ppb	
VEP-4	Dec, 2003					<1	<1	
VEP-4	Feb, 2004		1.40				<1	
VEP-4	March,2004							
VEP-4	May,2004		1.60			<1	<1	
VEP-4	June,2004							
VEP-4	July, 2004							
VEP-4	Aug,2004		20.00			<1	<1	
VEP-4	Sept, 2005							
VEP-4	Oct,2004		<1			<1	<1	
GT-3S	Dec, 2003					<1	<1	
GT-3S	Feb, 2004		<1				<1	
GT-3S	March,2004							
GT-3S	May,2004		<1			<1	<1	
GT-3S	June,2004							
GT-3S	July, 2004							
GT-3S	Aug,2004		<1			<1	<1	
GT-3S	Sept, 2004							
GT-3S	Oct,2004		<1			<1	<1	
GT-6S	Dec, 2003					<1	<1	
GT-6S	Feb, 2004		1.20				<1	
GT-6S	March,2004							
GT-6S	May,2004		<1			<1	<1	
GT-6S	June,2004							
GT-6S	July, 2004							
GT-6S	Aug,2004		<1			<1	<1	
GT-6S	Sept,2005							
GT-6S	Oct,2004		<1			<1	<1	
GT-7S	Dec, 2003					<1	<1	
GT-7S	Feb, 2004		2.90				<1	
GT-7S	March,2004		1.90					
GT-7S	May,2004		6.70			2.20	3.00	
GT-7S	June,2004		24.00					
GT-7S	July, 2004		30.00					
GT-7S	Aug,2004	<1	2.30			<1	<1	
GT-7S	Sept,2004	54.00	2.40			1.40	1.90	
GT-7S	Oct,2004	2100.00	<10			110.00	170.00	
RW-1S	Dec, 2003					<1	<1	
RW-1S	Feb, 2004		<1				<1	
RW-1S	March,2004							
RW-1S	May,2004		<1			<1	<1	
RW-1S	June,2004							
RW-1S	July, 2004							
RW-1S	Aug,2004							
RW-1S	Sept,2004							
RW-1S	Oct,2004	<1	<1	<1	<1	<1	<1	
RW-1D	Dec, 2003					46.00	45.00	
RW-1D	Feb, 2004		<1				190.00	
RW-1D	March,2004							
RW-1D	May,2004		<1			26.00	29.00	
RW-1D	June,2004							
RW-1D	July, 2004							
RW-1D	Aug,2004		<1			4.50	4.30	
RW-1D	Sept,2004							
RW-1D	Oct,2004	<1	<1			4.20	2.90	

GROUNDWATER TECHNOLOGY

Project: Pawling Corporation
Location:
Date: 6/28/88
Operator: G. Pafumi & C. Burke
Method: IP
Equipment #:

Project #: 110-001-8
Time: 1:30 p.m.

WELL DATA MONITORING FORM

Well ID	Well Depth	T.O.C. Elev.	Depth to Water	Depth to Petro.	Petro. Thickness	Petro. Gravity	Hydro. Equiv.	Corrected DTW	Corrected Water Elev.
MW-5D	150	443.06	8.05						435.01
MW-3S	18.5	439.01	7.04						431.97
MW-4S	approx. 12	439.42	7.95						431.47
MW-1S	17	440.91	10.98						429.93
MW-1D	150	439.63	9.10						430.53
MW-2S	10.5	438.02	6.89						431.13
MW-2D1	42	437.66	7.17						430.49
MW-2D2	150	438.02	7.46						430.56
MW-5S	16.8	442.02	--*						
stream	11.30	427.95	2.7						430.65

Comments: * Not gauged this day. Could not locate early enough.

GROUNDWATER TECHNOLOGY

Project: Pawling Corporation
Location: Pawling, NY
Date: 8/01/88
Operator: C. Burke
Method: Interface Probe
Equipment #: 373

Project #: 110-001-870
Time:

WELL DATA MONITORING FORM

Well ID	Well Depth	T.O.C. Elev.	Depth to Water	Depth to Petro.	Petro. Thickness	Petro. Gravity	Hydro. Equiv.	Corrected DTW	Corrected Water Elev.
MW-1_s	17	440.91	9.42						431.49
MW-1_D	150	439.63	8.13						431.50
MW-2_s	10.5	438.02	7.35	solid					430.67
MW-2_{D1}	42	437.66	6.31						431.35
MW-2_{D2}	150	438.02	6.28						431.74
MW-3	18.5	439.01	5.25						433.76
MW-4	9.10	439.42	6.10						433.32
MW-5_s	16.8	442.02	6.41						435.61
MW-5_D	150	443.06	7.31						435.75
stream	10.75	427.95*	3.3						431.25

Comments: * 0 feet stream gauging datum plane at 427.95 feet stream level 3.3 feet above this 0 feet mark.

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-6-88 TOTAL DEPTH OF HOLE 15.2'

DIAMETER 6.25"

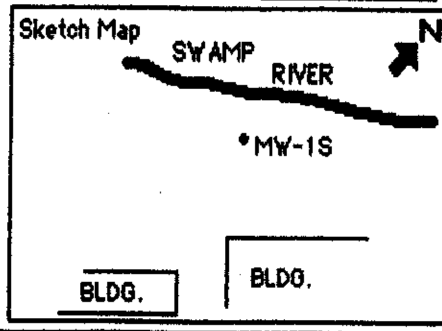
SCREEN DIA. 2" LENGTH 11' SLOT SIZE 0.012"

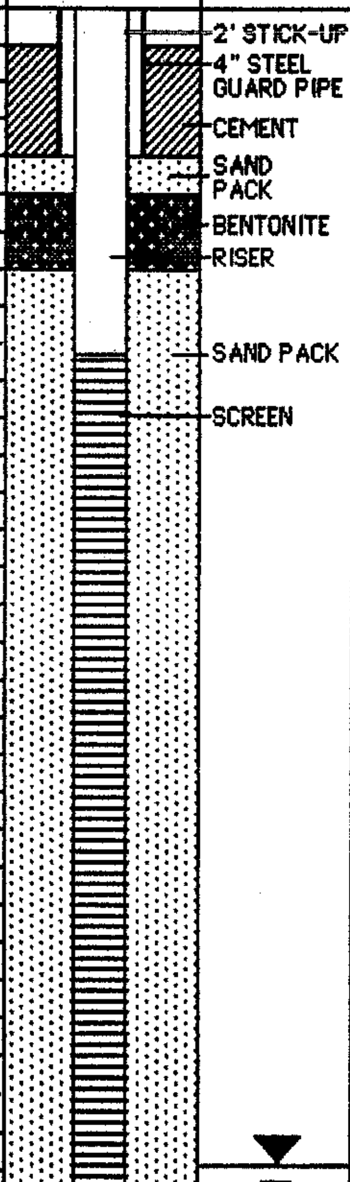
CASING DIA. 2" LENGTH 6' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-1S





DEPTH IN FEET	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–1		Dark brown, fine SAND & rubber pieces (Fill)
4–5	S-1 3-1-1-1	Brown, fine SAND with 1" stones, bottom 2" wet (Fill)
10	S-2	Dark gray, SILT & fine SAND, some wood fragments
15	S-3 100/0.2"	Dark gray, fine SAND
		T.D. 15.2'

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

PROJECT PAWLING   OWNER PAWLING

LOCATION PAWLING, NY   PROJECT NO. 110 001 8708

DATE DRILLED 6-7-88   TOTAL DEPTH OF HOLE 10.7'

DIAMETER 6.25"

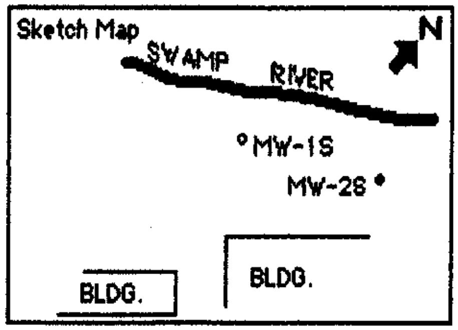
SCREEN DIA. 2"   LENGTH 7.5'   SLOT SIZE 0.012"

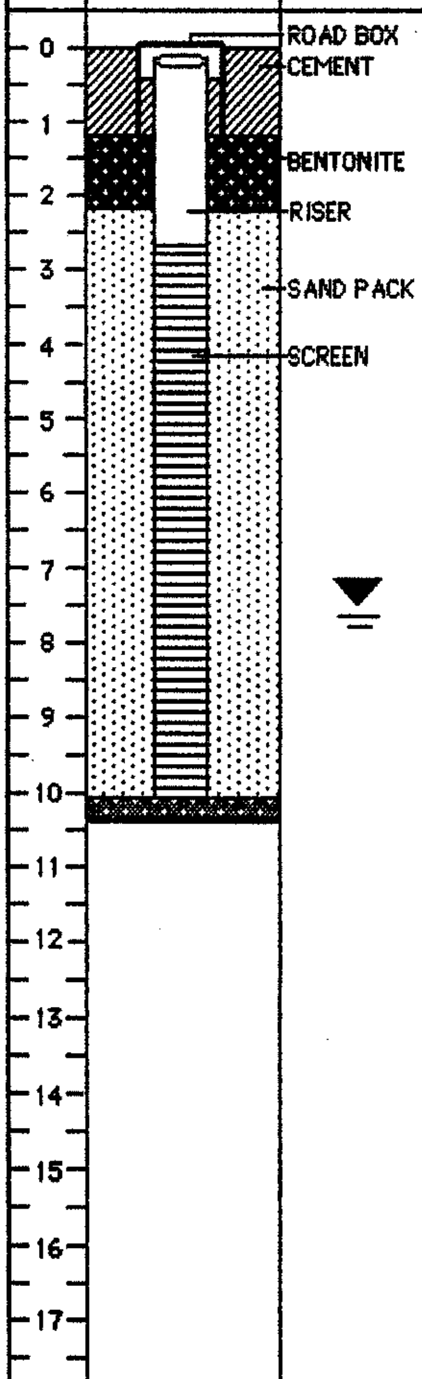
CASING DIA. 2"   LENGTH 2.7'   TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY   DRILLING METHOD HSA

DRILLER M. MULHERN   LOG BY W. LEONARD

WELL NUMBER MW-2S





DEPTH IN FEET	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–1		Brown, fine SAND (Fill)
5	S-1 2-2-2-2	Yellow brown, fine SAND, bottom of spoon moist
10	S-2 13-100/0.2"	Green & white weathered marble rock
10.7		T.D. 10.7'

PROJECT PAWLING OWNER PAWLING

WELL NUMBER MW-3S

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-7,8-88 TOTAL DEPTH OF HOLE 19.0'

DIAMETER 6.25"

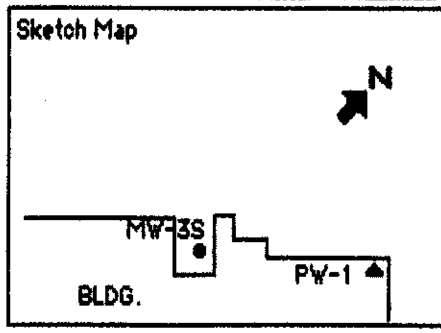
SCREEN DIA. 2" LENGTH 15.5' SLOT SIZE 0.012"

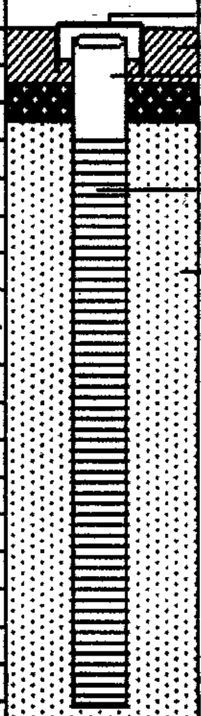
CASING DIA. 2" LENGTH 3' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

Sketch Map





DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 2		ROAD BOX CEMENT RISER BENTONITE		
4		SCREEN		Fill consisting of SAND & PEBBLES Rock fragments - GRANITE & QUARTZITE
6 – 8		SAND PACK	S-1 3-5-13-8	Moist, SAND & GRAVEL
10			S-2 10-12-14-14	Gray brown, wet, fine SAND,
				SAND & GRAVEL
12				Fine to very fine SAND
14 – 16			S-3 18-25-32-25	Light gray SAND & GRAVEL weathered rock- MARBLE- FE stained SAND & GRAVEL with PEBBLES of different mineralogy (till?)
18		AUGER RE-FUSAL AT 18.5'	S-4 27-100/.1"	Tan calcic SANDSTONE
20				T.D. 19.0'

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-8-88 TOTAL DEPTH OF HOLE 10.6'

DIAMETER 6.25"

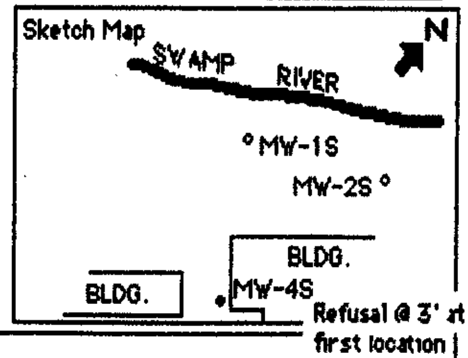
SCREEN DIA. 2" LENGTH 8' SLOT SIZE 0.012"

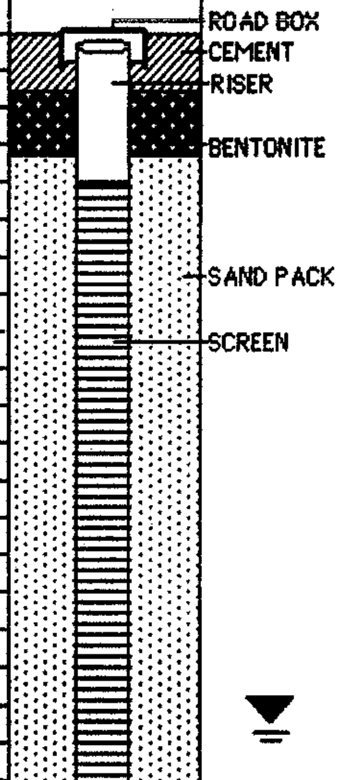
CASING DIA. 2" LENGTH 2' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-4S





DEPTH IN FEET	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0			Fill consisting of brown SAND & COBBLES
4			Brown, dry, fine SAND
5		S-1 18-29-41-40	Weathered rock - white & green very fine SAND with iron stained zones
9	▼		
10		S-2 37-100/.1"	Wet, weathered rock
10.6			T.D. 10.6'
11–17			

PROJECT PAWLING OWNER PAWLING

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-8-88 TOTAL DEPTH OF HOLE 16.8'

DIAMETER 6.25"

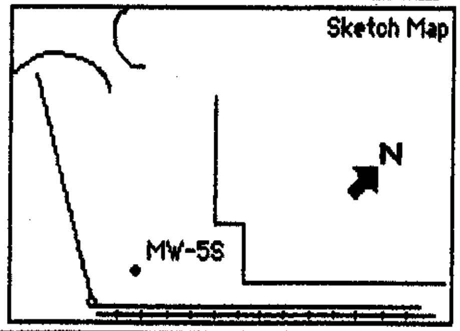
SCREEN DIA. 2" LENGTH 13.8' SLOT SIZE 0.012"

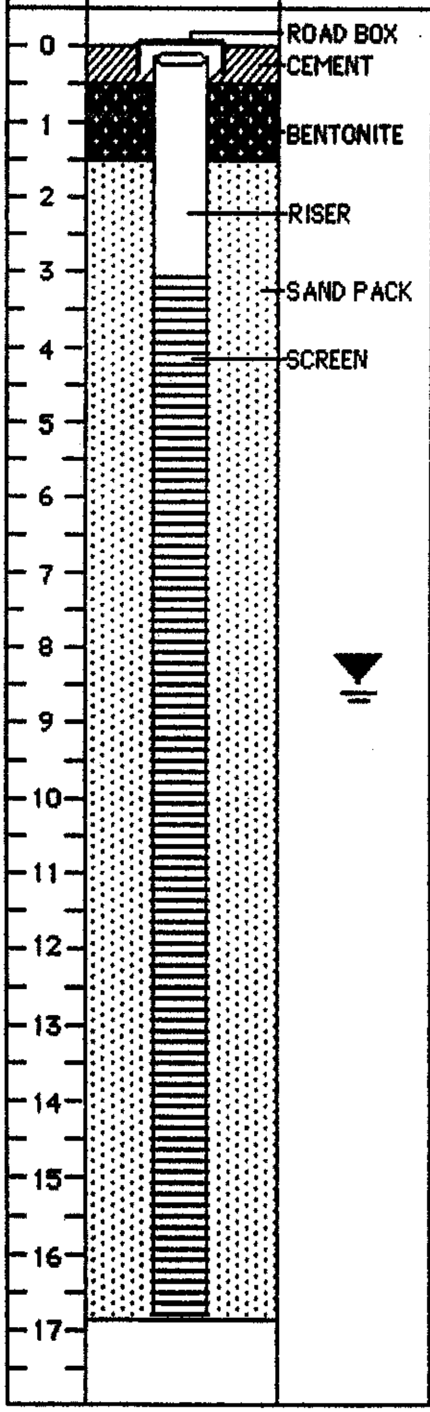
CASING DIA. 2" LENGTH 3' TYPE FIBERGLASS

DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD HSA

DRILLER M. MULHERN LOG BY W. LEONARD

WELL NUMBER MW-5S





DEPTH IN FEET	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
4–6	S-1 2-2-2-3	Fill consisting of red-brown fine SAND with PEBBLES bottom of spoon moist
10	S-2 8-8-14-18	Dark green to brown, wet, SAND & GRAVEL
16	S-3 5-8-24 100/.3"	SAND & GRAVEL Tan yellow calcic SANDSTONE
17		T.D. 16.8'

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-9, 6-16-88 TOTAL DEPTH OF HOLE 147'

DIAMETER

SCREEN DIA. 5 5/8" LENGTH 117' SLOT SIZE

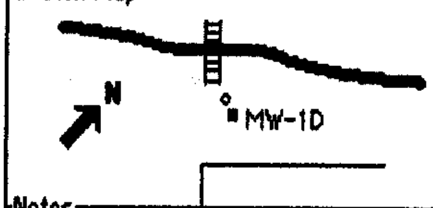
CASING DIA. 6" LENGTH 30' TYPE OPEN HOLE

DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

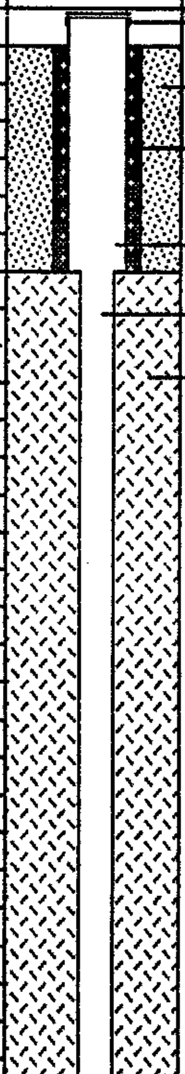
DRILLER ALAN GOULD LOG BY W. LEONARD

WELL NUMBER MW-1D

Sketch Map



Notes
NO HNU READING IN ANY WATER SAMPLE

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–30		LOCKING CAP; UNDISTURBED SOIL; BENTONITE/ CEMENT GROUT; 6" STEEL CASING	AUGERED TO 18.5' CORED 18.5'-33.5'; C-1; C-2; C-3		C-1 19.8' Fracture- no water returing to surface 21'-22' Fracture, mikly outtings - not competent rock - BOULDERS. RQD = 8.3% biotite hornblende gneiss
					C-2 24.5' Fracture - losing 50-60% of the water - silty seam 26.0' Slower drilling, RQD = 37.1%, very brecciated marble
		OPEN HOLE; BEDROCK			C-3 No obvious fractures, white sand cuttings, RQD = 98.1%, highly banded marble
30–147					Marble cuttings 42' Mud seam, 1 1/2' thick 50' Seam 85' Water bearing seam, ~ 30 gpm Marble cuttings 115' Seam ~ 2' thick, Fe stained 130' Seam ~ 1' thick, Fe stained, light brown zone 145' Water bearing seam, 1.5' thick
150					TD ~ 147' TOTAL YIELD ~ 150 GPM

Depth scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 130, 140, 150

PROJECT PAWLING OWNER PAWLING CORPORATION

WELL NUMBER MW-2D

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-10-88 TOTAL DEPTH OF HOLE 31.0'

DIAMETER ______

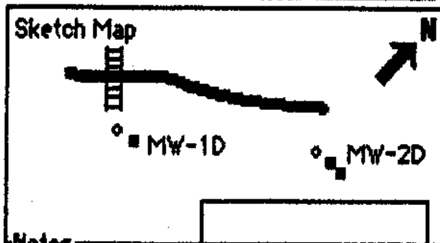
SCREEN DIA. ______ LENGTH ______ SLOT SIZE ______

CASING DIA. ______ LENGTH ______ TYPE ______

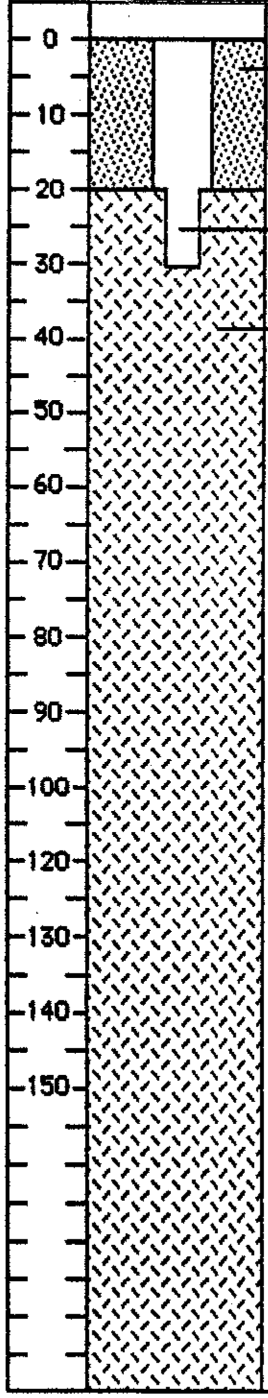
DRILLING CO. GROUNDWATER TECHNOLOGY DRILLING METHOD CORING

DRILLER M. MULHERN LOG BY W. LEONARD

Sketch Map



Notes



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 20		UNDISTURBED SOIL	AUGERED TO 21.5' CORED 21.5'-31.0' SS 100/0.4"		Green silty SAND with boulders SS 19.5'-19.9' Light brown SAND with weathered RX
20 – 30		CORE	C-1		C-1 24.5' Lost all water, RQD = 0%, Boulder upper part, lower - white marble with vertical Fe stained fracture
			C-2		C-2 26.5' Fracture, no water returning to surface, RQD = 78.3%, white marble first 1.0', 45 degree angled Fe stained fracture, lower clay seam
		BEDROCK			Attempted C-3 but water holes in core barrel got plugged with mud, sheared off diamond bit HOLE ABANDONED TD 31.0'

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-17-88 TOTAL DEPTH OF HOLE 42'

DIAMETER

SCREEN DIA. 5 5/8" LENGTH 14' SLOT SIZE

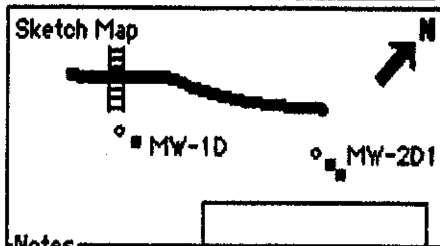
CASING DIA. 6" LENGTH 28' TYPE OPEN HOLE

DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

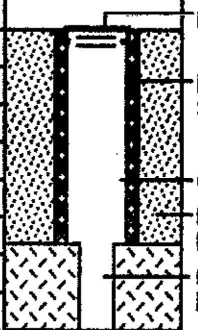
DRILLER ALAN GOULD LOG BY W. LEONARD

WELL NUMBER MW-2D1

Sketch Map



Notes



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX			
10		BENTONITE SEAL			
20		6" CASING			
		UNDISTURBED SOIL			Very broken up rock
30				5	30' fracture, small amount of water
		OPEN ROCK HOLE			35' Major water bearing zone, 50-60 GPM
40				5	42' Water bearing fracture, ~ 30 GPM
50					TD 42'
60					
70					
80					
90					
100					
120					
130					
140					
150					

PROJECT PAWLING OWNER PAWLING CORPORATION

WELL NUMBER MW-2D2

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-20-88 TOTAL DEPTH OF HOLE 150'

DIAMETER

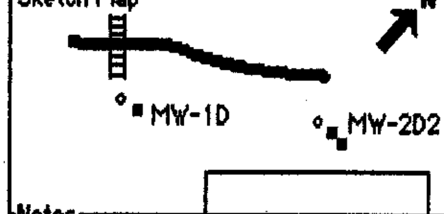
SCREEN DIA. 5 5/8" LENGTH 105' SLOT SIZE

CASING DIA. 6" LENGTH 45' TYPE OPEN HOLE

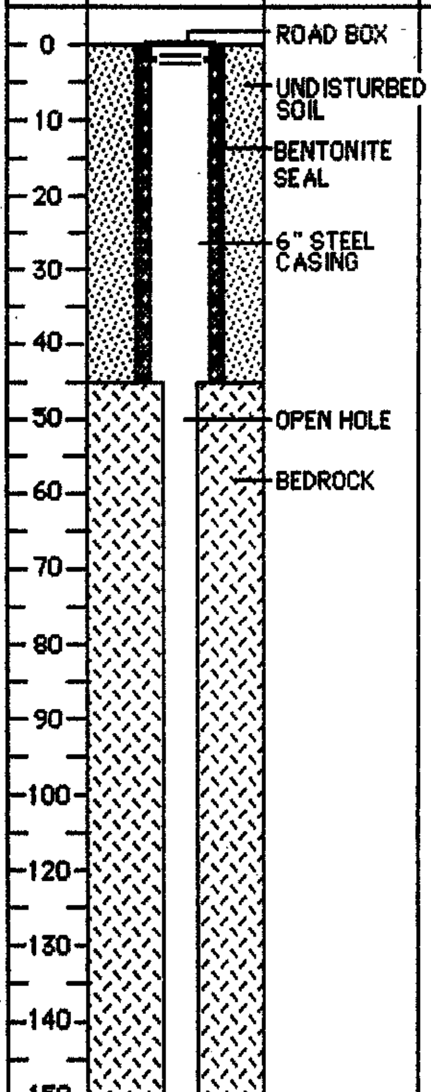
DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

DRILLER GOULD JR. LOG BY W. LEONARD

Sketch Map



Notes



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
				0	47' Small amount of water, marble, various colors
				0	63' Fracture
				0	72' Fracture with brown mud 1'-2' thick
				0	
				0	
				0	104' Increase a small amount of water
					119' Fracture with yellow mud, ~1' thick
				0	131' Fracture, Fe stained, some water
					TD 150'

PROJECT PAWLING OWNER PAWLING CORPORATION

LOCATION PAWLING, NY PROJECT NO. 110 001 8708

DATE DRILLED 6-14,6-21-88 TOTAL DEPTH OF HOLE 150'

DIAMETER

SCREEN DIA. 5 5/8" LENGTH 120' SLOT SIZE

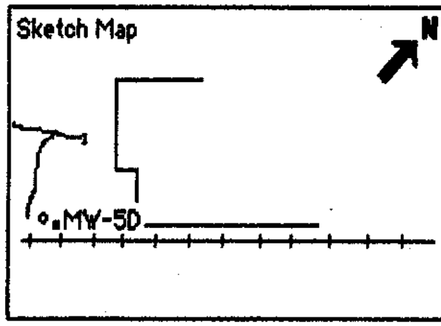
CASING DIA. 6" LENGTH 30' TYPE OPEN HOLE

DRILLING CO. GOULD DRILLING METHOD AIR ROTORY

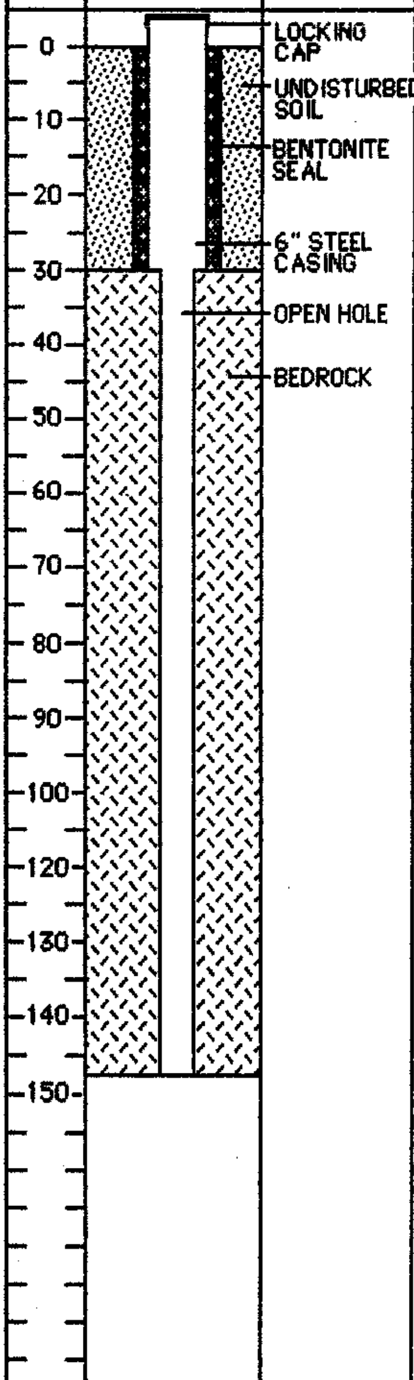
DRILLER GOULD JR. LOG BY W. LEONARD

WELL NUMBER MW-5D

Sketch Map



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	P.I.D PPM	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)



BLOWS PER 6" OF SPOON: AUGERED TO 22.8' CORED 22.8'-37.8'; C-1; C-2; C-3; C-4

P.I.D PPM: 0; 0; 0; 0; 0; 0

DESCRIPTION / SOIL CLASSIFICATION:

C-1
Seam at 24', lost water, RQD = 80.2%, white marble

C-2
25.8' Fracture, no water returning to surface, RQD = 66.7%, white marble

C-3
No water returning to the surface, RQD = 50.8%, gray crystalline marble

C-4
No water returning to the surface, RQD = 100%, gray / white crystalline marble

30'-40' Very muddy water
38.5' Water bearing fracture, 40-50 GPM

~45' Cleaner water

48.5'-54' Brown muddy very cold water

~70' Muddy water, various colored marble, gray, white, yellow, light brown, pink throughout borehole

Various colored marble, gray, white, yellow, light brown, pink throughout borehole

TD ~ 150'

TABLES

Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-3S	438	03/01/92	6.60	431.4									
GT-3S	438	04/01/92	7.88	430.12									
GT-3S	438	05/01/92	7.64	430.36									
GT-3S	438	08/01/92	6.89	431.11									
GT-3S	438	09/01/92	6.51	431.49									
GT-3S	438	10/01/92	7.28	430.72									
GT-3S	438	11/01/92	6.66	431.34									
GT-3S	438	12/01/92	6.68	431.32									
GT-3S	438	01/01/93	6.65	431.35									
GT-3S	438	03/01/93	6.45	431.55									
GT-3S	438	04/01/93	6.20	431.8									
GT-3S	438	05/01/93	6.38	431.62									
GT-3S	438	08/01/93	7.62	430.38									
GT-3S	438	09/01/93	6.96	431.04									
GT-3S	438	10/01/93	7.14	430.86									
GT-3S	438	11/01/93	6.96	431.04									
GT-3S	438	12/01/93	6.62	431.38									
GT-3S	438	02/01/94	6.26	431.74									
GT-3S	438	04/01/94	3.58	434.42									
GT-3S	438	05/31/94	6.36	431.84									
GT-3S	438	06/01/94	6.80	431.2									
GT-3S	438	07/01/94	6.50	431.5									
GT-3S	438	05/01/94	6.45	431.55									
GT-3S	438	08/01/94	6.40	431.6									
GT-3S	438	10/01/94	6.43	431.57									
GT-3S	438	11/01/94	6.23	431.77									
GT-3S	438	12/01/94	6.10	431.9									
GT-3S	438	01/01/95	6.04	431.96	<1	<1	<1	<1	<1	15	<1		15
GT-3S	438	02/09/95	6.25	431.75									
GT-3S	438	03/01/95	6.54	431.46									
GT-3S	438	04/01/95	6.28	431.72	<1	<1	<1	<1	<1	<1	7		7
GT-3S	438	05/17/95	6.86	431.14									
GT-3S	438	06/01/95	6.91	431.09									
GT-3S	438	07/13/95	8.00	430	<1	<1	<1	<1	10	4	<1		14
GT-3S	438	08/16/95	7.65	420.35									
GT-3S	438	09/19/95	7.95	430.05									
GT-3S	438	10/17/95	6.73	431.27	<1	<1	<1	<1	<1	<1	<1		<1
GT-3S	438	11/14/95	6.91	431.09									
GT-3S	438	12/05/95	6.16	431.84									
GT-3S	438	01/16/96	6.36	431.64	<1	<1	<1	<1	<1	<1	<1		ND
GT-3S	438	02/15/96	6.11	431.89									
GT-3S	438	03/15/96	5.58	432.42									
GT-3S	438	04/11/96	5.62	432.38	<1	<1	<1	<1	<1	<1	<1		1
GT-3S	438	05/28/96	6.27	431.73									
GT-3S	438	06/26/96	6.12	431.88									
GT-3S	438	07/19/96	6.25	431.75	<1	<1	<1	<1	<1	120	100		220
GT-3S	438	08/19/96	6.48	431.52									
GT-3S	438	09/08/96	6.87	431.13									
GT-3S	438	10/08/96	6.16	431.84	<1	<1	<1	<1	<1	<1	<1		<1
GT-3S	438	11/21/96	6.74	431.26									
GT-3S	438	12/16/96	5.53	432.47									
GT-3S	438	01/30/97	6.09	431.91	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	02/13/97	6.14	431.86									
GT-3S	438	04/02/97	5.55	432.45									
GT-3S	438	04/23/97	5.51	432.49	<1	<1	<1	<1	<1	<1	<1	10	10
GT-3S	438	05/13/97	6.20	431.8									
GT-3S	438	06/10/97	5.38	432.62									
GT-3S	438	07/08/97	7.15	430.85	<1	86	<1	<1	<1	<1	<1	130	216
GT-3S	438	08/03/97	7.11	430.89									
GT-3S	438	09/25/97	7.40	430.6									
GT-3S	438	10/22/97	7.74	430.26	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	11/11/97	6.47	431.53									
GT-3S	438	12/10/97	6.30	431.7									
GT-3S	438	01/20/98	6.05	431.95	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	02/16/98	6.27	431.73									
GT-3S	438	03/17/98	6.02	431.98									
GT-3S	438	04/15/98	NG		<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	05/07/98	7.13	430.87									
GT-3S	438	06/03/98	6.61	431.39									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation (ft-asl)	Sample Date	Depth to Water (ft)	Water Elevation (ft-asl)	TOLUENE (ug/l)	TRICHLOROETHENE (ug/l)	1,1,1-TRICHLOROETHANE (ug/l)	TETRACHLOROETHENE (ug/l)	TRANS-1,2-DICHLOROETHENE (ug/l)	VINYL CHLORIDE (ug/l)	ETHYLBENZENE (ug/l)	CIS-1,2-DICHLOROETHENE (ug/l)	TOTAL VOCS (ug/l)
GT-3S	438	07/21/98	6.49	431.52									
GT-3S	438	08/21/98	6.92	431.08									
GT-3S	438	10/19/98	7.32	430.68									
GT-3S	438	11/24/98	7.40	430.6									
GT-3S	438	12/23/99	7.09	430.91									
GT-3S	438	12/29/99	6.42	431.58	<1	<1	<1	<1	<1	<1	<1	2	2
GT-3S	438	02/16/00	6.13	431.87	<1	<1	<1	<1	<1	2	NA	15	17
GT-3S	438	08/02/00	6.50	431.5	<1	<1	<1	<1	<1	1	NA	7	8
GT-3S	438	08/29/00	6.93	431.07	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/20/00	6.80	431.2	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/23/01	6.50	431.5	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	05/23/01	6.26	431.74	<1	<1	<1	<1	<1	16	NA	32	48
GT-3S	438	08/28/01	6.40	431.6	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/21/01	7.00	431	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/13/02	6.61	431.39									0
GT-3S	438	05/23/02	6.32	431.68	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	08/29/02	6.93	431.1	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/27/02	6.27	431.73	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/28/03	5.85	432.15	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	03/01/92	5.40	432.5									
GT-6S	437.9	04/01/92	6.19	431.71									
GT-6S	437.9	05/01/92	6.07	431.63									
GT-6S	437.9	08/01/92	6.31	431.59									
GT-6S	437.9	11/01/92	6.29	431.61									
GT-6S	437.9	12/01/92	6.09	431.81									
GT-6S	437.9	01/01/93	5.85	432.05									
GT-6S	437.9	03/01/93	5.95	431.95									
GT-6S	437.9	04/01/93	5.16	432.74									
GT-6S	437.9	05/01/93	5.82	432.08									
GT-6S	437.9	08/01/93	7.00	430.9									
GT-6S	437.9	09/01/93	6.67	431.23									
GT-6S	437.9	10/01/93	6.61	431.29									
GT-6S	437.9	11/01/93	6.40	431.5									
GT-6S	437.9	12/01/93	5.92	431.98									
GT-6S	437.9	01/01/94	6.13	431.77									
GT-6S	437.9	02/01/94	5.59	432.31									
GT-6S	437.9	04/01/94	5.04	432.86									
GT-6S	437.9	05/01/94	5.79	432.11									
GT-6S	437.9	06/01/94	6.18	431.72									
GT-6S	437.9	07/01/94	8.21	429.69									
GT-6S	437.9	08/01/94	6.04	431.86									
GT-6S	437.9	09/01/94	5.90	432									
GT-6S	437.9	10/01/94	5.80	432.1									
GT-6S	437.9	11/01/94	5.61	432.29									
GT-6S	437.9	12/01/94	5.36	432.54									
GT-6S	437.9	01/01/95	5.36	432.54									
GT-6S	437.9	02/09/95	5.54	432.36	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	03/01/95	5.57	432.33									
GT-6S	437.9	04/01/95	5.58	432.32									
GT-6S	437.9	05/17/95	5.86	432.04	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	06/01/95	6.13	431.77									
GT-6S	437.9	07/13/95	6.98	430.92									
GT-6S	437.9	08/16/95	6.87	431.03	7	<1	<1	<1	2	<1	<1		9
GT-6S	437.9	09/18/95	7.14	430.76									
GT-6S	437.9	10/17/95	5.91	431.99									
GT-6S	437.9	11/14/95	5.14	432.76	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	12/06/95	5.31	432.59									
GT-6S	437.9	01/16/96	5.64	432.26									
GT-6S	437.9	02/15/96	5.31	432.59	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	03/15/96	4.87	433.03									
GT-6S	437.9	04/11/96	5.01	432.89									
GT-6S	437.9	05/28/96	5.53	432.37	<1	1	<1	<1	<1	<1	9		10
GT-6S	437.9	06/26/96	5.64	432.26									
GT-6S	437.9	07/19/96	5.49	432.41									
GT-6S	437.9	08/19/96	5.89	432.01	<1	<1	<1	<1	<1	<1	4		4
GT-6S	437.9	09/06/96	6.25	431.65									
GT-6S	437.9	10/08/96	5.55	432.35									

ft-asl = feet above sea level
ug/l = micrograms per liter
M:\CommonProj\PawlingCorp\Report2002\Table1

Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-6S	437.9	11/21/96	6.14	431.76	<1	<1	<1	<1	<1	<1	2		2
GT-6S	437.9	12/18/96	4.77	433.13									
GT-6S	437.9	01/30/97	5.33	432.57									
GT-6S	437.9	02/19/97	5.59	432.31	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	04/02/97	4.88	433.02									
GT-6S	437.9	04/23/97	4.80	433.1									
GT-6S	437.9	05/13/97	5.47	432.43	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	05/19/97	5.90	432									
GT-6S	437.9	07/08/97	6.34	431.56									
GT-6S	437.9	08/08/97	6.29	431.61	<1	1	<1	<1	<1	<1	<1	<1	1
GT-6S	437.9	09/25/97	6.69	431.21									
GT-6S	437.9	10/22/97	7.10	430.8									
GT-6S	437.9	11/11/97	6.04	431.66									
GT-6S	437.9	12/10/97	5.61	432.29									
GT-6S	437.9	01/20/98	5.42	432.48									
GT-6S	437.9	02/19/98	5.58	432.32	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	03/17/98	6.28	431.62									
GT-6S	437.9	04/15/98	5.50	432.4									
GT-6S	437.9	05/07/98	5.99	431.91	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	06/03/98	5.72	432.18									
GT-6S	437.9	07/21/98	5.80	432.1									
GT-6S	437.9	10/19/98	7.72	430.18									
GT-6S	437.9	11/24/98	6.73	431.17									
GT-6S	437.9	12/23/98	6.51	431.39									
GT-6S	437.9	12/28/98	6.93	431.97	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	02/13/00	5.58	432.32	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	06/02/00	5.78	432.12	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	08/29/00	6.22	431.68	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	11/20/00	6.10	431.8	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	02/23/01	5.82	432.08	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	05/23/01	5.29	432.61	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	08/29/01	6.40	431.5	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	11/21/01	6.40	431.5	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	02/13/02	5.93	431.97									0
GT-6S	437.9	05/23/02	5.64	432.26	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	08/28/02	6.35	431.55	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	11/27/02	5.58	432.32	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	02/28/03	5.30	432.6	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-7S	440.1	03/01/92	7.30	432.8									
GT-7S	440.1	04/01/92	7.30	432.8									
GT-7S	440.1	05/01/92	7.91	432.19									
GT-7S	440.1	06/01/92	10.50	429.6									
GT-7S	440.1	11/01/92	10.48	429.62									
GT-7S	440.1	12/01/92	10.29	429.81									
GT-7S	440.1	01/01/93	9.70	430.4									
GT-7S	440.1	03/01/93	9.80	430.3									
GT-7S	440.1	05/01/93	9.40	430.7									
GT-7S	440.1	08/01/93	8.92	431.18									
GT-7S	440.1	09/01/93	8.63	431.47									
GT-7S	440.1	10/01/93	8.50	431.6									
GT-7S	440.1	11/01/93	8.36	431.74									
GT-7S	440.1	12/01/93	7.75	432.35									
GT-7S	440.1	01/01/94	8.35	431.75									
GT-7S	440.1	02/01/94	7.65	432.45									
GT-7S	440.1	04/01/94	6.73	433.37									
GT-7S	440.1	05/01/94	7.36	432.74									
GT-7S	440.1	06/01/94	8.01	432.09									
GT-7S	440.1	07/01/94	7.09	433.01									
GT-7S	440.1	08/01/94	7.85	432.25									
GT-7S	440.1	09/01/94	7.78	432.32									
GT-7S	440.1	12/01/94	7.10	433									
GT-7S	440.1	01/11/95	6.93	433.17	140,000	10000	<50	140	<50	1400	<50		151540
GT-7S	440.1	02/09/95	7.06	433.04	280,000	9900	<50	<50	<50	1400	300		391600
GT-7S	440.1	03/30/95	7.17	432.93	300,000	11000	<1000	<1000	<1000	<1000	12000		323000
GT-7S	440.1	04/25/95	7.17	432.93	230,000	6900	<500	<500	<500	<500	8400		244300
GT-7S	440.1	05/17/95	7.49	432.61	42,000	<500	<500	<500	<500	2300	8500		52600
GT-7S	440.1	06/20/95	7.60	432.5	380,000	<250	<250	8000	<250	<250	<250		388000

ft-asl = feet above sea level
ug/l = micrograms per liter
M:\Common\Proj\PawlingCorp\Report2002\Table1

Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-7S	440.1	07/13/95	6.29	431.81	310,000	7900	<100	250	7700	<100	<100		325850
GT-7S	440.1	08/16/95	7.63	432.24	260,000	<50	<50	<50	10000	1100	<50		281100
GT-7S	440.1	10/17/95			57,000	<100	<100	<100	<100	<100	3900		60800
GT-7S	440.1	11/14/95			<1	2	<1	<1	<1	<1	13		15
GT-7S	440.1	12/05/95	7.83	433.07	100,000	<11	<11	<11	<11	<11	1800		101800
GT-7S	440.1	01/16/96	7.76	432.35	59,000						250		59250
GT-7S	440.1	02/15/96	6.61	433.28	<500	<500	<500	<500	24000	<500	<500		24000
GT-7S	440.1	03/15/96	6.27	433.63									
GT-7S	440.1	04/11/96	6.37	433.73									
GT-7S	440.1	07/19/96	NG		1	81	<1	7	<1	NS	170		259
GT-7S	440.1	08/19/96	8.41	431.68	<1	30	<1	<1	<1	130	80		240
GT-7S	440.1	09/06/96			<1	4	<1	2	<1	<1	8		13
GT-7S	440.1	10/09/96	6.54	433.56	<1	<1	<1	<1	<1	<1	<1		<1
GT-7S	440.1	11/21/96	8.19	431.91	68,000	<250	<1	<250	<250	<250	500		66980
GT-7S	440.1	12/18/96	6.53	433.57	27,000	<100	<100	<100	<100	NA	NA		27000
GT-7S	440.1	01/30/97	7.41	432.69	130,000	<1000	<1000	<1000	<1000	NA	NA	3500	133500
GT-7S	440.1	02/19/97	7.31	432.79	140,000	<500	<500	<500	<500			4600	145350
GT-7S	440.1	04/02/97	6.87	433.23	110,000	<200	<200	<200	<200			850	110850
GT-7S	440.1	04/23/97	6.85	433.25	160,000	<100	300	<100	<100			3500	163600
GT-7S	440.1	05/13/97	7.42	432.68	15,000	<50	<50	<50	<50	<50	<50	290	15290
GT-7S	440.1	06/03/97	7.55	432.55	80,000	<50	<50	<50	<50	180	<50	410	80200
GT-7S	440.1	07/08/97	8.32	431.78	30,000	<50	<50	<50	<50	<50	<50	500	30500
GT-7S	440.1	08/09/97	8.30	431.8	58,000	<50	<50	<50	<50	<50	<50	180	69160
GT-7S	440.1	09/25/97	8.61	431.49	<50	<50	<50	<50	<50	<50	<50	<50	<50
GT-7S	440.1	10/22/97	9.14	430.96	<50	<50	<50	<50	<50	<50	<50	<50	<50
GT-7S	440.1	11/11/97	8.22	431.88	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	12/10/97	7.60	432.5	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	01/20/98	7.41	432.69	<1	1	<1	<1	1	<1	<1	<1	2
GT-7S	440.1	02/18/98	7.57	432.53	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	03/17/98	7.43	432.67	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	04/15/98	7.36	432.74	<1	<1	<1	<1	<1	1	<1	<1	1
GT-7S	440.1	05/07/98	7.88	432.22	<1	1	<1	<1	53	<1	<1	<1	5[illegible]
GT-7S	440.1	06/03/98	7.51	432.59	1,800	2	<1	<1	110	43	<2	<1	196
GT-7S	440.1	07/21/98	7.58	432.52	<1	1	<1	<1	1	<1	<1	<1	2
GT-7S	440.1	08/21/98	7.95	432.15	3	11	<1	1	3	<1	3	<1	26
GT-7S	440.1	09/16/98	5.36	434.74	<1	7	<1	<1	3	<1	<1	<1	9
GT-7S	440.1	10/19/98	8.26	431.84	1	12	<1	1	<1	<1	<1	1	15
GT-7S	440.1	11/24/98	8.40	431.7	4	9	<1	1	2	<1	1	<1	16
GT-7S	440.1	12/23/98	8.47	431.63	<1	4	<1	<1	<1	<1	<1	<1	4
GT-7S	440.1	10/27/99	NG		<1	4	<1	<1	<1	16	<1	6	28
GT-7S	440.1	11/30/99	NG		<1	2	<1	<1	<1	<1	<1	1	3
GT-7S	440.1	12/28/99	7.63	432.47	<1	2	<1	<1	<1	<1	<1	1	3
GT-7S	440.1	01/18/00	7.80	432.3	<1	1	<1	<1	<1	<1	NA	<1	1
GT-7S	440.1	02/16/00	7.75	432.35	<1	3	<1	<1	<1	<1	NA	<1	3
GT-7S	440.1	03/23/00	7.02	433.08	4	2	<1	<1	<1	5	NA	3	14
GT-7S	440.1	04/26/00	7.10	433	5	2	<1	<1	1	2	NA	2	15
GT-7S	440.1	06/02/00	7.35	432.75	<1	1	<1	<1	<1	<1	NA	<1	1
GT-7S	440.1	06/30/01	NM		13,000	150	<50	<50	<50	140	NA	420	13710
GT-7S	440.1	07/21/00	8.64	431.46	14,000	4	<1	<1	5	84	NA	240	14433
GT-7S	440.1	08/29/00	8.58	431.52	12,000	<200	<200	<200	<200	<200	NA	630	12633
GT-7S	440.1	09/20/00	8.38	431.72	10,000	<200	<200	<200	<200	<200	NA	393	10393
GT-7S	440.1	10/12/00	8.89	431.21	14,000	<200	<200	<200	<200	<200	NA	463	14463
GT-7S	440.1	11/20/00	8.72	431.38	12,000	<200	<200	<200	<200	<200	NA	460	12493
GT-7S	440.1	12/20/00	10.02	430.08	12,000	<200	<200	<200	<200	<200	NA	440	12440
GT-7S	440.1	01/29/01	9.45	430.65	15,000	250	<250	<250	<250	<250	NA	660	15910
GT-7S	440.1	02/23/01	7.81	432.29	24,000	260	<250	<250	<250	<250	NA	830	25030
GT-7S	440.1	03/28/01	8.70	431.4	11,000	<250	<250	<250	<250	<250	NA	530	11530
GT-7S	440.1	04/19/01	9.50	430.6	7,200	<250	<250	<250	<250	<250	NA	<250	7200
GT-7S	440.1	05/23/01	8.42	431.68	8,700	<200	<200	<200	<200	<200	NA	280	8980
GT-7S	440.1	06/22/01	7.42	432.68									0
GT-7S	440.1	07/20/01	7.75	432.35									0
GT-7S	440.1	08/29/01	8.89	431.21	<20	49	<20	<20	<20	23	NA	520	592
GT-7S	440.1	09/26/01	NM										0
GT-7S	440.1	10/31/01	9.12	430.98									0
GT-7S	440.1	11/21/01	9.50	430.6	5,800	<200	<200	<200	<200	<200	NA	300	5900
GT-7S	440.1	12/18/01	NM		4,200	<200	<200	<200	<200	<200	NA	<200	4200
GT-7S	440.1	01/29/02	9.50	430.6									0
GT-7S	440.1	02/12/02	9.56	430.54									0

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample -Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-7S	440.1	03/21/02	NM										0
GT-7S	440.1	04/23/02	9.62	430.48	71	<50	<50	<50	<50	<50	NA	<50	71
GT-7S	440.1	05/23/02	8.59	431.51	4,800	<200	<200	<200	<200	<200	NA	<200	4800
GT-7S	440.1	06/17/02	7.89	432.21	6,300	<200	<200	<200	<200	<200	NA	410	6710
GT-7S	440.1	07/17/02	9.83	430.27	1,300	<50	<50	<50	<50	NA	NA	NA	1300
GT-7S	440.1	08/29/02	9.15	430.95	6,600	13	<10	<10	<10	<10	NA	150	6763
GT-7S	440.1	09/27/02	9.85	430.25	350	<10	<10	<10	<10	<10	NA	<10	350
GT-7S	440.1	10/21/02	9.45	430.65	43	<1	<1	<1	<1	NA	NA	NA	43
GT-7S	440.1	11/27/02	9.90	430.2	46	<5	<5	<5	<5	<5	NA	<5	48
GT-7S	440.1	12/17/02	7.80	432.3	3	2	<1	<1	<1	<1	NA	<1	5
GT-7S	440.1	01/29/03	8.97	431.13	52	2	<1	<1	<1	<1	NA	<1	54
GT-7S	440.1	02/28/03	8.91	431.19	828	2	<1	<1	<1	5	NA	10	837
GT-7S	440.1	03/31/03	6.70	433.4	<1	1	<1	<1	<1	<1	NA	<1	1
NVP-1	NM	01/16/96	6.51	NA									
NVP-1	NM	02/15/96	5.83	NA									
NVP-1	NM	03/16/96	5.45	NA									
NVP-1	NM	04/11/96	5.72	NA									
NVP-1	NM	05/26/96	5.15	NA									
NVP-1	NM	06/26/96	5.18	NA									
NVP-1	NM	07/16/96	6.17	NA									
NVP-1	NM	08/19/96	6.53	NA									
NVP-1	NM	09/06/96	DRY	NA									
NVP-1	NM	10/09/96	6.35	NA									
NVP-1	NM	12/18/96	5.19	NA									
NVP-1	NM	01/30/97	5.96	NA									
NVP-1	NM	02/19/97	6.07	NA									
NVP-1	NM	04/02/97	5.56	NA									
NVP-1	NM	04/23/97	5.51	NA									
NVP-1	NM	05/13/97	5.99	NA									
NVP-1	NM	06/09/97	6.52	NA									
NVP-1	NM	07/08/97	6.15	NA									
NVP-1	NM	09/25/97	7.20	NA									
NVP-1	NM	10/22/97	DRY	NA									
NVP-1	NM	01/23/98	6.90	NA									
NVP-1	NM	02/16/98	5.86	NA									
NVP-1	NM	03/17/98	4.79	NA									
NVP-1	NM	05/07/98	5.98	NA									
NVP-1	NM	06/03/98	5.65	NA									
NVP-1	NM	07/21/98	6.21	NA									
NVP-1	NM	08/21/98	6.48	NA									
NVP-1	NM	10/19/98	7.10	NA									
NVP-1	NM	11/24/98	7.23	NA									
NVP-1	NM	12/23/98	DRY	NA									
NVP-1	NM	12/28/99	6.70	NA									
NVP-1	NM	02/13/00	6.24	NA									
NVP-1	NM	06/02/00	6.40	NA									
NVP-1	NM	09/29/00	6.65	NA									
NVP-1	NM	11/20/00	6.95	NA									
NVP-1	NM	02/23/01	6.75	NA									
NVP-1	NM	05/23/01	6.87	NA									
NVP-1	NM	08/23/01	7.53	NA									
NVP-1	NM	11/21/01	7.41	NA									
NVP-1	NM	02/13/02	6.75	NA									
NVP-1	NM	05/23/02	6.40	NA									
NVP-1	NM	08/28/02	7.35	NA									
NVP-1	NM	11/27/02	DRY	NA									
NVP-1	NM	02/26/03	7.67	NA									
RW-1D	NM	02/09/95		NA	1	6	<1	<1	<1	1	1		3
RW-1D	NM	05/17/95		NA	3	5	<1	<1	<1	41	80		129
RW-1D	NM	08/30/95		NA	19	2	<1	2	11	<1	<1		28
RW-1D	NM	11/14/95		NA									
RW-1D	NM	02/15/96	6.58	NA									
RW-1D	NM	05/28/96	6.78	NA	<50	<50	<50	<50	<50	960	650		1610
RW-1D	NM	08/19/96	NG	NA	6	4	<1	<1	<1	820	650		1489
RW-1D	NM	11/21/96	7.95	NA	<1	<1	<1	<1	<1	240	650		890
RW-1D	NM	02/19/97	6.84	NA	<10	<10	<10	<10	<10	30	<10	77	107

ft-asl = feet above sea level
ug/l = micrograms per liter
M:\Common\Proj\PawlingCorp\Report2032\Table1

Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-1D	NM	05/13/97	6.78	NA	<50	88	<50	<50	<50	<50	<50	110	198
RW-1D	NM	08/08/97	7.51	NA	<20	<20	<20	<20	<20	<20	<20	120	120
RW-1D	NM	11/11/97	7.01	NA	<20	<20	<20	<20	<20	<20	<20	110	110
RW-1D	NM	02/18/98	6.94	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-1D	NM	05/07/98	6.97	NA	<1	2	<1	<1	180	<1	<1	<1	182
RW-1D	NM	08/21/98	7.48	NA	<1	3	<1	1	303	94	<1	<1	398
RW-1D	NM	11/24/98	7.61	NA									
RW-1D	NM	12/29/99	7.13	NA	<1	<1	<1	<1	<1	<1	<1	13	13
RW-1D	NM	02/13/00	8.80	NA	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1D	NM	05/02/00	7.08	NA	<1	<1	<1	<1	<1	6	NA	28	32
RW-1D	NM	08/28/00	7.38	NA	<1	<1	<1	<1	<1	24	NA	42	66
RW-1D	NM	11/20/00	7.18	NA	<1	<1	<1	<1	<1	1	NA	<1	1
RW-1D	NM	02/23/01	6.87	NA	3	<1	<1	<1	<1	240	NA	380	623
RW-1D	NM	05/23/01	6.85	NA	1	<1	<1	<1	<1	160	NA	300	461
RW-1D	NM	08/29/01	7.42	NA	<1	<1	<1	<1	<1	2	NA	8	10
RW-1D	NM	11/21/01	7.25	NA	<1	<1	<1	<1	<1	<1	NA	4	4
RW-1D	NM	02/13/02	6.85	NA									0
RW-1D	NM	05/23/02	8.75	NA	<1	<1	<1	<1	<1	<1	NA	5	5
RW-1D	NM	08/29/02	7.16	NA	<1	<1	<1	<1	<1	<1	NA	3	3
RW-1D	NM	11/27/02	6.73	NA	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1D	NM	02/28/03	6.42	NA	<10	<10	<10	<10	<10	69	NA	127	196
RW-1S	437.5	03/01/92	5.75	431.75									
RW-1S	437.5	04/01/92	9.32	428.18									
RW-1S	437.5	05/01/92	9.40	428.1									
RW-1S	437.5	06/01/92	6.72	430.78									
RW-1S	437.5	11/01/92	8.45	429.05									
RW-1S	437.5	12/01/92	10.05	427.45									
RW-1S	437.5	01/01/93	10.10	427.4									
RW-1S	437.5	02/01/93	10.10	427.4									
RW-1S	437.5	03/01/93	8.28	429.22									
RW-1S	437.5	04/01/93	10.00	427.5									
RW-1S	437.5	08/01/93	10.05	427.45									
RW-1S	437.5	09/01/93	9.70	427.8									
RW-1S	437.5	10/01/93	8.80	428.7									
RW-1S	437.5	11/01/93	9.90	427.6									
RW-1S	437.5	12/01/93	10.20	427.2									
RW-1S	437.5	01/01/94	10.30	427.2									
RW-1S	437.5	02/01/94	10.80	428.7									
RW-1S	437.5	04/01/94	10.10	427.4									
RW-1S	437.5	05/01/94	49.75	387.75									
RW-1S	437.5	06/01/94	9.41	428.09									
RW-1S	437.5	07/01/94	9.65	427.85									
RW-1S	437.5	08/01/94	9.65	427.85									
RW-1S	437.5	09/01/94	9.64	427.88									
RW-1S	437.5	10/01/94	9.60	427.9									
RW-1S	437.5	11/01/94	9.85	427.85									
RW-1S	437.5	12/01/94	9.50	428									
RW-1S	437.5	01/01/95	9.45	428.05									
RW-1S	437.5	02/09/95	9.70	427.8	13,000	<50	140	<50	<50	940	230		14310
RW-1S	437.5	03/01/95	9.70	427.8									
RW-1S	437.5	04/01/95	9.39	428.12									
RW-1S	437.5	05/17/95	9.60	427.9	16,000	<250	<250	<250	<250	<250	<250		16000
RW-1S	437.5	06/01/95	9.35	428.15									
RW-1S	437.5	07/13/95	9.67	427.83									
RW-1S	437.5	08/18/95	9.64	427.66	23,000	<10	<10	<10	220	920	<10		24140
RW-1S	437.5	09/18/95	9.66	427.84									
RW-1S	437.5	10/17/95	9.64	427.86									
RW-1S	437.5	11/14/95	9.36	428.14	<1	<1	<1	<1	<1	<1	<1		<1
RW-1S	437.5	12/05/95	9.39	428.11									
RW-1S	437.5	01/16/96	8.66	428.84									
RW-1S	437.5	02/15/96	9.47	428.03	2,000				22		45		2067
RW-1S	437.5	03/15/96	8.97	428.53									
RW-1S	437.5	04/11/96	9.66	427.65									
RW-1S	437.5	05/28/96	9.53	427.97	5,800	<50	<50	<50	<50	1400	270		7570
RW-1S	437.5	06/26/96	6.17	431.33									
RW-1S	437.5	07/19/96	9.65	427.85									
RW-1S	437.5	08/19/96	7.33	430.17	<1	<1	<1	<1	<1	<1	<1		<1

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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-1S	437.5	09/06/96	8.58	428.92									
RW-1S	437.5	10/03/96	8.75	428.75									
RW-1S	437.5	11/21/96	9.12	428.38	3,800	<1	<1	<1	<1	14	43		3880
RW-1S	437.5	12/18/96	9.42	428.08									
RW-1S	437.5	01/30/97	9.40	428.1									
RW-1S	437.5	02/19/97	9.22	428.28	7,700	<50	<50	<50	<50	180	<1	55	7936
RW-1S	437.5	04/02/97	9.10	428.4									
RW-1S	437.5	04/23/97	9.07	428.43									
RW-1S	437.5	05/13/97	9.25	428.25	220	<10	<10	<10	<10	<10	<10	130	350
RW-1S	437.5	06/09/97	6.33	431.17									
RW-1S	437.5	07/08/97	9.27	428.23									
RW-1S	437.5	08/08/97	9.06	428.44	7,900	<20	<20	<20	<20	<20	<20	<20	7600
RW-1S	437.5	09/25/97	9.70	427.8									
RW-1S	437.5	10/22/97	9.55	427.95									
RW-1S	437.5	11/11/97			300	<10	<10	<10	<10	<10	<10	<10	300
RW-1S	437.5	12/10/97	6.02	431.48									
RW-1S	437.5	02/18/98			<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-1S	437.5	03/17/98	10.75	426.75									
RW-1S	437.5	05/07/98	8.75	428.75	24	1	<1	<2	78	<1	<1	<1	101
RW-1S	437.5	07/21/98	6.61	430.89									
RW-1S	437.5	08/21/98	6.68	430.82	100	<1	<1	<1	48	45	<1	<1	193
RW-1S	437.5	10/19/98	5.95	431.55									
RW-1S	437.5	11/24/98	8.95	428.55									
RW-1S	437.5	12/23/98	9.00	428.5									
RW-1S	437.5	12/28/99	6.40	431.1	<1	<1	<1	<1	<1	<1	<1	8	8
RW-1S	437.5	02/13/00	6.42	431.08	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	06/02/00	8.71	428.79	10	<1	<1	<1	<1	<1	NA	18	28
RW-1S	437.5	08/26/00	7.20	430.3	7	<1	<1	<1	<1	<1	NA	<1	7
RW-1S	437.5	11/20/00	10.63	426.87	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/23/01	8.60	428.9	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	05/23/01	5.50	432	1	<1	<1	<1	<1	<1	NA	4	5
RW-1S	437.5	08/28/01	6.94	430.56	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	11/21/01	9.67	427.83	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/13/02	9.05	428.45									0
RW-1S	437.5	05/23/02	11.43	426.07	<1	1	<1	<1	<1	<1	NA	<1	1
RW-1S	437.5	08/28/02	8.45	429.05	8	<1	<1	<1	<1	<1	NA	<1	8
RW-1S	437.5	11/27/02	11.65	425.85	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/28/03	11.67	425.83	1	<1	<1	<1	<1	<1	NA	1	2.2
RW-2S	438.2	02/01/92	6.65	431.55									
RW-2S	438.2	04/01/92	8.08	430.12									
RW-2S	438.2	05/01/92	7.93	430.27									
RW-2S	438.2	11/01/92	8.07	430.13									
RW-2S	438.2	12/01/92	7.93	430.27									
RW-2S	438.2	01/01/93	8.10	430.1									
RW-2S	438.2	03/01/93	8.03	430.17									
RW-2S	438.2	04/01/93	8.01	430.19									
RW-2S	438.2	05/01/93	8.40	429.8									
RW-2S	438.2	08/01/93	8.40	429.8									
RW-2S	438.2	09/01/93	7.80	430.4									
RW-2S	438.2	10/01/93	7.57	430.63									
RW-2S	438.2	11/01/93	8.45	429.75									
RW-2S	438.2	12/01/93	7.40	430.8									
RW-2S	438.2	01/01/94	7.40	430.8									
RW-2S	438.2	02/01/94	7.03	431.2									
RW-2S	438.2	04/01/94	7.35	430.85									
RW-2S	438.2	05/01/94	7.13	431.07									
RW-2S	438.2	06/01/94	7.52	430.68									
RW-2S	438.2	07/01/94	7.85	430.35									
RW-2S	438.2	08/01/94	7.42	430.78									
RW-2S	438.2	09/01/94	7.08	431.12									
RW-2S	438.2	10/01/94	7.10	431.1									
RW-2S	438.2	11/01/94	7.10	431.1									
RW-2S	438.2	12/01/94	7.03	431.17									
RW-2S	438.2	01/01/95	7.10	431.1									
RW-2S	438.2	02/09/95	7.51	430.69	<1	3	0	<1	<1	<1	<1		3
RW-2S	438.2	03/01/95	7.50	430.7									
RW-2S	438.2	04/01/95	6.97	431.23									

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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-2S	438.2	05/17/95	7.30	430.9	17	4	<1	<1	<1	<1	18		59
RW-2S	438.2	06/01/95	7.48	430.72									
RW-2S	438.2	07/13/95	7.72	430.48									
RW-2S	438.2	08/18/95	7.50	430.7	35	2	<1	<1	13	<1	<1		49
RW-2S	438.2	11/14/95	7.04	431.16	<1	<1	<1	<1	<1	<1	<1		<1
RW-2S	438.2	12/05/95	6.94	431.26									
RW-2S	438.2	01/16/96	DRY	#VALUE!									
RW-2S	438.2	02/15/96	7.17	431.03	<1	<1	<1	<1	2	<1	<1		2
RW-2S	438.2	03/15/96	7.28	430.92									
RW-2S	438.2	04/11/96	7.30	430.9									
RW-2S	438.2	05/28/96	7.14	431.06	71	9	<10	<10	<10	800	<10		1260
RW-2S	438.2	06/26/96	7.06	431.14									
RW-2S	438.2	07/19/96	7.18	431.02									
RW-2S	438.2	08/19/96	7.13	431.07	<1	<1	<1	<1	<1	<1	5		5
RW-2S	438.2	09/06/96	DRY	#VALUE!									
RW-2S	438.2	10/09/96	7.45	430.75									
RW-2S	438.2	11/21/96	7.65	430.55	<1	<1	<1	<1	<1	<1	5		5
RW-2S	438.2	12/18/96	8.13	430.07									
RW-2S	438.2	01/30/97	8.13	430.07									
RW-2S	438.2	02/19/97	8.52	429.68	<2	<2	<2	<2	<2	4	<2	35	39
RW-2S	438.2	04/02/97	8.03	430.17									
RW-2S	438.2	04/23/97	8.00	430.2									
RW-2S	438.2	05/13/97	8.20	430	<1	1	<1	<1	<1	<1	<1	32	33
RW-2S	438.2	06/09/97	7.10	431.1									
RW-2S	438.2	07/08/97	7.91	430.29									
RW-2S	438.2	08/08/97	7.97	430.23	<1	2	<1	<1	<1	<1	<1	<1	2
RW-2S	438.2	09/25/97	8.74	429.46									
RW-2S	438.2	10/22/97	8.40	429.8									
RW-2S	438.2	11/11/97		438.2	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	12/10/97	7.92	430.28									
RW-2S	438.2	01/20/98	8.36	429.84									
RW-2S	438.2	02/16/98	8.15	430.05	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	03/17/98	7.79	430.41									
RW-2S	438.2	05/07/98	8.81	429.39	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	06/03/98	8.09	430.11									
RW-2S	438.2	07/21/98	8.27	429.93									
RW-2S	438.2	08/21/98	7.43	430.77	22	<1	<1	<1	9	2	<1	<1	33
RW-2S	438.2	10/19/98	8.53	429.67									
RW-2S	438.2	11/24/98	8.11	430.09									
RW-2S	438.2	12/23/98	7.90	430.3									
RW-2S	438.2	12/29/99	7.15	431.05	<1	<1	<1	<1	<1	<1	<1	6	6
RW-2S	438.2	02/13/00	7.17	431.03	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	05/02/00	7.35	430.85	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/29/00	8.00	430.2	<1	<1	<1	<1	<1	<1	NA	7	7
RW-2S	438.2	11/20/00	8.00	430.2	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/23/01	8.40	429.8	<1	<1	<1	<1	<1	<1	NA	3	3
RW-2S	438.2	05/23/01	8.50	429.7	8	<1	<1	<1	<1	<1	NA	18	26
RW-2S	438.2	08/28/01	8.74	429.46	<1	<1	<1	<1	<1	<1	NA	5	5
RW-2S	438.2	11/21/01	10.04	428.16	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/13/02	8.30	429.9									0
RW-2S	438.2	05/22/02	9.62	428.58	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/29/02	8.20	420	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	11/27/02	9.87	428.33	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/26/03	9.78	428.42	<1	<1	<1	<1	<1	<1	NA	<1	0
SV-1	NM	01/16/96	5.55	NA									
SV-1	NM	02/15/96	4.74	NA									
SV-1	NM	03/15/96	5.65	NA									
SV-1	NM	04/11/96	5.69	NA									
SV-1	NM	05/28/96	5.98	NA									
SV-1	NM	06/26/96	6.25	NA									
SV-1	NM	07/19/96	DRY	NA									
SV-1	NM	08/19/96	6.59	NA									
SV-1	NM	09/06/96	DRY	NA									
SV-1	NM	10/09/96	6.61	NA									
SV-1	NM	11/21/96	DRY	NA									
SV-1	NM	12/18/96	3.98	NA									
SV-1	NM	01/30/97	4.78	NA									

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Table 1
Fawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation (ft-asl)	Sample Date	Depth to Water (ft)	Water Elevation (ft-asl)	TOLUENE (ug/l)	TRICHLOROETHENE (ug/l)	1,1,1-TRICHLOROETHANE (ug/l)	TETRACHLOROETHENE (ug/l)	TRANS-1,2-DICHLOROETHENE (ug/l)	VINYL CHLORIDE (ug/l)	ETHYLBENZENE (ug/l)	CIS-1,2-DICHLOROETHENE (ug/l)	TOTAL VOCS (ug/l)
SV-1	NM	02/19/97	4.67	NA									
SV-1	NM	04/02/97	4.15	NA									
SV-1	NM	04/23/97	4.12	NA									
SV-1	NM	05/13/97	5.98	NA									
SV-1	NM	06/09/97	6.35	NA									
SV-1	NM	07/08/97	5.10	NA									
SV-1	NM	10/22/97	DRY	NA									
SV-1	NM	12/10/97	5.06	NA									
SV-1	NM	01/20/98	4.70	NA									
SV-1	NM	02/18/98	5.45	NA									
SV-1	NM	03/17/98	5.92	NA									
SV-1	NM	05/07/98	5.09	NA									
SV-1	NM	06/08/98	5.10	NA									
SV-1	NM	07/21/98	5.22	NA									
SV-1	NM	08/21/98	DRY	NA									
SV-1	NM	10/19/98	7.44	NA									
SV-1	NM	11/24/98	DRY	NA									
SV-1	NM	12/23/98	DRY	NA									
SV-1	NM	12/29/99	DRY	NA									
SV-1	NM	02/12/00	DRY	NA									
SV-1	NM	06/02/00	DRY	NA									
SV-1	NM	08/29/00	DRY	NA									
SV-1	NM	11/20/00	DRY	NA									
SV-1	NM	02/23/01	DRY	NA									
SV-1	NM	05/23/01	DRY	NA									
SV-1	NM	08/29/01	DRY	NA									
SV-1	NM	11/21/01	DRY	NA									
SV-1	NM	02/13/02	DRY	NA									
SV-1	NM	05/23/02	6.01	NA									
SV-1	NM	08/29/02	DRY	NA									
SV-1	NM	11/27/02	6.19	NA									
SV-1	NM	02/28/03	5.98	NA									
VEP-1	NM	01/18/96	7.64	NA									
VEP-1	NM	02/15/96	6.28	NA									
VEP-1	NM	03/15/96	6.09	NA									
VEP-1	NM	04/11/96	6.38	NA									
VEP-1	NM	05/28/96	6.81	NA									
VEP-1	NM	06/28/96	8.63	NA									
VEP-1	NM	07/19/96	8.33	NA									
VEP-1	NM	08/19/96	9.14	NA									
VEP-1	NM	09/06/96	7.25	NA									
VEP-1	NM	10/09/96	8.81	NA									
VEP-1	NM	11/21/96	8.31	NA									
VEP-1	NM	12/18/96	6.79	NA									
VEP-1	NM	01/30/97	7.54	NA									
VEP-1	NM	02/19/97	7.65	NA									
VEP-1	NM	04/02/97	7.02	NA									
VEP-1	NM	04/23/97	7.03	NA									
VEP-1	NM	05/13/97	6.53	NA									
VEP-1	NM	06/09/97	8.00	NA									
VEP-1	NM	07/08/97	7.42	NA									
VEP-1	NM	09/09/97	7.80	NA									
VEP-1	NM	09/25/97	8.50	NA									
VEP-1	NM	10/22/97	8.77	NA									
VEP-1	NM	12/10/97	6.90	NA									
VEP-1	NM	01/20/98	6.58	NA									
VEP-1	NM	02/18/98	6.80	NA									
VEP-1	NM	03/17/98	6.50	NA									
VEP-1	NM	04/15/98	6.75	NA									
VEP-1	NM	05/07/98	7.53	NA									
VEP-1	NM	06/03/98	7.05	NA									
VEP-1	NM	08/21/98	7.46	NA									
VEP-1	NM	10/19/98	8.78	NA									
VEP-1	NM	11/24/98	8.41	NA									
VEP-1	NM	12/23/98	8.41	NA									
VEP-1	NM	12/29/99		NA									
VEP-1	NM	02/13/00	7.38	NA									

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Well ID	Casing Elevation (ft-asl)	Sample Date	Depth to Water (ft)	Water Elevation (ft-asl)	TOLUENE (ug/l)	TRICHLOROETHENE (ug/l)	1,1,1-TRICHLOROETHANE (ug/l)	TETRACHLOROETHENE (ug/l)	TRANS-1,2-DICHLOROETHENE (ug/l)	VINYL CHLORIDE (ug/l)	ETHYLBENZENE (ug/l)	CIS-1,2-DICHLOROETHENE (ug/l)	TOTAL VOCS (ug/l)
VEP-1	NM	06/02/00	7.90	NA									
VEP-1	NM	08/29/00	8.22	NA									
VEP-1	NM	11/20/00	8.16	NA									
VEP-1	NM	02/23/01	8.13	NA									
VEP-1	NM	05/23/01	8.08	NA									
VEP-1	NM	08/29/01	8.71	NA									
VEP-1	NM	11/21/01	8.71	NA									
VEP-1	NM	02/13/02	6.02	NA									
VEP-1	NM	05/23/02	7.79	NA									
VEP-1	NM	08/29/02	8.60	NA									
VEP-1	NM	11/27/02	7.80	NA									
VEP-1	NM	02/28/03	7.52	NA									
VEP-2	NM	02/15/96	5.85	NA	<1	<1	<1	<1	<1	<1	<1		ND
VEP-2	NM	05/28/96	5.78	NA									
VEP-2	NM	08/19/96	6.48	NA									
VEP-2	NM	11/21/96	7.56	NA									
VEP-2	NM	02/19/97	6.68	NA									
VEP-2	NM	05/13/97	5.69	NA									
VEP-2	NM	08/09/97	6.95	NA									
VEP-2	NM	02/16/98	6.40	NA									
VEP-2	NM	05/07/98	6.04	NA									
VEP-2	NM	08/21/98	7.24	NA									
VEP-2	NM	11/24/98	7.88	NA									
VEP-2	NM	12/29/99	7.28	NA									
VEP-2	NM	02/13/00	6.91	NA									
VEP-2	NM	06/02/00	6.55	NA									
VEP-2	NM	08/29/00	7.19	NA									
VEP-2	NM	11/20/00	7.51	NA									
VEP-2	NM	02/23/01	7.04	NA									
VEP-2	NM	05/23/01	7.45	NA									
VEP-2	NM	08/29/01	7.90	NA									
VEP-2	NM	11/21/01	8.31	NA									
VEP-2	NM	02/13/02	7.53	NA									
VEP-2	NM	05/23/02	6.85	NA									
VEP-2	NM	08/29/02	7.90	NA									
VEP-2	NM	11/27/02	7.01	NA									
VEP-2	NM	02/28/03	6.60	NA									
VEP-3	NM	02/15/96	DRY	NA									
VEP-3	NM	05/28/96	DRY	NA									
VEP-3	NM	08/19/96	DRY	NA									
VEP-3	NM	11/21/96	DRY	NA									
VEP-3	NM	02/19/97	6.10	NA									
VEP-3	NM	05/13/97	DRY	NA									
VEP-3	NM	08/09/97	DRY	NA									
VEP-3	NM	02/16/98	DRY	NA									
VEP-3	NM	05/07/98	DRY	NA									
VEP-3	NM	08/21/98	DRY	NA									
VEP-3	NM	11/24/98	DRY	NA									
VEP-3	NM	12/29/99		NA									
VEP-3	NM	02/13/00	DRY	NA									
VEP-3	NM	06/02/00	DRY	NA									
VEP-3	NM	08/29/00	DRY	NA									
VEP-3	NM	11/20/00	DRY	NA									
VEP-3	NM	02/23/01	DRY	NA									
VEP-3	NM	05/23/01	DRY	NA									
VEP-3	NM	08/29/01	DRY	NA									
VEP-3	NM	11/21/01	DRY	NA									
VEP-3	NM	02/13/02	DRY	NA									
VEP-3	NM	05/23/02	DRY	NA									
VEP-3	NM	08/29/02	DRY	NA									
VEP-3	NM	11/27/02	DRY	NA									
VEP-3	NM	02/28/03	DRY	NA									
VEP-4	NM	02/08/95		NA	<1	1	<1	<1	<1	<1	<1		1
VEP-4	NM	05/17/95		NA	110	140	<1	2	<1	<1	28		278
VEP-4	NM	08/16/95		NA	8	3	<1	2	<1	<1	<1		14

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
VEP-4	NM	11/14/95		NA	<1	1	<1	<1	<1	<1	<1		1
VEP-4	NM	02/15/96	7.82	NA	<1	<1	<1	<1	<1	<1	<1		ND
VEP-4	NM	05/28/96	7.27	NA	<1	2	<1	2	<1	<1	<1		4
VEP-4	NM	08/13/96	8.03	NA	<1	2	<1	1	<1	<1	<1		3
VEP-4	NM	11/21/96	8.18	NA	<1	2	<1	<1	<1	<1	<1		2
VEP-4	NM	02/19/97	8.39	NA	<1	10	<1	<1	<1	<1	<1	2	12
VEP-4	NM	05/13/97	7.61	NA	<1	4	<1	1	<1	<1	<1	<1	5
VEP-4	NM	08/08/97	8.71	NA	<1	5	<1	<1	<1	<1	<1	<1	5
VEP-4	NM	11/11/97	8.15	NA	<1	14	<1	<1	<1	<1	<1	<1	14
VEP-4	NM	02/18/98	7.95	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
VEP-4	NM	05/07/98	7.52	NA	<1	2	<1	<1	<1	<1	<1	<1	2
VEP-4	NM	08/21/98	9.85	NA	<1	1	<1	<1	<1	<1	<1	<1	1
VEP-4	NM	11/24/98	9.36	NA									
VEP-4	NM	12/29/99	8.90	NA	<1	2	<1	<1	<1	<1	<1	<1	2
VEP-4	NM	02/13/00	8.97	NA	<1	2	<1	<1	<1	<1	NA	<1	2
VEP-4	NM	06/02/00	8.15	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	08/29/00	8.55	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	11/20/00	8.98	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	02/23/01	NM	NA	Well Cap Brkn								
VEP-4	NM	05/23/01	NM	NA	Well Cap Brkn								
VEP-4	NM	08/29/01	NM	NA	Well Cap Brkn								
VEP-4	NM	11/21/01	10.15	NA	<1	6	<1	<1	<1	<1	NA	<1	6
VEP-4	NM	02/12/02	NM	NA	Well Cap Brkn								
VEP-4	NM	05/23/02	8.09	NA		<1	<1	<1	<1	<1	NA	<1	0
VEP-4	NM	09/28/02	8.15	NA		7	<1	<1	<1	<1	NA	2	9
VEP-4	NM	11/27/02	8.42	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	02/28/03	NM	NA									
VEP-5	NM	02/16/96	DRY	NA									
VEP-5	NM	05/28/96	DRY	NA									
VEP-5	NM	08/16/96	DRY	NA									
VEP-5	NM	11/21/96	DRY	NA									
VEP-5	NM	02/19/97	4.07	NA									
VEP-5	NM	05/13/97	DRY	NA									
VEP-5	NM	08/08/97	DRY	NA									
VEP-5	NM	02/18/98		NA									
VEP-5	NM	05/07/98		NA									
VEP-5	NM	08/21/98	DRY	NA									
VEP-5	NM	11/24/98	4.03	NA									
VEP-5	NM	12/29/99		NA									
VEP-5	NM	02/13/00	DRY	NA									
VEP-5	NM	06/02/00	DRY	NA									
VEP-5	NM	08/28/00	DRY	NA									
VEP-5	NM	11/20/00	DRY	NA									
VEP-5	NM	02/23/01	NM	NA									
VEP-5	NM	05/22/01	DRY	NA									
VEP-5	NM	08/29/01	DRY	NA									
VEP-5	NM	11/21/01	DRY	NA									
VEP-5	NM	02/13/01	DRY	NA									
VEP-5	NM	05/23/01	DRY	NA									
VEP-5	NM	08/29/01	DRY	NA									
VEP-5	NM	11/21/01	DRY	NA									
VEP-5	NM	02/13/02	DRY	NA									
VEP-5	NM	05/23/02	3.72	NA									
VEP-5	NM	08/29/02	DRY	NA									
VEP-5	NM	11/27/02	4.73	NA									
VEP-5	NM	02/28/03	4.18	NA									
VEP-6	NM	01/16/96	6.51	NA									
VEP-6	NM	02/15/96	5.70	NA									
VEP-6	NM	03/15/96	5.45	NA									
VEP-6	NM	04/11/96	6.21	NA									
VEP-6	NM	05/28/96	6.18	NA									
VEP-6	NM	06/26/96	5.71	NA									
VEP-6	NM	07/19/96	5.93	NA									
VEP-6	NM	08/19/96	6.19	NA									
VEP-6	NM	09/06/96	6.35	NA									
VEP-6	NM	10/09/96	6.17	NA									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation (ft-asl)	Sample Date	Depth to Water (ft)	Water Elevation (ft-asl)	TOLUENE (ug/l)	TRICHLOROETHENE (ug/l)	1,1,1-TRICHLOROETHANE (ug/l)	TETRACHLOROETHENE (ug/l)	TRANS-1,2-DICHLOROETHENE (ug/l)	VINYL CHLORIDE (ug/l)	ETHYLBENZENE (ug/l)	CIS-1,2-DICHLOROETHENE (ug/l)	TOTAL VOCS (ug/l)
VEP-6	NM	11/21/96	7.42	NA									
VEP-6	NM	12/18/96	5.65	NA									
VEP-6	NM	01/30/97	DRY	NA									
VEP-6	NM	02/19/97	5.90	NA									
VEP-6	NM	04/02/97	5.02	NA									
VEP-6	NM	04/23/97	4.99	NA									
VEP-6	NM	05/12/97	5.15	NA									
VEP-6	NM	06/09/97	DRY	NA									
VEP-6	NM	07/08/97	DRY	NA									
VEP-6	NM	10/22/97	DRY	NA									
VEP-6	NM	12/10/97	DRY	NA									
VEP-6	NM	01/20/98	3.36	NA									
VEP-6	NM	02/16/98	3.40	NA									
VEP-6	NM	03/17/98	3.33	NA									
VEP-6	NM	05/07/98	DRY	NA									
VEP-6	NM	06/02/98	DRY	NA									
VEP-6	NM	07/21/98	3.60	NA									
VEP-6	NM	08/21/98	3.40	NA									
VEP-6	NM	10/19/98	3.58	NA									
VEP-6	NM	11/24/98	3.59	NA									
VEP-6	NM	12/23/98	DRY	NA									
VEP-6	NM	12/29/99	3.45	NA									
VEP-6	NM	02/13/00	DRY	NA									
VEP-6	NM	06/02/00	DRY	NA									
VEP-6	NM	08/28/00	3.23	NA									
VEP-6	NM	11/20/00	DRY	NA									
VEP-6	NM	02/23/01	3.28	NA									
VEP-6	NM	05/23/01	DRY	NA									
VEP-6	NM	08/28/01	7.24	NA									
VEP-6	NM	11/21/01	DRY	NA									
VEP-6	NM	02/13/02	6.78	NA									
VEP-6	NM	05/23/02	3.10	NA									
VEP-6	NM	08/29/02	3.20	NA									
VEP-6	NM	11/27/02	4.00	NA									
VEP-6	NM	02/26/03	DRY	NA									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 2

Pawling Corporation
Recovery Well Sampling Results

Month	Well	Toluene	TCE	1,1,1 TCA	PCE	Trans 1,2-DCE	Vinyl Chloride	Cis-1;2 DCE	Total
May 23, 2002	RW-1S	<1	1	<1	<1	<1	<1	<1	1
	RW-2S	<1	<1	<1	<1	<1	<1	<1	0
August 29, 2002	RW-1S	8	<1	<1	<1	<1	<1	<1	8
	RW-2S	<1	<1	<1	<1	<1	<1	<1	0
November 27, 2002	RW-1S	<1	<1	<1	<1	<1	<1	<1	0
	RW-2S	<1	<1	<1	<1	<1	<1	<1	0
March 6, 2003	RW-1S	1.2	<1	<1	<1	<1	<1	1	2.2
	RW-2S	<1	<1	<1	<1	<1	<1	<1	0

Note: All analytical results expressed in micrograms per liter (ug/l)

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Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS)		GALLONS PUMPED SINCE LAST MONITOR DATE		TOTAL VOC CONCENTRATION (milligrams per liter)		TOTAL POUNDS REMOVED BETWEEN MONITORING DATES			CUMULATIVE POUNDS REMOVED
	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	BOTH	
03/11/92	680	120	680	120	154.07	154.07	0.87	0.15	1.03	1.03
04/10/92	1,980	720	1,300	600	154.07	154.07	1.67	0.77	2.44	3.47
05/26/92	44,520	1,410	42,540	690	154.07	154.07	54.69	0.89	55.58	59.05
06/29/92	72,990	4,040	28,470	2,630	154.07	154.07	36.60	3.38	39.98	99.03
09/16/92	73,300	4,080	310	40	76	76	0.20	0.03	0.22	99.26
10/16/92	108,540	4,480	35,240	400	76	76	22.35	0.25	22.60	121.86
11/20/92	136,240	5,670	27,700	1,190	76	76	17.57	0.75	18.32	140.18
12/18/92	156,156	6,610	19,916	940	76	76	12.63	0.60	13.23	153.41
01/13/93	164,970	7,080	8,814	470	43.11	0.04	3.17	0.00	3.17	156.58
02/01/93	181,860	7,925	16,890	845	43.11	0.04	6.08	0.00	6.08	162.65
03/02/93	195,640	8,860	13,780	935	43.11	0.04	4.96	0.00	4.96	167.61
04/01/93	214,230	10,470	18,590	1,610	20.66	0.062	3.20	0.00	3.21	170.82
04/27/93	224,440	11,260	10,210	790	20.66	0.062	1.76	0.00	1.76	172.58
05/06/93	224,700	11,300	260	40	8.95	27.94	0.02	0.01	0.03	172.61
06/21/93	240,640	12,190	15,940	890	8.95	27.94	1.19	0.21	1.40	174.00
06/28/93	243,920	12,300	3,280	110	8.95	27.94	0.24	0.03	0.27	174.27
07/14/93	250,780	12,400	6,860	100	14.74	*	0.84	0.00	0.84	175.12
08/11/93	261,310	12,410	10,530	10	19.84	9.4	1.74	0.00	1.74	176.86
09/23/93	276,060	12,410	14,750	0	19.84	9.4	2.44	0.00	2.44	179.30
10/20/93	285,040	12,410	8,980	0	22.45	0.02	1.68	0.00	1.68	180.99
11/17/93	295,230	12,420	10,190	10	22.45	0.02	1.91	0.00	1.91	182.89
12/14/93	312,770	12,530	17,540	110	22.45	0.02	3.29	0.00	3.29	186.18
01/24/94	344,170	12,570	31,400	40	6.9	0.08	1.81	0.00	1.81	187.99
02/25/94	418,930	12,970	74,760	400	32.3	0.21	20.15	0.00	20.15	208.14
03/15/94	431,850	15,150	12,920	2,180	32.3	0.21	3.48	0.00	3.49	211.63
04/05/94	432,450	16,810	600	1,660	11	6.09	0.06	0.08	0.14	211.76
05/03/94	432,950	17,650	500	840	23.6	5	0.10	0.04	0.13	211.90
06/30/94	451,560	17,650	18,610	0	23.6	5	3.66	0.00	3.66	215.56
07/15/94	456550	17650	4,990	0	24	5.9	1.00	0.00	1.00	216.56
08/09/94	465770	17770	9,220	120	14.56	0.46	1.12	0.00	1.12	217.68
09/08/94	478090	18280	12,320	510	14.56	0.46	1.50	0.00	1.50	219.18
10/13/94	491,700	18,430	13,610	150	7.31	0.24	0.83	0.00	0.83	220.01
11/02/94	499,310	18,570	7,610	920	0.05	0.01	0.00	0.00	0.00	220.01
12/08/94	512,570	19,540	13,260	970	0.05	0.01	0.01	0.00	0.01	220.02
01/11/95	524,290	20,850	11,720	1,310	7.18	0.003	0.70	0.00	0.70	220.72
02/09/95	535,650	21,990	11,360	1,140	14.31	0.003	1.36	0.00	1.36	222.08
03/15/95	547,870	22,470	12,220	480	13.63	*	1.39	0.00	1.39	223.47

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Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS)		GALLONS PUMPED SINCE LAST MONITOR DATE		TOTAL VOC CONCENTRATION (milligrams per liter)		TOTAL POUNDS REMOVED BETWEEN MONITORING DATES			CUMULATIVE POUNDS REMOVED
	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	BOTH	
04/25/95	560,110	22,810	12,240	340	18.00	0.04	1.84	0.00	1.84	225.31
05/17/95	567,840	22,810	7,730	0	18.00	0.04	1.16	0.00	1.16	226.47
06/20/95	578,890	22,820	11,050	10	18.00	0.04	1.66	0.00	1.66	228.13
07/13/95	584,740	22,820	5,850	0	24.14	0.05	1.18	0.00	1.18	229.31
08/15/95	592,820	22,820	8,080	0	24.14	0.05	1.63	0.00	1.63	230.94
09/19/95	597,860	22,820	5,040	0	24.14	0.05	1.02	0.00	1.02	231.96
10/17/95	605,300	22,820	7,440	0	0.0	0.0	0.00	0.00	0.00	231.96
11/14/95	611,600	22,830	6,300	10	0.0	0.0	0.00	0.00	0.00	231.96
12/05/95	618,980	22,960	7,380	130	0.0	0.0	0.00	0.00	0.00	231.96
01/16/96	630,480	23,090	11,500	130	2.07	0.0	0.20	0.00	0.20	232.16
02/15/96	640,000	24,350	9,520	1,260	2.07	0.0	0.16	0.00	0.16	232.32
03/15/96	645,550	25,440	5,550	1,090	2.07	0.0	0.10	0.00	0.10	232.42
04/11/96	648,614	26,468	3,064	1,028	8.23	1.26	0.21	0.01	0.22	232.64
05/29/96	660,510	27,870	11,896	1,402	8.23	1.26	0.82	0.01	0.83	233.47
06/26/96	660,510	28,170	0	300	8.23	1.26	0.00	0.00	0.00	233.47
07/19/96	665,260	28,350	4,750	180	0.0005	0.0045	0.00	0.00	0.00	233.47
08/19/96	667,450	28,570	2,190	220	0.0005	0.0045	0.00	0.00	0.00	233.47
09/06/96	667,460	28,580	10	10	0.0005	0.0045	0.00	0.00	0.00	233.47
10/09/96	672,710	28,720	5,250	140	3.86	0.005	0.17	0.00	0.17	233.64
11/21/96	680,791	29,599	8,081	879	3.86	0.005	0.26	0.00	0.26	233.90
12/18/96	687,998	31,391	7,207	1,792	3.86	0.005	0.23	0.00	0.23	234.13
01/30/97	698,470	33,085	10,472	1,694	7.94	0.039	0.69	0.00	0.69	234.82
02/19/97	703,180	33,653	4,710	568	7.94	0.039	0.31	0.00	0.31	235.13
04/02/97	712,501	34,713	9,321	1,060	7.94	0.039	0.62	0.00	0.62	235.75
04/23/97	718,960	36,005	6,459	1,292	0.35	0.033	0.02	0.00	0.02	235.77
05/13/97	722,865	37,949	3,905	1,944	0.35	0.033	0.01	0.00	0.01	235.78
06/09/97	728,810	38,880	5,945	931	0.35	0.033	0.02	0.00	0.02	235.80
07/08/97	733,450	38,250	4,640	(630)	7.90	0.0015	0.31	0.00	0.31	236.11
08/09/97	735,580	38,450	2,130	200	7.90	0.0015	0.14	0.00	0.14	236.25
09/25/97	744,660	39,220	9,080	770	7.90	0.0015	0.60	0.00	0.60	236.85
10/22/97	748,550	39,360	3,890	140	0.30	0.0	0.01	0.00	0.01	236.86
11/11/97	751,270	39,980	2,720	620	0.30	0.0	0.01	0.00	0.01	236.87
12/10/97	751,270	42,750	0	2,770	0.30	0.0	0.00	0.00	0.00	236.87
01/20/98	751,270	45,740	0	2,990	0.0	0.0	0.00	0.00	0.00	236.87
02/16/98	752,600	47,010	1,330	1,270	0.0	0.0	0.00	0.00	0.00	236.87
03/17/98	752,870	48,460	270	1,450	0.0	0.0	0.00	0.00	0.00	236.87
04/15/98	755,810	48,750	2,940	290	0.10	0.0	0.01	0.00	0.01	236.88

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Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS)		GALLONS PUMPED SINCE LAST MONITOR DATE		TOTAL VOC CONCENTRATION (milligrams per liter)		TOTAL POUNDS REMOVED BETWEEN MONITORING DATES			CUMULATIVE POUNDS REMOVED
	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	BOTH	
05/27/98	772,810	49,070	17,000	320	0.10	0.0	0.01	0.00	0.01	236.89
06/03/98	784,750	50,050	11,940	980	0.10	0.0	0.01	0.00	0.01	236.90
07/21/98	787,610	51,930	2,860	1,880	0.193	0.0325	0.00	0.00	0.01	236.91
08/20/98	787,610	51,930	0	0	0.193	0.0325	0.00	0.00	0.00	236.91
09/18/98	793,735	52,495	6,125	565	0.193	0.0057	0.01	0.00	0.01	236.92
10/19/98	796,730	53,310	2,995	815	0.034	0.0057	0.00	0.00	0.00	236.92
11/24/98	826,830	53,970	30,100	660	0.034	0.0057	0.01	0.00	0.01	236.93
12/23/98	838,140	54,530	11,310	560	0.034	0.0	0.00	0.00	0.00	236.93
01/14/99	840,660	54,590	2,460	60	0.819	0.0	0.02	0.00	0.02	236.95
02/11/99	843,310	57,290	2,710	2,700	0.819	0.0	0.02	0.00	0.02	236.97
03/25/99	843,310	57,323	0	33	0.819	0.0	0.00	0.00	0.00	236.97
04/23/99	843,310	57,670	0	347	0.001	0.0	0.00	0.00	0.00	236.97
05/25/99	843,310	57,673	0	3	0.001	0.0	0.00	0.00	0.00	236.97
06/29/99	843,310	58,010	0	337	0.001	0.0	0.00	0.00	0.00	236.97
07/27/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	236.97
08/30/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	236.97
09/21/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	236.97
10/27/99	843,310	58,010	0	0	0.008	0.006	0.00	0.00	0.00	236.97
11/30/99	843,478	58,093	168	83	0.008	0.006	0.00	0.00	0.00	236.97
12/29/99	843,478	58,093	0	0	0.008	0.006	0.00	0.00	0.00	236.97
01/18/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	236.97
02/16/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	236.97
03/23/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	236.97
04/25/00	843,478	58,093	0	0	0.028	0.0	0.00	0.00	0.00	236.97
06/02/00	141,430	58,100		7	0.028	0.0	0.00	0.00	0.00	236.97
06/19/00	148,160	60,230	6,730	2,130	0.028	0.0	0.00	0.00	0.00	236.97
07/21/00	148,160	60,230	0	0	0.007	0.007	0.00	0.00	0.00	236.97
08/29/00	148,560	60,390	400	160	0.007	0.007	0.00	0.00	0.00	236.97
09/20/00	157,010	63,130	8,450	2,740	0.007	0.007	0.00	0.00	0.00	236.97
10/12/00	163,002	63,630	5,992	500	0.0	0.0	0.00	0.00	0.00	236.97
11/20/00	165,020	64,170	2,018	540	0.0	0.0	0.00	0.00	0.00	236.97
12/20/00	165,240	65,150	220	980	0.0	0.0	0.00	0.00	0.00	236.97
01/29/01	177,958	66,140	12,718	990	0.0	0.003	0.00	0.00	0.00	236.97
02/23/01	182,580	67,900	4,622	1,760	0.0	0.003	0.00	0.00	0.00	236.97
03/29/01	183,030	70,030	450	2,130	0.0	0.003	0.00	0.00	0.00	236.97
04/19/01	183,110	74,590	80	4,560	0.005	0.003	0.00	0.00	0.00	236.97
05/23/01	183,320	75,450	210	860	0.005	0.026	0.00	0.00	0.00	236.97

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Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS)		GALLONS PUMPED SINCE LAST MONITOR DATE		TOTAL VOC CONCENTRATION (milligrams per liter)		TOTAL POUNDS REMOVED BETWEEN MONITORING DATES			CUMULATIVE POUNDS REMOVED
	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	BOTH	
06/22/01		78,170		2,720	0.005	0.026	0.00	0.00	0.00	236.97
07/20/01	185,630	80,800	185,630	2,630	0.0	0.005	0.00	0.00	0.00	236.97
08/29/01	202,930		17,300		0.0	0.005	0.00	0.00	0.00	236.97
09/26/01	209,700		6,770		0.0	0.005	0.00	0.00	0.00	236.97
10/31/01	209,700		0		0.0	0.0	0.00	0.00	0.00	236.97
11/21/01					0.0	0.0	0.00	0.00	0.00	236.97
12/18/01	251,063		251,063		0.0	0.0	0.00	0.00	0.00	236.97
01/29/02	255,710		4,647		0.000	0.00	0.00	0.00	0.00	236.97
02/13/02	257,490		1,780		0.000	0.00	0.00	0.00	0.00	236.97
03/21/02					0.000	0.00	0.00	0.00	0.00	236.97
04/23/02	260,360		2,870		0.000	0.00	0.00	0.00	0.00	236.97
05/23/02	260,630		270		0.001	0.00	0.00	0.00	0.00	236.97
06/17/02	268,570		7,940		0.001	0.00	0.00	0.00	0.00	236.97
07/17/02	277,410		8,840		0.001	0.00	0.00	0.00	0.00	236.97
08/29/02	289,130		11,720		0.008	0.00	0.00	0.00	0.00	236.97
09/27/02	290,320		1,190		0.008	0.00	0.00	0.00	0.00	236.97
10/21/02					0.008	0.00	0.00	0.00	0.00	236.97
11/27/02	80,960		0		0.000	0.00	0.00	0.00	0.00	236.97
12/17/02	93,410		12,450		0.000	0.00	0.00	0.00	0.00	236.97
01/29/03	115,610		22,200		0.000	0.00	0.00	0.00	0.00	236.97
02/28/03	119,710		4,100		0.000	0.00	0.00	0.00	0.00	236.97
3/31/2003	121490		1,780		0.000	0.00	0.00	0.00	0.00	236.97

Notes: 1. 1.03 pounds removed during initial system shakedown. 2. Total VOCs are from month indicated or closest sampling date.
* Only combined influent sample collected this date. Assume all contribution from RW-1.

Table 4

Pawling Corporation
Water Treatment Discharge Sampling Results

Month	Toluene	PCE	1,1,1 TCA	Trans 1,2-DCE	TCE
SPDES Discharge Limit	33.0	4.6	20.0	30.0	20.0
April 25, 2002	<1	<1	<1	<1	<1
May 31, 2002	<1	<1	<1	<1	<1
June 20, 2002	<1	<1	<1	<1	<1
July 31, 2002	<1	<1	<1	<1	<1
August 23, 2002	<1	<1	<1	<1	<1
September 27, 2002	<1	<1	<1	<1	<1
October 30, 2002	<1	<1	<1	<1	<1
November 25, 2002	<1	<1	<1	<1	<1
December 2002	NS	NS	NS	NS	NS
January 29, 2003	<1	<1	<1	<1	<1
February 28, 2003	<1	<1	<1	<1	<1
March 6, 2003	<1	<1	<1	<1	<1

Note: All analytical results expressed in micrograms per liter (ug/l)

NS – Not sampled.

Table 5

Pawling Corporation
Off-Gas Effluent Monitoring Results

Monitoring Date	Photo Ionization Detector Reading			Laboratory Analytical Total VOCs	
	SVE	A/S	DPE	SVE	A/S & DPE
4/23/02	0.0	NA	0.0	NA	NA
5/23/02	0.0	0.0	0.0	NA	NA
6/17/02	0.0	0.0	0.0	NA	NA
7/17/02	0.0	0.0	0.0	NA	NA
8/29/02	0.0	0.0	0.0	NA	NA
9/27/02	0.0	NA*	NA*	NA	NA
10/21/02	0.0	0.0	0.0	NA	NA
11/27/02	0.0	0.0	0.0	NA	NA
12/17/02	0.0	0.0	0.0	NA	NA
01/29/03	0.0	0.0	0.0	NA	NA
02/28/03	0.0	0.0	0.0	NA	NA
3/31/03	0.0	0.0	0.0	NA	NA

All results expressed in parts per million volume (ppmv)

NA = Not Applicable

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Table 6

Pawling Corporation
GT-7S Analytical Results

Month	Toluene	PCE	TCE	1,1,1 TCA	Trans 1,2-DCE	Cis 1,2- DCE	Vinyl Chloride	Total VOCs
April 25, 2002	71	<50	<50	<50	<50	<50	<50	71
May 23, 2002	4,600	<200	<200	<200	<200	<200	<200	4,600
June 17, 2002	6,300	<200	<200	<200	<200	410	<200	6,710
July 17, 2002	1,300	<50	<50	<50	<50	<50	<50	1,300
August 29, 2002	6,600	<10	13	<10	<10	150	<10	6,763
September 27, 2002	390	<10	<10	<10	<10	<10	<10	390
October 21, 2002	43	<1	<1	<1	<1	<1	<1	43
November 27, 2002	48	<5	<5	<5	<5	<5	<5	48
December 17, 2002	3	<1	2	<1	<1	<1	<1	5
January 29, 2003	52	<1	2	<1	<1	<1	<1	54
March 6, 2003	620	<1	2	<1	<1	10	5	637
March 31, 2003	<1	<1	1	<1	<1	<1	<1	1

Note: All analytical results are expressed in micrograms per liter (ug/l)

FIGURES

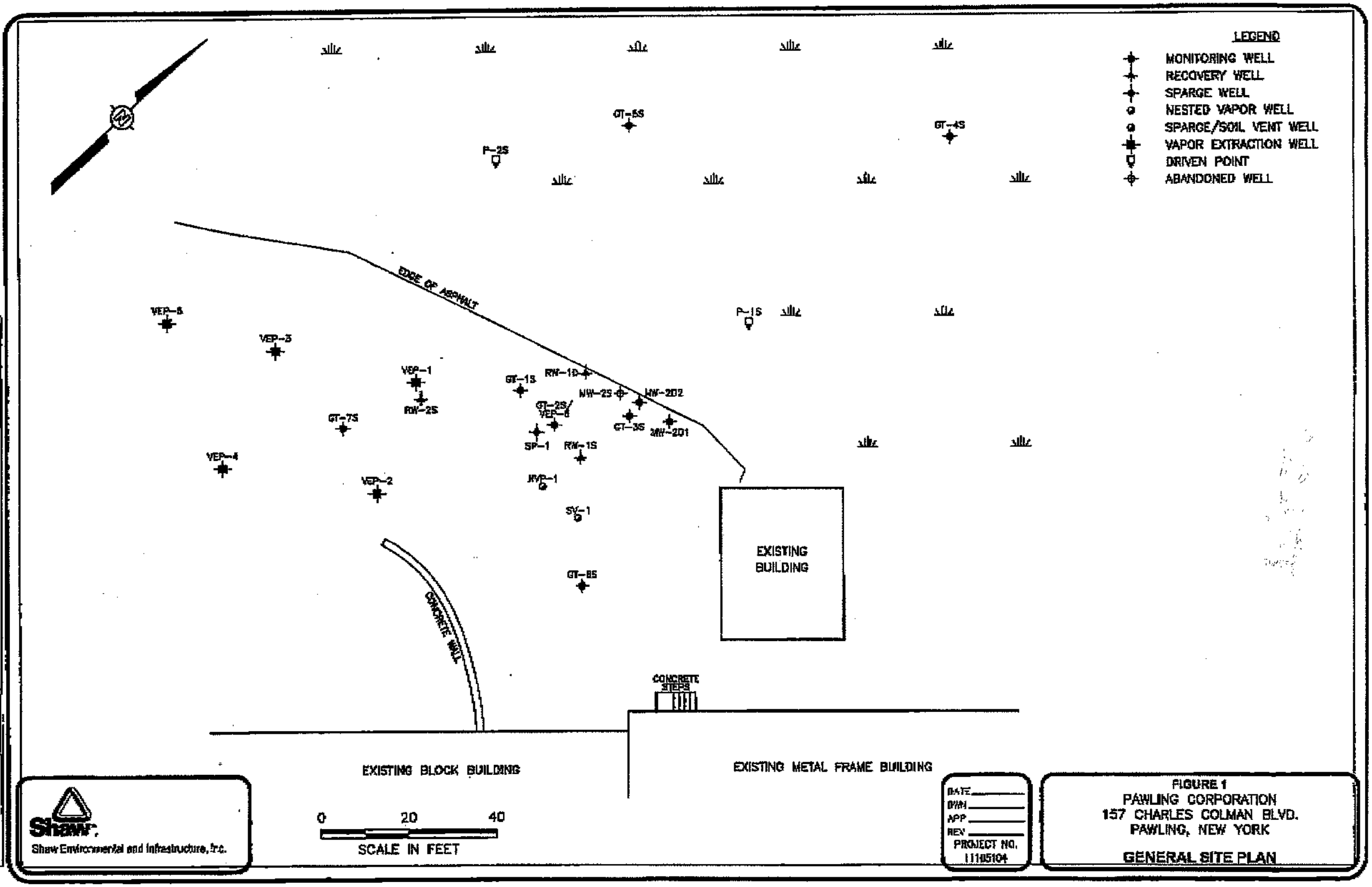

LEGEND
MONITORING WELL
RECOVERY WELL
SPARGE WELL
NESTED VAPOR WELL
SPARGE/SOIL VENT WELL
VAPOR EXTRACTION WELL
DRIVEN POINT
ABANDONED WELL
GT-5S
GT-4S
P-2S
EDGE OF ASPHALT
P-1S
VEP-5
VEP-3
VEP-1
RW-2S
GT-1S
RW-1D
MW-2S
MW-202
GT-2S/
GT-3S
MW-201
GT-7S
SP-1
RW-1S
VEP-4
VEP-2
NVP-1
SV-1
GT-8S
EXISTING BUILDING
CONCRETE WALL
CONCRETE STEPS
EXISTING BLOCK BUILDING
EXISTING METAL FRAME BUILDING
0 20 40
SCALE IN FEET
Shaw
Shaw Environmental and Infrastructure, Inc.
DATE
DWN
APP
REV
PROJECT NO.
11105104
FIGURE 1
PAWLING CORPORATION
157 CHARLES COLMAN BLVD.
PAWLING, NEW YORK
GENERAL SITE PLAN

FIGURE 2
GROUNDWATER ELEVATIONS

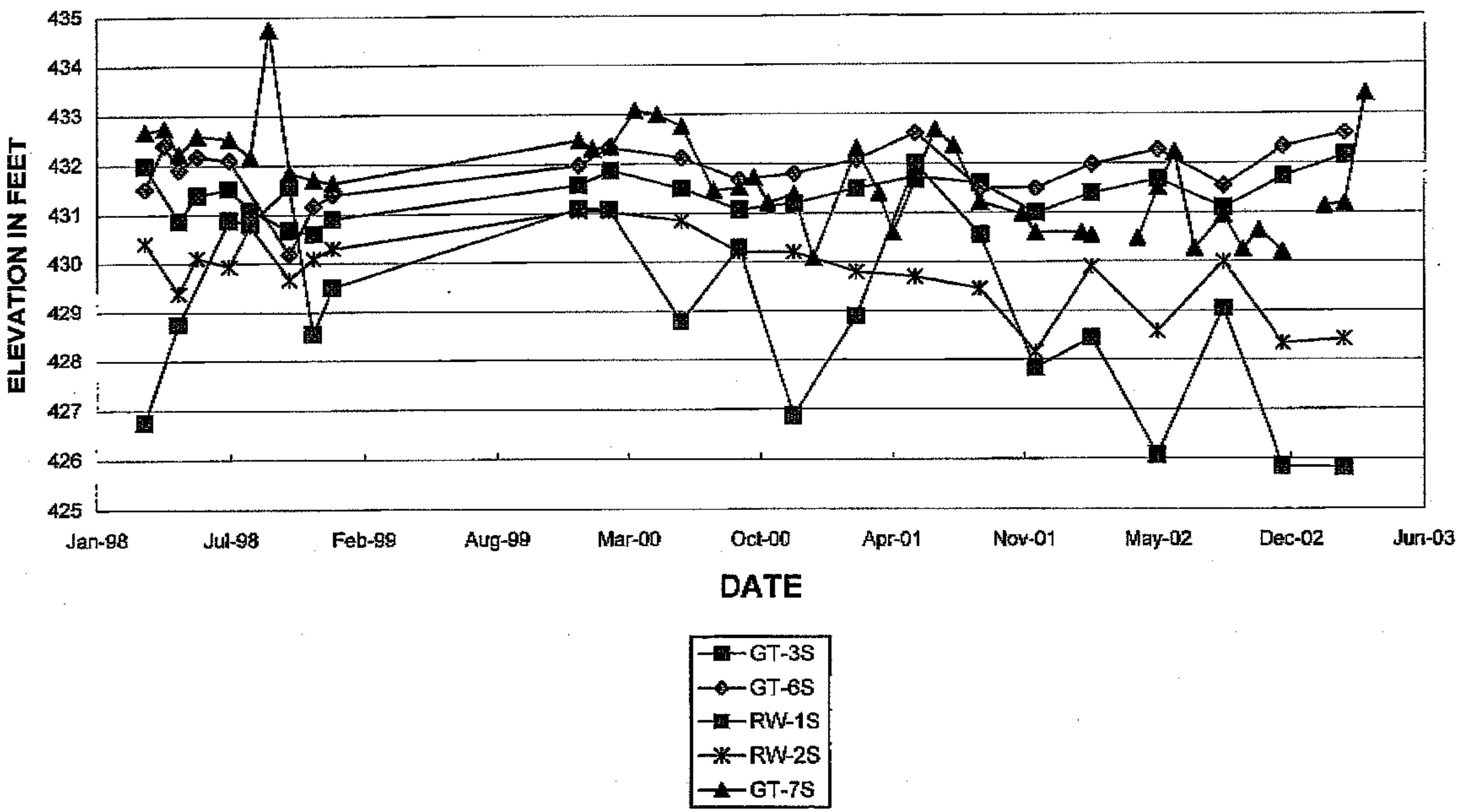
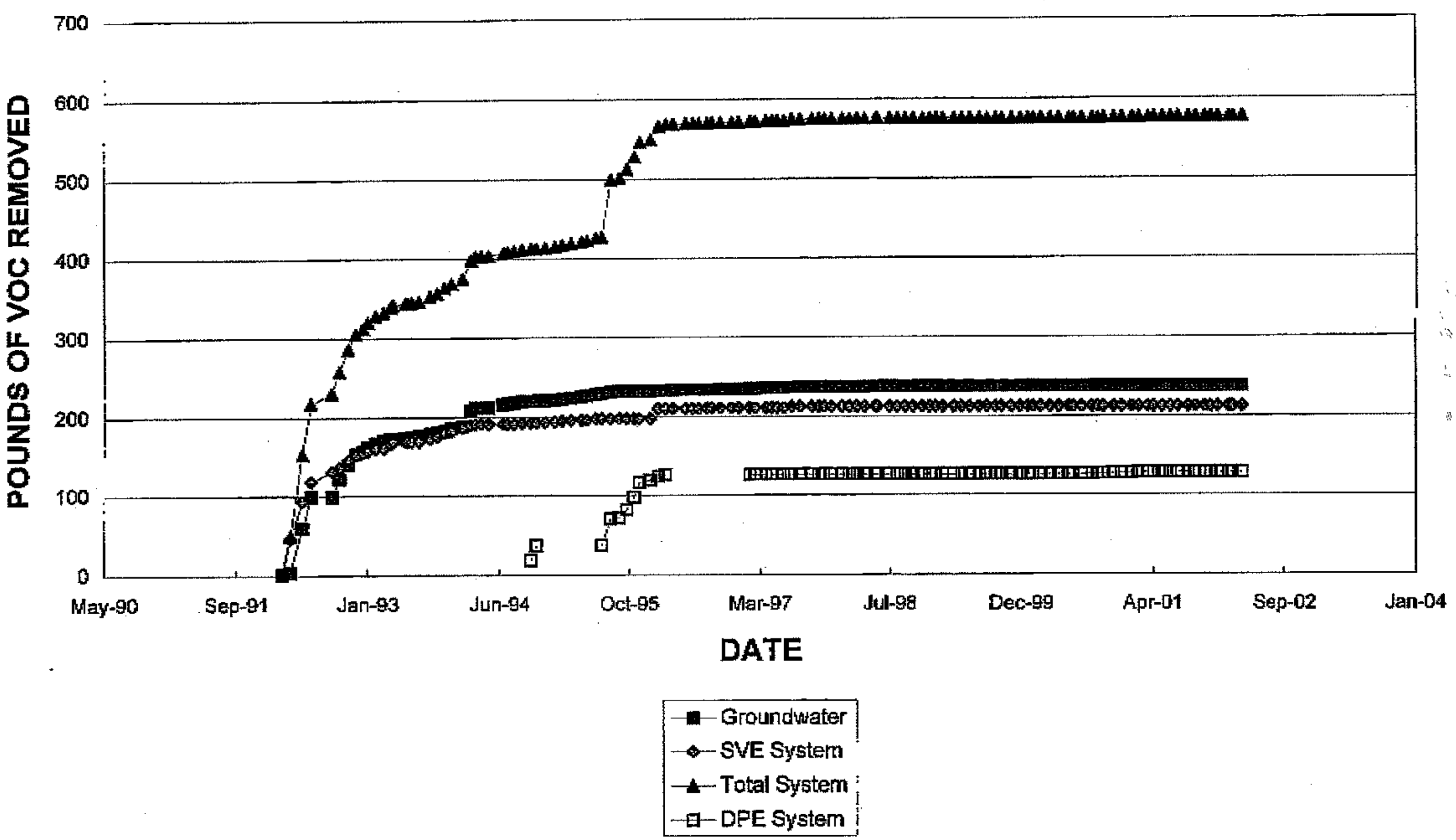


FIGURE 3
CUMULATIVE VOC REMOVAL



IT Corporation
13 British American Boulevard
Latham, NY 12110-1405
Tel. 518.783.1996
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A Member of The IT Group

the IT group[SM]

December 12, 2000

Mr. Jim Schreyer
Construction Inspector
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 3
21 South Putt Corners Road
New Paltz, NY 12561-1696

Subject: **Recommended Remedial Plan for OU-2 Bedrock Aquifer**
Pawling Corporation, Site Number 3-14-002
Village of Pawling, Dutchess County
IT Corporation Project: 11105104

Dear Mr. Schreyer:

IT Corporation is submitting this recommended remedial strategy for the Operable Unit-2 (OU-2) Bedrock Aquifer on behalf of Pawling Corporation. IT Corporation has evaluated numerous assessment and remedial options for the Bedrock Aquifer at this site and is recommending Natural Attenuation as the preferred approach. Natural attenuation refers to naturally-occurring processes in soil and groundwater environments that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in those media. These in-situ processes include biotransformation, dispersion, dilution, adsorption, volatilization, and chemical or biological stabilization or destruction of contaminants (U.S.EPA, 1998)1.

Biotransformation can often be a dominant process in the natural attenuation of chlorinated solvents. At chlorinated solvent contaminated sites, most of the solvent degradation occurs by reductive dechlorination (U.S.EPA, 1998)1. Reductive dechlorination is a microbially-mediated reaction whereby a chlorine atom on the chlorinated solvent is replaced by a hydrogen atom (Vogel and McCarty, 1987)2. The major dechlorination pathway is:

PCE ---- TCE ---- Cis,1,2-DCE ---- Vinyl Chloride ---- Ethene

1 U.S. EPA , 1998, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. EPA/600/R-98/128, September, 1998.
2 Vogel,T.M. and P.L. McCarty, 1987, Abiotic and Biotic Transformations of 1,1,1-Trichloroethane under Methanogenic Conditions, Environ. Sci. technol., 21(12):1208-1213.

To support remediation by natural attenuation, it must be scientifically demonstrated that attenuation of the site contaminants is occurring at rates sufficient to be protective of human health and the environment. According to the "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater" (U.S.EPA, 1998), three lines of evidence can be used to support natural attenuation of chlorinated solvents including:

1. Observed reductions in contaminant concentrations along the flow path downgradient from the source of contamination.

2. Documented loss of contaminant mass at the field scale using:

   a) Chemical and geochemical analytical data including decreasing parent compound concentration, increasing daughter compound concentrations, depletion of electron acceptors and donors, and increasing metabolic byproduct concentrations; and/or;

   b) A rigorous estimate of residence time along the flow path to document contaminant mass reduction and to calculate biological decay rates at the field scale.

3. Laboratory microcosm or field data that support the occurrence of biotransformation and give rates of biotransformation.

Natural attenuation has been approved by EPA and numerous state agencies as an acceptable remedy at many sites assuming some scientific evidence of the processes can be presented.

Existing site-specific support for this remedy includes the following:

- The site hydrogeology and assessment data determined that the only source of chlorinated solvents was in the overburden. Bedrock groundwater flow is upward into the Swamp River and shallow overburden. Source cleanup of the overburden will remove the source of the dissolved levels which are found in the bedrock (which are present due to past pumping of deep bedrock production wells for water supply to the Pawling Corporation facility).

- The bedrock contains only low levels of chlorinated solvents which is conducive to cleanup by a less aggressive remedial strategy such as natural attenuation. The most recent sampling results collected on August 29, 2000 detected only cis-1,2-Dichloroethene and vinyl chloride, at 42 and 24 ug/L, respectively.

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1 U.S. EPA , 1998, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. EPA/600/R-98/128, September, 1998.
2 Vogel,T.M. and P.L. McCarty, 1987, Abiotic and Biotic Transformations of 1,1,1-Trichloroethane under Methanogenic Conditions, Environ. Sci. technol., 21(12):1208-1213.

- The presence of cis-1,2-Dichloroethene and vinyl chloride which are TCE/PCE breakdown products indicates that degradation is occurring.

- The bedrock aquifer discharges into the wetlands downgradient of the site. The high organic content and complex pathways of flow within this system will allow continued degradation of the low concentrations of chlorinated solvents that have been detected in the bedrock near the former source area.

- The wetland that is situated adjacent to and downgradient of the Pawling Corporation site is the Great Swamp. The Swamp is currently not impacted by the existing chlorinated solvent plumes. This was documented by surface water and sediment sampling. If additional assessment and drilling in the swamp is required it will create the potential for extensive impacts to this protected wetland due to the disruption of native animal and plant species, as well as physical damage to the environs. IT Corporation solicited bids from several different drilling companies and all indicated that mobilization of personnel and drilling equipment into the Great Swamp will require the need for heavy equipment, access roads and construction of drilling platforms within the confines of the wetland area. This impact is far more of an environmental issue than the existing conditions. Pawling Corporation is very active in the protection of the Great Swamp and has provided additional information on this ecosystem (**Attachment 1**).

IT Corporation is recommending that a Natural Attenuation Monitoring Plan be prepared which provides all available documentation of natural attenuation processes occurring at the site. Some additional sampling of natural attenuation field parameters, such as oxidation reduction potential, methane, TOC, and chloride, will be proposed to assist in documenting the processes. Based upon the site conditions and desire to protect the Great Swamp, Pawling Corporation is requesting that the New York State Department of Environmental Conservation approve the preparation of the proposed approach.

If you wish to further discuss this proposed plan, please contact Wendy Leonard at (305) 818-2616.

Sincerely,
IT Corporation

for

Wendy Leonard
Senior Hydrogeologist

Copy: Susan Thompson – Pawling Corporation

1 U.S. EPA , 1998, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. EPA/600/R-98/128, September, 1998.
2 Vogel,T.M. and P.L. McCarty, 1987, Abiotic and Biotic Transformations of 1,1,1-Trichloroethane under Methanogenic Conditions, Environ. Sci. technol., 21(12):1208-1213.

ATTACHMENT 1
A GUIDEBOOK TO THE GREAT SWAMP OF PUTNAM AND DUTCHESS COUNTIES, NY

1 U.S. EPA , 1998, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. EPA/600/R-98/128, September, 1998.
2 Vogel,T.M. and P.L. McCarty, 1987, Abiotic and Biotic Transformations of 1,1,1-Trichloroethane under Methanogenic Conditions, Environ. Sci. technol., 21(12):1208-1213.

The Nature Conservancy

Lower Hudson Chapter
41 South Moger Avenue
Mt. Kisco, New York 10549
914-244-3271
FAX 914-244-3275

A GUIDEBOOK TO THE GREAT SWAMP OF PUTNAM AND DUTCHESS COUNTIES, NEW YORK

A listing of recreational access points, and the organizations and agencies that are helping to protect wetland resources for public benefit.

The Nature Conservancy

BACKGROUND AND DESCRIPTION

During the past three centuries, over half of the nation's wetlands have been lost to agricultural, commercial, and residential development. New York State alone has lost over 60% of its wetlands. Only in the past few decades have we been made aware of the significant services that wetlands provide for our communities. These benefits, some of which are unique to wetland systems, include:

- reducing the severity and frequency of floods
- filtration and settling of pollutants
- recharging of aquifers and reservoirs
- reducing the severity of droughts
- wildlife habitat
- recreational and educational amenities
- renewable resources
- scenic views
- maintenance of neighboring property values
- habitat for about one-third of species listed as federally threatened or endangered in the United States

In light of this new appreciation of wetlands and their functions, public agencies and private organizations have invested considerable resources in trying to protect wetlands throughout the country during the past thirty years. Regulations, such as the Clean Water Act and New York State Environmental Conservation Law, have helped to protect natural resources such as the Great Swamp for local communities that depend on them for economic and ecological vitality. Many municipalities, nonprofit organizations, businesses, and individuals have also made significant investments over the years to preserve the Great Swamp. These successes, however, are mirrored by decreases in water quality resulting from land use practices upstream of the wetlands, and elsewhere in the watershed. Specifically, pollutants, erosion, and runoff from buffer areas continue to lead to serious impairment and degradation of the wetland. These problems,

which affect all of us, could be reduced or eliminated through education and participation of landowners, public officials, and involved citizens. In many cases, the economic costs of wetlands protection are negligible or cost-effective in contrast to the high costs of clean-up and remediation. Conservation of natural resources does not automatically result in economic privation - nor should it.

The Great Swamp

The Great Swamp is a freshwater wetland of approximately 4,800 acres located in Putnam and Dutchess Counties, New York. As with most watersheds, it is not defined by political or regulatory boundaries. The Great Swamp watershed includes parts of the towns of Southeast, Patterson, Pawling, and Dover in New York State, as well as a portion of Fairfield County in Connecticut. The wetland is actually divided into two drainages: one flowing north to the Housatonic River, then to Long Island Sound, and the other traveling south to the East Branch Croton Reservoir, which supplies 10% of New York City's drinking water. Many people in Putnam and Westchester Counties also depend on the Great Swamp watershed for drinking water supplies.

The Great Swamp is one of the state's largest freshwater wetlands, and is fed by numerous streams of high water quality, with portions of the wetland designated as Class I by the State Department of Environmental Conservation. Dutchess and Putnam Counties have designated their respective lands in the Great Swamp as Critical Environmental Areas. The United States Fish and Wildlife Service recognizes the Great Swamp as a priority wetland in its 1990 Regional Concept Plan. The Great Swamp has been included as an area deserving protection in the 1986 New York State Environmental Quality Bond Act, as well as the more recent New York State Open Space Plan and Environmental Protection Fund.

The New York Natural Heritage Program has identified a number of rare species in the Great Swamp watersheds (north and south flows). These are summarized in the table below.

Plants and Animals

Common Name	Scientific Name	Rank
swamp birch	*Betula pumila*	G5/S2
blazing star	*Chamaelirium luteum*	G5/S2
Long's bittercress	*Cardamine longii*	G3-4/S2
Bush's sedge	*Carex bushii*	G4/S3
redrooted flatsedge	*Cyperus erythrorhizos*	G5/S1
field dodder	*Cuscuta campestris*	G5/S1
yellow wild flax	*Linum sulcatum*	G5/S2
spreading globeflower	*Trollius laxus laxus*	G4/S2-3
Carolina whitlow-grass	*Draba reptans*	G5/S1
green milkweed	*Asclepias viridiflora*	G5/S2
bog turtle	*Clemmys muhlenbergii*	G3/S2

Natural Communities

inland Atlantic white cedar swamp G2-3/S1
rich shrub fen G3-4/S1-2
floodplain forest G3-4/S2-3

Heritage Ranking System:

S1 — Found at fewer than six sites in the State (considered endangered statewide).
S2 — Found at fewer than twenty known sites in the State.
S3 — Found at fewer than 100 known sites in the State.
G3 — Found at fewer than 100 known sites in the world.
G4-5 — Considered globally secure.

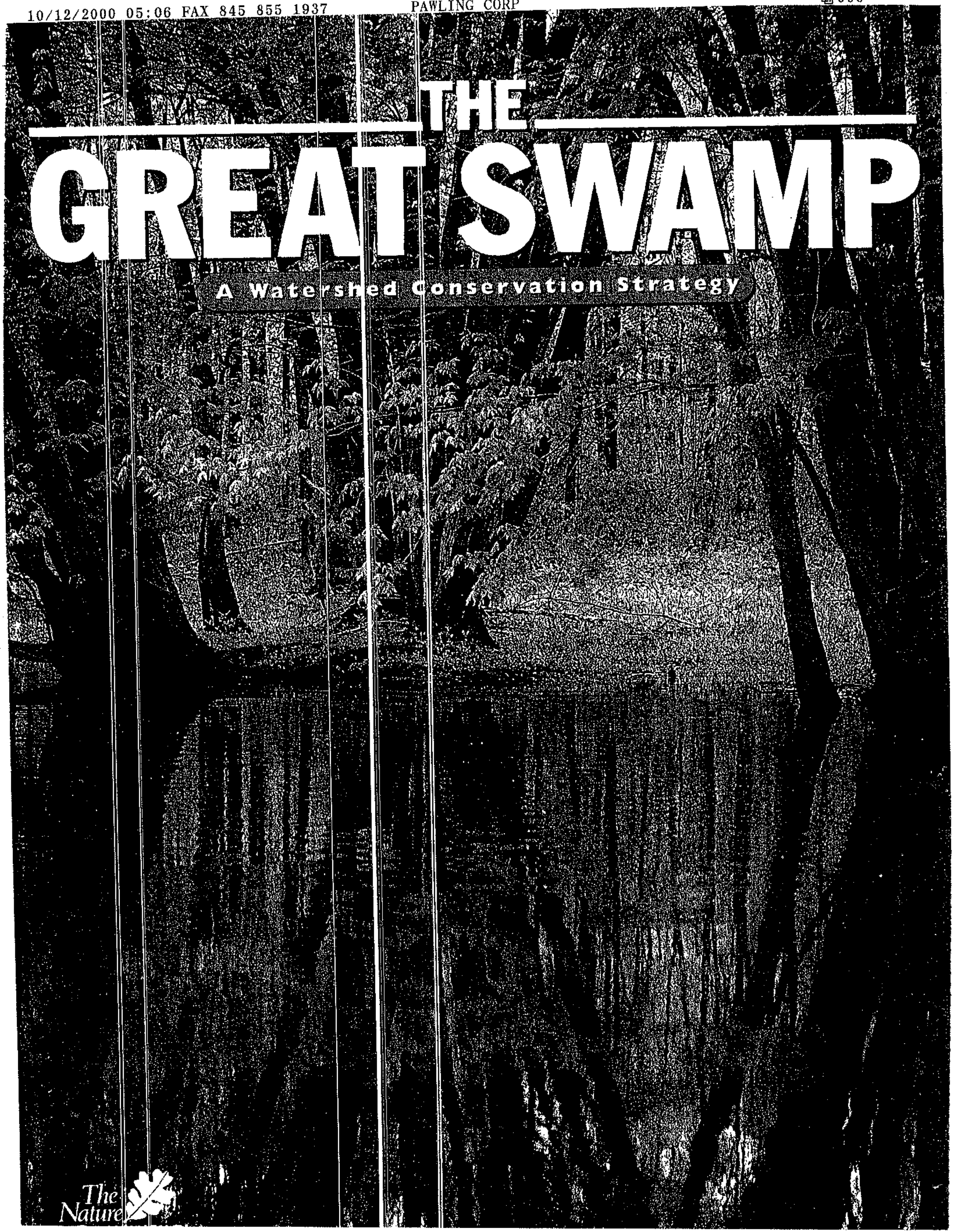
Threats to wetland integrity and water quality in the Great Swamp derive primarily from increases in water pollution and discharges, the result of changes in land use practices in the watershed over the past few decades. Although state and local government (and New York City, in the case of the southern flow) are involved in regulating certain land use activites in and near the wet- lands, such regulations can be limited in their effectiveness. In some cases, lack of funding has led to enforcement difficulties. In any event, it is local residents who have the largest stake in protecting the Great Swamp. To a great extent, protection of the water quality and natural resources of the Great Swamp is now largely the responsibility of local communities that depend on it for drink- ing water, filtration, active and passive recreation, esthetics, open space, and economic return.

Your Wetlands

The following pages provide a listing of sites that are available to the public for access to the Great Swamp. The wetlands, rivers, and streams provide tremendous resources for hiking, canoeing, birding, angling, and hunting. Take time to both enjoy the Great Swamp and its myriad of natural areas, and to become involved in protecting it. The sites you visit have been protected through the work of individuals such as yourself who serve the public, whether as volunteers, donors, or as part of a non-profit or municipal government body. Many others in the private sector are working to ensure the continued health and high water quality standards of the Great Swamp. We encourage you to become involved with the many ongoing efforts to protect the Great Swamp. This Guidebook includes a list of agencies and private organizations that are working to protect water quality, biological diversity, fisheries, recreational access, and scenic views of the Great Swamp.

What You Can Do

- Support or volunteer for organizations working to protect the wetlands and water quality of the Great Swamp
- If you are a landowner with property in or near the wetland system, consider working with one of the active organizations to protect or improve management of wetlands and buffer areas on your land
- Voice your opinions to - or become involved in - local government
- Teach your children, or children you know, about the importance of wetlands
- Help to initiate or encourage school and community programs that focus on the Great Swamp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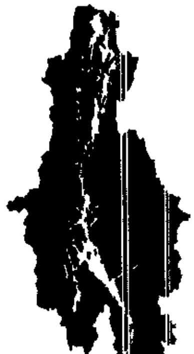
GREAT SWAMP
A Watershed Conservation Strategy
The Nature



Executive Summary

VISION

Enhancement of the communities, economy and environment within the Great Swamp Watershed through conservation of the wetland ecosystem and environmentally compatible economic growth.

The Great Swamp is an ecological treasure nestled in the fast-developing southern Harlem Valley. One of the largest wetlands in New York State, it is located less than 60 miles from New York City in eastern Putnam and Dutchess counties. The wetland stretches nearly 20 miles across the five municipalities of Southeast, Patterson, Pawling Town, Pawling Village, and Dover.

The Great Swamp is set in a 62,343-acre watershed covering portions of both New York and Connecticut. Defined by topography, the watershed is the total surface area draining into the Great Swamp wetland. The Great Swamp Watershed contains two distinct basins: one flowing north and the other flowing south. The south flow basin is part of New York City's Croton watershed, supplying drinking water to Putnam and Westchester counties and New York City.

The Great Swamp provides ecological services that directly and indirectly benefit every watershed resident. The Great Swamp improves water quality, recharges the aquifer, reduces flooding, provides habitat for plants and animals, and creates open space areas for recreation and scenic views. These services also contribute to increased property values and provide opportunities for tourism. For the 40,000 residents who live near it and the more than one million people who depend on it for drinking water, the Great Swamp is a vital natural resource

Despite the value of this ecosystem, the Great Swamp is threatened. The watershed is at the edge of advancing suburban development expanding north from Westchester County and New York City. The area's rural quality of life and easy access to major commercial centers makes the watershed an attractive place to live. The watershed's attractiveness, however, has fueled rapid population growth. Population in Patterson, for example, increased 204% between 1960-1990. If population in the watershed continues to grow at current rates, it will double in just 45 years.

Population growth generally leads to additional residential and commercial development. Much of this development is likely to occur along or near Route 22, an important commercial and transportation corridor that closely parallels the eastern edge of the Great Swamp. Regardless of where it is located, development that is poorly planned or incompatible with environmental conditions is likely to impact the hydrology, wildlife, and habitat of the watershed, as well as reduce open space and obstruct scenic views. In addition, poorly planned development often increases the costs of government services such as education, fire, police, water, and sewage treatment. Taken together, such development tends to reduce the overall quality of life for watershed residents.

Growth and development trends in the watershed are likely to continue. Thus, conservation of the Great Swamp and enhancement of the local quality of life depend on development and economic growth that are compatible with the environment and consistent with community goals. The sustained health of each element – community, economy, and environment – is tied to the vitality of the others and must be pursued simultaneously. This premise underlies the initiatives proposed in this conservation strategy.

RECOMMENDED STRATEGIES

Six initiatives are proposed to conserve the Great Swamp and foster compatible economic growth:

- **Increase public awareness of the Great Swamp**
- **Foster local leadership on wetland and watershed protection**
- **Strengthen wetland protections**
- **Improve water quality**
- **Protect plant and animal habitat**
- **Encourage compatible economic development and improved land-use planning**

INCREASE PUBLIC AWARENESS OF THE GREAT SWAMP

The Great Swamp is a valuable resource, yet few people know exactly where it is, how to access it, or why it is important to protect. Much of the Great Swamp is privately owned and few recreation access points have even minimal information or amenities. Route 22 and Metro-North Railroad provide views of the wetland, but few travelers are aware of the vast ecosystem they are passing by. For teachers interested in using the Great Swamp as a learning resource, there is little coordination or support. To increase the public's understanding of the Great Swamp and enhance its value as a recreation and education resource, the following are proposed:

Expand community outreach activities: Expand naturalist-led excursions such as canoe trips and wildflower hikes, continue wetland cleanup days, and establish volunteer community monitoring programs such as water quality monitoring and macroinvertebrate monitoring.

Create signage and publicity: Post road signs identifying the Great Swamp and create a Great Swamp poster for Metro-North Railroad.

Improve managed recreation access: Improve canoe launch sites, maintain vegetative debris in river channels, establish the Maybrook Rail Trail, acquire additional public recreation lands, and expand greenways and trails.

Promote education: Incorporate the Great Swamp into the local school curriculum, develop Great Swamp resource materials, establish a Great Swamp interpretive center, and organize a Great Swamp educators conference.

FOSTER LOCAL LEADERSHIP ON WETLAND AND WATERSHED PROTECTION

The Great Swamp is not constrained by political boundaries. The wetland traverses five municipalities and two counties and its watershed extends into sixteen different political jurisdictions across both New York and Connecticut. Actions in one jurisdiction may have environmental and fiscal impacts far beyond municipal borders. Pollutants, for example, can originate anywhere in the watershed and be carried by streams and groundwater into the wetland. Incompatible land uses and development can obstruct scenic views and reduce land values on a regional basis.

Each municipality has taken important steps to conserve its natural heritage, but most of these steps have been taken independently and are not implemented consistently across municipal borders. Thus, the benefits of these policies are limited to their area of implementation and may be undermined by conflicting policies in neighboring jurisdictions.

Both elected officials and community members have a role to play in establishing local environmental and economic policies. These policies will be more effective if implemented consistently across all watershed municipalities. To foster leadership toward a watershed perspective, the following are proposed:

Establish a Great Swamp Watershed Advisory Council: Establish a forum to facilitate communication, cooperation, and coordinated land-use planning amongst watershed communities.

Strengthen Friends of the Great Swamp (FrOGS): Enhance this community coalition's ability to guide conservation and environmentally compatible development with additional funds to support research, education, and outreach activities, creation of an information center, and inclusion on distribution lists for development proposals affecting the Great Swamp.

Form a Wetland Watch Citizen Network: Form a network of trained citizens to augment state and local efforts to prevent illegal dumping, reduce pollution, and ensure that local natural resources are conserved.

Official Recognition of the Great Swamp

PRIORITY CONSERVATION PROJECT: *New York State Open Space Conservation Plan, 1992, 1995, 1998.*

IMPORTANT BIRD AREA: *National Audubon Society, 1997.*

CRITICAL ENVIRONMENTAL AREA, DUTCHESS COUNTY: *Dutchess County Legislature, 1991.*

CRITICAL ENVIRONMENTAL AREA, PUTNAM COUNTY: *Putnam County Legislature, 1988.*

PRIORITY WETLAND: *United States Fish and Wildlife Service, Northeast Region, Regional Wetlands Concept Plan, 1990.*

"IMPORTANT, SCARCE AND VULNERABLE" WETLAND: *United States Fish and Wildlife Service, Emergency Wetlands Resource Act, 1990.*

SIGNIFICANT NATURAL AREA: *Dutchess County Environmental Management Council, 1983.*

NOMINATED AS A NATIONAL NATURAL LANDMARK: *United States Department of Interior, 1982.*

CLASS I WETLAND: *New York State Department of Environmental Conservation.*

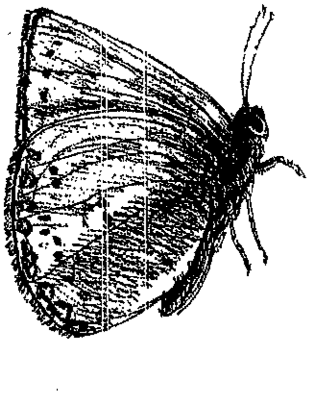
STRENGTHEN WETLAND PROTECTIONS

Prior to the mid-1970s, many people considered wetlands to be wastelands – lands that had little value unless drained, filled, developed, or converted to agricultural uses. This misconception contributed to a loss of more than half the wetland area in the continental United States existing prior to European settlement. This nation-wide decline in wetland area resulted in reduced populations of waterfowl, fish, and wildlife and caused an increase in destructive flooding, polluted waters, and erosion.

Local, state, and federal governments responded to these concerns with policies and regulations to protect the functions and values of wetland systems. These policies have slowed but not stopped the cumulative loss of wetlands. In Patterson and Southeast, 753 acres of wetland were lost between 1963 and 1991 (Smith and DeGloria, 1993).

In New York, wetlands 12.4 acres or larger are mapped and regulated by the state. Although these protected areas include 4,202 acres of the Great Swamp (known as DP-22), a recent analysis suggests that the full extent of the Great Swamp is actually 6,768 acres – 38% larger than that mapped by the state (see box on p.2). This discrepancy leaves many wetland areas without state protection.

Even with state and federal oversight, primary responsibility for wetland and natural resource



protection rests with local officials. In the Great Swamp Watershed, these protections vary considerably across municipalities, leading to incomplete and inconsistent protection for wetlands and natural resources.

The cumulative impacts of land-use decisions must be taken into account at all levels to ensure adequate protection of wetlands and the valuable services they provide. Recommendations to strengthen wetland protections focus at the local, state, and federal levels:

Improve implementation of state and federal wetland programs: Re-delineate the boundaries of the Great Swamp (DP-22) and other wetlands based on new data, re-classify wetlands connected to the Great Swamp as Class I wetlands to provide them with a higher degree of protection, exempt the Great Swamp from U.S. Army Corps of Engineers Nationwide Permits, and protect wetland buffers.

Strengthen and harmonize local regulatory controls and enforcement: At the local level, wetland and natural resource protections could be enhanced if each municipality were to regulate wetlands 1/4 acre or larger, extend wetland and stream buffer zones where appropriate, restrict building in floodplains, establish wetland overlay zones, adopt no net loss of wetlands policy, and establish a wetland tax policy.

IMPROVE WATER QUALITY

Water is an essential resource for personal, economic, and ecological reasons. Wetlands such as the Great Swamp play a vital role in maintaining good water quality.

Based on stream sampling data, water quality in the south flow of the Great Swamp is mixed. Nutrients and pollutants in the Great Swamp's East Branch Croton River are measurably elevated downstream as compared with headwater values (New York City Department of Environmental Protection, 1993). However, with the exception of phosphorus, water quality parameters generally remain within an acceptable range based on designated uses and ecological functions. Nonetheless, recent stream sampling data (New York City Department of Environmental Protection, 1998) show that conductivity, temperature, pH, dissolved oxygen, fecal coliform and phosphorus were all measured outside of this range at some time between 1993 and 1997.

Water quality in the Great Swamp is affected by the accumulation of pollutants and nutrients originating throughout the watershed. Major sources of pollution include septic waste disposal systems, road salt, animal waste from horse and livestock farming, impervious surfaces, golf courses and residential lawns. Sixteen sewage treatment plants discharge into the Great Swamp or its tributaries. Together, these plants accumulated 222 violations of their effluent discharge (SPDES) permits between 1995-1998 (New York State Department of Environmental Conservation, 1998, 1999).

To improve water quality in the Great Swamp and throughout the watershed, the following are proposed:

Reduce pollution from septic systems: Reduce excessive pollution discharge from septic systems by ensuring adequate septic spacing, establishing regular pumping and inspections, creating septic pump-out districts, and promoting septic education programs.

Reduce pollution from road salt: Reduce road salt in the Great Swamp by removing salt piles from locations near the wetland, covering salt piles, exploring alternatives to the use of salt, marking roadways near the Great Swamp as low salt areas, and limiting sand-salt mixes.

Reduce pollution from livestock waste and agricultural run-off: Reduce pollution from farm activities by creating natural vegetation buffers, modifying tillage practices, and constructing on-farm catchments.

Reduce pollution from storm-water run-off: Prevent untreated storm-water run-off from entering wetlands and streams by creating first flush catchments and maintaining stormwater systems.

Reduce other sources of pollution: Reduce pollution inputs throughout the watershed by enrolling golf courses in environmental certification programs, limiting railroad herbicide spraying, preventing dumping, holding additional hazardous waste disposal days, and improving Putnam Lake water quality.

Protect and monitor water resources: Provide enhanced protection to streams by re-classifying trout streams to require higher water quality standards and establish a monitoring program for water resources in both the north and the south flow basin.

PROTECT PLANT AND ANIMAL HABITAT

Wetlands are among the most biologically productive ecosystems on Earth (Tiner, 1997). The Great Swamp wetland and watershed supports 31 different natural vegetation communities (Olivero, 1998) and numerous documented species of amphibian, reptile, butterfly, dragonfly, and bird. However, the survival of many plant and animal species in the Great Swamp is threatened by the loss, fragmentation and degradation of habitat.

Ecological protection priorities focus on 46 rare plant and animal species and significant natural communities found in the Great Swamp Watershed. The Great Swamp contains ideal habitat for known populations of bog turtle (Clemmys muhlenbergii), a federally protected species under the Endangered Species Act. It supports 19 rare plant species and eight significant natural communities. A recent study in the Great Swamp (Klemens, et al., 1999) found that large, relatively undisturbed landscape blocks support the greatest diversity of wildlife. Disturbance factors such as roads, development, invasive species, and pollution all tend to increase fragmentation, reduce habitat cover, and inhibit migration between habitat types. Species requiring specific habitat types or combinations of habitat types will tend to be eliminated first, leaving only the generalized or common species.

Integrating conservation and compatible economic growth requires sufficient knowledge of species habitat needs and the effects of various land uses on biological integrity. This information guides protection efforts and informs land use policies. To conserve the Great Swamp's biological diversity, the following are proposed:

Acquire habitat and recreation land: Create a land protection and management plan, acquire lands forfeited due to tax delinquency, and pursue land conservation efforts among land trusts and conservation organizations.

Protect and monitor species and habitat: Conduct additional species surveys, continue studying the effects of land-use practices on biological diversity, protect the bog turtle and its habitat, post turtle crossing signs, identify and protect vernal pools, control invasive species, and incorporate ecological concerns during railroad maintenance.

ENCOURAGE COMPATIBLE ECONOMIC DEVELOPMENT AND LAND-USE PLANNING

Compatible development is the production of goods and services, the creation and maintenance of businesses, and the pursuit of land uses that conserve the environment, enhance the local economy and achieve community goals (Center for Compatible Economic Development, 1997). This three-pronged approach recognizes that maintaining a high quality of life requires that each of these components – community, economy, and environment – be in balance and reinforce one another.

Residential and commercial development often results in loss of natural areas, increased impervious surfaces, and fragmentation of habitat. However, if new growth is managed in a watershed context, homes and businesses can be located and designed to have a minimal impact on streams, wetlands, and waterbodies. A key component of achieving compatible development is watershed planning. This process directs proposed development to the least sensitive areas and attempts to control the amount and location of impervious cover in a watershed. Some areas are designated as growth areas, while others are partly or fully protected from future development (Schueler, 1998).

Wetland regulation and other forms of land conservation are commonly perceived to be detrimental to the municipal tax base. However, studies show that residential land uses consistently cost more in services than they pay in taxes (American Farmland Trust, 1997). Across New York State, taxes are generally higher in towns that have more residents, more commercial property, and more jobs (Brighton, 1997). On the other hand, studies show that the fiscal impact of conservation and compatible development is, on net, generally positive (Schueler, 1998; Caputo, 1979).

To promote compatible economic development and regional land-use planning, the following are proposed:

Design a watershed conservation and development plan: A comprehensive watershed land-use plan should be devised that identifies sensitive wetlands, natural resources, floodplains, steep slopes, wildlife migration corridors, conservation open space, and other unbuildable areas. The remaining buildable lands should be identified and developers should be encouraged through a variety of incentive mechanisms to direct residential, commercial, and industrial development toward those areas.

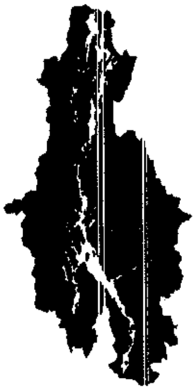
Adopt a Great Swamp Critical Environmental Area Management Plan: Putnam and Dutchess counties should adopt management plans for the Great Swamp Critical Environmental Area.

Incorporate Great Swamp conservation in the Croton Plan for the New York City Watershed: Because the Great Swamp is a significant wetland that plays an important role in maintaining water quality in New York City's Croton Watershed, special attention should be paid to incorporating Great Swamp conservation efforts into the Croton planning process in Patterson and Southeast.

Utilize available land-use planning tools: Numerous land-use planning tools are available to municipalities and should be considered when appropriate. These include overlay zoning, floating zones, cluster development, incentive zoning, transfer of development rights, agricultural zones, and intermunicipal agreements.

Great Swamp Facts

Wetland Size (TNC estimate):	**6,768 acres**
Wetland Size (DEC delineated):	**4,202 acres**
Watershed Size:	**62,343 acres**
North Flow:	19,694 acres
South Flow:	42,649 acres
Wetland Length:	**19.8 miles**
Maximum Width:	**1.3 miles**
Watershed Residents (1990):	**39,305**
Percent of DEP Croton Watershed Area:	**18%**
Total Rare or Significant Elements:	**46**
Significant Natural Communities:	8
Rare Plant Species:	19
Rare Amphibian and Reptile Species:	8
Rare Bird Species:	10
Rare Fish Species:	1



The Wetland and its Watershed

VISION

Conservation of the Great Swamp's large wetland and watershed system through local community support and municipal leadership across political boundaries.

THE GREAT SWAMP AND THE SOUTHERN HARLEM VALLEY

The Great Swamp is an ecological treasure. Set in a dynamic landscape of farms, hamlets, forests and commerce, the Great Swamp is a vast wetland ecosystem that plays a valuable role in maintaining water quality, flood control, wildlife habitat, recreation and rural quality of life. For the 40,000 residents who live near it and the more than one million people who depend on it for drinking water, it is a vital natural resource.

The Great Swamp is one of the largest freshwater wetlands in New York State. Nearly twenty miles long, its 6,768 acres traverse the five municipalities of Southeast Patterson, Pawling Village, Pawling Town, and Dover in eastern Dutchess and Putnam counties. New York State ranks the Great Swamp as a Class I wetland, meaning it provides the most critical of the state's wetland benefits.

Identified as DP-22 by New York State, the Great Swamp wetland spans two watersheds that divide imperceptibly at Pawling into a north and a south flow. In the north flow basin, the Swamp River runs through the Great Swamp, originating near Mount Tom and winding northward through the wetland from Pawling to Wingdale and Dover Furnace. A small dam near Dutchess County Route 26 artificially creates the northern boundary of the Great Swamp wetland. The Swamp River, however, continues north where it enters the Ten Mile River, eventually joining the Housatonic River and ultimately the Long Island Sound.

In the south flow basin, the East Branch Croton River flows through the Great Swamp, originating near Purgatory Hill and traveling through Pawling Village before entering the wetland and continuing south through the towns of Pawling, Patterson and Southeast. The Muddy Brook extension of the Great Swamp flows north from Ice Pond and joins the East Branch Croton River near Pine Island. The wetland's southern extent ends at Milltown Road where water flows into the East Branch Reservoir. The south flow basin of the Great Swamp is the northern-most source of the Croton System, part of New York City's drinking water supply.

The combined north and south flowing basins (hereafter referred to as the Great Swamp Watershed) cover a total land area of 62,343 acres (approximately 97 square miles). The Watershed is nestled in the Harlem Valley and extends into sixteen different political jurisdictions, including seven municipalities within New York and three within Connecticut. The watershed is bounded to the south by the entrance to the East Branch Reservoir and the hills along the south side of Federal Hill Road in Southeast. To the north, it is bounded by Dutchess County Route 26 and the hills above Dover Furnace in Dover. The watershed is bounded to the east and west by the ridgelines of the Harlem Valley, extending into Union Vale, Beekman, and Kent to the west and into Sherman, New Fairfield, and Danbury Connecticut to the east.

Elevations in the watershed range from a low of 390 feet above sea level at the wetlands southern endpoint in Southeast to a high of 1,336 feet along the eastern ridgeline in northeast Patterson. Elevations in the Great Swamp wetland range from 440 feet at the directional divide in Pawling to 390 feet at the southern endpoint and 417 feet at the northern endpoint in Dover.

The Great Swamp is part of a network of wetlands, rivers and waterbodies throughout its watershed. Defined by topography, the Great Swamp Watershed represents the landscape's total surface area that drains into the Great Swamp wetland. Much of the rain and snow falling anywhere within the watershed flows into tributaries or underground through the soil, eventually discharging into the wetland. The watershed is comprised of 18 sub-basins, each with a network of tributary streams draining into the Great Swamp (see map p.26). More than 800 wetlands are located within the Great Swamp Watershed.

Upland areas of the watershed are integral components of the wetlands ecology. As water drains to the lowest point in the watershed – the Great Swamp – it picks up tiny particles of soil, oil, road salt, animal manure, fertilizers, pesticides, and other pollutants from upland areas. Because much of the water in the Great Swamp originates in the upland areas of the watershed, land uses and pollution sources throughout the watershed affect water quality in the wetland and in the aquifer. Upland areas of the watershed are also critical habitat for wetland species such as birds, reptiles, amphibians, and mammals.

The Wetland and its Watershed

WHAT IS A WETLAND?

The term wetland refers to a variety of aquatic and semi-aquatic systems that includes bogs, swamps, marshes, fens, peatlands, wet meadows and floodplain forests. These systems can vary markedly in size, landscape position, and type of vegetation. They can also vary in frequency and degree of water present, ranging from permanently flooded to seasonally or intermittently flooded. Some wetlands, such as vernal pools, appear dry at certain times of year, but still provide vital wetland functions.

Wetlands are typically defined by a combination of three elements: water, vegetation, and soil. As the name implies, wetlands are lands where periodic saturation with water is the dominant factor. Because water is generally present at the surface or in the root zone, wetlands support vegetation that is adapted to wet conditions (hydrophytes) (Mitsch and Gosselink, 1993). Wetlands are generally associated with hydric soils that differ from adjacent upland soils. For regulatory delineation purposes, the U.S. Army Corps of Engineers evaluates each of these features. New York State defines a wetland primarily on the presence of aquatic or semi-aquatic vegetation. Soils or hydrology are used in cases where vegetation is not definitive.

Freshwater wetlands such as the Great Swamp are often transitional areas, forming a continuous gradient between uplands and open water (Mitsch and Gosselink, 1993). They support both terrestrial and aquatic species of plants and animals and they can vary in size depending on the level and frequency of flooding. As such, they can be difficult to delineate accurately. Previous studies suggest that New York State wetland maps significantly underestimate the full extent of the Great Swamp and other wetlands in the watershed (see box this page).

BENEFITS OF THE GREAT SWAMP

The Great Swamp provides numerous ecological services that directly and indirectly benefit every watershed resident. These services, provided free by nature, enhance the surrounding communities, their economies, and the overall environment. These services include:

- **Water filtration:** The Great Swamp improves water quality by slowing water velocity and facilitating complex biochemical processes. In slow moving water, sediments and pollutants settle to the wetland bottom where soils and vegetation absorb, sequester, or transform certain harmful pollutants.
- **Ground-water recharge:** In times of drought, the Great Swamp recharges ground-water aquifers and buffers the effects of low rainfall periods.
- **Flood control:** Much of the Great Swamp is a broad floodplain forest that detains and absorbs stormwater run-off. The wetland vegetation and flat gradient reduce the water's velocity, thereby reducing erosion and the potentially destructive effects of floodwaters on downstream or adjacent property. This function is particularly important for lands downstream from developed areas because impervious surfaces such as buildings and parking lots tend to increase the quantity and velocity of stormwater run-off.
- **Habitat for plants, animals and rare species:** The Great Swamp is part of a highly productive wetland and upland ecosystem that supports a remarkable diversity of plants and animals. Through decomposition of abundant organic matter, the Great Swamp provides nutrients for vegetation and food for small invertebrates and forage-fish that in turn become food for animals higher up the food chain. Many wildlife species require wetlands for survival, while others use it as a safe connective corridor between neighboring habitats. Many migratory bird species use the Great Swamp as a refueling stop. Rare species such as the bog turtle and rare natural communities such as fens are integral parts of the Great Swamp's biological diversity.
- **Recreation, open space and scenic views:** The vast natural areas of the Great Swamp wetland and watershed offer extensive opportunities for canoeing, hiking, hunting, fishing, bird watching, painting, photography and solitude.
- **Education:** The Great Swamp is a diverse biolog-

THE FULL EXTENT OF THE GREAT SWAMP

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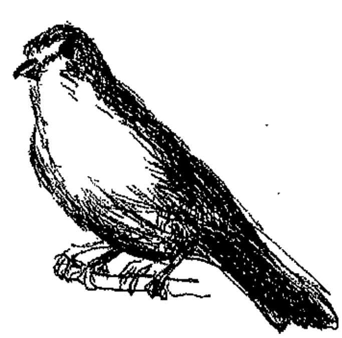


ical laboratory used by students, teachers and researchers in local elementary and secondary schools as well as colleges, universities, and research institutes throughout the area. Studies and lessons regarding biology, ecology, archeology, local history, geology, water sciences, environmental studies, art, and other topics have been conducted in the Great Swamp.

■ **Benefits to business and the local economy:** Because water filtration, flood control, and groundwater recharge are provided naturally, the Great Swamp reduces the need for tax revenue to supply these functions through costly technology. By maintaining open space and scenic beauty, it keeps property values high. And because of the recreational opportunities it affords such as hunting, fishing, birding, canoeing, hiking, and wildlife viewing, it also attracts visitors to the area who in turn contribute to the local economy.

THE HUMAN CONTEXT

HISTORY[1]

Humans are believed to have settled near the Great Swamp for more than 8,000 years (Tompkins, 1979). Pottery artifacts and other evidence of early occupation have been found at rock shelters and other sites near the wetland in Southeast, Patterson and Pawling. Algonquian-speaking Native Americans of the Wappinger Confederacy settled in the area long ago, probably attracted by the wetlands abundant supply of root plants, fish, waterfowl and fur-bearing mammals.

European settlement was facilitated by Henry Hudson's exploration of the Hudson River in 1609. By 1683, the borders of New York and Dutchess County were established. The Treaty of Dover in 1731 added the strip of land known as the "Oblong", and in 1812 the Philipse Patent split off from Dutchess County to become Putnam County. Quakers immigrated to the area in the 1750s, as did others from New England and Long Island. Small settlements developed near streams and well-traveled roads. Iron mines and foundries were established, as were mills, agriculture and cattle farms.

The earliest written mention of the "Great Swamp" is found in the Indian-Dutch Treaty of 1617 (Bodor), which stated that furs from the Great Swamp "were most desirable" (Hillery, undated). The Great Swamp covered a large extent of area on both sides of the East Branch Croton River, and residents believed that valuable and fertile land would be created if the wetland were drained. In 1793, the New York State Legislature approved a petition from residents stating that the channels of the Croton and its tributary, Muddy Brook, were "greatly obstructed by fallen trees and ancient beaver dams, and that if these obstructions could be removed, and the channels cleared and straightened, a large amount of land could be made into valuable pasturage" (Pelletreau, 1886). Funds were appropriated and some attempts were made to drain the Great Swamp, but without success. More attempts were made in the 1840s, also without success (Putnam Ledger, 1978). Plans for a canal along the Harlem Valley were proposed but then abandoned (Wilson, 1907).

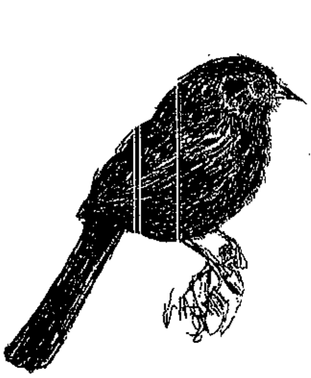
The arrival of the railroad in 1848, built through the Great Swamp, connected lower Dutchess, Putnam, and Westchester counties to New York City and opened the city's markets to Harlem Valley goods. By the 1850s the railroad was carrying 3 million passengers each year in addition to iron ore, animals, lumber, and dairy products. The railroad fueled the region's economic and population growth and transformed Harlem Valley's cattle industry into New York State's largest milk producing area. Tourism and second homes were also made possible by the railroad, which put Quaker Hill and other areas of the watershed within comfortable reach of New York City.

By the mid-19th century, the area's milk, dairy, and iron industries were all thriving and many Harlem Valley residents were prospering. At the same time, New York City's population was burgeoning and outbreaks of cholera, typhoid, and yellow fever were common due to polluted wells and water supply. The city's response was to seek water from outside the city by damming the Croton River and building a 40.5 mile long aqueduct to Manhattan. This soon proved insufficient, and in 1885 construction of the New Croton System commenced. Completed in 1911, the system consisted of a network of 12 reservoirs, including the East Branch Reservoir, which receives waters from the south flow of the Great Swamp Watershed (Southeast Museum, 1998).

The economic and physical landscape of eastern Putnam County was dramatically altered by construction of the Croton reservoirs. Much of the low-lying farmland was flooded, and reservoir-adjacent properties were condemned to protect water quality. East Branch Reservoir was sited in the former location of Southeast Center, the original center of the town. Over two hundred buildings, including churches, stores, and homes, were either destroyed or relocated to accommodate the reservoir. By the late 1880s, Southeast's population had dropped considerably due to the loss of farmland and destruction of important industries (Southeast Museum, 1998).

WATERSHED COMMUNITIES AND THE REGIONAL ECONOMY

Primarily rural and residential, the Great Swamp Watershed is currently at the edge of advancing suburban development migrating north from



The Wetland and its Watershed

New York City and Westchester County. Comprising the communities of Southeast, Patterson, Pawling, and Dover, the area offers a rural quality of life, lower housing prices than to the south, and proximity to the New York metropolitan area. The suburban advance has affected the southern watershed communities more than the northern communities. In 1998 Putnam County had the highest population growth rate and the highest median income in New York State (U.S. Census).

Watershed residents are within commuting distance of major commercial and employment centers such as Danbury Connecticut, White Plains, Poughkeepsie, and New York City. According to the 1990 U.S. Census, 43% of Pawling workers commute more than 30 minutes to work. The average commute to work for Patterson residents is 33 minutes. In Patterson, 69% worked outside Putnam County including 17% who worked outside New York State.

New York State Route 22 is the major north-south transportation corridor and the primary commercial route in the watershed. Constructed over the old Harlem Valley Drovers Road used by farmers and dairymen taking produce to New York City markets, Route 22 links the watershed towns and closely parallels the Great Swamp wetland. Much of the future commercial and industrial development is likely to occur along or near this road. Transportation planners are preparing to accommodate recent population growth by widening Route 22 and extending Metro-North commuter railroad service between the watershed towns and New York City (Peters, 1997), thus facilitating growth trends to continue further north.

Commercial activities in the watershed consist primarily of light industry, agriculture, retail and services. Small, growing companies are locating in the watershed and more workers are telecommuting or traveling to the city only when necessary. The tourism and second home industry is growing, as are service businesses that cater to commuters (Schibanoff, 1997).

The area's scenic resources, open spaces, and historic sites give tourism the highest potential for future economic growth in the Harlem Valley, according to a study of economic development in Dover, Amenia, Northeast, and Pine Plains (Abeles Phillips Preiss & Shapiro, 1991). A recent analysis (Davidson-Peterson Associates, Inc., 1997) shows tourism in Dutchess County grew 38% over the last five years. Tourism is the second largest job producing sector of the county's economy after manufacturing, supporting 9,148 jobs. Dutchess County attracted 3.1 million visitors who spent $334.6 million in 1997. While not specific to the Great Swamp Watershed, this data highlights the potential economic benefits of promoting and protecting the recreational opportunities and scenic beauty of the Harlem Valley. Tourism is an area in which economic growth can be compatible with conservation of natural resources.

Pawling Corporation: A Great Swamp Neighbor

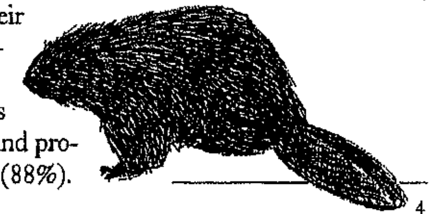
The Pawling Corporation, a rubber and plastic products manufacturer, has been located adjacent to the Great Swamp in the Village of Pawling since 1945. Like many businesses prior to the 1970s, it did not appreciate the value of wetlands. In the late 1960's Pawling Corporation burned solvent waste on site. In 1988, these practices were linked to excessive concentrations of volatile organic compounds in on-site ground-water. The company began remediation of the contaminated ground-water in 1992. Further investigation revealed that the Great Swamp's soils and organic processes actually reduced the spread and impact of the pollutants and substantially reduced the cost of the cleanup.

With the cleanup process nearly complete, Pawling Corporation has found that it continues to benefit by keeping the wetland clean. It has initiated community and employee education programs such as "Swamp: Sponge or Filter" and "A Safe Environment: Guide to the Great Swamp" to create greater awareness of the value of wetlands. The financial, environmental, and aesthetic benefits of the Great Swamp have led the Pawling Corporation into a partnership with the wetland for their mutual benefit and success. Pawling Corporation is also a member of Friends of the Great Swamp.

PUBLIC OPINION: LOCAL ATTITUDES TOWARD CONSERVATION AND DEVELOPMENT

In September 1997, a public opinion survey[2] was conducted throughout the Great Swamp Watershed to gauge community attitudes toward conservation and development issues (The Kitchens Group, 1997). The survey of registered voters living in the watershed revealed that most community members desire a rural quality of life, strong natural resource protections, clean water, and a balance between economic growth and environmental protection.

The survey found that the Great Swamp is a well-known landmark in the local area. Eighty-five percent of residents polled consider the Great Swamp part of the community's heritage. More than one-third (36 percent) visited the Great Swamp within the past year. They also believe the Great Swamp plays an important role in their quality of life. They say it prevents flooding (89%), protects wildlife habitat and endangered species (93%), contributes to the scenic beauty of the area (94%), and provides outdoor recreational opportunities (88%).



II. Animals, Plants and Natural Communities Found in the Great Swamp

OCCURRENCE STATUS

A
Accidental occurrence with only one or two sightings in the past three years during the breeding season.

B
Breeding activity is confirmed or expected due to regular sighting during the breeding season.

M
Seen during the migration season in larger numbers than in breeding season.

I
Irregular occurrence during the non-breeding season.

PB
Possible breeder based on a few sightings during the breeding season.

R
Year round resident and breeder.

V
Visitor seen regularly during breeding season, but not showing any characteristics of breeding activity.

W
Overwinters in the Great Swamp in much greater or smaller numbers than in breeding season.

U
Unconfirmed

S
Found in the watershed but not the wetland

RARITY STATUS

E
Endangered

T
Threatened

SC
Special Concern

Source: NYS DEC 1998a

Birds: The following list identifies 185 birds seen in the Great Swamp wetland and its 100 foot buffer zone only. Bird surveys were conducted by Dr. James Utter and William Wallace, Jr. of Purchase College, SUNY during 1997 and 1998. Sibyll Gilbert, Barbara Butler, Allan Michelin, and Helen Andrews also contributed occurrence records.

COMMON NAME	SCIENTIFIC NAME	STATUS
Grebes		
Pied-billed Grebe	*Podilymbus podiceps*	M
Cormorants		
Double-crested Cormorant	*Phalacrocorax auritus*	V
American Bittern	*Botaurus lentiginosus*	M, PB
Least Bittern	*Ixobrychus exilis*	M, PB
Great Blue Heron	*Ardea herodias*	B, M
Great Egret	*Ardea alba*	I
Green Heron	*Butorides virescens*	B, M
Black-crowned Night-Heron	*Nycticorax nycticorax*	A
New World vultures		
Black Vulture	*Coragyps atratus*	V, M
Turkey Vulture	*Cathartes aura*	R, M
Waterfowl		
Canada Goose	*Branta canadensis*	R, M
Snow Goose	*Chen caerulescens*	I, M
Mute Swan	*Cygnus olor*	R
Wood Duck	*Aix sponsa*	B, M
American Black Duck	*Anas rubripes*	M, W
Mallard	*Anas platyrhynchos*	R, M
Blue-winged Teal	*Anas discors*	M, V
Green-winged Teal	*Anas crecca*	M, V
Ring-necked Duck	*Aythya collaris*	M, W
White-winged Scoter	*Melanitta fusca*	A
Bufflehead	*Bucephala albeola*	M
Common Goldeneye	*Bucephala clangula*	M
Hooded Merganser	*Lophodytes cucullatus*	M
Common Merganser	Mergus merganser	M, W
Hawks, Eagles and Kites		
Osprey	*Pandion haliaetus*	M
Bald Eagle	*Haliaeetus leucocephalus*	M, I

COMMON NAME	SCIENTIFIC NAME	STATUS
Hawks, Eagles and Kites cont'd		
Northern Harrier	*Circus cyaneus*	M, I
Sharp-shinned Hawk	*Accipiter striatus*	M, W
Cooper's Hawk	*Accipiter cooperii*	R, M
Northern Goshawk	*Accipiter gentilis*	M, W
Red-shouldered Hawk	*Buteo lineatus*	PB, M, W
Broad-winged hawk	*Buteo platypterus*	PB, M
Red-tailed Hawk	*Buteo jamaicensis*	R, M
Falcons and Caracaras		
American Kestrel	*Falco sparverius*	B, M
Merlin	*Falco columbarius*	M
Peregrine Falcon	*Falco peregrinus*	M
Pheasants, Grouse, Quail and Turkeys		
Ring-necked Pheasant	*Phasianus colchicus*	R
Ruffed Grouse	*Bonasa umbellus*	R
Wild Turkey	*Meleagris gallopavo*	R
Rails and Coots		
Virginia Rail	*Rallus limicola*	B, M
Sora	*Porzana carolina*	B, M
Common Moorhen	*Gallinula chloropus*	I
Plovers and Lapwings		
Killdeer	*Charadrius vociferus*	B, M
Sandpipers		
Greater Yellowlegs	*Tringa melanoleuca*	M
Lesser Yellowlegs	*Tringa flavipes*	M
Solitary Sandpiper	*Tringa solitaria*	M
Spotted Sandpiper	*Actitis macularia*	B, M
Semipalmated Sandpiper	*Calidris pusilla*	M
Least Sandpiper	*Calidris minutilla*	M
Pectoral Sandpiper	*Calidris melanotos*	M
Common Snipe	*Gallinago gallinago*	M
American Woodcock	*Scolopax minor*	B, M
Gulls and Terns		
Ring-billed Gull	*Larus delawarensis*	V
Herring Gull	*Larus argentatus*	V
Great Black-backed Gull	*Larus marinus*	V
Pigeons and Doves		
Rock Dove	*Columba livia*	R
Mourning Dove	*Zenaida macroura*	R
Old World Cuckoos		
Black-billed Cuckoo	*Coccyzus erythropthalmus*	B, M
Yellow-billed Cuckoo	*Coccyzus americanus*	B, M
Owls		
Eastern Screech-Owl	*Otus asio*	R
Great Horned Owl	*Bubo virginianus*	R
Barred Owl	*Strix varia*	R
Northern Saw-whet Owl	*Aegolius acadicus*	M, W?
Nightjars		
Common Nighthawk	*Chordeiles minor*	M
Swifts		
Chimney Swift	*Chaetura pelagica*	B, M
Hummingbirds		
Ruby-throated Hummingbird	*Archilochus colubris*	B, M
Kingfishers		
Belted Kingfisher	*Ceryle alcyon*	R
Woodpeckers		
Red-bellied Woodpecker	*Melanerpes carolinus*	R
Yellow-bellied Sapsucker	*Sphyrapicus varius*	M, W
Downy Woodpecker	*Picoides pubescens*	R
Hairy Woodpecker	*Picoides villosus*	R
Northern Flicker	*Colaptes auratus*	B, M, W
Pileated Woodpecker	*Dryocopus pileatus*	R
Tyrant Flycatchers		
Olive-sided Flycatcher	*Contopus borealis*	M
Eastern Wood-Pewee	*Contopus virens*	B, M
Yellow-bellied Flycatcher	*Empidonax flaviventris*	M

COMMON NAME	SCIENTIFIC NAME	STATUS
Tyrant Flycatchers cont'd		
Acadian Flycatcher	*Empidonax virescens*	M
Alder Flycatcher	*Empidonax alnorum*	B, M
Willow Flycatcher	*Empidonax traillii*	B, M
Least Flycatcher	*Empidonax minimus*	B, M
Eastern Phoebe	*Sayornis phoebe*	B, M
Great Crested Flycatcher	*Myiarchus crinitus*	B, M
Eastern Kingbird	*Tyrannus tyrannus*	B, M
Vireos and Allies		
White-eyed Vireo	*Vireo griseus*	B, M
Yellow-throated Vireo	*Vireo flavifrons*	B, M
Blue-headed Vireo	*Vireo solitarius*	M
Warbling Vireo	*Vireo gilvus*	B, M
Philadelphia Vireo	*Vireo philadelphicus*	M
Red-eyed Vireo	*Vireo olivaceus*	B, M
Crows and Jays		
Blue Jay	*Cyanocitta cristata*	R
American Crow	*Corvus brachyrhynchos*	R
Fish Crow	*Corvus ossifragus*	PB
Common Raven	*Corvus corax*	R
Larks		
Horned Lark	*Eremophila alpestris*	W
Swallows		
Purple Martin	*Progne subis*	M
Tree Swallow	*Tachycineta bicolor*	B, M
N. Rough-winged Swallow	*Stelgidopteryx serripennis*	B, M
Bank Swallow	*Riparia riparia*	B, M
Cliff Swallow	*Petrochelidon pyrrhonota*	M
Barn Swallow	*Hirundo rustica*	B, M
Tits and Allies		
Black-capped Chickadee	*Poecile atricapillus*	R
Tufted Titmouse	*Baeolophus bicolor*	R
Nuthatches		
Red-breasted Nuthatch	*Sitta canadensis*	M, W
White-breasted Nuthatch	*Sitta carolinensis*	R
Creepers		
Brown Creeper	*Certhia americana*	R
Wrens		
Carolina Wren	*Thryothorus ludovicianus*	R
House Wren	*Troglodytes aedon*	B, M
Winter Wren	*Troglodytes troglodytes*	W
Marsh Wren	*Cistothorus palustris*	B
Kinglets		
Golden-crowned Kinglet	*Regulus satrapa*	M, W
Ruby-crowned Kinglet	*Regulus calendula*	M, W
Old World Warblers		
Blue-gray Gnatcatcher	*Polioptila caerulea*	B, M
Thrushes		
Eastern Bluebird	*Sialia sialis*	B
Veery	*Catharus fuscescens*	B, M
Swainson's Thrush	*Catharus ustulatus*	M
Hermit Thrush	*Catharus guttatus*	M
Wood Thrush	*Hylocichla mustelina*	B, M
American Robin	*Turdus migratorius*	B, M, W
Mockingbirds and Thrashers		
Gray Catbird	*Dumetella carolinensis*	B, M
Northern Mockingbird	*Mimus polyglottos*	B
Brown Thrasher	*Toxostoma rufum*	B, M
Starlings		
European Starling	*Sturnus vulgaris*	B, M, W
Waxwings and Silky-flycatchers		
Cedar Waxwing	*Bombycilla cedrorum*	B, M, W
New World Warblers		
Blue-winged Warbler	*Vermivora pinus*	B, M
Tennessee Warbler	*Vermivora peregrina*	M
Nashville Warbler	*Vermivora ruficapilla*	M

COMMON NAME	SCIENTIFIC NAME	STATUS
New World Warblers cont'd		
Northern Parula	*Parula americana*	M
Yellow Warbler	*Dendroica petechia*	B, M
Chestnut-sided Warbler	*Dendroica pensylvanica*	B, M
Magnolia Warbler	*Dendroica magnolia*	M
Black-throated Blue Warbler	*Dendroica caerulescens*	M
Yellow-rumped Warbler	*Dendroica coronata*	M
Black-throated Green Warbler	*Dendroica virens*	M
Blackburnian Warbler	*Dendroica fusca*	M
Pine Warbler	*Dendroica pinus*	M
Prairie Warbler	*Dendroica discolor*	B, M
Palm Warbler	*Dendroica palmarum*	M
Bay-breasted Warbler	*Dendroica castanea*	M
Blackpoll Warbler	*Dendroica striata*	M
Cerulean Warbler	*Dendroica cerulea*	B, M
Black-and-white Warbler	*Mniotilta varia*	B, M
American Redstart	*Setophaga ruticilla*	B, M
Worm-eating Warbler	*Helmitheros vermivorus*	B, M
Ovenbird	*Seiurus aurocapillus*	B, M
Northern Waterthrush	*Seiurus noveboracensis*	B, M
Louisiana Waterthrush	*Seiurus motacilla*	B, M
Connecticut Warbler	*Oporornis agilis*	M
Mourning Warbler	*Oporornis philadelphia*	M
Common Yellowthroat	*Geothlypis trichas*	B, M
Hooded Warbler	*Wilsonia citrina*	M
Wilson's Warbler	*Wilsonia pusilla*	M
Canada Warbler	*Wilsonia canadensis*	B, M
Yellow-breasted Chat	*Icteria virens*	M
Tanagers		
Scarlet Tanager	*Piranga olivacea*	B, M
Tanagers, Buntings, Sparrows and Allies		
Eastern Towhee	*Pipilo erythrophthalmus*	B, M
American Tree Sparrow	*Spizella arborea*	M, W
Chipping Sparrow	*Spizella passerina*	B, M
Field Sparrow	*Spizella pusilla*	B, M
Savannah Sparrow	*Passerculus sandwichensis*	PB, M
Fox Sparrow	*Passerella iliaca*	M, W
Song Sparrow	*Melospiza melodia*	R, M
Lincoln's Sparrow	*Melospiza lincolnii*	M
Swamp Sparrow	*Melospiza georgiana*	B, M, W
White-throated Sparrow	*Zonotrichia albicollis*	M, W
White-crowned Sparrow	*Zonotrichia leucophrys*	M
Dark-eyed Junco	*Junco hyemalis*	M, W
Cardinals, Grosbeaks and American Buntings		
Northern Cardinal	*Cardinalis cardinalis*	R
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	B, M
Blue Grosbeak	*Guiraca caerulea*	V
Indigo Bunting	*Passerina cyanea*	B, M
Troupials and Allies		
Bobolink	*Dolichonyx oryzivorus*	B, M
Red-winged Blackbird	*Agelaius phoeniceus*	B, M
Eastern Meadowlark	*Sturnella magna*	PB
Rusty Blackbird	*Euphagus carolinus*	M
Common Grackle	*Quiscalus quiscula*	B, M
Brown-headed Cowbird	*Molothrus ater*	B, M
Orchard Oriole	*Icterus spurius*	PB
Baltimore Oriole	*Icterus galbula*	B, M
Siskins, Crossbills and Allies		
Purple Finch	*Carpodacus purpureus*	PB, M
House Finch	*Carpodacus mexicanus*	R
Common Redpoll	*Carduelis flammea*	M, W
Pine Siskin	*Carduelis pinus*	M, W
American Goldfinch	*Carduelis tristis*	R
Evening Grosbeak	*Coccothraustes vespertinus*	M, W
Old World Sparrows		
House Sparrow	*Passer domesticus*	R

Reptiles and Amphibians (Herpetofauna) This list is based on surveys conducted by Dr. Michael Klemens and Diane Murphy of the Wildlife Conservation Society between 1992 and 1998.

COMMON NAME	SCIENTIFIC NAME	STATUS
Reptiles		
Snapping Turtle	*Chelydra s. serpentina*	
Painted Turtle	*Chrysemys picta*	
Spotted Turtle	*Clemmys guttata*	SC
Wood Turtle	*Clemmys insculpta*	SC
Bog Turtle	*Clemmys muhlenbergii*	E
Common Musk Turtle	*Sternotherus odoratus*	
Eastern Box Turtle	*Terrapene c. carolina*	SC
Copperhead	*Agkistrodon contortrix mokasen*	
Northern Black Racer	*Coluber c. constrictor*	
Timber Rattlesnake	*Crotalus horridus*	T
Northern Ringneck Snake	*Diadophis punctatus edwardsii*	
Black Rat Snake	*Elaphe o. obsoleta*	
Hognose Snake	*Heterodon platirhinos*	SC
Eastern Milk Snake	*Lampropeltis t. triangulum*	
Northern Water Snake	*Nerodia s. sipedon*	
Smooth Green Snake	*Opheodrys vernalis*	
Brown Snake	*Storeria d. dekayi*	
Redbelly Snake	*Storeria o. occipitomaculata*	
Ribbon Snake	*Thamnophis s. sauritus*	
Eastern Garter Snake	*Thamnophis s. sirtalis*	
Amphibians		
Jefferson Salamander	*Ambystoma jeffersonianum*	SC
Blue-spotted Salamander	*Ambystoma laterale*	SC
Spotted Salamander	*Ambystoma maculatum*	SC
Marbled Salamander	*Ambystoma opacum*	SC(proposed)
Northern Two-lined Salamander	*Eurycea bislineata*	
Four-toed Salamander	*Hemidactylium scutatum*	
Red-spotted Newt	*Notophthalmus v. viridescens*	
Redback Salamander	*Plethodon cinereus*	
Northern Slimy Salamander	*Plethodon glutinosus*	
American Toad	*Bufo americanus*	
Gray Tree Frog	*Hyla versicolor*	
Spring Peeper	*Pseudacris c. crucifer*	
Bullfrog	*Rana catesbeiana*	
Green Frog	*Rana clamitans melanota*	
Pickerel Frog	*Rana palustris*	
Wood Frog	*Rana sylvatica*	

Fish and Crayfish This list is based on surveys conducted in the Great Swamp and its tributaries by Dr. Scott Silver, Dr. Michael Klemens, Diane Murphy, Tracy Van Holt, and Kristi MacDonald of the Wildlife Conservation Society during the 1997 field season.

COMMON NAME	SCIENTIFIC NAME	STATUS
Fish		
Black Crappie	*Pomoxis nigromaculatus*	
Bluegill	*Lepomis macrochirus*	
Brook Trout	*Salvelinus fontinalis*	
Brown Bullhead	*Ameiurus nebulosus*	
Brown Trout	*Salmo trutta*	
Common Shiner	*Luxilus cornutus*	
Creek Chub	*Semotilus atromaculatus*	
Creek Chubsucker	*Erimyzon oblongus*	
Cutlips Minnow	*Exoglossum maxillingua*	
Eastern Blacknose Dace	*Rhinichthys atratulus*	
Fallfish	*Semotilus corporalis*	
Fathead Minnow	*Pimephales promelas*	
Fish cont'd		
Golden Shiner	*Notemigonus crysoleucas*	
Green Sunfish	*Lepomis cyanellus*	
Johnny Darter	*Etheostoma nigrum*	
Largemouth Bass	*Micropterus salmoides*	
Longear Sunfish	*Lepomis megalotis*	T
Longnose Dace	*Rhinichthys cataractae*	
Pickerel	*Esox americanus*	
Pumpkinseed	*Lepomis gibbosus*	
Redbreast Sunfish	*Lepomis auritus*	
Rock Bass	*Ambloplites rupestris*	
Slimy Sculpin	*Cottus cognatus*	
Smallmouth Bass	*Micropterus dolomieu*	
Spottail Shiner	*Notropis hudsonius*	
Tessellated Darter	*Etheostoma olmstedi*	
White Sucker	*Catostomus commersoni*	
Yellow Bullhead	*Ameiurus natalis*	
Yellow Perch	*Perca flavescens*	
Crayfish		
	Cambarus bartonii	
	Cambarus robustus	
	Orconectes immunis	
	Orconectes limosus	
	Orconectes robustus	
	Orconectes rusticus	
	Orconectes virilis	
	Procambarus acutus	

Butterflies (Lepidoptera) This list is based on surveys conducted by Dr. Scott Silver and Dr. Fred Koontz of the Wildlife Conservation Society in 1997.

Acadia Hairstreak	*Satyrium acadica*	
American Buckeye	*Junonia coenia*	
American Copper	*Lycaena phlaeas*	
American Lady	*Vanessa virginiensis*	
Aphrodite Fritillary	*Speyeria aphrodite*	
Appalachian Brown	*Satyrodes appalachia*	
Baltimore	*Euphydryas phaeton*	
Banded Hairstreak	*Satyrium calanus*	
Black Swallowtail	*Papilio polyxenes*	
Bronze Copper	*Lycaena hyllus*	
Broadwing Skipper	*Poanes viator*	
Cabbage White	*Pieris rapae*	
Clouded Sulphur	*Colias philodice*	
Cobweb Skipper	*Hesperia metea*	
Common Ringlet	*Caenonympha cymela*	
Common Wood Nymph	*Cercyonis pegala*	
Coral Hairstreak	*Satyriums titus*	
Crossline Skipper	*Polites origenes*	U
Delaware Skipper	*Atrytone delaware*	
Dion Skipper	*Euphyes dion*	
Dreamy duskywing	*Erynnis icelus*	
Dun Skipper	*Euphyes vestris*	
Eastern Comma	*Polygonia comma*	
Eastern-Tailed Blue	*Everes comyntas*	
Eastern Tiger Swallowtail	*Pterourus glaucus*	
European Skipper	*Thymelicus lineola*	
Eyed Brown	*Satyrodes eurydice*	
Falcate Orangetip	*Anthocharis midea*	
Great Spangled Fritillary	*Speyeria cybele*	
Harvester	*Feniseca tarquinia*	
Hobomok Skipper	*Poanes hobomok*	
Indian Skipper	*Hesperia sassacus*	
Juvenal's duskywing	*Erynnis juvenalis*	U
Least Skipper	*Ancyloxypha numitor*	

COMMON NAME	SCIENTIFIC NAME	STATUS
Butterflies cont'd		
Little Glassywing	*Pompeius verna*	
Little Wood Satyr	*Megisto cymela*	
Long Dash Skipper	*Polites mystic*	
Meadow Fritillary	*Boloria bellona*	
Monarch	*Danaus plexippus*	
Mourning Cloak	*Nymphalis antiopa*	
Mulberry Wing	*Poanes massasoit*	
Northern Broken Dash	*Wallengrenia egeremet*	U
Northern Cloudywing	*Thorybes pylades*	
Olive Hairstreak	*Callophrys gryneus*	
Orange Sulphur	*Colias eurytheme*	
Painted Lady	*Vanessa cardui*	
Pearl Crescent	*Phyciodes tharos*	
Peck's Skipper	*Polites peckius*	
Question Mark	*Polygonia interrogationis*	
Red Admiral	*Vanessa atalanta*	
Red-spotted Purple	*Basilarchia astyanax*	
Silver-bordered Fritillary	*Boloria selene*	
Silver-spotted Skipper	*Epargyreus clarus*	
Spicebush Swallowtail	*Pterourus troilus*	
Spring Azure	*Celastrina ladon*	
Summer Azure	*Celastrina ladon*	
Tawny edged Skipper	*Polites themistocles*	
Viceroy	*Limenitis archippus*	
West Virginia White	*Pieris virginiensis*	
Wild Indigo Duskywing	*Erynnis baptisiae*	
Zabulon Skipper	*Poanes zabulon*	

Damselflies and Dragonflies (Odonates) This list is based primarily on surveys conducted by Ken Soltesz during the 1997 field season with the Wildlife Conservation Society.

COMMON NAME	SCIENTIFIC NAME	STATUS
Damselflies: Suborder Zygoptera		
Broad-winged Damsels: Family Calopterygidae		
River Jewelwing	*Calopteryx aequabilis*	
Ebony Jewelwing	*Calopteryx maculata*	
Spreadwing Damsels: Family Lestidae		
Spotted Spreadwing	*Lestes congener*	
Amber-winged Spreadwing	*Lestes eurinus*	
Sweetflag Spreadwing	*Lestes forcipatus*	
Elegant Spreadwing	*Lestes inaequalis*	
Slender Spreadwing	*Lestes rectangularis*	
Swamp Spreadwing	*Lestes vigilax*	
Pond Damsels: Family Coenagrionidae		
Violet Dancer	*Argia fumipennis violacea*	
Aurora Damsel	*Chromagrion conditum*	
Azure Bluet	*Enallagma aspersum*	
Familiar Bluet	*Enallagma civile*	
Northern Bluet	*Enallagma cyathigerum*	
Turquoise Bluet	*Enallagma divagans*	
Stream Bluet	*Enallagma exsulans*	
Skimming Bluet	*Enallagma geminatum*	
Orange Bluet	*Enallagma signatum*	
Fragile Forktail	*Ischnura posita*	
Eastern Forktail	*Ischnura verticalis*	
Dragonflies: Suborder Anisoptera		
Darners: Family Aeshnidae		
Canada Darner	*Aeshna canadensis*	
Spatterdock Darner	*Aeshna mutata*	
Black-tipped Darner	*Aeshna tuberculifera*	
Shadow Darner	*Aeshna umbrosa*	
Green-striped Darner	*Aeshna verticalis*	
Green Darner	*Anax junius*	
Springtime Darner	*Basiaeschna janata*	
Fawn Darner	*Boyeria vinosa*	

COMMON NAME	SCIENTIFIC NAME	STATUS
Darners: Family Aeshnidae cont'd		
Swamp Darner	*Epiaeschna heros*	
Harlequin Darner	*Gomphaeschna furcillata*	
Cyrano Darner	*Nasiaeschna pentacantha*	
Clubtails: Family Gomphidae		
Unicorn Clubtail	*Arigomphus villosipes*	
Black-shouldered Spinyleg	*Dromogomphus spinosus*	
Lancet Clubtail	*Gomphus exilis*	
Ashy Clubtail	*Gomphus lividus*	
Spiketails: Family Cordulegastridae		
Delta-spotted Spiketail	*Cordulegaster diastatops*	
Twin-spotted Spiketail	*Cordulegaster maculata*	
Emeralds: Family Corduliidae		
American Emerald	*Cordulia shurtleffi*	
Beaverpond Baskettail	*Epitheca canis*	
Common Baskettail	*Epitheca cynosura*	
Water Prince	*Epitheca princeps*	
Clamp-tipped Emerald	*Somatochlora tenebrosa*	
Skimmers: Family Libellulidae		
Calico Pennant	*Celithemis elisa*	
Halloween Pennant	*Celithemis eponina*	
Eastern Pondhawk	*Erythemis simplicicollis*	
Chalk-fronted Corporal	*Ladona julia*	
Dot-tailed Whiteface	*Leucorrhinia intacta*	
Spangled Skimmer	*Libellula cyanea*	
Slaty Skimmer	*Libellula incesta*	
Widow Skimmer	*Libellula luctuosa*	
Twelve-spotted Skimmer	*Libellula pulchella*	
Four-spotted Skimmer	*Libellula quadrimaculata*	
Painted Skimmer	*Libellula semifasciata*	
Blue Dasher	*Pachydiplax longipennis*	
Eastern Amberwing	*Perithemis tenera*	
Common Whitetail	*Plathemis lydia*	
Jane's Meadowhawk	*Sympetrum janeae*	
Band-winged Meadowhawk	*Sympetrum semicinctum*	
Yellow-legged Meadowhawk	*Sympetrum vicinum*	
Black Saddlebags	*Tramea lacerata*	

Bees and Wasps This list of bees (pollinators) and hunting wasps (predators) is based on surveys conducted by Dr. Parker Gambino in 1998 at three sites in the Great Swamp. Specimens were identified to the genus level.

COMMON NAME	SCIENTIFIC NAME	STATUS
Bees		
Plasterer bees	***Colletidae***	
Plasterer bees	*Colletes*	
Yellowfaced bees	*Hylaeus*	
Mining bees	***Andrenidae***	
	Andrena	
	Heterosarus	
Sweat bees	***Halictidae***	
	Augochlora	
	Augochlorella	
	Augochloropsis	
	Agapostemon	
	Halictus	
	Lasioglossum	
Leafcutter bees	***Megachilidae***	
	Coelioxys	
	Megachile	
	Anthophoridae	
Cuckoo bees	*Nomada*	
Small carpenter bees	*Ceratina*	
Large carpenter bees	*Xylocopa*	

COMMON NAME | SCIENTIFIC NAME | [illegible]

Bees cont'd	
Social bees	***Apidae***
Honey bees	*Apis*
Bumble bees	*Bombus*
Wasps	
Aphid wasps	***Sphecidae***
	Sceliphron
	Sphex
	Isodontia
Organ pipe mud daubers	*Trypoxylon*
	Ectemnius
beewolves or bee-killers	*Philanthus*
beetle wasps	*Cerceris*
	Astatinae sp.
	Pemphredoninae sp
Potter wasps	***Eumenidae***
	Ancistrocerus
	Eumenes
	Monobia
	Parancistrocerus
	Euodynerus
Social wasps	***Vespidae***
	Polistes
	Vespula
	Dolichovespula

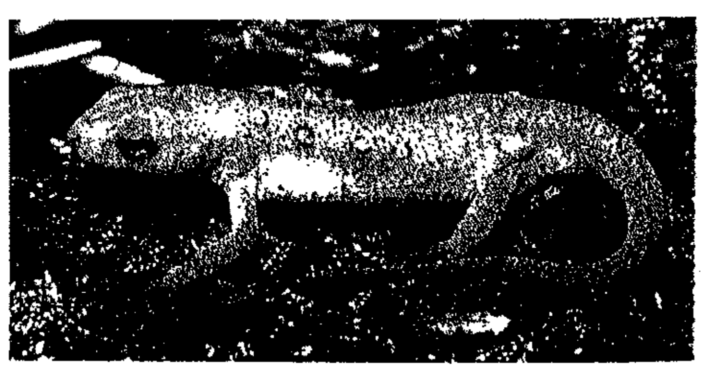
Ferns This list of ferns is based on surveys conducted in the Pawling area by Don Lubin of Allston Massachusetts on August 7 & 8 1996. The nomenclature and order follow that in the Flora of North America.

Rattlesnake	*Botrychium virginianum*	S
Cinnamon	*Osmunda cinnamomea*	
Interrupted	*Osmunda claytoniana*	
Royal	*Osmunda regalis*	
Maidenhair	*Adiantum pedantum*	
Hayscented	*Dennstaedtia punctilobula*	S
Bracken	*Pteridium aquilinum*	
New York	*Thelypteris noveboracensis*	
Marsh	*Thelypteris palustris*	
Broad Beech	*Phegopteris hexagonoptera*	
Ebony Spleenwort	*Asplenium platyneuron*	S
Walking	*Asplenium rhizophyllum*	S
Ostrich	*Matteuccia struthiopteris*	
Sensitive	*Onoclea sensibilis*	
Silvery Glade	*Deparia acrostichoides*	
Lady	*Athyrium filix-femina*	
Bulblet	*Cystopteris bulbifera*	S
Fragile (Mackay's)	*Cystopteris tenuis*	S
Blunt-lobed Woodsia	*Woodsia obtusa*	S
Spinulose Woodfern	*Dryopteris carthusiana*	
Clinton's	*Dryopteris clintoniana*	
Crested	*Dryopteris cristata*	
Evergreen Woodfern	*Dryopteris intermedia*	
Marginal Woodfern	*Dryopteris marginalis*	
Christmas	*Polystichum acrostichoides*	
Rock Polypody	*Polypodium virginianum*	
Hybrids	*Dryopteris intermedia X marginalis*	
	Polypodium appalachianum X virginianum	
Allies		
Shining Clubmoss	*Huperzia lucidula*	
Common Horsetail	*Equisetum arvens*	
Scouring Rush	*Equisetum hyemale*	

Natural Communities Natural vegetation communities were identified and mapped in 1997-1998 by Adele Olivero of the New York Natural Heritage Program (1998). The community, system and subsystem classification is based on Reschke (1990).

SYSTEM	SUBSYSTEM	NATURAL COMMUNITY
Riverine	Natural Streams	Marsh headwater stream
Lacustrine	Natural Lakes and Ponds	Bog lake Eutrophic pond
Palustrine	Open Mineral Soil Wetlands	Deep emergent marsh Shallow emergent marsh Shrub swamp Sinkhole wetland
	Open Peatlands	Sedge meadow Rich sloping fen* Rich graminoid fen* Rich shrub fen* Inland poor fen Dwarf shrub bog* Highbush blueberry bog thicket
	Forested Mineral Soil Wetlands	Floodplain forest* Red maple-hardwood swamp* Vernal pool Hemlock hardwood swamp
	Forested Peatlands	Inland Atlantic white cedar swamp*
Terrestrial	Open Uplands	Cliff community Successional shrubland
	Barrens and Woodlands	Acidic talus slope woodland Pitch pine-oak-heath rocky summit* Successional red cedar woodland
	Forested uplands	Appalachian oak-hickory forest Chestnut oak forest Oak-tulip tree forest Appalachian oak-pine forest Beech-maple mesic forest Hemlock-northern hardwood forest Successional northern hardwoods

*Indicates significant occurrence



Rare or Significant Plants, Animals, and Natural Communities in the Great Swamp Watershed

	COMMON NAME	SCIENTIFIC NAME	NYS STATUS	GLOBAL RANK	STATE RANK
Plants	Atlantic white cedar	*Chamaecyparis thyoides*	Rare	G4	S3
	Bicknell's sedge	*Carex bicknellii*	Rare	G5	S2
	Devil's bit	*Chamaelirium luteum*	Rare	G5	S2
	Carolina whitlow-grass	*Draba reptans*	Rare	G5	S2
	Dwarf huckleberry	*Gaylussacia dumosa*		G5	S1
	Emmons sedge	*Carex albicans var. emmonsii*	Rare	G5T5	S3
	Five-angled field-dodder	*Cuscuta pentagona*	Rare	G5	S2S3
	Hop sedge	*Cyperus lupulinus ssp. lupulinus*		G5T?	S2
	Large twayblade	*Liparis liliifolia*	Rare	G5	S2
	Long's bittercress	*Cardamine longii*		G3Q	S2
	Scarlet Indian-paintbrush	*Castilleja coccinea*	Threatened	G5	S1
	Soapwort gentian	*Gentiana saponaria*	Rare	G5	S1
	Southern dodder	*Cuscuta obtusiflora*		G5	S1
	Spotted pondweed	*Potamogeton pulcher*		G5	S1
	Spreading globeflower	*Trollius laxus ssp. laxus*	Threatened	G4T3Q	S3
	Swamp birch	*Betula pumila*	Rare	G5	S2
	Violet lespedeza	*Lespedeza violacea*	Rare	G5	S2
	Wild sweet-william	*Phlox maculata*	Rare	G5	S1
	Yellow wild flax	*Linum sulcatum*	Rare	G5	S2
Animals					
	Bog turtle**	*Clemmys muhlenbergii*	Endangered	G3	S2
	Timber rattlesnake	*Crotalus horridus*	Threatened	G4	S3
	Eastern hognose snake	*Heterodon platirhinos*	Special Concern	G5	S3
	Jefferson salamander	*Ambystoma jeffersonianum*	Special Concern	G5	S4
	Blue-spotted salamander	*Ambystoma laterale*	Special Concern	G5	S4
	Spotted salamander	*Ambystoma maculatum*	Special Concern	G5	S5
	Spotted turtle	*Clemmys guttata*	Special Concern	G5	S4
	Wood turtle	*Clemmys insculpta*	Special Concern	G4	S4
	Bald eagle**	*Haliaeetus leucocephalus*	Endangered	G4	S1
	Peregrine falcon	*Falco peregrinus*	Endangered	G4	S2
	Osprey	*Pandion haliaetus*	Threatened	G5	S4
	Red-shouldered hawk	*Buteo lineatus*	Threatened	G5	S4
	Northern harrier	*Circus cyaneus*	Threatened	G5	S3
	Least bittern	*Ixobrychus exilis*	Special Concern	G5	S3
	Cooper's hawk	*Accipiter cooperii*	Special Concern	G5	S4
	Common nighthawk	*Chordeiles minor*	Special Concern	G5	S4
	Common raven	*Corvus corax*	Special Concern	G5	S4
	Eastern bluebird	*Sialia sialis*	Special Concern	G5	S5
	Longear Sunfish	*Lepomis megalotis*	Threatened	G5	S1
Natural Communities					
	Dwarf shrub bog			G4	S3
	Floodplain forest			G3G4	S2S3
	Inland Atlantic white cedar swamp			G2G3	S1
	Pitch pine-oak-heath rocky summit			G4	S3
	Red maple-hardwood swamp			G5	S4S5
	Rich graminoid fen			G3	S1S2
	Rich shrub fen			G3G4	S1S2
	Rich sloping fen			G3	S1S2

** Listed as a "Threatened" Species under the federal Endangered Species Act.

Sources: New York Natural Heritage Program, 1998; New York State Department of Environmental Conservation, 1998; Klemens, et al., 1999; Murphy, 1998; Utter and Wallace 1998

Plants and Animals

[illegible]

[illegible]

5 or fewer occurrences globally (G1) or in New York State (S1)

[illegible]

6-20 occurrences globally (G2) or in New York State (S2)

[illegible]

21-100 occurrences globally (G3) or in New York State (S3)

[illegible]

Apparently secure globally (G4) or in New York State (S4)

[illegible]

Demonstrably secure globally (G5) or in New York State (S5)

Source: NY Natural Heritage Program

timing and predictability, and rate of change of hydrologic conditions) can be caused by development, drawdown of ground-water by underground wells, and channeling of streams. Alterations in water flow regime may directly kill species that depend on specific flow conditions or may indirectly alter natural communities by creating conditions suitable for less desirable species.

■ Invasive species and competition: Common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*) represent the two most abundant invasive species threatening the integrity of the Great Swamp. At least 573 acres of wetland in the watershed contain one or both of these invasive plants (Olivero, 1998). Brown trout (*Salmo trutta*), introduced by the state for sport fishing, compete with native fish. *Orconectes rusticus*, an invasive species of crayfish, has recently entered the watershed and may soon cause the extirpation of some native species of crayfish (Murphy, 1998). Zebra mussels (*Dreissena polymorpha*), while not yet present, may also pose a future threat to aquatic species if they are introduced.

■ Direct mortality can result from a number of threats mentioned above. Road crossings, hunting, trapping, fishing, species collection, off-road vehicles, trampling, and predation also cause direct mortality to plants and animals.

The Bog Turtle: A Species Under Threat

In 1997, the bog turtle (*Clemmys muhlenbergii*) was listed under the federal Endangered Species Act as a "threatened" species. It is also officially listed as an endangered species in New York and is listed on Appendix I of the Convention on International Trade in Endangered Species (CITES). Based on documented losses of bog turtles and their habitat, the northern population, which ranges from Maryland to New York and western Massachusetts, has declined by at least 50 percent over the last 20 years (U.S. Fish and Wildlife Service, in Bay Journal, 1997). Many consider it the rarest North American turtle.

First identified by scientists in 1801, the bog turtle is one of North America's smallest turtles with the upper shell of adults measuring just 3 to 4.5 inches long. The bog turtle is distinguishable from other species by a large orange, yellow, or red spot on its neck. It is capable of living twenty years or more in the wild (Klemens, 1993).

■ RANGE: The bog turtle is found in twelve states sparsely distributed over a discontinuous geographic range extending from New England to northern Georgia. A 250-mile gap between southern Virginia and northern Maryland separates the species into distinct northern and southern populations. In New York, the bog turtle is concentrated primarily in the southeastern corner of the state. They have been documented in Columbia, Dutchess, Putnam, and Orange counties, but are believed to be extirpated from Westchester and Rockland counties (Klemens, 1993). Small populations still survive in western New York, but are in decline. Nearly all southeastern New York's bog turtle habitat (99%) occurs on private lands; the remaining one percent is found on state lands (Breisch et al., 1994; Federal Register, 1997).

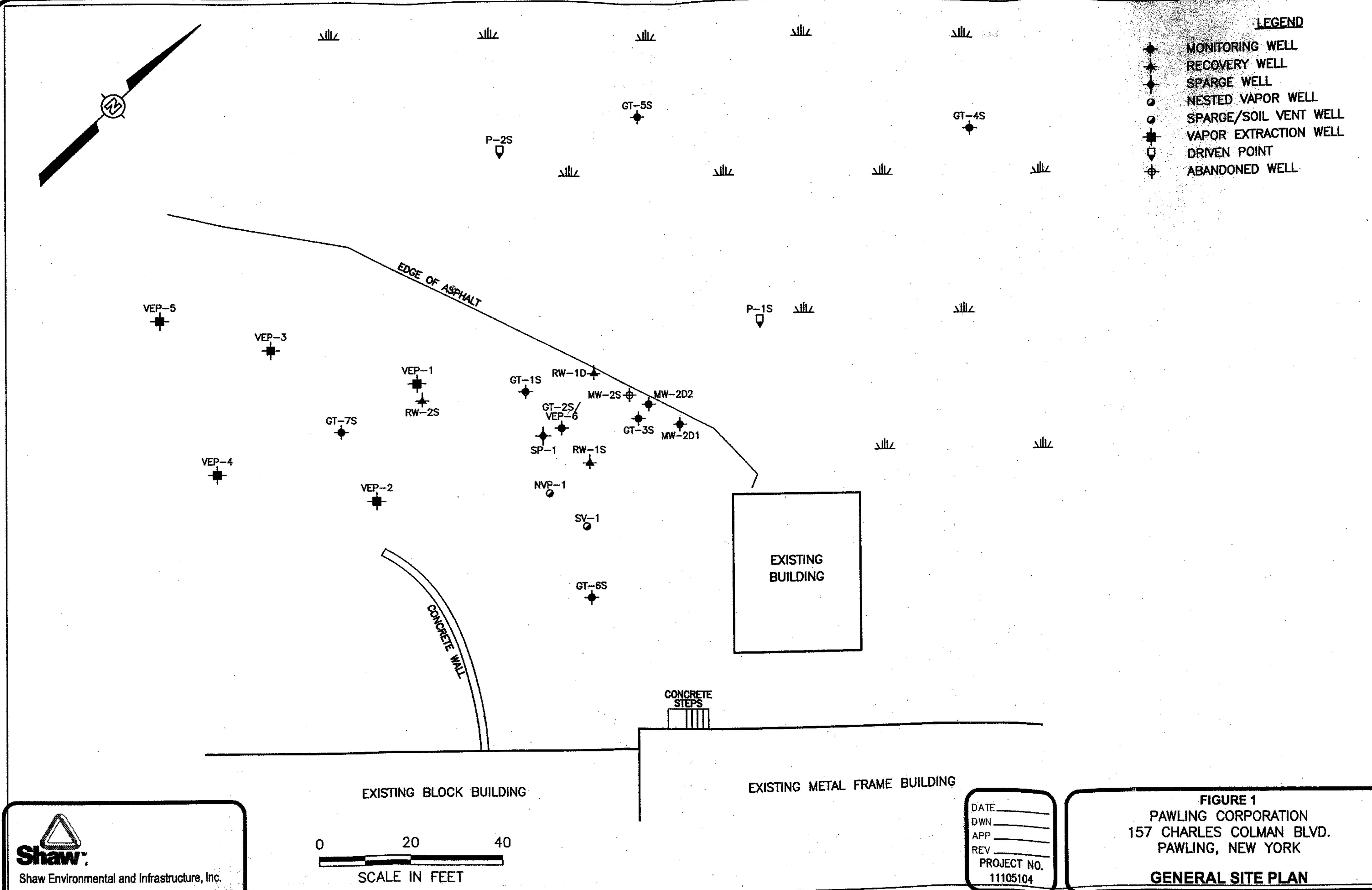
■ HABITAT: Bog turtles are usually found in wetland areas that are a mix of micro-habitats which include dry pockets, saturated areas, and areas that are periodically flooded. They generally live in small, ground-water-fed wetlands with shallow rivulets of water, lots of mud to burrow into, and sun-bathed sedge tussocks on which they lay their eggs. Bog turtles appear to require calcareous (calcium carbonate charged) ground-water in at least portions of their habitat complex. They depend upon this diverse hydrological system, utilizing shallow water in spring and returning to deeper water in winter (Klemens, 1993; Kiviat, 1993; Utter, 1994).

The Great Swamp watershed is ideal habitat for the bog turtle. The calcareous bedrock, the broad, relatively flat basin with low gradient, slow moving streams, relatively large number of calcareous seeps and network of streamside riparian corridors provides the basis for suitable bog turtle habitat (Utter, 1994).

■ THREATS: Loss and fragmentation of its wetland habitat, coupled with illegal collection by poachers and mortality while crossing roads, are the main causes of the bog turtle's decline. Degradation of their habitat is often caused by the cumulative effects of land use changes outside wetlands as well as human alteration of unprotected wetlands and colonization of fen areas by invasive species such as common reed (*Phragmites australis*) or purple loosestrife (*Lythrum salicaria*). These changes can alter water chemistry and flow and create barriers to travel between different habitat types. Nearby development also threatens the turtle by creating habitat for skunks, raccoons, opossums and other species that may prey upon bog turtle eggs.

JACKIE BECKETT/© AMERICAN MUSEUM OF NATURAL HISTORY

■ ENDANGERED SPECIES ACT: The federal "threatened" listing under the Endangered Species Act means that federal agencies must consult with U.S. Fish and Wildlife Service on federally funded projects such as highway construction which could affect a listed species or its habitat. Activities which may jeopardize a listed species or its habitat are not authorized under Nationwide Permits. Any work that may affect the bog turtle must involve notification of the U.S. Army Corps of Engineers and coordination with the U.S. Fish and Wildlife Service. The listing makes sale of bog turtles illegal. Funding for research, habitat restoration and land protection measures may also become available.

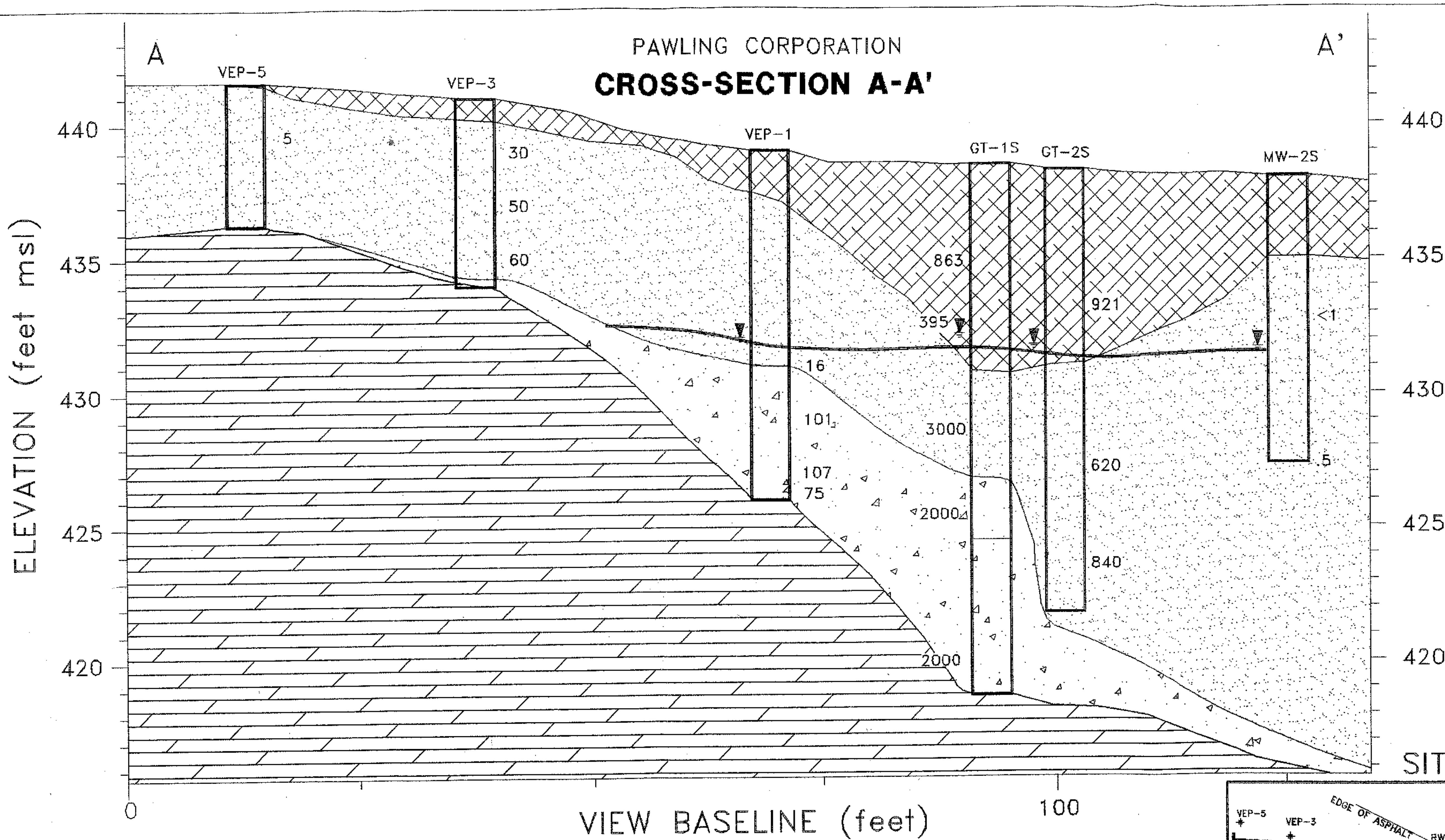


Shaw Environmental and Infrastructure, Inc.

DATE
DWN
APP
REV
PROJECT NO. 11105104

FIGURE 1
PAWLING CORPORATION
157 CHARLES COLMAN BLVD.
PAWLING, NEW YORK

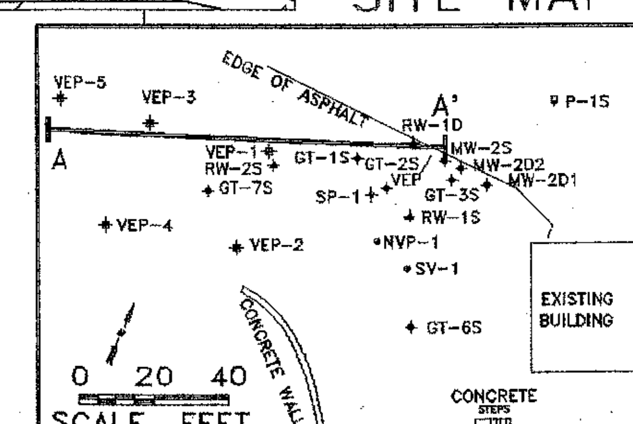
GENERAL SITE PLAN



LEGEND

FILL
SAND
BOULDERS
2000 PID READING
MARBLE BEDROCK
WATER ELEVATION

SITE MAP



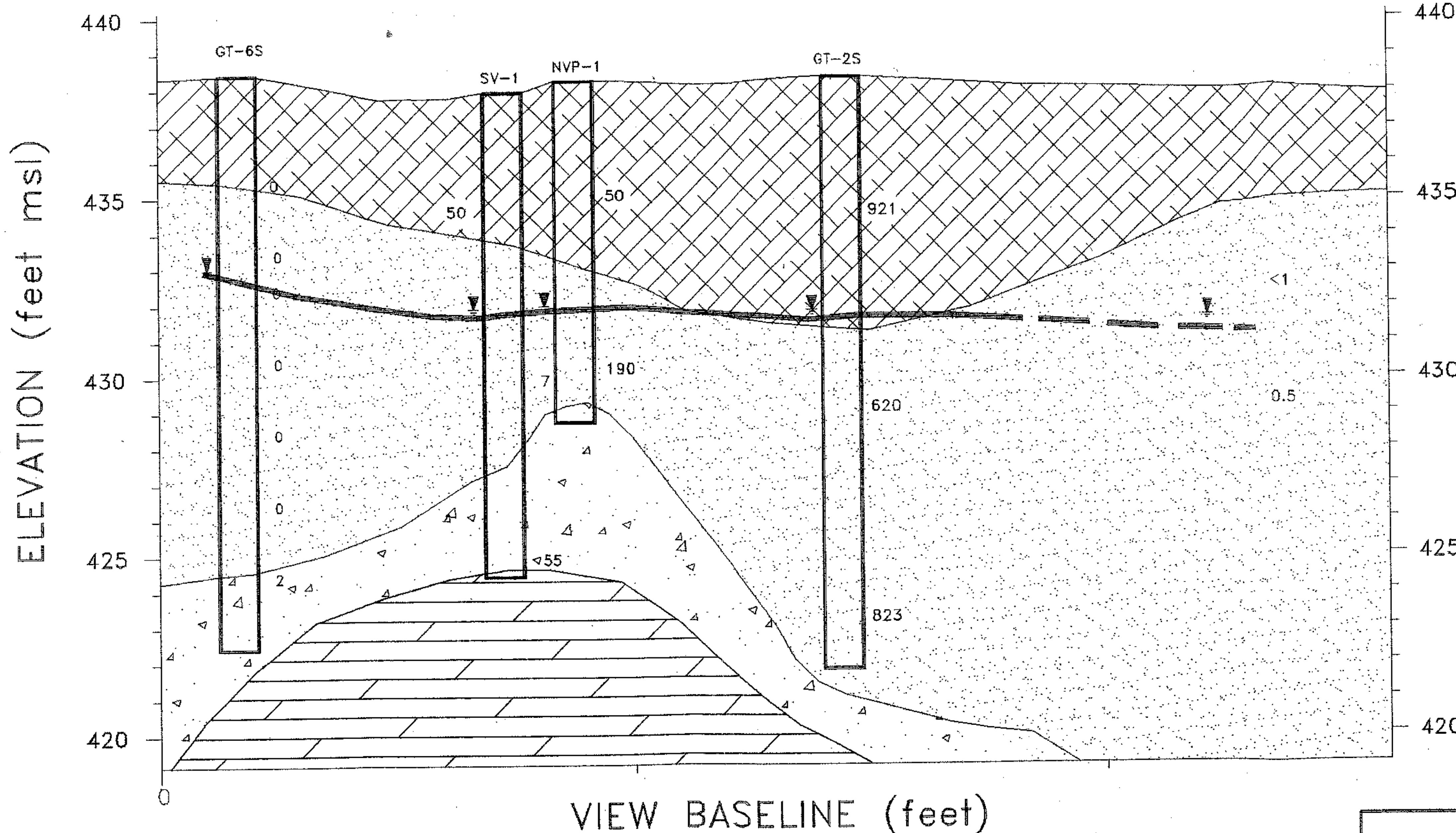
07/08/1992 CROSS1.DWG

GROUNDWATER TECHNOLOGY

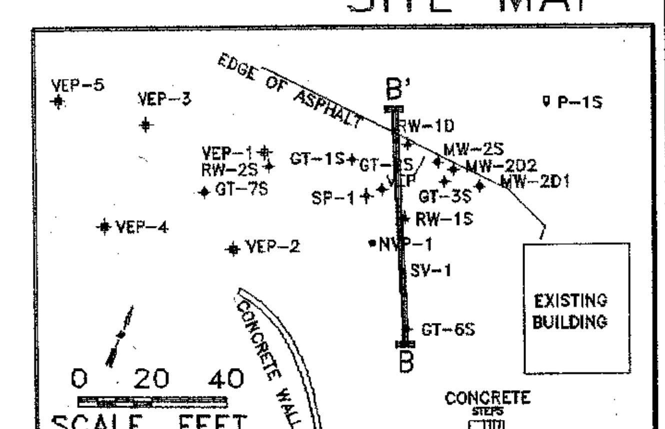
Project PAWLING
Location Pawling, New York
Geologist TMM
Owner PAWLING CO.
Project Number 011101354
Checked By WCL Date 7/17/92

PAWLING CORPORATION

CROSS-SECTION B-B'



SITE MAP



LEGEND

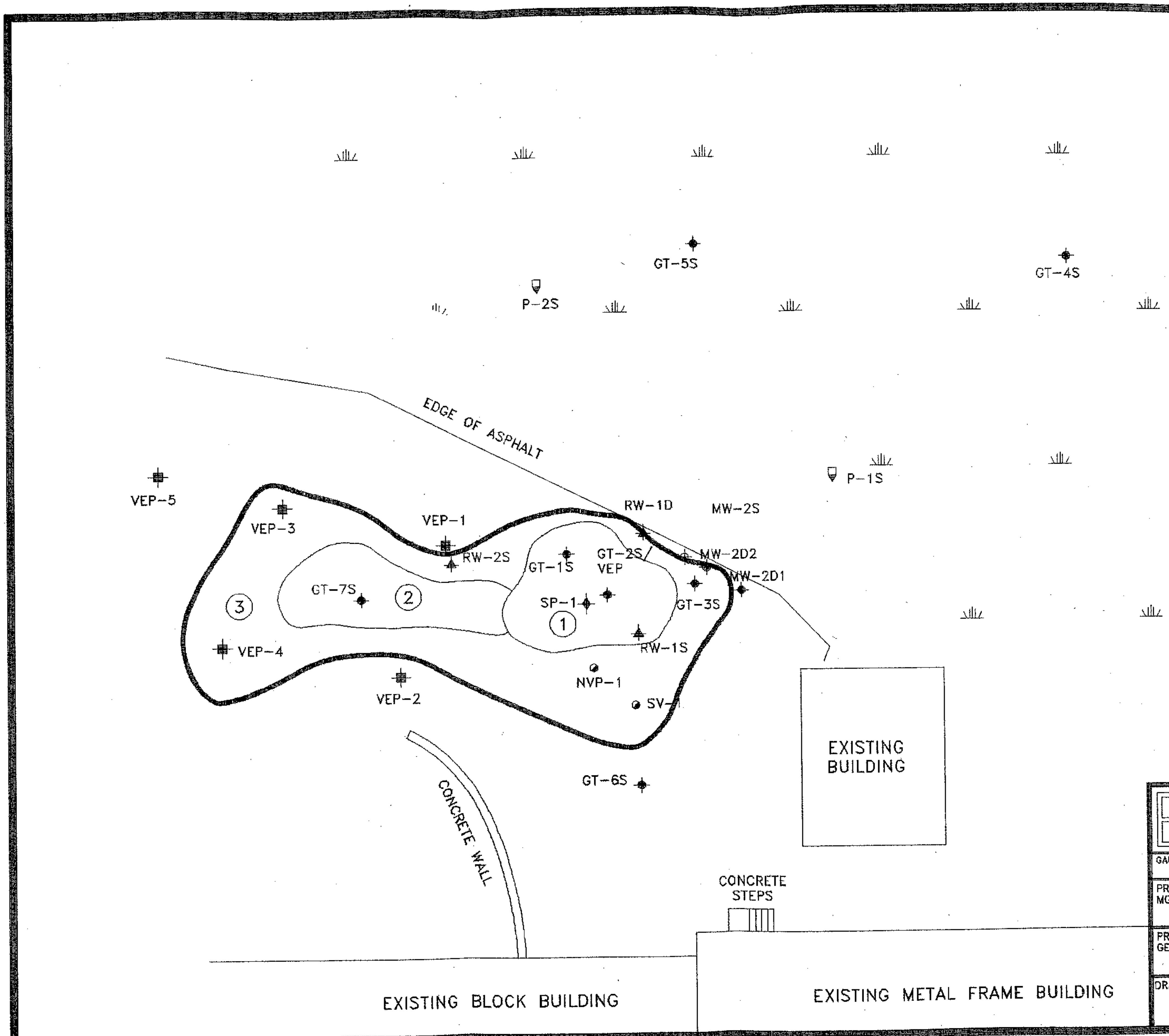
FILL — SAND — BOULDERS

2000 PID READING — MARBLE BEDROCK — WATER ELEVATION

07/08/1992 CROSS2.DWG

GROUNDWATER TECHNOLOGY

Project: PAWLING	Owner: PAWLING CO.
Location: Pawling, New York	Project Number: 011101354
Geologist: TMM	Checked By: WCL Date: 8/6/92



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE, SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- (3) AREA UTILIZED IN MASS BALANCE

SCALE 0 20 40 FEET

N

AREA NO.	AREA (SQ. FT.)	THICKNESS (FT.)	TOTAL VOLUME
①	624	7	4,368
②	528	7	3,696
③	2096	7	14,672

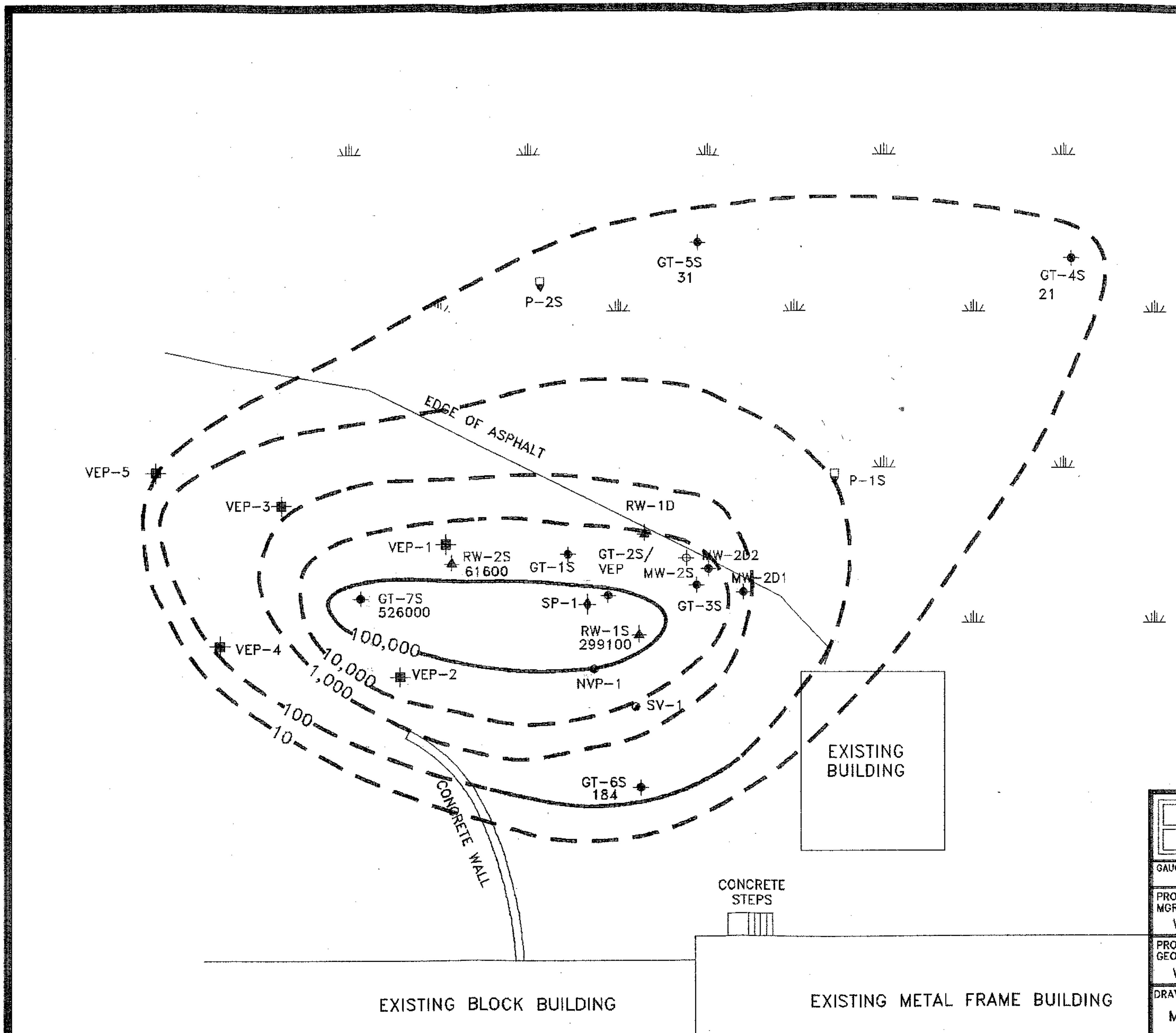
GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE:
DATE: 8/6/92
ACAD FILE: 5104VOC3

PROJECT MGR. WL
PROJECT GEO. WL
DRAWN BY: MET

EXTENT OF UNSATURATED ADSORBED PHASE (MARCH 1992)

CLIENT: PAWLING CORPORATION
PROJECT NO.: 011105104
LOCATION: PAWLING NEW YORK
FIGURE NO.:



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE,SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- 21– TOTAL VOLATILE ORGANIC COMPOUNDS (VOCS) IN ppb
- 1000– TOTAL VOCS CONTOUR IN ppb

SCALE 0 20 40 FEET

N

WELL ID NO.	TOTAL VOCS (ppb)	TOTAL CHLORINATED (ppb)
GT-4S	21	21
GT-5S	31	21
GT-6S	184	184
GT-7S	526,000	86,000
RW-1S	299,100	59,100
RW-2S	61,600	13,600

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE: 3/10/92 | DATE: 8/6/92 | ACAD FILE: 5104VOC2

PROJECT MGR.: WL

PROJECT GEO.: WL

DRAWN BY: MET

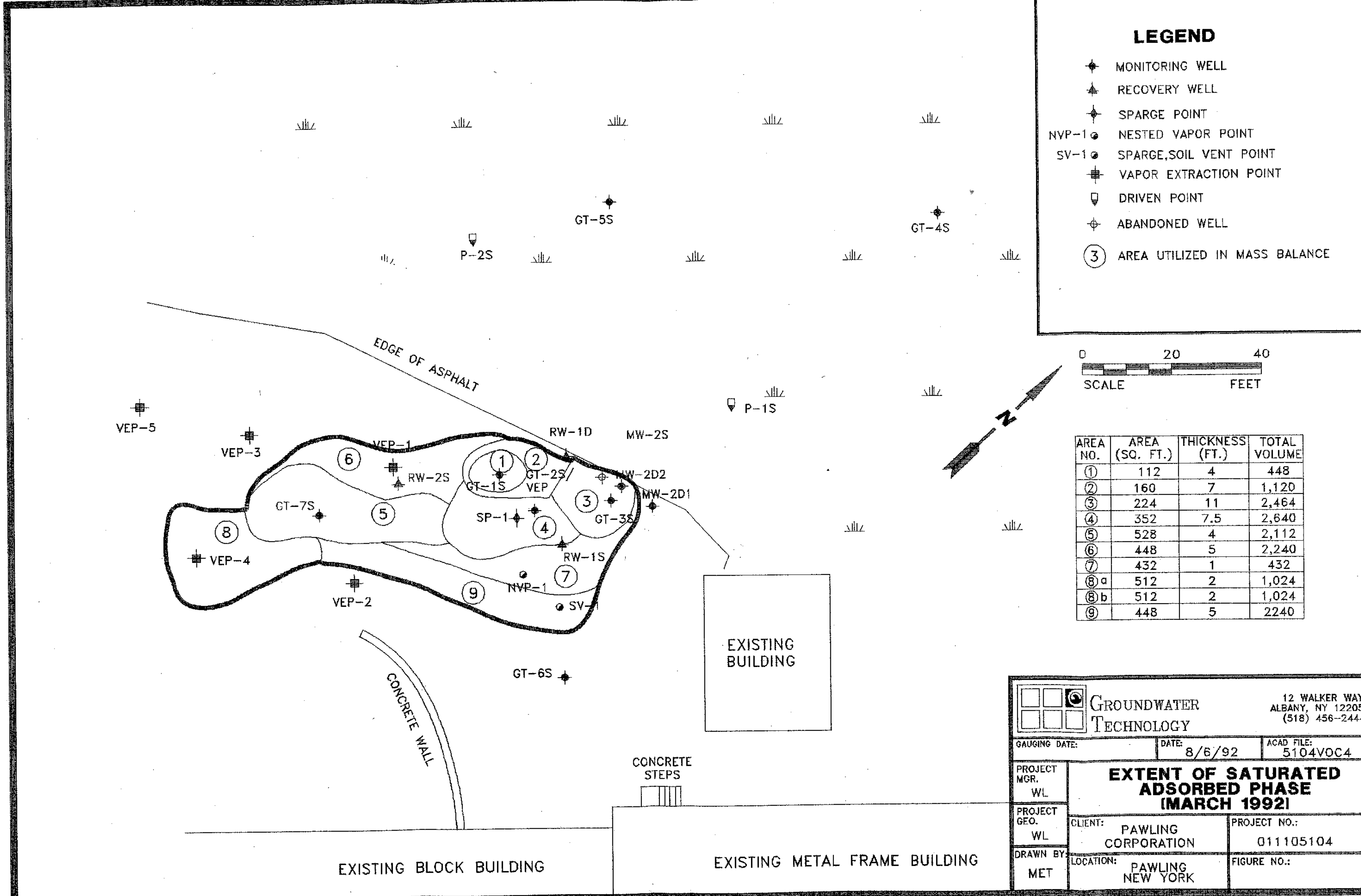
TOTAL VOCs IN GROUNDWATER [OVERBURDEN AQUIFER]

CLIENT: PAWLING CORPORATION

PROJECT NO.: 01110-1354

LOCATION: PAWLING NEW YORK

FIGURE NO.:



AREA NO.	AREA (SQ. FT.)	THICKNESS (FT.)	TOTAL VOLUME
①	112	4	448
②	160	7	1,120
③	224	11	2,464
④	352	7.5	2,640
⑤	528	4	2,112
⑥	448	5	2,240
⑦	432	1	432
⑧a	512	2	1,024
⑧b	512	2	1,024
⑨	448	5	2240

GROUNDWATER TECHNOLOGY

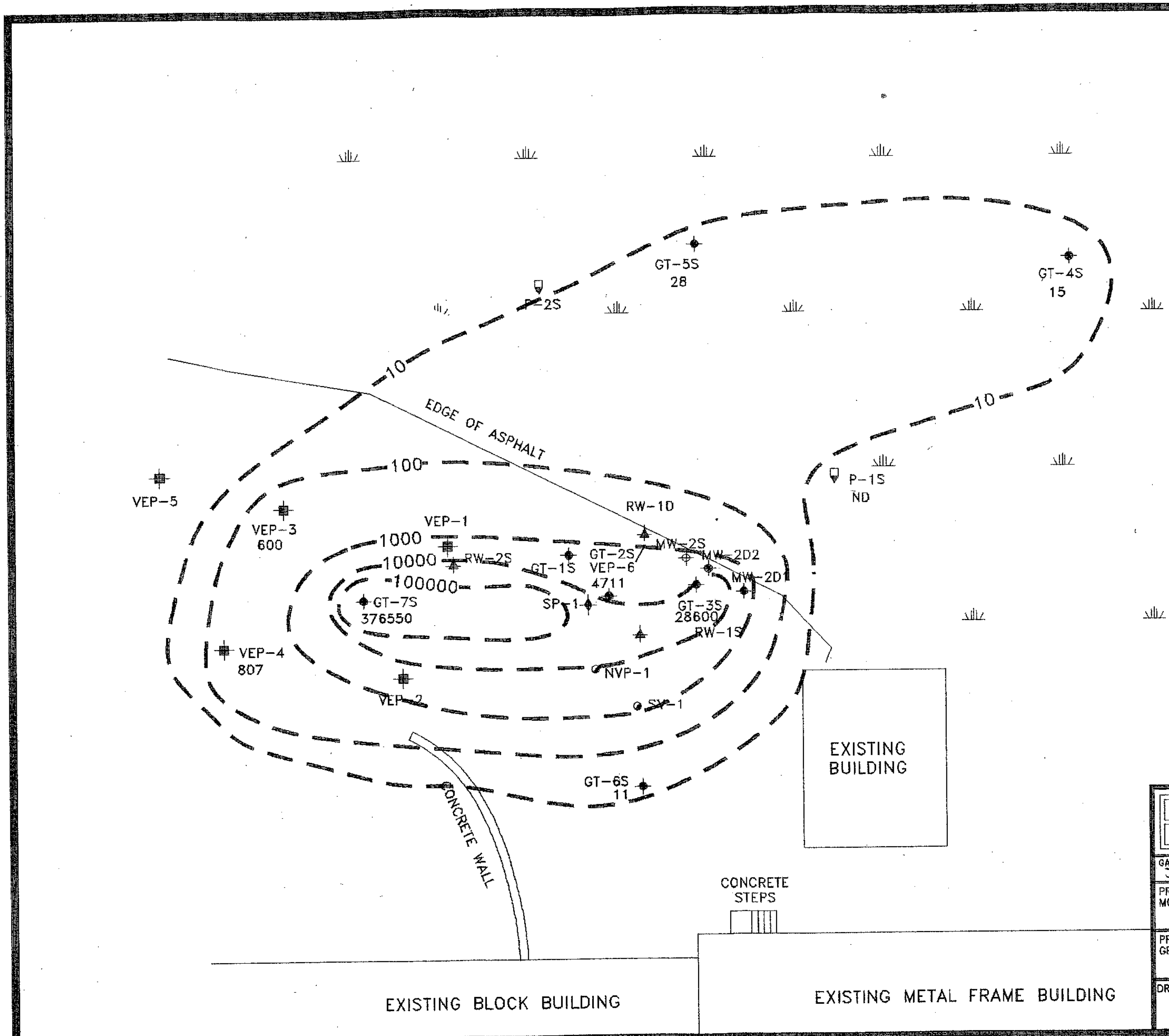
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE: | DATE: 8/6/92 | ACAD FILE: 5104VOC4

EXTENT OF SATURATED ADSORBED PHASE (MARCH 1992)

PROJECT MGR.: WL
PROJECT GEO.: WL
DRAWN BY: MET

CLIENT: PAWLING CORPORATION
PROJECT NO.: 011105104
LOCATION: PAWLING NEW YORK
FIGURE NO.:



LEGEND

- MONITORING WELL
- RECOVERY WELL
- SPARGE POINT
- NVP-1 NESTED VAPOR POINT
- SV-1 SPARGE, SOIL VENT POINT
- VAPOR EXTRACTION POINT
- DRIVEN POINT
- ABANDONED WELL
- 15– TOTAL VOLATILE ORGANIC COMPOUNDS (VOCs) IN ppb
- 100– TOTAL VOCs CONTOUR IN ppb

WELL ID NO.	TOTAL VOCs (ppb)	TOTAL CHLORINATED (ppb)
VEP-3	600	600
VEP-4	807	657
VEP-6	4711	1811
GT-3S	28600	4600
GT-4S	15	15
GT-5S	28	28
GT-6S	11	11
GT-7S	376550	70380

GROUNDWATER TECHNOLOGY
12 WALKER WAY
ALBANY, NY 12205
(518) 456-2444

GAUGING DATE: June 30 ~~8/6/92~~
DATE: 4/24/92
ACAD FILE: 5104-VOC

PROJECT MGR.: WL
PROJECT GEO.: WL
DRAWN BY: MET

TOTAL VOCs IN GROUNDWATER (OVERBURDEN AQUIFER)

CLIENT: PAWLING CORPORATION
PROJECT NO.: 01110-5104
LOCATION: PAWLING NEW YORK
FIGURE NO.:

Shaw® Shaw Environmental, Inc.

March 7, 2005

Susan R. Thompson
Regulatory Affairs Manager
Pawling Corporation
157 Charles Colman Boulevard
Pawling, New York 12564-1188

Subject: Status Report
April 2003 through March 2004
Shaw Environmental, Inc. Project: 11105104

Dear Susan:

This status report details the results of operation of the groundwater pumping and treatment system and dual phase extraction (DPE) system for the period from April 2003 through March 2004. A copy was forwarded to the New York State Department of Environmental Conservation (NYSDEC).

The remedial system has been in operation since March 9, 1992. During the current twelve month reporting period the groundwater treatment system and the DPE system were operational for two out of the twelve months, due to various mechanical problems causing the system to shut down between monthly O&M visits. As per approval of the NYSDEC, the Soil Vapor Extraction System was permanently shut down in June 2003.

The following sections present data associated with each component of the system from April 1, 2003 through March 31, 2004, as well as throughout the entire system operation.

Groundwater Extraction System

Operation and maintenance (O&M) site visits were performed on April 21, May 14, June 4, July 30, September 30, October 12, November 20 and December 16, 2003. O&M visits were performed in 2004 on January 14, February 25 and March 27. There were mechanical problems with operation of the air compressor that powers the pneumatic groundwater extraction pumps; readings were not obtained for the months of July 2003 through February 2004. The numerous mechanical problems were addressed and corrected in February and March 2004.

Quarterly groundwater gauging performed during this monitoring period indicated that the water table elevation fluctuated, and was fairly consistent with historical seasonal trends. **Figure 1** shows the layout of recovery, monitoring, air sparge and soil vapor extraction wells at the project site. **Figure 2** presents the groundwater elevation trends over time. The groundwater gauging data are presented in **Table 1**.

The dissolved volatile organic compound (VOC) concentrations in the on site recovery gallery are evaluated through quarterly sampling and analysis of groundwater from recovery wells RW-1S and RW-2S. Quarterly sampling was performed on June 4 and November 20, 2003 and on February 26, 2004. Samples were not obtained during the November 2003 quarterly sampling event because the wells could not be accessed. The concentrations of VOCs in RW-1S were non-detect for November 2003 and February 2004; in June 2003 the total VOCs in well RW-1S was 1.1 micrograms per liter (ug/l). The concentration of total VOCs in RW-2S remained non-detect for all three sampling quarters. A summary of VOC concentrations reported for RW-1S and RW-2S is provided on **Table 2**. **Table 1** shows the reported VOC concentrations of each compound detected. Laboratory results are included as **Appendix A**.

Groundwater Treatment System

Operation of the groundwater treatment system occurred during the period of April through June 2003 and again in March 2004. As discussed above, numerous mechanical difficulties with the system were encountered, and repairs were made in February and March 2004. Influent VOC concentrations to the air stripper were non-detect for the months that the two active recovery wells were functioning (RW-1S and RW-2S).

During the current reporting period, the groundwater pumping system functioned during the period of April through June 2003 and again in February through March 2004. The total mass removal of VOCs for RW-1S was 1.62 x 10^{-6} pounds of VOCs. Regarding well RW-2S, the concentration of VOCs detected in quarterly groundwater samples obtained for well RW-2S was non-detect for the entire twelve month period, as indicated on **Table 2**, therefore, the total VOCs extracted from this well was zero. **Table 3** presents the groundwater treatment system pumping data and VOC removal data for the life of the project. As indicated on this table, no significant concentrations of VOCs have been removed by the groundwater treatment system since the autumn of 1997. This data indicates the groundwater treatment system has been successful in removing the majority of VOCs from groundwater within the zone of influence for pumping wells RW-1S and RW-2S. Therefore, operation of this system is not considered to be contributing to additional site remediation.

Effluent samples were collected to track the performance of the groundwater treatment system and insure system discharges were within permitted levels. Due to mechanical problems with the system, the groundwater treatment system operated for only portion of the year, and effluent samples were obtained in April & May 2003 and March 2004. All system effluent samples collected during the reporting period showed VOC concentrations below method detection limits for all events. Monthly sample results have been tabulated and are presented in **Table 4.**

Dual Phase Extraction System

Previous temporary dual phase extraction system operation confirmed that DPE would enhance remediation at the site. Therefore, a temporary DPE system was installed on GT-7S (August 16, 17, and 18, 1995), and started up on August 23, 1995. Due to the decreasing performance of GT-7S, this extraction point was re-drilled on May 28, 1996, and replaced with a 3-inch-diameter, stainless steel well screen with galvanized steel well casing. This system was activated on September 6, 1996 and was operational through November 7, 1996.

Installation of the permanent DPE system was completed in November 1998. Electrical connections were completed by Pawling Corporation during December 1999. Start up and operation of the DPE system was performed on June 2, 2000 after installation of a new transfer pump motor and associated electrical connections.

Operation of the DPE system has been sporadic over the current monitoring period due to numerous mechanical difficulties and breakdowns encountered. This resulted in the DPE system operating for only two of the twelve months: April and May 2003. There was blockage within the air stripper, the air compressor lines were leaking, the transfer pump was leaking, and the DPE pump was not functioning correctly. Repairs, including replacement of the DPE and air stripper pumps was performed on February 25-26, 2004. Upon completion of these repairs, the system appeared to be up and running, however, the DPE system continued to go into high alarm phase. Additional investigation concerning this issue revealed the DPE float switch needed replacement. After completion of this last repair, the system has been operating smoothly.

During the two months the system was in operation, the DPE system operated at an average vacuum of 3.75 inches of mercury (Hg) as measured at the wellhead. The average airflow being extracted by the DPE system was approximately 33.7 CFM. During the two months the system was in operation the DPE system extracted 2,050 gallons of water at an average total VOC concentration of 1.43 ug/l. The average flow rate of extracted groundwater via the DPE for the three operational months is approximately $2.37 x 10^{-2}$ gallons per minute. Because the system was not operating upon arrival for 10 of the 12 operating months, the VOCs removed as a result of vapor extraction were calculated for the two operational months of April & May 2003. Calculations show a total mass of 3.5 $x10^{-6}$ pounds of VOCs removed as a result of the operation of the groundwater portion of the DPE system for the operational months of April & May 2003. Total VOCs calculated to have been extracted as a result of the lifetime operation of the DPE system is 128.04 pounds, as illustrated in **Figure 3.**

Samples are collected monthly from GT-7S to track groundwater quality entering the DPE system. When compared to historical analytical data obtained in 2000 – 2001, 2001-2002 and 2002-2003, the analytical data for the time period of April 2003-March 2004 shows a continued decrease in total VOC concentrations. For the reporting year 2000-2001, results ranged from a low of 10,390 ug/l (August 2000) to a high of 25,090 ug/l (February 2001). For the reporting period of 2001- 2002, results ranged from a low of 7 ug/l in September 2001 to a high of 12,883 in October 2001. For the period of April 2002-March 2003, results ranged from a low of 1 ug/l in March 2003 to a high of 6,763 ug/l in August 2002. Recent analytical data for the period of April 2003-March 2004 indicate a low of 1.0 ug/l in April 2003 to a high of 16.2 ug/l in October 2003. Recent analytical results are presented in **Table 6**; a summary of historical analytical data can be found on **Table 1.**

Soil Vapor Extraction System

Historical SVE data indicated asymptotic removal conditions had been reached in 1997; further VOC removal has not occurred since then. Therefore, the Soil Vapor Extraction System was shut down permanently in June 2003.

Air Sparge System

The air sparge system was not operated during this reporting period.

Off-Gas Treatment System

The effluent stacks were separated at the end of December 1993, per the approved air permit modification. Individual stack effluent concentrations were monitored monthly with a PID to document VOC levels emitted into the atmosphere. **Table 5** contains the monitoring results. Previous comparison of analytical data with the PID readings demonstrated that concentrations less than 1 ppmv with the PID are below discharge limits. Monitored readings for this current reporting period were all below measurable limits. Because all readings were below measurable limits, air samples were not required for laboratory analysis.

Deep Groundwater Monitoring Well Analytical Data

As proposed in the Annual Status Report for 2002-2003, Shaw performed quarterly sampling of deep groundwater monitoring wells MW-2D1 and MW-2D2 to verify the absence of impacts to deep groundwater located downgradient of the remediation system. Quarterly sampling was performed on these wells on November 20, 2003 and February 26, 2004. Analytical results are presented on **Table 7**. For well MW-2D1, total VOC concentrations were 3.0 ug/l for November 2003 and 7.8 ug/l for February 2004. Regarding well MW-2D2, analytical results were non-detect for November 2003 and 3.9 ug/l for February 2004. There were no exceedances of the NYS Groundwater Standards for any of the compounds detected. Quarterly sampling of these wells will continue during the next year.

Conclusions & Recommendations

Through March 2003 the remedial system at this site had removed 577.14 pounds of VOCs from the subsurface (212.13 pounds through soil vapor extraction, 236.97 pounds through groundwater extraction, and 128.04 pounds from the DPE system at GT-7S). **Figure 3** shows the cumulative VOC removal for the total system as well as the individual components. Due to several mechanical problems with various components of the system, the system was non-operational for 10 of the 12 months for this reporting period. Therefore, the VOC extraction total remains the same for the reporting period of April 2003-March 2004.

For the current reporting period, there has been no calculated removal of VOCs as a result of the groundwater treatment system. However, current available data continues to support the historical groundwater treatment data indicating that asymptotic removal conditions have been achieved utilizing current treatment equipment. Therefore, Shaw recommends discontinuing the operation of the groundwater treatment system.

Two rounds of quarterly sampling for deep wells MW-2D1 and MW-2D2 indicate the presence of residual concentrations of VOCs in deep groundwater below State standards. The DPE system was repaired in February & March 2004, and has been functioning continuously since then. It is assumed that the continuous functioning of the DPE system will result in lower concentrations of VOCs in the source area.

Operation of the DPE system, while demonstrated to have not been continuous over the current monitoring period, has resulted in the removal of 3.5 $x10^{-6}$ pounds of VOCs from the subsurface. Operation of the DPE system in the area of GT-7S appears to be decreasing the concentrations of VOCs surrounding GT-7S, as evidenced by decreasing concentrations of VOCs in monthly groundwater samples. Continued operation of the DPE also appears to be helping to decrease VOC concentrations in RW-1S and RW-2S. RW-1S has shown VOC concentrations below method detection limits for five of the last twelve quarters; the remaining five quarters displayed VOC concentrations ranging from 1 to 8 ug/l. Concentrations of VOCs in RW-2S have been below method detection limits for nine of the last twelve quarters. Concentrations in RW-1D displayed a decrease in total VOC concentration during the past year: in February 2003 a total VOC concentration of 196 ug/l was detected, whereas in September 2003 a total VOC concentration of 13 ug/l was reported.

Quarterly groundwater sampling was performed during this reporting period on June 4, September 30 and November 20, 2003 and February 26, 2004. GT-7S was also sampled monthly during the reporting period. **Table 6** shows analytical results from monthly groundwater samples collected from GT-7S. **Table 1** shows the tabulated data collected for all analytical results received for this period as well as historical analytical results.

The VOC concentrations in recovery wells have been declining since operation of the DPE system was initiated in June 2000. VOC concentrations in monitoring wells have also declined during the reporting period. GT-6S has shown a total VOC concentration below the method detection limit for 16 of the last 17 quarterly sample events. GT-3S has shown total VOC concentrations below method detection limits for the last eleven quarterly sample events. VEP-4 has shown total VOC concentrations below 10 ug/l for the last thirteen sampling events.

It is imperative that continuous operation of the DPE system on a year round basis be implemented to address the final "hot spot" in this area. Remediation of the area in the vicinity of GT-7S is the last step necessary prior to obtaining clean closure for this area of concern. Based upon decreasing VOC concentrations across the site, we believe progress is continuing to be made in remediating the last area of concern in OU-1. Extensive repairs were made to the DPE system in February and March 2004. The DPE system is now operating continuously, and increased removal of VOCs from the subsurface is anticipated for the next reporting year. We will continue to track data as it becomes available and notify you at the earliest opportunity of any changes to this strategy.

If you have any questions concerning this site, please contact us at (845) 492-3100.

Sincerely,

Shaw Environmental, Inc.

Rebecca A. Ferguson, CPG
Project Manager

Attachments

TABLES

Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-3S	438	03/01/92	6.60	431.4									
GT-3S	438	04/01/92	7.88	430.12									
GT-3S	438	05/01/92	7.64	430.36									
GT-3S	438	08/01/92	6.89	431.11									
GT-3S	438	09/01/92	6.51	431.49									
GT-3S	438	10/01/92	7.28	430.72									
GT-3S	438	11/01/92	6.66	431.34									
GT-3S	438	12/01/92	6.68	431.32									
GT-3S	438	01/01/93	6.65	431.35									
GT-3S	438	03/01/93	6.45	431.55									
GT-3S	438	04/01/93	6.20	431.8									
GT-3S	438	05/01/93	6.38	431.62									
GT-3S	438	08/01/93	7.62	430.38									
GT-3S	438	09/01/93	6.96	431.04									
GT-3S	438	10/01/93	7.14	430.86									
GT-3S	438	11/01/93	6.96	431.04									
GT-3S	438	12/01/93	6.62	431.38									
GT-3S	438	02/01/94	6.26	431.74									
GT-3S	438	04/01/94	3.58	434.42									
GT-3S	438	05/01/94	6.36	431.64									
GT-3S	438	06/01/94	6.80	431.2									
GT-3S	438	07/01/94	6.50	431.5									
GT-3S	438	08/01/94	6.45	431.55									
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
GT-3S	438	10/01/94	6.43	431.57									
GT-3S	438	11/01/94	6.23	431.77									
GT-3S	438	12/01/94	6.10	431.9									
GT-3S	438	01/01/95	6.04	431.96									
GT-3S	438	02/08/95	6.25	431.75	<1	<1	<1	<1	<1	15	<1		15
GT-3S	438	03/01/95	6.54	431.46									
GT-3S	438	04/01/95	6.28	431.72									
GT-3S	438	05/17/95	6.86	431.14	<1	<1	<1	<1	<1	<1	7		7
GT-3S	438	06/01/95	6.91	431.09									
GT-3S	438	07/13/95	8.00	430									
GT-3S	438	08/16/95	7.66	430.36	<1	<1	<1	<1	10	4	<1		14
GT-3S	438	09/18/95	7.95	430.05									
GT-3S	438	10/17/95	6.73	431.27									
GT-3S	438	11/14/95	6.81	431.09	<1	<1	<1	<1	<1	<1	<1		<1
GT-3S	438	12/05/95	6.16	431.84									
GT-3S	438	01/16/96	6.36	431.64									
GT-3S	438	02/15/96	6.11	431.89	<1	<1	<1	<1	<1	<1	<1		ND
GT-3S	438	03/15/96	5.56	432.42									
GT-3S	438	04/11/96	5.62	432.38									
GT-3S	438	05/28/96	6.27	431.73	<1	<1	<1	<1	<1	<1	<1		1
GT-3S	438	06/26/96	6.12	431.88									
GT-3S	438	07/19/96	6.25	431.75									
GT-3S	438	08/19/96	6.48	431.52	<1	<1	<1	<1	<1	120	180		220
GT-3S	438	09/06/96	6.87	431.13									
GT-3S	438	10/09/96	6.16	431.84									
GT-3S	438	11/21/96	6.74	431.26	<1	<1	<1	<1	<1	<1	<1		<1
GT-3S	438	12/16/96	5.53	432.47									
GT-3S	438	01/30/97	6.09	431.91									
GT-3S	438	02/19/97	6.14	431.86	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	04/02/97	5.55	432.45									
GT-3S	438	04/23/97	5.51	432.49									
GT-3S	438	05/13/97	6.20	431.8	<1	<1	<1	<1	<1	<1	<1	10	10
GT-3S	438	06/19/97	5.38	432.62									
GT-3S	438	07/08/97	7.15	430.85									
GT-3S	438	08/08/97	7.11	430.89	<1	86	<1	<1	<1	<1	<1	130	216
GT-3S	438	09/25/97	7.40	430.6									
GT-3S	438	10/22/97	7.74	430.26									
GT-3S	438	11/11/97	6.47	431.53	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	12/10/97	6.30	431.7									
GT-3S	438	01/20/98	6.05	431.95									
GT-3S	438	02/18/98	6.27	431.73	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	03/17/98	6.02	431.98									
GT-3S	438	04/15/98	NG										
GT-3S	438	05/07/98	7.13	430.87	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	06/03/98	6.61	431.39									
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
GT-3S	438	09/21/98	6.92	431.08									
GT-3S	438	10/19/98	7.32	430.68									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-3S	438	12/29/98	6.42	431.58	<1	<1	<1	<1	<1	<1	<1	2	2
GT-3S	438	02/16/00	6.13	431.87	<1	<1	<1	<1	<1	2	NA	15	17
GT-3S	438	08/02/00	6.60	431.6	<1	<1	<1	<1	<1	1	NA	7	8
GT-3S	438	08/29/00	6.93	431.07	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/20/00	6.80	431.2	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/23/01	6.50	431.5	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	05/23/01	6.26	431.74	<1	<1	<1	<1	<1	16	NA	32	48
GT-3S	438	08/28/01	6.40	431.6	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/21/01	7.00	431	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/13/02	6.61	431.39									0
GT-3S	438	05/23/02	6.32	431.68	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	08/29/02	6.80	431.1	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/27/02	6.27	431.73	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/28/03	5.85	432.15	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	06/04/03	NM		<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	09/30/03	5.67	432.33	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/20/03	5.41	432.59	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/26/04	6.25	431.75	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	03/01/92	5.40	432.5									
GT-6S	437.9	04/01/92	6.19	431.71									
GT-6S	437.9	05/01/92	6.07	431.83									
GT-6S	437.9	06/01/92	6.31	431.59									
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
[illegible]	[illegible]	12/01/92	[illegible]	[illegible]									
GT-6S	437.9	01/01/93	5.85	432.05									
GT-6S	437.9	03/01/93	5.95	431.95									
GT-6S	437.9	04/01/93	5.16	432.74									
GT-6S	437.9	05/01/93	5.82	432.08									
GT-6S	437.9	08/01/93	7.00	430.9									
GT-6S	437.9	08/01/93	6.67	431.23									
GT-6S	437.9	10/01/93	6.61	431.29									
GT-6S	437.9	11/01/93	6.40	431.5									
GT-6S	437.9	12/01/93	5.92	431.98									
GT-6S	437.9	01/01/94	6.13	431.77									
GT-6S	437.9	02/01/94	5.59	432.31									
GT-6S	437.9	04/01/94	5.04	432.86									
GT-6S	437.9	05/01/94	5.79	432.11									
GT-6S	437.9	06/01/94	6.18	431.72									
GT-6S	437.9	07/01/94	8.21	429.69									
GT-6S	437.9	08/01/94	6.04	431.85									
GT-6S	437.9	09/01/94	5.90	432									
GT-6S	437.9	10/01/94	5.80	432.1									
GT-6S	437.9	11/01/94	5.61	432.29									
GT-6S	437.9	12/01/94	5.36	432.54									
GT-6S	437.9	01/01/95	5.36	432.54									
GT-6S	437.9	02/09/95	5.54	432.36	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	03/01/95	5.57	432.33									
GT-6S	437.9	04/01/95	5.58	432.32									
GT-6S	437.9	05/17/95	5.86	432.04	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	06/01/95	6.13	431.77									
GT-6S	437.9	07/13/95	6.98	430.92									
GT-6S	437.9	08/15/95	6.87	431.03	7	<1	<1	<1	2	<1	<1		9
GT-6S	437.9	09/19/95	7.14	430.76									
GT-6S	437.9	10/17/95	5.91	431.99									
GT-6S	437.9	11/14/95	5.14	432.76	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	12/05/95	5.31	432.59									
GT-6S	437.9	01/16/96	5.64	432.26									
GT-6S	437.9	02/15/96	5.31	432.59	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	03/15/96	4.87	433.03									
GT-6S	437.9	04/11/96	5.01	432.89									
GT-6S	437.9	05/28/96	5.63	432.37	<1	1	<1	<1	<1	<1	9		10
GT-6S	437.9	06/26/96	5.64	432.26									
GT-6S	437.9	07/10/96	5.49	432.41									
GT-6S	437.9	08/19/96	5.89	432.01	<1	<1	<1	<1	<1	<1	4		4
GT-6S	437.9	09/06/96	6.25	431.65									
GT-6S	437.9	10/09/96	5.55	432.35									
GT-6S	437.9	11/21/96	6.14	431.76	<1	<1	<1	<1	<1	<1	2		2
GT-6S	437.9	12/18/96	4.77	433.13									
GT-6S	437.9	01/30/97	5.33	432.57									
GT-6S	437.9	[illegible]	[illegible]	[illegible]	<1	<1	<1	<1	<1	[illegible]	[illegible]	[illegible]	[illegible]
GT-6S	437.9	04/02/97	4.86	433.02									
GT-6S	437.9	04/23/97	4.80	433.1									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-6S	437.9	07/08/97	6.34	431.56									
GT-6S	437.9	08/04/97	6.29	431.61	<1	1	<1	<1	<1	<1	<1	<1	1
GT-6S	437.9	09/25/97	6.69	431.21									
GT-6S	437.9	10/22/97	7.10	430.8									
GT-6S	437.9	11/11/97	6.04	431.86									
GT-6S	437.9	12/10/97	5.61	432.29									
GT-6S	437.9	01/26/98	5.42	432.48									
GT-6S	437.9	02/16/98	5.58	432.32	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	03/17/98	6.38	431.52									
GT-6S	437.9	04/15/98	5.50	432.4									
GT-6S	437.9	05/07/98	5.99	431.91	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	06/03/98	5.72	432.18									
GT-6S	437.9	07/21/98	5.80	432.1									
GT-6S	437.9	10/19/98	7.72	430.18									
GT-6S	437.9	11/24/98	6.73	431.17									
GT-6S	437.9	12/23/98	6.51	431.39									
GT-6S	437.9	12/29/99	5.93	431.97	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	02/13/00	5.58	432.32	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	06/02/00	5.78	432.12	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	08/29/00	6.22	431.68	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	11/20/00	6.10	431.8	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	02/23/01	5.82	432.08	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	05/23/01	5.29	432.61	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	[illegible]	[illegible]	431.5	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	11/21/01	6.40	431.5	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	02/13/02	5.93	431.97									0
GT-6S	437.9	05/23/02	5.64	432.26	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	08/20/02	6.35	431.55	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	11/27/02	5.58	432.32	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	02/28/03	5.30	432.6	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	06/04/03	NM		<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	09/30/03	5.19	432.71									NA
GT-6S	437.9	11/20/03	4.80	433	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	02/26/04	5.80	432.1	<1	1.2	<1	<1	<1	<1	NA	<1	1.2
GT-6S	437.9	[illegible]	[illegible]	437.9									
GT-7S	440.1	03/01/92	7.30	432.8									
GT-7S	440.1	04/01/92	7.30	432.8									
GT-7S	440.1	05/01/92	7.91	432.19									
GT-7S	440.1	06/01/92	10.50	429.6									
GT-7S	440.1	11/01/92	10.48	429.62									
GT-7S	440.1	12/01/92	10.28	429.81									
GT-7S	440.1	01/01/93	9.70	430.4									
GT-7S	440.1	03/01/93	9.80	430.3									
GT-7S	440.1	05/01/93	9.40	430.7									
GT-7S	440.1	08/01/93	8.92	431.18									
GT-7S	440.1	09/01/93	8.63	431.47									
GT-7S	440.1	10/01/93	8.50	431.6									
GT-7S	440.1	11/01/93	8.36	431.74									
GT-7S	440.1	12/01/93	7.76	432.35									
GT-7S	440.1	01/01/94	8.35	431.75									
GT-7S	440.1	02/01/94	7.65	432.45									
GT-7S	440.1	04/01/94	6.73	433.37									
GT-7S	440.1	05/01/94	7.36	432.74									
GT-7S	440.1	06/01/94	8.01	432.09									
GT-7S	440.1	07/01/94	7.09	433.01									
GT-7S	440.1	08/01/94	7.85	432.25									
GT-7S	440.1	09/01/94	7.78	432.32									
GT-7S	440.1	12/01/94	7.10	433									
GT-7S	440.1	01/11/95	6.93	433.17	140,000	10000	<50	140	<50	1400	<50		151540
GT-7S	440.1	02/09/95	7.08	433.04	290,000	9900	<50	<50	<50	1400	300		301600
GT-7S	440.1	03/30/95	7.17	432.93	300,000	16000	<1000	<1000	<1000	<1000	12000		323000
GT-7S	440.1	04/25/95	7.17	432.93	230,000	5800	<500	<500	<500	<500	8400		244300
GT-7S	440.1	05/17/95	7.49	432.61	42,000	<500	<500	<500	<500	2300	8500		52800
GT-7S	440.1	06/20/95	7.60	432.5	380,000	<250	<250	6000	<250	<250	<250		386000
GT-7S	440.1	07/13/95	8.29	431.81	310,000	7900	<100	250	7700	<100	<100		325550
GT-7S	440.1	08/16/95	7.86	432.24	250,000	<50	<50	<50	10000	1100	<50		261100
GT-7S	440.1	10/17/95			57,000	<100	<100	<100	<100	<100	3900		60900
GT-7S	440.1	11/14/95			<1	2	<1	<1	<1	<1	13		15
GT-7S	440.1	12/05/95	7.03	433.07	100,000	<11	<11	<11	<11	<11	1800		101800
GT-7S	440.1	[illegible]	[illegible]	[illegible]	[illegible]						350		59250
GT-7S	440.1	02/15/96	6.81	433.29	<500	<500	<500	<500	24000	<500	<500		24000
GT-7S	440.1	03/15/96	6.27	433.83									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-7S	440.1	08/19/96	8.41	431.69	<1	30	<1	<1	<1	130	80		240
GT-7S	440.1	08/06/96			<1	4	<1	2	<1	<1	6		13
GT-7S	440.1	10/09/96	6.54	433.56	<1	<1	<1	<1	<1	<1	<1		<1
GT-7S	440.1	11/21/96	8.19	431.91	68,000	<250	<1	<250	<250	<250	980		68960
GT-7S	440.1	12/16/96	6.53	433.57	27,000	<100	<100	<100	<100	NA	NA		27000
GT-7S	440.1	01/30/97	7.41	432.69	130,000	<1000	<1000	<1000	<1000	NA	NA	3500	133500
GT-7S	440.1	02/19/97	7.31	432.79	140,000	<500	<500	<500	<500			4800	145350
GT-7S	440.1	04/02/97	6.87	433.23	110,000	<200	<200	<200	<200			650	110650
GT-7S	440.1	04/23/97	6.85	433.25	160,000	<100	300	<100	<100			3500	163800
GT-7S	440.1	05/13/97	7.42	432.68	15,000	<50	<50	<50	<50	<50	<50	290	15290
GT-7S	440.1	06/09/97	7.55	432.55	60,000	<50	<50	<50	<50	190	<50	410	60600
GT-7S	440.1	07/08/97	8.32	431.78	30,000	<50	<50	<50	<50	<50	<50	500	30500
GT-7S	440.1	08/08/97	8.30	431.8	59,000	<50	<50	<50	<50	<50	<50	160	59160
GT-7S	440.1	09/25/97	8.61	431.49	<50	<50	<50	<50	<50	<50	<50	<50	<50
GT-7S	440.1	10/22/97	9.14	430.96	<50	<50	<50	<50	<50	<50	<50	<50	<50
GT-7S	440.1	11/11/97	8.22	431.88	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	12/10/97	7.60	432.5	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	01/20/98	7.41	432.69	<1	1	<1	<1	1	<1	<1	<1	2
GT-7S	440.1	02/16/98	7.57	432.53	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	03/17/98	7.43	432.67	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	04/15/98	7.36	432.74	<1	<1	<1	<1	<1	1	<1	<1	1
GT-7S	440.1	05/07/98	7.88	432.22	<1	1	<1	<1	53	<1	<1	<1	54
GT-7S	440.1	06/03/98	7.51	432.59	1,800	2	<1	<1	110	43	<2	<1	1955
GT-7S	440.1	07/21/98	[illegible]	[illegible]	<1	1	<1	<1	1	<1	<1	<1	2
GT-7S	440.1	08/21/98	7.95	432.15	3	11	<1	1	3	<1	3	<1	28
GT-7S	440.1	09/16/98	5.36	434.74	<1	7	<1	<1	3	<1	<1	<1	9
GT-7S	440.1	10/19/98	8.26	431.84	1	12	<1	1	<1	<1	<1	1	15
GT-7S	440.1	11/24/98	8.40	431.7	4	9	<1	1	2	<1	1	<1	16
GT-7S	440.1	12/23/98	8.47	431.63	<1	4	<1	<1	<1	<1	<1	<1	4
GT-7S	440.1	10/27/99	NG		<1	4	<1	<1	<1	16	<1	8	26
GT-7S	440.1	11/30/99	NG		<1	2	<1	<1	<1	<1	<1	1	3
GT-7S	440.1	12/29/99	7.63	432.47	<1	2	<1	<1	<1	<1	<1	1	3
GT-7S	440.1	01/18/00	7.80	432.3	<1	1	<1	<1	<1	<1	NA	<1	1
GT-7S	440.1	02/16/00	7.78	432.36	<1	3	<1	<1	<1	<1	NA	<1	3
GT-7S	440.1	03/23/00	7.02	433.08	4	2	<1	<1	<1	5	NA	3	14
GT-7S	440.1	04/28/00	7.10	433	8	2	<1	<1	1	2	NA	2	16
GT-7S	440.1	06/02/00	7.35	432.75	<1	1	<1	<1	<1	<1	NA	<1	1
GT-7S	440.1	06/30/01	NM		13,000	150	<50	<50	<50	140	NA	420	13710
GT-7S	440.1	07/21/00	8.64	431.46	14,000	4	<1	<1	5	84	NA	340	14433
GT-7S	440.1	08/29/00	8.56	431.62	12,000	<200	<200	<200	<200	<200	NA	630	12630
GT-7S	440.1	09/20/00	8.38	431.72	10,000	<200	<200	<200	<200	<200	NA	390	10390
GT-7S	440.1	10/12/00	8.89	431.21	14,000	<200	<200	<200	<200	<200	NA	460	14460
GT-7S	440.1	11/20/00	8.72	431.38	12,000	<200	<200	<200	<200	<200	NA	460	12460
GT-7S	440.1	12/20/00	10.02	430.08	12,000	<200	<200	<200	<200	<200	NA	440	12440
GT-7S	440.1	01/28/00	9.45	430.65	15,000	250	<250	<250	<250	<250	NA	660	15910
GT-7S	440.1	02/23/01	7.81	432.29	24,000	260	<250	<250	<250	<250	NA	830	25090
GT-7S	440.1	03/29/01	6.70	431.4	11,000	<250	<250	<250	<250	<250	NA	530	11530
GT-7S	440.1	04/19/01	9.50	430.6	7,200	<250	<250	<250	<250	<250	NA	<250	7200
GT-7S	440.1	05/23/01	8.42	431.68	8,700	<200	<200	<200	<200	<200	NA	280	8960
GT-7S	440.1	06/22/01	7.42	432.68									0
GT-7S	440.1	07/20/01	7.75	432.35									0
GT-7S	440.1	08/29/01	8.89	431.21	<20	49	<20	<20	<20	23	NA	520	592
GT-7S	440.1	09/26/01	NM										0
GT-7S	440.1	10/31/01	9.12	430.98									0
GT-7S	440.1	11/21/01	8.60	430.8	5,600	<200	<200	<200	<200	<200	NA	300	5900
GT-7S	440.1	12/18/01	NM		4,200	<200	<200	<200	<200	<200	NA	<200	4200
GT-7S	440.1	01/29/02	9.50	430.6									0
GT-7S	440.1	02/13/02	9.58	430.54									0
GT-7S	440.1	03/21/02	NM										0
GT-7S	440.1	04/23/02	9.62	430.48	71	<50	<50	<50	<50	<50	NA	<50	71
GT-7S	440.1	05/23/02	8.59	431.51	4,800	<200	<200	<200	<200	<200	NA	<200	4800
GT-7S	440.1	06/17/02	7.89	432.21	8,300	<200	<200	<200	<200	<200	NA	410	8710
GT-7S	440.1	07/17/02	9.83	430.27	1,300	<50	<50	<50	<50	NA	NA	NA	1300
GT-7S	440.1	08/29/02	9.15	430.95	6,800	13	<10	<10	<10	<10	NA	150	5763
GT-7S	440.1	09/27/02	9.85	430.25	390	<10	<10	<10	<10	<10	NA	<10	390
GT-7S	440.1	10/21/02	9.45	430.65	43	<1	<1	<1	<1	NA	NA	NA	43
GT-7S	440.1	11/27/02	9.90	430.2	48	<5	<5	<5	<5	<5	NA	<5	48
GT-7S	440.1	12/17/02	7.80	432.3	3	2	<1	<1	<1	<1	NA	<1	5
GT-7S	440.1	01/28/03	8.97	431.13	52	2	<1	<1	<1	<1	NA	<1	54
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<1	<1	<1	5	NA	10	637
GT-7S	440.1	03/31/03	6.70	433.4	<1	1	<1	<1	<1	<1	NA	<1	1
GT-7S	440.1	04/21/03	7.05	433.05	<1.0	1	<1.0	<1.0	<1.0	<1.0	NA	<1.0	1

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Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-7S	440.1	07/30/03	7.62	432.48	<1	1.2	<1	<1	<1	<1	NA	<1	1.2
GT-7S	440.1	08/30/03	6.98	433.12	<1	10	<1	<1	<1	<1	NA	<1	10
GT-7S	440.1	10/17/03	7.26	432.84	<1	14	<1	1.1	<1	NA	NA	16.2	
GT-7S	440.1	11/20/03	7.26	432.84	<1	12	<1	<1	<1	<1	NA	<1	12
GT-7S	440.1	12/18/03	6.83	433.27	<1	2	<1	<1	<1	<1	NA	<1	2
GT-7S	440.1	01/14/04	6.98	433.12	<1	4.3	<1	<1	<1	<1	NA	<1	4.3
GT-7S	440.1	02/28/04	7.60	432.5	<1	2.9	<1	<1	<1	<1	NA	<1	2.9
GT-7S	440.1	03/27/04	7.84	432.26	<1	1.9	<1	<1	<1	<1	NA	<1	1.9
GT-7S	440.1			440.1									
NVP-1	NM	01/18/96	6.51	NA									
NVP-1	NM	02/15/96	5.83	NA									
NVP-1	NM	03/15/96	5.46	NA									
NVP-1	NM	04/11/96	5.72	NA									
NVP-1	NM	05/28/96	6.15	NA									
NVP-1	NM	06/26/96	6.18	NA									
NVP-1	NM	07/19/96	6.17	NA									
NVP-1	NM	08/19/96	8.63	NA									
NVP-1	NM	09/06/96	DRY	NA									
NVP-1	NM	10/09/96	6.35	NA									
NVP-1	NM	12/18/96	6.19	NA									
NVP-1	NM	01/30/97	6.98	NA									
NVP-1	NM	02/19/97	6.07	NA									
NVP-1	NM	04/02/97	5.55	NA									
NVP-1	NM	04/23/97	5.51	NA									
NVP-1	NM	05/13/97	5.99	NA									
NVP-1	NM	06/08/97	6.52	NA									
NVP-1	NM	07/08/97	6.15	NA									
NVP-1	NM	09/25/97	7.20	NA									
NVP-1	NM	10/22/97	DRY	NA									
NVP-1	NM	01/20/98	5.90	NA									
NVP-1	NM	02/16/98	5.99	NA									
NVP-1	NM	03/17/98	4.79	NA									
NVP-1	NM	05/07/98	5.98	NA									
NVP-1	NM	06/03/98	5.95	NA									
NVP-1	NM	[illegible]	[illegible]	NA									
NVP-1	NM	08/21/98	6.48	NA									
NVP-1	NM	10/19/98	7.10	NA									
NVP-1	NM	11/24/98	7.23	NA									
NVP-1	NM	12/23/98	DRY	NA									
NVP-1	NM	12/29/99	6.70	NA									
NVP-1	NM	02/13/00	6.24	NA									
NVP-1	NM	08/02/00	6.48	NA									
NVP-1	NM	08/29/00	6.95	NA									
NVP-1	NM	11/20/00	6.95	NA									
NVP-1	NM	02/23/01	6.75	NA									
NVP-1	NM	05/23/01	6.87	NA									
NVP-1	NM	08/29/01	7.53	NA									
NVP-1	NM	11/21/01	7.41	NA									
NVP-1	NM	02/13/02	6.76	NA									
NVP-1	NM	05/23/02	6.40	NA									
NVP-1	NM	08/29/02	7.35	NA									
NVP-1	NM	11/27/02	DRY	NA									
NVP-1	NM	02/28/03	7.67	NA									
NVP-1	NM	08/04/03	NM	NA									
NVP-1	NM	09/30/03	NM	NA									
NVP-1	NM	11/20/03	7.32	NA									
NVP-1	NM	02/26/04	7.96	NA									
NVP-1	NM			NA									
RW-1D	NM	02/08/95		NA	1	0	<1	<1	<1	1	1		3
RW-1D	NM	05/17/95		NA	3	5	<1	<1	<1	41	80		120
RW-1D	NM	09/30/95		NA	13	2	<1	2	11	<1	<1		28
RW-1D	NM	11/14/95		NA									
RW-1D	NM	02/15/96	6.58	NA									
RW-1D	NM	05/28/96	6.76	NA	<50	<50	<50	<50	<50	930	650		1610
RW-1D	NM	08/19/96	NG	NA	6	4	<1	<1	<1	620	660		1469
RW-1D	NM	11/21/96	7.35	NA	<1	<1	<1	<1	<1	240	650		890
RW-1D	NM	02/19/97	6.84	NA	<10	<10	<10	<10	<10	30	<10	77	107
RW-1D	NM	05/13/97	6.78	NA	<50	88	<50	<50	<50	<50	<50	110	198
RW-1D	NM	08/09/97	7.51	NA	<20	<20	<20	<20	<20	<20	<20	120	120
RW-1D	NM	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	140
RW-1D	NM	02/16/98	6.94	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-1D	NM	05/07/98	6.97	NA	<1	2	<1	<1	180	<1	<1	<1	162

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
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Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-1D	NM	12/28/99	7.13	NA	<1	<1	<1	<1	<1	<1	<1	13	13
RW-1D	NM	02/13/00	6.80	NA	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1D	NM	06/02/00	7.08	NA	<1	<1	<1	<1	<1	6	NA	26	32
RW-1D	NM	08/29/00	7.38	NA	<1	<1	<1	<1	<1	24	NA	42	66
RW-1D	NM	11/20/00	7.18	NA	<1	<1	<1	<1	<1	1	NA	<1	1
RW-1D	NM	02/23/01	5.87	NA	3	<1	<1	<1	<1	240	NA	380	623
RW-1D	NM	05/23/01	5.86	NA	1	<1	<1	<1	<1	160	NA	300	461
RW-1D	NM	08/29/01	7.42	NA	<1	<1	<1	<1	<1	2	NA	8	10
RW-1D	NM	11/21/01	7.25	NA	<1	<1	<1	<1	<1	<1	NA	4	4
RW-1D	NM	02/13/02	6.95	NA									0
RW-1D	NM	05/23/02	6.75	NA	<1	<1	<1	<1	<1	<1	NA	5	5
RW-1D	NM	08/29/02	7.15	NA	<1	<1	<1	<1	<1	<1	NA	3	3
RW-1D	NM	11/27/02	6.73	NA	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1D	NM	02/28/03	6.42	NA	<10	<10	<10	<10	<10	69	NA	127	196
RW-1D	NM	06/04/03	NM	NA	<1	<1	<1	<1	<1	22	NA	31	53
RW-1D	NM	09/30/03	6.48	NA	<1	<1	<1	<1	<1	<1	NA	13	13
RW-1D	NM	11/20/03	6.85	NA									
RW-1D	NM			NA									
RW-1S	437.5	03/01/92	5.75	431.75									
RW-1S	437.5	04/01/92	9.32	428.18									
RW-1S	437.5	05/01/92	9.40	428.1									
RW-1S	437.5	06/01/92	6.72	430.78									
RW-1S	437.5	11/01/92	8.45	429.05									
RW-1S	437.5	12/01/92	10.05	427.45									
RW-1S	437.5	01/01/93	10.10	427.4									
RW-1S	437.5	02/01/93	10.10	427.4									
RW-1S	437.5	03/01/93	8.28	429.22									
RW-1S	437.5	04/01/93	10.00	427.5									
RW-1S	437.5	08/01/93	10.05	427.45									
RW-1S	437.5	09/01/93	9.70	427.8									
RW-1S	437.5	10/01/93	8.80	428.7									
RW-1S	437.5	11/01/93	9.90	427.6									
RW-1S	437.5	12/01/93	10.30	427.2									
RW-1S	437.5	01/01/94	10.30	427.2									
RW-1S	437.5	02/01/94	[illegible]	[illegible]									
RW-1S	437.5	04/01/94	10.10	427.4									
RW-1S	437.5	05/01/94	49.75	387.75									
RW-1S	437.5	06/01/94	9.41	428.09									
RW-1S	437.5	07/01/94	9.65	427.85									
RW-1S	437.5	08/01/94	9.85	427.65									
RW-1S	437.5	09/01/94	9.64	427.86									
RW-1S	437.5	10/01/94	9.60	427.9									
RW-1S	437.5	11/01/94	9.85	427.65									
RW-1S	437.5	12/01/94	9.50	428									
RW-1S	437.5	01/01/95	9.45	428.05									
RW-1S	437.5	02/09/95	9.70	427.8	13,000	<50	140	<50	<50	840	230		14310
RW-1S	437.5	03/01/95	9.70	427.8									
RW-1S	437.5	04/01/95	9.38	428.12									
RW-1S	437.5	05/17/95	9.60	427.9	18,000	<250	<250	<250	<250	<250	<250		18000
RW-1S	437.5	06/01/95	9.35	428.15									
RW-1S	437.5	07/13/95	9.67	427.83									
RW-1S	437.5	08/16/95	9.64	427.86	23,000	<10	<10	<10	220	920	<10		24140
RW-1S	437.5	09/19/95	9.66	427.84									
RW-1S	437.5	10/17/95	9.64	427.86									
RW-1S	437.5	11/14/95	9.36	428.14	<1	<1	<1	<1	<1	<1	<1		<1
RW-1S	437.5	12/05/95	9.39	428.11									
RW-1S	437.5	01/16/96	8.86	428.64									
RW-1S	437.5	02/15/96	9.47	428.03	2,000				22		45		2067
RW-1S	437.5	03/15/96	8.97	428.53									
RW-1S	437.5	04/11/96	9.65	427.85									
RW-1S	437.5	05/28/96	9.53	427.97	5,900	<50	<50	<50	<50	1400	270		7570
RW-1S	437.5	06/26/96	6.17	431.33									
RW-1S	437.5	07/19/96	9.65	427.85									
RW-1S	437.5	08/19/96	7.33	430.17	<1	<1	<1	<1	<1	<1	<1		<1
RW-1S	437.5	09/08/96	8.58	428.92									
RW-1S	437.5	10/09/96	8.75	428.75									
RW-1S	437.5	11/21/96	9.12	428.38	3,800	<1	<1	<1	<1	14	46		3860
RW-1S	437.5	12/18/96	9.42	428.08									
RW-1S	437.5	01/30/97	9.40	428.1									
RW-1S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	55	7035
RW-1S	437.5	04/02/97	9.10	428.4									
RW-1S	437.5	04/23/97	9.07	428.43									

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Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-1S	437.5	07/08/97	9.27	428.23									
RW-1S	437.5	08/08/97	9.06	428.44	7,800	<20	<20	<20	<20	<20	<20	<20	7900
RW-1S	437.5	09/25/97	9.70	427.8									
RW-1S	437.5	10/22/97	9.55	427.95									
RW-1S	437.5	11/11/97			300	<10	<10	<10	<10	<10	<10	<10	300
RW-1S	437.5	12/10/97	6.02	431.48									
RW-1S	437.5	02/16/98			<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-1S	437.5	03/17/98	10.76	426.75									
RW-1S	437.5	05/07/98	8.75	428.75	24	1	<1	<2	78	<1	<1	<1	101
RW-1S	437.5	07/21/98	6.61	430.89									
RW-1S	437.5	08/21/98	6.68	430.82	180	<1	<1	<1	48	45	<1	<1	193
RW-1S	437.5	10/19/98	5.95	431.55									
RW-1S	437.5	11/24/98	8.95	428.55									
RW-1S	437.5	12/23/98	8.00	429.5									
RW-1S	437.5	12/29/99	6.40	431.1	<1	<1	<1	<1	<1	<1	<1	8	8
RW-1S	437.5	02/13/00	6.42	431.08	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	06/02/00	8.71	428.79	10	<1	<1	<1	<1	<1	NA	18	28
RW-1S	437.5	08/29/00	7.20	430.3	7	<1	<1	<1	<1	<1	NA	<1	7
RW-1S	437.5	11/20/00	10.63	426.87	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/23/01	8.60	428.9	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	05/23/01	5.50	432	1	<1	<1	<1	<1	<1	NA	4	5
RW-1S	437.5	08/29/01	6.94	430.56	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	11/21/01	9.67	427.83	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/13/02	9.05	428.45									0
RW-1S	437.5	05/23/02	11.43	426.07	<1	1	<1	<1	<1	<1	NA	<1	1
RW-1S	437.5	08/29/02	8.45	429.05	8	<1	<1	<1	<1	<1	NA	<1	8
RW-1S	437.5	11/27/02	11.65	425.85	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/28/03	11.67	425.83	1	<1	<1	<1	<1	<1	NA	1	2.2
RW-1S	437.5	06/04/03	NM	-	<1	<1	<1	<1	<1	<1	NA	1.1	1.1
RW-1S	437.5	09/30/03	NM										
RW-1S	437.5	11/20/03	5.97	431.53	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/26/04	7.48	430.02	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	03/01/92	6.65	431.55									
RW-2S	438.2	04/01/92	8.08	430.12									
RW-2S	438.2	05/01/92	7.93	430.27									
RW-2S	438.2	11/01/92	8.07	430.13									
RW-2S	438.2	12/01/92	7.93	430.27									
RW-2S	438.2	01/01/93	8.10	430.1									
RW-2S	438.2	03/01/93	8.03	430.17									
RW-2S	438.2	04/01/93	8.01	430.19									
RW-2S	438.2	05/01/93	8.40	429.8									
RW-2S	438.2	08/01/93	8.40	429.8									
RW-2S	438.2	09/01/93	7.80	430.4									
RW-2S	438.2	10/01/93	7.57	430.63									
RW-2S	438.2	11/01/93	8.45	429.75									
RW-2S	438.2	12/01/93	7.40	430.8									
RW-2S	438.2	01/01/94	7.40	430.8									
RW-2S	438.2	02/01/94	7.00	431.2									
RW-2S	438.2	04/01/94	7.35	430.85									
RW-2S	438.2	05/01/94	7.13	431.07									
RW-2S	438.2	06/01/94	7.52	430.68									
RW-2S	438.2	07/01/94	7.85	430.35									
RW-2S	438.2	08/01/94	7.42	430.78									
RW-2S	438.2	09/01/94	7.08	431.12									
RW-2S	438.2	10/01/94	7.10	431.1									
RW-2S	438.2	11/01/94	7.10	431.1									
RW-2S	438.2	12/01/94	7.03	431.17									
RW-2S	438.2	01/01/95	7.10	431.1									
RW-2S	438.2	02/09/95	7.51	430.69	<1	3	0	<1	<1	<1	<1		3
RW-2S	438.2	03/01/95	7.50	430.7									
RW-2S	438.2	04/01/95	6.97	431.23									
RW-2S	438.2	05/17/95	7.30	430.9	17	4	<1	<1	<1	<1	18		39
RW-2S	438.2	06/01/95	7.48	430.72									
RW-2S	438.2	07/13/95	7.72	430.48									
RW-2S	438.2	08/16/95	7.50	430.7	36	2	<1	<1	13	<1	<1		49
RW-2S	438.2	11/14/95	7.04	431.16	<1	<1	<1	<1	<1	<1	<1		<1
RW-2S	438.2	12/05/95	6.94	431.26									
RW-2S	438.2	01/16/96	DRY	#VALUE!									
RW-2S	438.2	02/15/96	7.17	431.03	<1	<1	<1	<1	2	<1	<1		2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
RW-2S	438.2	04/11/96	7.30	430.9									
RW-2S	438.2	05/28/96	7.14	431.06	71	9	<10	<10	<10	800	<10		1260

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Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-2S	438.2	08/19/96	7.13	431.07	<1	<1	<1	<1	<1	<1	5		5
RW-2S	438.2	09/06/96	DRY	WALUE!									
RW-2S	438.2	10/09/96	7.45	430.75									
RW-2S	438.2	11/21/96	7.65	430.55	<1	<1	<1	<1	<1	<1	5		5
RW-2S	438.2	12/18/96	8.13	430.07									
RW-2S	438.2	01/30/97	8.13	430.07									
RW-2S	438.2	02/19/97	8.52	429.68	<2	<2	<2	<2	<2	4	<2	35	39
RW-2S	438.2	04/02/97	8.03	430.17									
RW-2S	438.2	04/23/97	8.00	430.2									
RW-2S	438.2	05/13/97	8.20	430	<1	1	<1	<1	<1	<1	<1	32	33
RW-2S	438.2	06/09/97	7.10	431.1									
RW-2S	438.2	07/08/97	7.91	430.29									
RW-2S	438.2	08/08/97	7.97	430.23	<1	2	<1	<1	<1	<1	<1	<1	2
RW-2S	438.2	09/25/97	8.74	429.46									
RW-2S	438.2	10/22/97	8.40	429.8									
RW-2S	438.2	11/11/97		438.2	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	12/10/97	7.92	430.28									
RW-2S	438.2	01/20/98	8.36	429.84									
RW-2S	438.2	02/16/98	8.15	430.05	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	03/17/98	7.79	430.41									
RW-2S	438.2	05/07/98	8.81	429.39	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	06/03/98	8.09	430.11									
RW-2S	438.2	07/21/98	8.27	429.93									
RW-2S	438.2	08/21/98	7.43	430.77	22	<1	<1	<1	9	2	<1	<1	33
RW-2S	438.2	10/19/98	8.53	429.67									
RW-2S	438.2	11/24/98	8.11	430.09									
RW-2S	438.2	12/23/98	7.90	430.3									
RW-2S	438.2	12/29/99	7.15	431.05	<1	<1	<1	<1	<1	<1	<1	6	6
RW-2S	438.2	02/13/00	7.17	431.03	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	06/02/00	7.35	430.85	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/29/00	8.00	430.2	<1	<1	<1	<1	<1	<1	NA	7	7
RW-2S	438.2	11/20/00	8.00	430.2	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/23/01	8.40	429.8	<1	<1	<1	<1	<1	<1	NA	3	3
RW-2S	438.2	05/23/01	8.50	429.7	8	<1	<1	<1	<1	<1	NA	18	26
RW-2S	438.2	08/28/01	8.74	429.46	<1	<1	<1	<1	<1	<1	NA	5	5
RW-2S	438.2	11/21/01	10.04	428.16	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/13/02	8.30	429.9									0
RW-2S	438.2	06/23/02	9.82	428.68	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/29/02	8.20	430	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	11/27/02	9.87	428.33	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/28/03	9.78	428.42	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	06/04/03	NM		<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/30/03	NM										
RW-2S	438.2	11/20/03	7.17	431.03	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/26/04	7.23	430.97	<1	<1	<1	<1	<1	<1	NA	<1	0
SV-1	NM	01/16/96	5.65	NA									
SV-1	NM	02/15/96	4.74	NA									
SV-1	NM	03/15/96	5.65	NA									
SV-1	NM	04/11/96	6.69	NA									
SV-1	NM	05/28/96	6.98	NA									
SV-1	NM	06/28/96	6.25	NA									
SV-1	NM	07/19/96	DRY	NA									
SV-1	NM	08/19/96	6.58	NA									
SV-1	NM	09/06/96	DRY	NA									
SV-1	NM	10/09/96	6.61	NA									
SV-1	NM	11/21/96	DRY	NA									
SV-1	NM	12/18/96	3.88	NA									
SV-1	NM	01/30/97	4.76	NA									
SV-1	NM	02/19/97	4.87	NA									
SV-1	NM	04/02/97	4.15	NA									
SV-1	NM	04/23/97	4.12	NA									
SV-1	NM	05/13/97	5.88	NA									
SV-1	NM	06/09/97	6.35	NA									
SV-1	NM	07/08/97	5.10	NA									
SV-1	NM	10/22/97	DRY	NA									
SV-1	NM	12/10/97	5.06	NA									
SV-1	NM	01/20/98	4.70	NA									
SV-1	NM	02/16/98	5.45	NA									
SV-1	NM	03/17/98	5.92	NA									
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
SV-1	NM	06/03/98	6.10	NA									
SV-1	NM	07/21/98	6.22	NA									

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Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
SV-1	NM	11/24/98	DRY	NA									
SV-1	NM	12/23/98	DRY	NA									
SV-1	NM	12/28/98	DRY	NA									
SV-1	NM	02/13/00	DRY	NA									
SV-1	NM	05/02/00	DRY	NA									
SV-1	NM	08/29/00	DRY	NA									
SV-1	NM	11/20/00	DRY	NA									
SV-1	NM	02/23/01	DRY	NA									
SV-1	NM	05/23/01	DRY	NA									
SV-1	NM	08/28/01	DRY	NA									
SV-1	NM	11/21/01	DRY	NA									
SV-1	NM	02/13/02	DRY	NA									
SV-1	NM	05/23/02	6.01	NA									
SV-1	NM	08/29/02	DRY	NA									
SV-1	NM	11/27/02	6.19	NA									
SV-1	NM	02/26/03	5.98	NA									
SV-1	NM	06/04/03	NM	NA									
SV-1	NM	09/30/03	NM	NA									
SV-1	NM	11/20/03	DRY	NA									
SV-1	NM	02/26/04	DRY	NA									
VEP-1	NM	01/16/96	7.54	NA									
VEP-1	NM	02/15/96	6.28	NA									
VEP-1	NM	03/15/96	6.09	NA									
VEP-1	NM	04/11/96	6.38	NA									
VEP-1	NM	05/28/96	6.61	NA									
VEP-1	NM	06/26/96	6.63	NA									
VEP-1	NM	07/19/96	8.33	NA									
VEP-1	NM	08/19/96	9.14	NA									
VEP-1	NM	09/06/96	7.25	NA									
VEP-1	NM	10/09/96	6.91	NA									
VEP-1	NM	11/21/96	8.31	NA									
VEP-1	NM	12/18/96	6.79	NA									
VEP-1	NM	01/30/97	7.54	NA									
VEP-1	NM	02/18/97	7.65	NA									
VEP-1	NM	04/02/97	7.02	NA									
VEP-1	NM	04/28/97	7.00	NA									
VEP-1	NM	05/13/97	6.53	NA									
VEP-1	NM	06/08/97	8.09	NA									
VEP-1	NM	07/08/97	7.42	NA									
VEP-1	NM	08/08/97	7.80	NA									
VEP-1	NM	08/25/97	8.50	NA									
VEP-1	NM	10/22/97	8.77	NA									
VEP-1	NM	12/10/97	6.90	NA									
VEP-1	NM	01/20/98	6.58	NA									
VEP-1	NM	02/16/98	6.60	NA									
VEP-1	NM	03/17/98	6.50	NA									
VEP-1	NM	04/15/98	6.75	NA									
VEP-1	NM	05/07/98	7.53	NA									
VEP-1	NM	06/03/98	7.05	NA									
VEP-1	NM	09/21/98	7.46	NA									
VEP-1	NM	10/19/98	8.78	NA									
VEP-1	NM	11/24/98	8.41	NA									
VEP-1	NM	12/23/98	8.41	NA									
VEP-1	NM	12/28/98		NA									
VEP-1	NM	02/13/00	7.38	NA									
VEP-1	NM	05/02/00	7.90	NA									
VEP-1	NM	08/29/00	8.22	NA									
VEP-1	NM	11/20/00	8.18	NA									
VEP-1	NM	02/23/01	8.13	NA									
VEP-1	NM	05/23/01	8.08	NA									
VEP-1	NM	08/29/01	8.71	NA									
VEP-1	NM	11/21/01	8.71	NA									
VEP-1	NM	02/13/02	8.02	NA									
VEP-1	NM	05/23/02	7.79	NA									
VEP-1	NM	08/29/02	8.60	NA									
VEP-1	NM	11/27/02	7.60	NA									
VEP-1	NM	02/26/03	7.52	NA									
VEP-1	NM	06/04/03	NM	NA									
VEP-1	NM	09/30/03	NM	NA									
VEP-1	NM	11/20/03	[illegible]	NA									
VEP-1	NM	02/26/04	7.66	NA									
VEP-2	NM	02/15/96	5.86	NA	<1	<1	<1	<1	<1	<1	<1		ND

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
VEP-2	NM	11/21/96	7.56	NA									
VEP-2	NM	02/19/97	6.68	NA									
VEP-2	NM	05/13/97	5.68	NA									
VEP-2	NM	08/09/97	6.95	NA									
VEP-2	NM	02/16/98	6.40	NA									
VEP-2	NM	05/07/98	6.04	NA									
VEP-2	NM	08/21/98	7.24	NA									
VEP-2	NM	11/24/98	7.68	NA									
VEP-2	NM	12/29/99	7.28	NA									
VEP-2	NM	02/13/00	8.91	NA									
VEP-2	NM	06/02/00	6.66	NA									
VEP-2	NM	08/29/00	7.18	NA									
VEP-2	NM	11/20/00	7.51	NA									
VEP-2	NM	02/23/01	7.04	NA									
VEP-2	NM	05/23/01	7.45	NA									
VEP-2	NM	08/29/01	7.90	NA									
VEP-2	NM	11/21/01	8.31	NA									
VEP-2	NM	02/13/02	7.53	NA									
VEP-2	NM	05/23/02	6.85	NA									
VEP-2	NM	08/29/02	7.80	NA									
VEP-2	NM	11/27/02	7.01	NA									
VEP-2	NM	02/28/03	6.80	NA									
VEP-2	NM	06/04/03	NM	NA									
VEP-2	NM	09/30/03	NM	NA									
VEP-2	NM	11/20/03	6.97	NA									
VEP-2	NM	02/26/04	6.37	NA									
VEP-3	NM	02/15/96	DRY	NA									
VEP-3	NM	05/28/96	DRY	NA									
VEP-3	NM	08/19/96	DRY	NA									
VEP-3	NM	11/21/96	DRY	NA									
VEP-3	NM	02/19/97	5.10	NA									
VEP-3	NM	05/13/97	DRY	NA									
VEP-3	NM	08/09/97	DRY	NA									
VEP-3	NM	02/16/98	DRY	NA									
VEP-3	NM	05/07/98	DRY	NA									
VEP-3	NM	08/21/98	DRY	NA									
VEP-3	NM	11/24/98	DRY	NA									
VEP-3	NM	12/29/99	[illegible]	NA									
VEP-3	NM	02/13/00	DRY	NA									
VEP-3	NM	06/02/00	DRY	NA									
VEP-3	NM	08/29/00	DRY	NA									
VEP-3	NM	11/20/00	DRY	NA									
VEP-3	NM	02/23/01	DRY	NA									
VEP-3	NM	05/23/01	DRY	NA									
VEP-3	NM	08/29/01	DRY	NA									
VEP-3	NM	11/21/01	DRY	NA									
VEP-3	NM	02/13/02	DRY	NA									
VEP-3	NM	05/23/02	DRY	NA									
VEP-3	NM	08/29/02	DRY	NA									
VEP-3	NM	11/27/02	DRY	NA									
VEP-3	NM	02/28/03	DRY	NA									
VEP-3	NM	06/04/03	DRY	NA									
VEP-3	NM	09/30/03	NM	NA									
VEP-3	NM	11/20/03	DRY	NA									
VEP-3	NM			NA									
VEP-4	NM	02/09/95		NA	<1	1	<1	<1	<1	<1	<1		1
VEP-4	NM	05/17/95		NA	110	140	<1	2	<1	<1	26		278
VEP-4	NM	08/16/95		NA	8	3	<1	2	<1	<1	<1		14
VEP-4	NM	11/14/95		NA	<1	1	<1	<1	<1	<1	<1		1
VEP-4	NM	02/15/96	7.62	NA	<1	<1	<1	<1	<1	<1	<1		ND
VEP-4	NM	05/28/96	7.27	NA	<1	2	<1	2	<1	<1	<1		4
VEP-4	NM	08/19/96	8.03	NA	<1	2	<1	1	<1	<1	<1		3
VEP-4	NM	11/21/96	8.16	NA	<1	2	<1	<1	<1	<1	<1		2
VEP-4	NM	02/19/97	8.39	NA	<1	10	<1	<1	<1	<1	<1	2	12
VEP-4	NM	05/12/97	7.51	NA	<1	4	<1	1	<1	<1	<1	<1	5
VEP-4	NM	08/09/97	8.71	NA	<1	5	<1	<1	<1	<1	<1	<1	5
VEP-4	NM	11/11/97	8.15	NA	<1	14	<1	<1	<1	<1	<1	<1	14
VEP-4	NM	02/16/98	7.85	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
VEP-4	NM	05/07/98	7.52	NA	<1	2	<1	<1	<1	<1	<1	<1	2
VEP-4	NM	08/21/98	9.85	NA	<1	1	<1	<1	<1	<1	<1	<1	1
VEP-4	NM	11/24/98	9.36	NA									
VEP-4	NM	12/29/99	8.90	NA	<1	2	<1	<1	<1	<1	<1	<1	2

ft-asl = feet above sea level
ug/l = micrograms per liter
M:\Common\Proj\PawlingCorp\Report2002\Table1

Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
VEP-4	NM	08/29/00	8.55	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	11/20/00	6.98	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	02/23/01	NM	NA	Well Cap Brkn								
VEP-4	NM	05/23/01	NM	NA	Well Cap Brkn								
VEP-4	NM	08/29/01	NM	NA	Well Cap Brkn								
VEP-4	NM	11/21/01	10.15	NA	<1	6	<1	<1	<1	<1	NA	<1	6
VEP-4	NM	02/13/02	NM	NA	Well Cap Brkn								
VEP-4	NM	05/23/02	8.69	NA		<1	<1	<1	<1	<1	NA	<1	0
VEP-4	NM	08/29/02	9.15	NA		7	<1	<1	<1	<1	NA	2	9
VEP-4	NM	11/27/02	8.42	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	02/28/03	NM	NA									
VEP-4	NM	06/04/03	NM	NA									
VEP-4	NM	09/30/03	7.94	NA	<1	2.8	<1	<1	<1	<1	NA	<1	2.8
VEP-4	NM	11/20/03	8.31	NA									
VEP-4	NM	02/26/04	8.83	NA									
VEP-5	NM	02/15/96	DRY	NA									
VEP-5	NM	05/28/96	DRY	NA									
VEP-5	NM	08/19/96	DRY	NA									
VEP-5	NM	11/21/96	DRY	NA									
VEP-5	NM	02/18/97	4.07	NA									
VEP-5	NM	05/13/97	DRY	NA									
VEP-5	NM	08/08/97	DRY	NA									
VEP-5	NM	02/16/98		NA									
VEP-5	NM	05/07/98		NA									
VEP-5	NM	08/21/98	DRY	NA									
VEP-5	NM	11/24/98	4.03	NA									
VEP-5	NM	12/20/99		NA									
VEP-5	NM	02/13/00	DRY	NA									
VEP-5	NM	08/02/00	DRY	NA									
VEP-5	NM	08/29/00	DRY	NA									
VEP-5	NM	11/20/00	DRY	NA									
VEP-5	NM	02/23/01	NM	NA									
VEP-5	NM	05/23/01	DRY	NA									
VEP-5	NM	08/29/01	DRY	NA									
VEP-5	NM	11/21/01	DRY	NA									
VEP-5	NM	02/13/01	DRY	NA									
VEP-5	NM	05/23/01	DRY	NA									
VEP-5	NM	08/28/01	DRY	NA									
VEP-5	NM	11/21/01	DRY	NA									
VEP-5	NM	02/13/02	DRY	NA									
VEP-5	NM	05/23/02	3.72	NA									
VEP-5	NM	08/29/02	DRY	NA									
VEP-5	NM	11/27/02	4.73	NA									
VEP-5	NM	02/28/03	4.18	NA									
VEP-5	NM	06/04/03	3.17	NA									
VEP-5	NM	09/30/03	NM	NA									
VEP-5	NM	11/20/03	2.80	NA									
VEP-5	NM	02/26/04	DRY	NA									
VEP-6	NM	01/16/96	8.51	NA									
VEP-6	NM	02/15/96	5.70	NA									
VEP-6	NM	03/15/96	5.45	NA									
VEP-6	NM	04/11/96	6.21	NA									
VEP-6	NM	05/28/96	6.18	NA									
VEP-6	NM	06/26/96	5.71	NA									
VEP-6	NM	07/19/96	5.93	NA									
VEP-6	NM	08/19/96	6.19	NA									
VEP-6	NM	09/06/96	6.35	NA									
VEP-6	NM	10/09/96	6.17	NA									
VEP-6	NM	11/21/96	7.42	NA									
VEP-6	NM	12/16/96	5.85	NA									
VEP-6	NM	01/30/97	DRY	NA									
VEP-6	NM	02/19/97	5.90	NA									
VEP-6	NM	04/02/97	5.02	NA									
VEP-6	NM	04/23/97	4.99	NA									
VEP-6	NM	05/13/97	5.16	NA									
VEP-6	NM	06/09/97	DRY	NA									
VEP-6	NM	07/08/97	DRY	NA									
VEP-6	NM	10/22/97	DRY	NA									
VEP-6	NM	12/10/97	DRY	NA									
VEP-6	NM	[illegible]	[illegible]	NA									
VEP-6	NM	02/16/98	3.40	NA									
VEP-6	NM	03/17/98	3.33	NA									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
VEP-6	NM	07/21/98	3.60	NA									
VEP-6	NM	08/21/98	3.40	NA									
VEP-5	NM	10/19/98	3.58	NA									
VEP-5	NM	11/24/98	3.58	NA									
VEP-6	NM	12/23/98	DRY	NA									
VEP-6	NM	12/29/99	3.45	NA									
VEP-6	NM	02/13/00	DRY	NA									
VEP-6	NM	06/02/00	DRY	NA									
VEP-6	NM	08/28/00	3.23	NA									
VEP-6	NM	11/20/00	DRY	NA									
VEP-6	NM	02/23/01	3.28	NA									
VEP-6	NM	05/23/01	DRY	NA									
VEP-6	NM	08/28/01	7.24	NA									
VEP-6	NM	11/21/01	DRY	NA									
VEP-6	NM	02/13/02	6.78	NA									
VEP-6	NM	05/23/02	3.10	NA									
VEP-6	NM	08/29/02	3.20	NA									
VEP-6	NM	11/27/02	4.00	NA									
VEP-6	NM	02/26/03	DRY	NA									
VEP-6	NM	06/04/03	NM	NA									
VEP-6	NM	09/30/03	NM	NA									
VEP-6	NM	11/20/03	3.00	NA									
VEP-6	NM	2/26/2004	DRY	NA									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 2

Pawling Corporation
Recovery Well Sampling Results

Month	Well	Toluene	TCE	1,1,1 TCA	PCE	Trans 1,2-DCE	Vinyl Chloride	Cis-1,2 DCE	Total
June 4, 2003 (May event)	RW-1S	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	1.1
	RW-2S	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
September 30, 2003 (August event)	RW-1S	NS	NS	NS	NS	NS	NS	NS	NS
	RW-2S	NS	NS	NS	NS	NS	NS	NS	NS
November 20, 2003	RW-1S	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	RW-2S	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
February 26, 2004	RW-1S	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	RW-2S	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes: All analytical results expressed in micrograms per liter (ug/l)   NS = Not Sampled

Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS)		GALLONS PUMPED SINCE LAST MONITOR DATE		TOTAL VOC CONCENTRATION (milligrams per liter)		TOTAL POUNDS REMOVED BETWEEN MONITORING DATES			CUMULATIVE POUNDS REMOVED
	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	BOTH	
03/11/92	680	120	680	120	154.07	154.07	0.87	0.15	1.03	**1.03**
04/10/92	1,980	720	1,300	600	154.07	154.07	1.67	0.77	2.44	**3.47**
05/26/92	44,520	1,410	42,540	690	154.07	154.07	54.69	0.89	55.58	**59.05**
06/29/92	72,990	4,040	28,470	2,630	154.07	154.07	36.60	3.38	39.98	**99.03**
09/16/92	73,300	4,080	310	40	76	76	0.20	0.03	0.22	**99.26**
10/16/92	108,540	4,480	35,240	400	76	76	22.35	0.25	22.60	**121.86**
11/20/92	136,240	5,670	27,700	1,190	76	76	17.57	0.75	18.32	**140.18**
12/18/92	156,156	6,610	19,916	940	76	76	12.63	0.60	13.23	**153.41**
01/13/93	164,970	7,080	8,814	470	43.11	0.04	3.17	0.00	3.17	**156.58**
02/01/93	181,860	7,925	16,890	845	43.11	0.04	6.08	0.00	6.08	**162.65**
03/02/93	195,640	8,860	13,780	935	43.11	0.04	4.96	0.00	4.96	**167.61**
04/01/93	214,230	10,470	18,590	1,610	20.66	0.062	3.20	0.00	3.21	**170.82**
04/27/93	224,440	11,260	10,210	790	20.66	0.062	1.76	0.00	1.76	**172.58**
05/06/93	224,700	11,300	260	40	8.95	27.94	0.02	0.01	0.03	**172.61**
06/21/93	240,640	12,190	15,940	890	8.95	27.94	1.19	0.21	1.40	**174.00**
06/28/93	243,920	12,300	3,280	110	8.95	27.94	0.24	0.03	0.27	**174.27**
07/14/93	250,780	12,400	6,860	100	14.74	*	0.84	0.00	0.84	**175.12**
08/11/93	261,310	12,410	10,530	10	19.84	9.4	1.74	0.00	1.74	**176.86**
09/23/93	276,060	12,410	14,750	0	19.84	9.4	2.44	0.00	2.44	**179.30**
10/20/93	285,040	12,410	8,980	0	22.45	0.02	1.68	0.00	1.68	**180.99**
11/17/93	295,230	12,420	10,190	10	22.45	0.02	1.91	0.00	1.91	**182.89**
12/14/93	312,770	12,530	17,540	110	22.45	0.02	3.29	0.00	3.29	**186.18**
01/24/94	344,170	12,570	31,400	40	6.9	0.08	1.81	0.00	1.81	**187.99**
02/25/94	418,930	12,970	74,760	400	32.3	0.21	20.15	0.00	20.15	**208.14**
03/15/94	431,850	15,150	12,920	2,180	32.3	0.21	3.48	0.00	3.49	**211.63**
04/05/94	432,450	16,810	600	1,660	11	6.09	0.06	0.08	0.14	**211.76**
05/03/94	432,950	17,650	500	840	23.6	5	0.10	0.04	0.13	**211.90**
06/30/94	451,560	17,650	18,610	0	23.6	5	3.66	0.00	3.66	**215.56**
07/15/94	456550	17650	4,990	0	24	5.9	1.00	0.00	1.00	**216.56**
08/09/94	465770	17770	9,220	120	14.56	0.46	1.12	0.00	1.12	**217.68**
09/08/94	478090	18280	12,320	510	14.56	0.46	1.50	0.00	1.50	**219.18**
10/13/94	491,700	18,430	13,610	150	7.31	0.24	0.83	0.00	0.83	**220.01**
11/02/94	499,310	18,570	7,610	920	0.05	0.01	0.00	0.00	0.00	**220.01**
12/06/94	512,570	19,540	13,260	970	0.05	0.01	0.01	0.00	0.01	**220.02**
01/11/95	524,290	20,850	11,720	1,310	7.18	0.003	0.70	0.00	0.70	**220.72**
02/09/95	535,850	21,990	11,360	1,140	14.31	0.003	1.36	0.00	1.36	**222.08**
03/15/95	547,870	22,470	12,220	480	13.63	*	1.39	0.00	1.39	**222.47**
04/25/95	560,110	22,810	12,240	340	18.00	0.04	1.84	0.00	1.84	**225.31**

Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS) RW-1	TOTALIZER READINGS (GALLONS) RW-2	GALLONS PUMPED SINCE LAST MONITOR DATE RW-1	GALLONS PUMPED SINCE LAST MONITOR DATE RW-2	TOTAL VOC CONCENTRATION (milligrams per liter) RW-1	TOTAL VOC CONCENTRATION (milligrams per liter) RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-1	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES BOTH	CUMULATIVE POUNDS REMOVED
06/20/95	578,890	22,820	11,050	10	18.00	0.04	1.66	0.00	1.66	228.13
07/13/95	584,740	22,820	5,850	0	24.14	0.05	1.18	0.00	1.18	229.31
08/15/95	592,820	22,820	8,080	0	24.14	0.05	1.63	0.00	1.63	230.94
09/19/95	597,860	22,820	5,040	0	24.14	0.05	1.02	0.00	1.02	231.96
10/17/95	605,300	22,820	7,440	0	0.0	0.0	0.00	0.00	0.00	231.96
11/14/95	611,600	22,830	6,300	10	0.0	0.0	0.00	0.00	0.00	231.96
12/05/95	618,980	22,960	7,380	130	0.0	0.0	0.00	0.00	0.00	231.96
01/16/96	630,480	23,090	11,500	130	2.07	0.0	0.20	0.00	0.20	232.16
02/15/96	640,000	24,350	9,520	1,260	2.07	0.0	0.16	0.00	0.16	232.32
03/15/96	645,550	25,440	5,550	1,090	2.07	0.0	0.10	0.00	0.10	232.42
04/11/96	648,614	26,468	3,064	1,028	8.23	1.26	0.21	0.01	0.22	232.64
05/29/96	660,510	27,870	11,896	1,402	8.23	1.26	0.82	0.01	0.83	233.47
06/26/96	660,510	28,170	0	300	8.23	1.26	0.00	0.00	0.00	233.47
07/19/96	665,260	28,350	4,760	180	0.0005	0.0045	0.00	0.00	0.00	233.47
08/19/96	667,450	28,570	2,190	220	0.0005	0.0045	0.00	0.00	0.00	233.47
09/06/96	667,460	28,580	10	10	0.0005	0.0045	0.00	0.00	0.00	233.47
10/09/96	672,710	28,720	5,250	140	3.86	0.005	0.17	0.00	0.17	233.64
11/21/96	680,791	29,599	8,081	879	3.86	0.005	0.26	0.00	0.26	233.90
12/18/96	687,998	31,391	7,207	1,792	3.86	0.005	0.23	0.00	0.23	234.13
01/30/97	698,470	33,085	10,472	1,694	7.94	0.039	0.69	0.00	0.69	234.82
02/19/97	703,180	33,653	4,710	568	7.94	0.039	0.31	0.00	0.31	235.13
04/02/97	712,501	34,713	9,321	1,060	7.94	0.039	0.62	0.00	0.62	235.75
04/23/97	718,960	36,005	6,459	1,292	0.35	0.033	0.02	0.00	0.02	235.77
05/13/97	722,865	37,949	3,905	1,944	0.35	0.033	0.01	0.00	0.01	235.78
06/09/97	728,810	38,880	5,945	931	0.35	0.033	0.02	0.00	0.02	235.80
07/08/97	733,450	38,250	4,640	(630)	7.90	0.0015	0.31	0.00	0.31	236.11
08/09/97	735,580	38,450	2,130	200	7.90	0.0015	0.14	0.00	0.14	236.25
09/25/97	744,660	39,220	9,080	770	7.90	0.0015	0.60	0.00	0.60	236.85
10/22/97	748,550	39,360	3,890	140	0.30	0.0	0.01	0.00	0.01	236.86
11/11/97	751,270	39,980	2,720	620	0.30	0.0	0.01	0.00	0.01	236.87
12/10/97	751,270	42,750	0	2,770	0.30	0.0	0.00	0.00	0.00	236.87
01/20/98	751,270	45,740	0	2,990	0.0	0.0	0.00	0.00	0.00	236.87
02/16/98	752,600	47,010	1,330	1,270	0.0	0.0	0.00	0.00	0.00	236.87
03/17/98	752,870	48,460	270	1,450	0.0	0.0	0.00	0.00	0.00	236.87
04/15/98	755,810	48,750	2,940	290	0.10	0.0	0.01	0.00	0.01	236.88
05/27/98	772,810	49,070	17,000	320	0.10	0.0	0.01	0.00	0.01	236.89
06/03/98	784,750	50,050	11,940	980	0.10	0.0	0.01	0.00	0.01	236.90
07/21/98	787,610	51,930	2,860	1,880	0.193	0.0325	0.00	0.00	0.01	236.91

Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS) RW-1	TOTALIZER READINGS (GALLONS) RW-2	GALLONS PUMPED SINCE LAST MONITOR DATE RW-1	GALLONS PUMPED SINCE LAST MONITOR DATE RW-2	TOTAL VOC CONCENTRATION (milligrams per liter) RW-1	TOTAL VOC CONCENTRATION (milligrams per liter) RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-1	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES BOTH	CUMULATIVE POUNDS REMOVED
09/18/98	793,735	52,495	6,125	565	0.193	0.0057	0.01	0.00	0.01	**236.92**
10/19/98	796,730	53,310	2,995	815	0.034	0.0057	0.00	0.00	0.00	**236.92**
11/24/98	826,830	53,970	30,100	660	0.034	0.0057	0.01	0.00	0.01	**236.93**
12/23/98	838,140	54,530	11,310	560	0.034	0.0	0.00	0.00	0.00	**236.93**
01/14/99	840,660	54,590	2,460	60	0.819	0.0	0.02	0.00	0.02	**236.95**
02/11/99	843,310	57,290	2,710	2,700	0.819	0.0	0.02	0.00	0.02	**236.97**
03/25/99	843,310	57,323	0	33	0.819	0.0	0.00	0.00	0.00	**236.97**
04/23/99	843,310	57,670	0	347	0.001	0.0	0.00	0.00	0.00	**236.97**
05/25/99	843,310	57,673	0	3	0.001	0.0	0.00	0.00	0.00	**236.97**
06/29/99	843,310	58,010	0	337	0.001	0.0	0.00	0.00	0.00	**236.97**
07/27/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	**236.97**
08/30/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	**236.97**
09/21/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	**236.97**
10/27/99	843,310	58,010	0	0	0.008	0.006	0.00	0.00	0.00	**236.97**
11/30/99	843,478	58,093	168	83	0.008	0.006	0.00	0.00	0.00	**236.97**
12/29/99	843,478	58,093	0	0	0.008	0.006	0.00	0.00	0.00	**236.97**
01/18/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	**236.97**
02/16/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	**236.97**
03/23/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	**236.97**
04/25/00	843,478	58,093	0	0	0.028	0.0	0.00	0.00	0.00	**236.97**
06/02/00	141,430	58,100		7	0.028	0.0	0.00	0.00	0.00	**236.97**
06/19/00	148,160	60,230	6,730	2,130	0.028	0.0	0.00	0.00	0.00	**236.97**
07/21/00	148,160	60,230	0	0	0.007	0.007	0.00	0.00	0.00	**236.97**
08/29/00	148,560	60,390	400	160	0.007	0.007	0.00	0.00	0.00	**236.97**
09/20/00	157,010	63,130	8,450	2,740	0.007	0.007	0.00	0.00	0.00	**236.97**
10/12/00	163,002	63,630	5,992	500	0.0	0.0	0.00	0.00	0.00	**236.97**
11/20/00	165,020	64,170	2,018	540	0.0	0.0	0.00	0.00	0.00	**236.97**
12/20/00	165,240	65,150	220	980	0.0	0.0	0.00	0.00	0.00	**236.97**
01/29/01	177,958	66,140	12,718	990	0.0	0.003	0.00	0.00	0.00	**236.97**
02/23/01	182,580	67,900	4,622	1,760	0.0	0.003	0.00	0.00	0.00	**236.97**
03/29/01	183,030	70,030	450	2,130	0.0	0.003	0.00	0.00	0.00	**236.97**
04/19/01	183,110	74,590	80	4,560	0.005	0.003	0.00	0.00	0.00	**236.97**
05/23/01	183,320	75,450	210	860	0.005	0.026	0.00	0.00	0.00	**236.97**
06/22/01		78,170		2,720	0.005	0.026	0.00	0.00	0.00	**236.97**
07/20/01	185,630	80,800	185,630	2,630	0.0	0.005	0.00	0.00	0.00	**236.97**
08/29/01	202,930		17,300		0.0	0.005	0.00	0.00	0.00	**236.97**
09/26/01	209,700		6,770		0.0	0.005	0.00	0.00	0.00	**236.97**
10/31/01	209,700		0		0.0	0.0	0.00	0.00	0.00	**236.97**

Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS) RW-1	TOTALIZER READINGS (GALLONS) RW-2	GALLONS PUMPED SINCE LAST MONITOR DATE RW-1	GALLONS PUMPED SINCE LAST MONITOR DATE RW-2	TOTAL VOC CONCENTRATION (milligrams per liter) RW-1	TOTAL VOC CONCENTRATION (milligrams per liter) RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-1	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES BOTH	CUMULATIVE POUNDS REMOVED
12/18/01	251,063		251,063		0.0	0.0	0.00	0.00	0.00	236.97
01/29/02	255,710		4,647		0.000	0.00	0.00	0.00	0.00	236.97
02/13/02	257,490		1,780		0.000	0.00	0.00	0.00	0.00	236.97
03/21/02					0.000	0.00	0.00	0.00	0.00	236.97
04/23/02	260,360		2,870		0.000	0.00	0.00	0.00	0.00	236.97
05/23/02	260,630		270		0.001	0.00	0.00	0.00	0.00	236.97
06/17/02	268,570		7,940		0.001	0.00	0.00	0.00	0.00	236.97
07/17/02	277,410		8,840		0.001	0.00	0.00	0.00	0.00	236.97
08/29/02	289,130		11,720		0.008	0.00	0.00	0.00	0.00	236.97
09/27/02	290,320		1,190		0.008	0.00	0.00	0.00	0.00	236.97
10/21/02					0.008	0.00	0.00	0.00	0.00	236.97
11/27/02	80,960		0		0.000	0.00	0.00	0.00	0.00	236.97
12/17/02	93,410		12,450		0.000	0.00	0.00	0.00	0.00	236.97
01/29/03	115,610		22,200		0.000	0.00	0.00	0.00	0.00	236.97
02/28/03	119,710		4,100		0.000	0.00	0.00	0.00	0.00	236.97
3/31/2003	121490		1,780		0.000	0.00	0.00	0.00	0.00	236.97
4/21/2003	121810		320		0.000	0.00	0.00	0.00	0.00	236.97
5/14/2003	122210		400		0.000	0.00	0.00	0.00	0.00	236.97
6/4/2003	122650		440		0.001	0.00	0.00	0.00	0.00	236.97
7/30/2003			-122,650		0.001	0.00	0.00	0.00	0.00	236.97
9/30/2003			0		0.001	0.00	0.00	0.00	0.00	236.97
10/17/2003			0		0.001	0.00	0.00	0.00	0.00	236.97
11/20/2003			0		0.000	0.00	0.00	0.00	0.00	236.97
12/16/2003			0		0.000	0.00	0.00	0.00	0.00	236.97
1/14/2004			0		0.000	0.00	0.00	0.00	0.00	236.97
2/26/2004	122870		122,870		0.000	0.00	0.00	0.00	0.00	236.97
3/27/2004	123210		340		0.000	0.00	0.00	0.00	0.00	236.97

Notes: 1. 1.03 pounds removed during initial system shakedown. 2. Total VOCs are from month indicated or closest sampling date.
* Only combined influent sample collected this date. Assume all contribution from RW-1.

Table 4

Pawling Corporation
Water Treatment Discharge Sampling Results

Month	Toluene	PCE	1,1,1 TCA	Trans 1,2-DCE	TCE
SPDES Discharge Limit	33.0	4.6	20.0	30.0	20.0
April 25, 2003	<1	<1	<1	<1	<1
May 30, 2003	<1	<1	<1	<1	<1
March 27, 2004*	<1	<1	<1	<1	1.9

Note: -All analytical results expressed in micrograms per liter (ug/l)
-System was not functioning for most of the reporting year, therefore the months with no sample data are omitted from this table.
* = USEPA sample holding time limit of 14 days was exceeded.

Table 5

Pawling Corporation
Off-Gas Effluent Monitoring Results

Monitoring Date	Photo Ionization Detector Reading			Laboratory Analytical Total VOCs	
	SVE	A/S	DPE	SVE	A/S & DPE
4/21/03	0.0	0.0	0.0	NA	NA
5/14/03	0.0	0.0	0.0	NA	NA
6/4/03	0.0	0.0	0.0	NA	NA
7/30/03	NA	NA	NA	NA	NA
9/30/03	NA	NA	NA	NA	NA
10/17/03	NA	NA	NA	NA	NA
11/20/03	NA	NA	NA	NA	NA
12/16/03	NA	NA	NA	NA	NA
1/14/04	NA	NA	NA	NA	NA
2/25/04	NA	0.0	0.0	NA	NA
3/27/04	0.0	0.0	0.0	NA	NA

All results expressed in parts per million volume (ppmv)

NA = Not Applicable

Table 6

Pawling Corporation
GT-7S Analytical Results

Month	Toluene	PCE	TCE	1,1,1 TCA	Trans-1,2-DCE	Cis 1,2-DCE	Vinyl Chloride	Total VOCs
April 21, 2003*	<1.0	<1.0	1	<1.0	<1.0	<1.0	<1.0	1
May 14, 2003*	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	1.4
June 4, 2003*	1.3	<1.0	3.8	<1.0	<1.0	<1.0	<1.0	5.1
July 30, 2003*	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	1.2
August, 2003	NA	NA	NA	NA	NA	NA	NA	NA
September 30, 2003*	<1.0	<1.0	10	<1.0	<1.0	<1.0	<1.0	10
October 17, 2003*	<1.0	1.1	14	<1.0	<1.0	1.1	NA	16.2
November 20, 2003	<1.0	<1.0	12	<1.0	<1.0	<1.0	<1.0	12
December 16, 2003*	<1.0	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	2.0
January 14, 2004*	<1.0	<1.0	4.3	<1.0	<1.0	<1.0	<1.0	4.3
February 26, 2004	<1.0	<1.0	2.9	<1.0	<1.0	<1.0	<1.0	2.9
March 27, 2004*	<1.0	<1.0	1.9	<1.0	<1.0	<1.0	<1.0	1.9

Note: All analytical results are expressed in micrograms per liter (ug/l)
NA = Parameter not analyzed for.
* = USEPA sample holding time limit of 14 days exceeded.

Table 7

Pawling Corporation
Deep Monitoring Well Sampling Results

Month	Well	Toluene	TCE	1,1,1 TCA	PCE	Trans 1,2-DCE	Vinyl Chloride	Cis-1,2 DCE	Total
	NYSDEC Groundwater Standard	5	5	5	5	5	2	5	-------
November 20, 2003	MW-2D1	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	1.6	3.0
	MW-2D2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
February 26, 2004	MW-2D1	<1.0	1.6	<1.0	1.2	<1.0	<1.0	5.0	7.8
	MW-2D2	<1.0	<1.0	<1.0	2.7	<1.0	<1.0	1.2	3.9

Note: All analytical results expressed in micrograms per liter (ug/l)
All samples were analyzed within the USEPA holding time limit of 14 days.

FIGURES

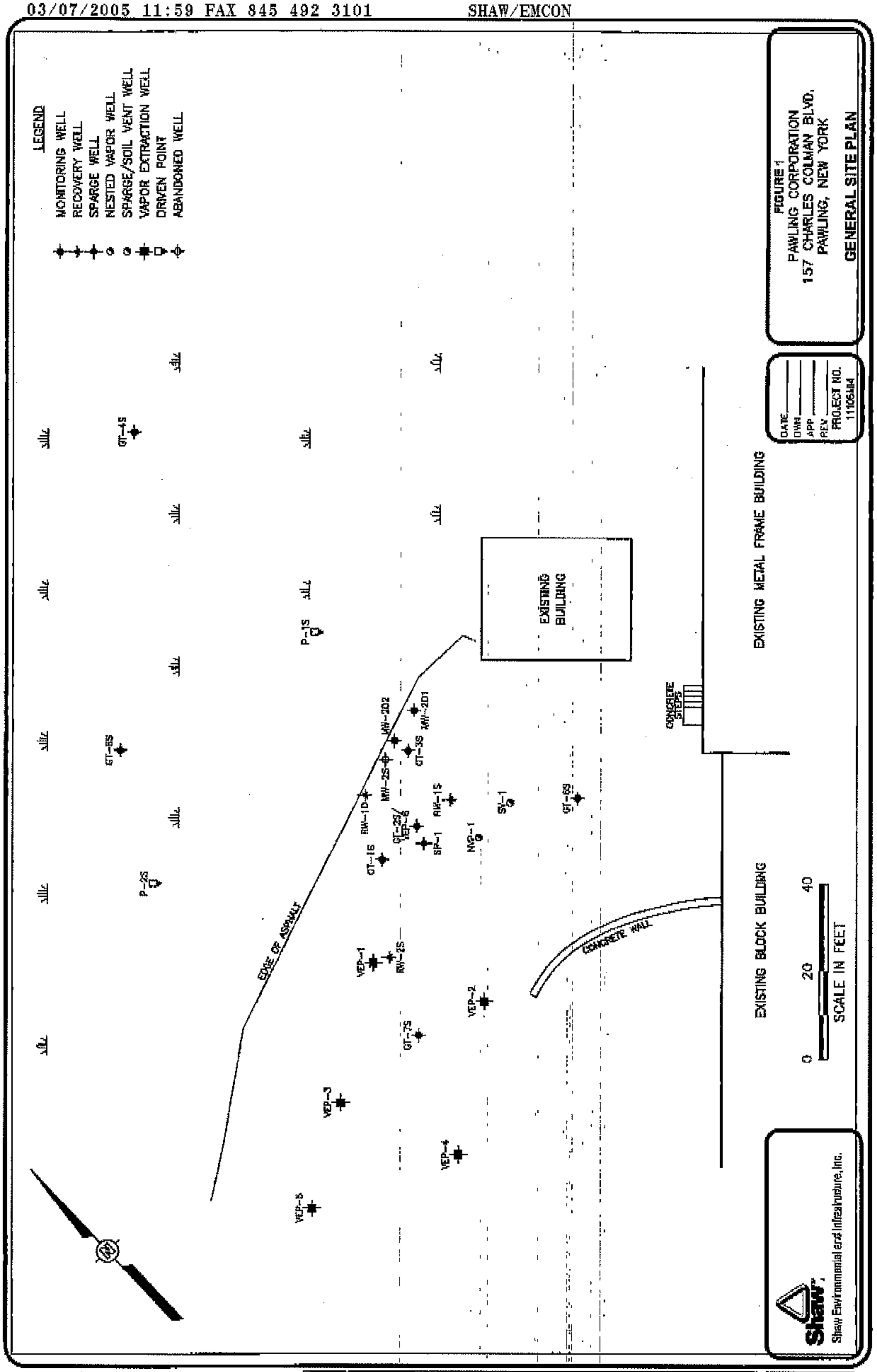

LEGEND
MONITORING WELL
RECOVERY WELL
SPARGE WELL
NESTED VAPOR WELL
SPARGE/SOIL VENT WELL
VAPOR EXTRACTION WELL
DRIVEN POINT
ABANDONED WELL
GT-4S
GT-5S
P-1S
P-2S
MW-2D2
MW-2D1
GT-3S
MW-2S
RW-1D
RW-1S
SV-1
GT-6S
GT-2S/VEP-6
SP-1
NVS-1
GT-1S
EDGE OF ASPHALT
VEP-1
RW-2S
VEP-2
GT-7S
VEP-3
VEP-4
VEP-5
EXISTING BUILDING
CONCRETE STEPS
CONCRETE WALL
EXISTING METAL FRAME BUILDING
EXISTING BLOCK BUILDING
0 20 40
SCALE IN FEET
DATE
DWN
APP
REV
PROJECT NO.
FIGURE 1
PAWLING CORPORATION
157 CHARLES COLMAN BLVD.
PAWLING, NEW YORK
GENERAL SITE PLAN
Shaw
Shaw Environmental and Infrastructure, Inc.

FIGURE 2
GROUNDWATER ELEVATIONS

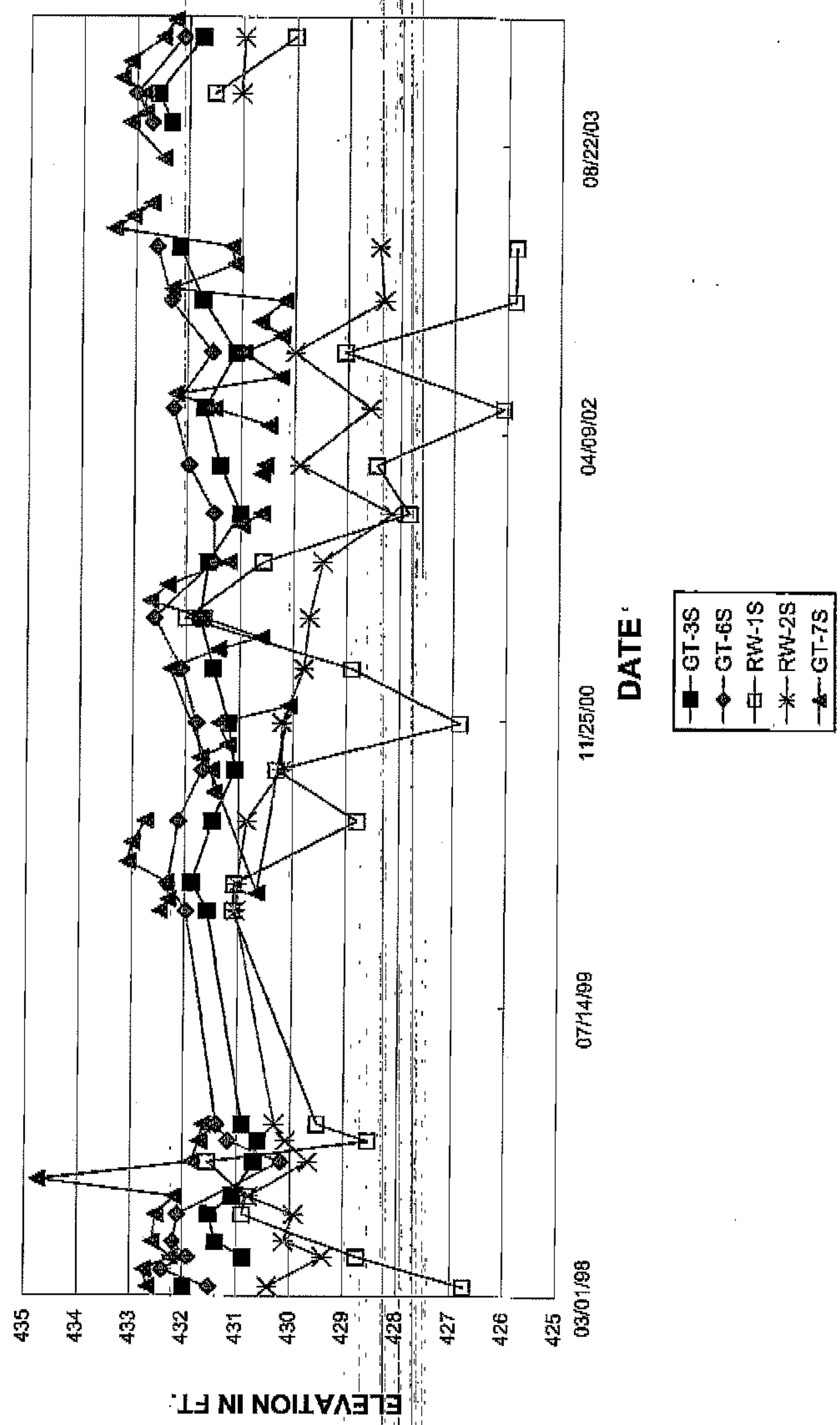
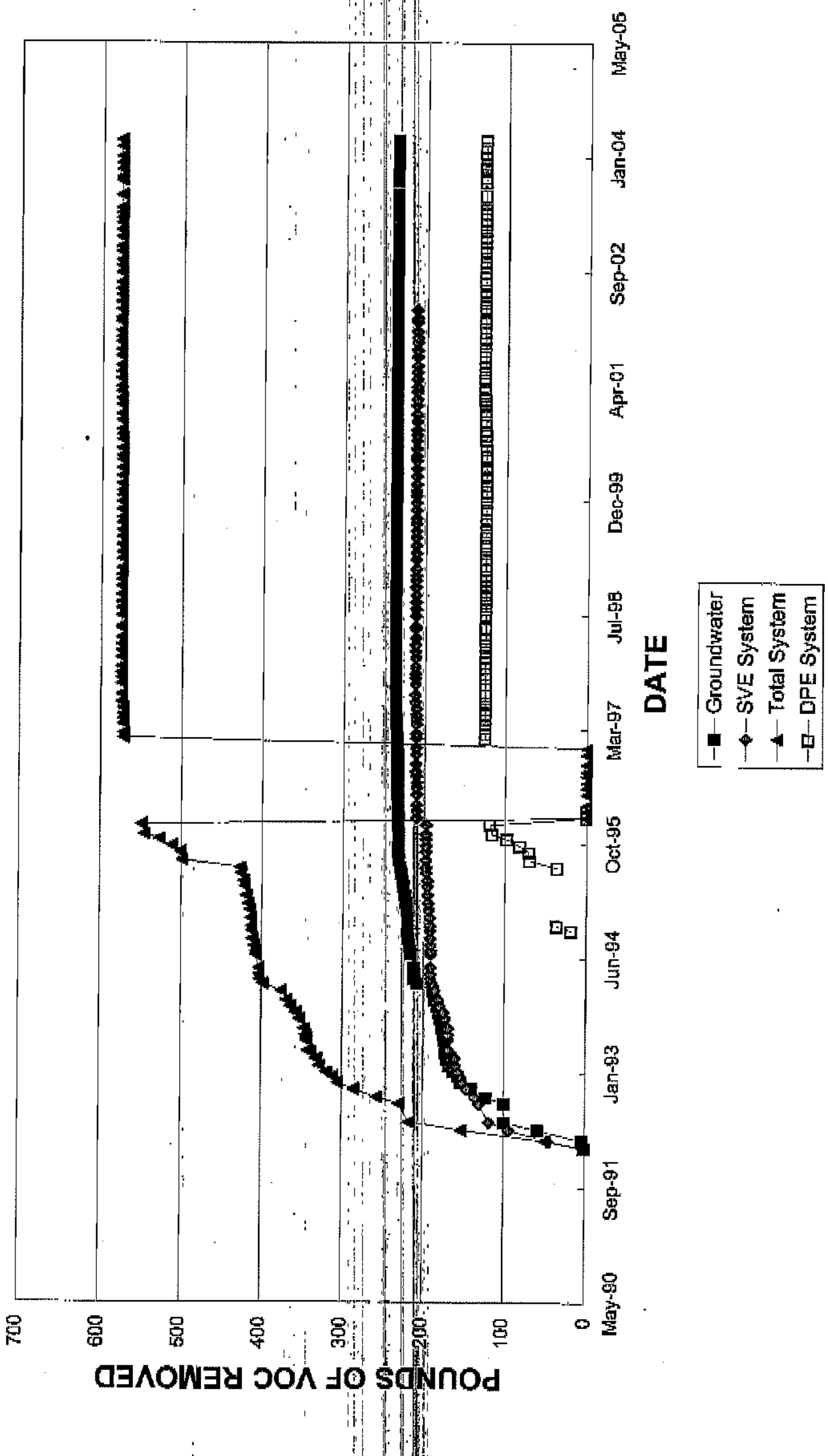


FIGURE 3
CUMULATIVE VOC REMOVAL



February 27, 2007

STATUS REPORT

157 Charles Coleman Boulevard
Pawling, New York

Prepared for

PAWLING CORPORATION
157 Charles Coleman Boulevard
Pawling, New York 12564

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

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1.0 INTRODUCTION

Roux Associates, Inc. (Roux Associates) has prepared this status report on behalf of Pawling Corporation for the June 2006 through December 2006 monitoring period of the groundwater pumping and treatment and dual phase extraction (DPE) systems at 157 Charles Colman Boulevard, Pawling, New York (Site) (Figure 1). The monitoring period activities included groundwater sampling, and laboratory analysis, as well as operation and maintenance (O&M) of the groundwater treatment and DPE systems.

This report provides a brief description of the Site background information, a description of the operation and maintenance (O&M) activities and methodologies, a discussion of the groundwater analytical results, as well as the O&M of the groundwater treatment and DPE systems.

2.0 SITE BACKGROUND

The following sections provide the background information regarding the Site, including a brief summary of previous investigations, and description of the groundwater treatment and DPE systems installed at the Site.

2.1 Site Background

The New York State Department of Environmental Conservation (NYSDEC) issued a Consent Order Case #3-1498/8712 to Pawling Corporation on February 24, 1988. This Consent Order alleged that non-contact cooling water discharged to the Swamp River through SPDES Permit #NY-000-4616 contained copper, zinc, and organic solvents. The NYSDEC also contended that storm water runoff from Pawling Corporation property (Site), containing copper, lead, and iron in concentrations exceeding State groundwater discharge limits, discharged into the groundwater via a dry well.

2.2 Previous Investigations

The NYSDEC Consent Order required Pawling Corporation to perform a groundwater investigation to identify the extent and source of the groundwater contamination. A summary of the findings of this investigation are presented in a report titled "Ground Water Investigation, Pawling Corporation, Pawling, New York" dated September 2, 1988 (GTI, 1988). Further delineation of potential upgradient sources was recommended as the final work step in the preliminary groundwater investigation.

Borings into the overburden and bedrock at the Site were conducted in June of 1988. Monitoring locations were placed adjacent and downgradient to the suspected contaminant sources. Several of these borings were completed as monitoring wells and were gauged and sampled in June 1988. Groundwater samples were also collected from production wells on the Site. Water and sediment samples from the stream were also collected during this monitoring well sampling event. Some of the results exceeded the NYSDEC Ambient Water-Quality Standards and Guidance Values (AWQSGVs) for toluene and 1,1,1-trichloroethene (1,1,1-TCA).

The objectives of this initial groundwater study included:

- Delineation of the concentration and extent of metal and solvent contamination in the groundwater;
- Determination of upgradient source potential impact to the Site;
- Evaluation of pathways of contaminant migration; and
- Obtaining information required for Site remediation design.

The initial groundwater study met most of these objectives; however, an additional upgradient well couplet was installed to determine if off-site sources were contributing to the groundwater contamination observed on the Site. This study also indicated that the groundwater at the facility had a north-northwesterly flow direction.

The groundwater quality information collected from the Site monitoring and production wells in June 1988 indicated generally low levels of volatile organic compounds (VOCs) across the Site, with high levels in the vicinity of MW-2S, MW-2D1 and MW-2D2. The locations of the monitoring wells are shown on Figure 2. Toluene and chlorinated compounds (i.e., tetrachloroethene [PCE]) comprised the VOCs that were detected. The area determined to have the most contamination was an area suspected of trenching and burning. Solvents were alleged to have been burned in these trenches in the late 1960s.

2.3 Description of Groundwater Treatment System

A work plan was submitted to the NYSDEC entitled "Work Plan for Subsurface Remedial Design and Implementation, Pawling Corporation", dated May 25, 1989 (GTI, 1989). This work plan was approved by the NYSDEC. The results of this work plan were utilized to select and design a remedial system for this Site. An engineering report, "Remedial System Design, Pawling Corporation", dated February 26, 1991 (GTI, 1991), was prepared and submitted to the NYSDEC. The plan was approved by the NYSDEC on June 17, 1991. The approved groundwater treatment system consisted of groundwater extraction wells, low-profile air stripper followed by liquid phase granular activated carbon (LPGAC), air sparging, soil vapor extraction (SVE) and vapor phase granular activated carbon (VPGAC) for off-gas treatment.

The final groundwater treatment system consisted of the following components:

- One air sparge point (SP-1);
- Five combined air sparge/SVE points (VP-1 through VP-5) plus one existing monitoring well (GT-2/VP-6);
- Two overburden recovery wells (RW-1S and RW-2S);
- One bedrock recovery well (RW-1D) (presently not a pumping well); and
- Two bedrock monitoring wells (MW-2D1 and MW-2D2).

Monitoring points were also installed to monitor the effectiveness of the remedial system. The monitoring points installed consisted of two monitoring wells (GT-6S and GT-7S) and one nested vapor probe (NVP-1). Figure 2 shows the locations of the groundwater treatment system, recovery and monitoring wells.

A complete groundwater gauging round was performed on March 9, 1992 prior to remedial system start-up to document the initial Site conditions. The overall Site overburden and bedrock groundwater flow directions were similar to that of previous gauging and indicated flow to the north toward Swamp River. The groundwater treatment system began operation on March 11, 1992. The SVE system was permanently shutdown in June 2003. The total VOCs removed by the SVE system is approximately 215 pounds. The air sparge system was not operated during this monitoring period. Historical performance monitoring data for the groundwater treatment system is presented in Appendix A.

2.3.1 DPE System

A temporary DPE system was installed in GT-7S in August of 1995 because it was thought that it would enhance remediation at the Site. The DPE system consists of a high-vacuum blower connected to GT-7S. The high-vacuum blower pulls groundwater into a knockout tank. The groundwater is then pumped from the knockout tank to the existing low profile air stripper for treatment. The temporary system ran from August 1995 until November 1995 and again the following summer. In November of 1998, a permanent installation of the DPE System was completed. Except for temporary shutdown periods due to mechanical difficulties, the DPE system has been in operation since November 1998.

3.0 GROUNDWATER TREATMENT SYSTEM MONITORING

Groundwater treatment system O&M visits during the monitoring period between June 2006 and December 2006 were performed on June 22, June 26, July 6, August 8, September 8, October 11, November 22, and December 27, 2006. The O&M visits consisted of performing routine maintenance activities of the groundwater treatment system and recording pertinent data. There were mechanical problems observed in October 2006 with the operation of the air compressor that powers the pneumatic groundwater extraction pumps in recovery wells RW-1S and RW-2S. As a result, no groundwater has been pumped from RW-1S and RW-2S since October 2006. As will be discussed below, it is recommended that the operation of the recovery wells be discontinued.

Groundwater samples were collected from RW-1S and RW-2S during the June and October 2006 quarterly sampling rounds and analyzed for VOCs. The sampling results for RW-1S and RW-2S are presented in Appendix B and summarized in Table 1. The concentrations in RW-1S were non-detect except for tetrachloroethene (PCE) at a concentration of 2.0 micrograms per liter (μg/L) in June 2006. The VOC concentrations in RW-1S have been non-detect since February 2004. RW-2S has also shown VOC concentrations below method detection limits since August 2004. The concentrations in RW-2S were non-detect except for trichloroethene (TCE) at a concentration of 1.4 μg/L in October 2006.

Effluent samples were collected from the groundwater treatment system by Pawling Corporation to track the performance of the groundwater treatment system to ensure that the discharge from the system is within allowable levels. As reported to Roux Associates by Pawling Corporation, concentrations of all system effluent samples collected have been below the SPDES discharge limit as summarized in Table 2.

The groundwater treatment system has been in operation since March of 1992. Historical performance monitoring data for the groundwater treatment system is presented in Appendix A. No significant concentrations have been removed by the groundwater treatment system since the autumn of 1997. The total amount of VOCs removed by the groundwater treatment system is approximately 240 pounds. This data indicates that the groundwater treatment system has been successful in removing the majority of VOCs from the groundwater within the zone of influence for pumping wells RW-1S and RW-2S.

3.1 DPE System Monitoring

The DPE system has been running continuously since June 2006. The total amount of groundwater removed during operation of the DPE system from June 2006 to December 2006 is approximately 16,000 gallons. Previously, the DPE system operated intermittently due to constant system mechanical failures.

The continued operation of the DPE system appears to be helping to decrease the toluene concentration in GT-7S. The concentration of toluene was 2,100 μg/L in October 2004. With the system up and running, the toluene concentrations have been non-detect over this reporting period. The total amount of VOCs removed by the DPE system is approximately 130 pounds. The groundwater sampling results from GT-7S are presented in Appendix B and summarized in Table 3.

4.0 QUARTERLY GROUNDWATER MONITORING

Quarterly groundwater monitoring was performed on June 7, 2006 and October 2, 2006 during this reporting period. The quarterly groundwater monitoring is discussed below.

4.1 Water-Level Measurements

During the quarterly monitoring events, water-level measurements were performed in the overburden and bedrock monitoring wells using an electronic water interface probe. All water-level measurements were recorded in the field notebook.

Groundwater occurs at a depth ranging from 5.31 feet to 9.06 feet below land surface (bls) as measured in the monitoring wells at the Site (Table 4). The estimated overall overburden and bedrock groundwater flow direction is toward the Swamp River.

4.2 Quarterly Groundwater Sampling

Quarterly groundwater samples were collected from three overburden monitoring wells VEP-4, GT-3S, GT-6S, and bedrock monitoring wells RW-1D, MW-2D1, and MW-2D2 on June 7, 2006 and October 2, 2006.

Prior to sampling, a minimum of three well-casing volumes of water was purged from each monitoring well. After purging was completed, each well was sampled using a new, clean disposable bailer and rope. The samples were transferred from the bailers directly into preserved laboratory-supplied sample bottles, which were then sealed, labeled with the well designation, and immediately placed in an ice-filled cooler for shipment to the laboratory. The samples were shipped via overnight delivery service, under chain of custody procedures, to Pawling's contract laboratory, Adirondack Environmental Services, Inc., in Albany, New York. All purge water was containerized in 55-gallon capacity drums and pumped through the groundwater treatment system.

4.3 Groundwater Analytical Methods and Results

The groundwater samples were analyzed for VOCs using United States Environmental Protection Agency (USEPA) Method E601/E602/8260B. The results for the overburden and bedrock monitoring wells are provided in Tables 5 and 6, respectively. The laboratory analytical data is provided in Appendix B.

The overburden monitoring wells GT-3S and GT-6S were non-detect for VOCs in this reporting period and have been non-detect since December 2003. The TCE concentrations in VEP-4 ranged from 2.3 µg/L to 3.2 µg/L during this reporting period, which are below the NYSDEC AWQSGVs.

The results for bedrock monitoring wells MW-2D1 and MW-2D2 indicate vinyl chloride (VC) and cis1,2-dichloroethene (DCE) have been detected at concentrations above the NYSDEC AWQSGVs in this reporting period. The DCE concentration was 14 µg/L and the VC concentration was 85.0 µg/L in MW-2D1. The results for bedrock monitoring well RW-1D also indicate VC and DCE were detected at concentrations above the NYSDEC AWQSGVs in this reporting period. The DCE concentration was 6.0 µg/L and the VC concentration was 26.0 µg/L in RW-1D in the October 2006 sampling round.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The following summary regarding groundwater conditions at the Site is based on the results of the quarterly groundwater sampling and laboratory analysis, and groundwater and DPE system performance monitoring performed during the reporting period.

- The VOC concentrations continue to be non-detect and/or less than the NYSDEC AWQSGVs in overburden wells RW-1S and RW-2S. The current and historical data continues to indicate that asymptotic removal rates (i.e., no additional VOC removal) have been achieved with the current groundwater treatment system.

- VOCs were non-detect in overburden wells GT-3S and GT-6S during the reporting period and have been non-detect since December 2003. TCE and DCE were detected in VEP-4 but at concentrations less than the NYSDEC AWQSGVs during this reporting period. The low VOC concentrations in the shallow monitoring wells also indicate that the groundwater treatment system has reached asymptotic levels.

- The continued operation of the DPE system in the area of GT-7S appears to be decreasing the concentrations of VOCs surrounding GT-7S. The toluene concentration in GT-7S has decreased from a concentration of 2,100 µg/L in October 2004 to non-detect from the June 7, 2006 sampling round to the November 22, 2006 sampling round. As discussed above, the VOC concentrations in the shallow monitoring wells GT-3S, GT-6S, VEP-4 and the recovery wells RW-1S and RW-2S continue to be non-detect or less than the NYSDEC AWQSGVs. This may be attributable to the continued operation of the DPE system.

- DCE and VC concentrations exceeding the NYSDEC AWQSGVs were detected in the bedrock monitoring wells RW-1D, MW-2D1, and MW-2D2. Minor detections of DCE and VC above the NYSDEC AWQSGVs have been found in RW-1D since December 2003. The presence of DCE demonstrates that some biologically mediated reductive dechlorination of PCE and TCE is occurring, since DCE is breakdown product of PCE and TCE. The presence of VC also indicates that natural degradation is occurring at the Site.

<u>Recommendations</u>

Based on the information presented in this status report, Roux Associates recommends:

- Groundwater monitoring and sampling activities should continue on a semi-annual basis.

- Groundwater treatment and DPE systems will continue to be monitored on a monthly basis.

- Continue with natural attenuation monitoring for the bedrock monitoring wells; the bedrock monitoring wells will continue to be monitored on quarterly basis.

- The recovery wells RW-1S and RW-2S should remain off as the groundwater concentrations remain below the NYSDEC AWQSGVs.

- The groundwater treatment system will continue to operate to treat the groundwater from the DPE system. The DPE system at GT-7S should continue to operate in the next reporting period.

If you should have any questions regarding the contents of this status report, please contact either of the undersigned.

Respectfully submitted,

ROUX ASSOCIATES, INC.

Glenn Netuschil, P.E.
Senior Engineer

Michael Roux
Principal Hydrogeologist

6.0 REFERENCES

Groundwater Technology, Inc. (GTI), 1988. Ground Water Investigation, Pawling Corporation, Pawling, New York, September 1988.

GTI, 1989. Work Plan for Subsurface Remedial Design and Implementation, Pawling Corporation, Pawling, New York, May 1989.

GTI, 1991. Remedial System Design, Pawling Corporation, Pawling, New York, February 1991.

NYSDEC, 1988. Order on Consent, Pawling Corporation, Case #3-1498/8712, Pawling, New York, February 1988.

**Table 1. Summary of Volatile Organic Compounds Detected in Recovery Wells RW-1S and RW-2S,
Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** **Sample Date:**	RW-1S Dec-03	RW-1S Feb-04	RW-1S Mar-04	RW-1S May-04	RW-1S Jun-04	RW-1S Jul-04	RW-1S Aug-04
Toluene	5		1.0 U	1.0 U	NS	1.0 U	NS	NS	1.0 U
Trichloroethene	5		1.0 U	1.0 U	NS	1.0 U	NS	NS	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	NS	1.0 U	NS	NS	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	NS	1.0 U	NS	NS	1.0 U
Vinyl Chloride	2		1.0 U	1.0 U	NS	1.0 U	NS	NS	1.0 U
cis 1,2 - Dichloroethene	5		1.0 U	1.0 U	NS	1.0 U	NS	NS	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs
RW - Recovery Well Designation
NS- Well was not sampled

Table 1. Summary of Volatile Organic Compounds Detected in Recovery Wells RW-1S and RW-2S, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	RW-1S Sep-04	RW-1S Oct-04	RW-1S Feb-05	RW-1S Aug-05	RW-1S Jun-06	RW-2S Dec-03	RW-2S Feb-04
Toluene	5		NS	1.0 U	1.0 U	1.0 U	1.0 U	NS	NS
Trichloroethene	5		NS	1.0 U	1.0 U	1.0 U	1.0 U	NS	NS
1,1,1 - Trichloroethane	5		NS	1.0 U	1.0 U	1.0 U	1.0 U	NS	NS
Tetrachloroethene	5		NS	1.0 U	1.0 U	1.0 U	2	NS	NS
Vinyl Chloride	2		NS	1.0 U	1.0 U	1.0 U	1.0 U	NS	NS
cis 1,2 - Dichloroethene	5		NS	1.0 U	1.0 U	1.0 U	1.0 U	NS	NS

Notes:
µg/L -Micrograms per liter
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Table 1. Summary of Volatile Organic Compounds Detected in Recovery Wells RW-1S and RW-2S, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** **Sample Date:**	RW-2S Mar-04	RW-2S May-04	RW-2S Jun-04	RW-2S Jul-04	RW-2S Aug-04	RW-2S Sep-04
Toluene	5		NS	NS	NS	NS	1.0 U	NS
Trichloroethene	5		NS	NS	NS	NS	1.0 U	NS
1,1,1 - Trichloroethane	5		NS	NS	NS	NS	1.0 U	NS
Tetrachloroethene	5		NS	NS	NS	NS	1.0 U	NS
Vinyl Chloride	2		NS	NS	NS	NS	1.0 U	NS
cis 1,2 - Dichloroethene	5		NS	NS	NS	NS	1.0 U	NS

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs
RW - Recovery Well Designation
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Table 1. Summary of Volatile Organic Compounds Detected in Recovery Wells RW-1S and RW-2S, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	RW-2S Oct-04	RW-2S Feb-05	RW-2S Jun-06	RW-2S Oct-06
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.0 U	1.0 U	1.4
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		1.0 U	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs
RW - Recovery Well Designation
NS- Well was not sampled

Table 2. Summary of Volatile Organic Compounds in the Groundwater Treatment System Effluent, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Month	Toluene	PCE	1,1,1 TCA	Trans 1,2-DCE	TCE
SPDES Discharge Limit	33	4.6	20	30	20
June 2006	<1	<1	<1	<1	<1
July 2006	<1	<1	<1	<1	<1
August 2006	<1	<1	<1	<1	<1
September 2006	<1	<1	<1	<1	<1
October 2006	<1	<1	<1	<1	<1
November 2006	<1	<1	<1	<1	<1
December 2006	<1	<1	<1	<1	<1

Notes:
The analytical results are in µg/L (micrograms per liter).
SPDES - State Pollution Discharge and Elimination System

Table 3. Summary of Volatile Organic Compounds in GT-7S, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	GT-7S Dec-03	GT-7S Feb-04	GT-7S Mar-04	GT-7S May-04	GT-7S Jun-04	GT-7S Jul-04	GT-7S Aug-04	GT-7S Sep-04	GT-7S Oct-04
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**54**	**2,100**
Trichloroethene	5		1.0 U	2.9	1.9	**6.7**	**24**	**30**	2.3	2.4	10.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0U	1.0U	1.0 U	1.0 U	1.0 U	1.0 U	10.0 U
Vinyl Chloride	2		1.0 U	1.0 U	1.0U	**2.2**	1.0 U	1.0 U	1.0 U	1.4	**110**
cis 1,2 - Dichloroethene	5		1.0 U	1.0 U	1.0U	3	1.0 U	1.0 U	1.0 U	1.9	170

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs

Table 3. Summary of Volatile Organic Compounds in GT-7S, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** **Sample Date:**	GT-7S Nov-04	GT-7S Dec-04	GT-7S Jan-05	GT-7S Feb-05	GT-7S Mar-05	GT-7S May-05	GT-7S Aug-05	GT-7S Jun-06	GT-7S Aug-06
Toluene	5		**1,900**	**1,500**	**1,300**	**1,300**	**1,300**	**550**	1.0 U	1.0 U	1.0 U
Trichloroethene	5		50.0 U	25.0 U	25.0 U	25.0 U	10.0 U	25.0 U	**19**	4.9	2.6
1,1,1 - Trichloroethane	5		50.0 U	25.0 U	25.0 U	25.0 U	10.0 U	25.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		50.0 U	25.0 U	25.0 U	25.0 U	10.0 U	25.0 U	1.1	1.0 U	1.0 U
Vinyl Chloride	2		50.0 U	25.0 U	25.0 U	25.0 U	**15**	25.0 U	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		50.0 U	**62**	25.0 U	25.0 U	**19**	25.0 U	**8.6**	1.0 U	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs

Table 3. Summary of Volatile Organic Compounds in GT-7S, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	GT-7S Sep-06	GT-7S 2-Oct-06	GT-7S 11-Oct-06	GT-7S 2-Nov-06	GT-7S 22-Nov-06
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1	1.0 U	**7.9**	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.9	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		1.0 U	**14**	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		1.0 U	3.1	1.0 U	1.0 U	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs

Table 4. Summary of Water-Level Measurements in Monitoring Wells, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York.

Date	Monitoring Well Designation	Measuring Point Elevation (ft rmsl)	Depth to Water (ft bls)	Water-Level Elevation (ft rmsl)
June 7, 2006	GT-3S	438	(1)	--
	VEP-4	NM	7.96	--
	GT-6S	437.9	5.31	432.59
	RW-1D	NM	8.67	--
	MW-2D2	438.02	6.68	431.34
	MW-2D1	437.66	(1)	--
October 2, 2006	GT-3S	438.00	6.39	431.61
	VEP-4	NM	9.06	
	GT-6S	437.90	5.92	431.98
	RW-1D	NM	(1)	--
	MW-2D2	438.02	6.82	431.20
	MW-2D1	437.66	6.81	430.85

Notes:

ft rmsl	Feet relative to mean sea level
ft bls	Feet below land surface
ft	Feet
NM	Not measured
(1)	Well not accessible at time of sampling

Table 5. Summary of Volatile Organic Compounds in Overburden Monitoring Wells, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	GT-3S Dec-03	GT-3S Feb-04	GT-3S Mar-04	GT-3S May-04	GT-3S Jun-04	GT-3S Jul-04	GT-3S Aug-04	GT-3S Sep-04	GT-3S Oct-04	GT-3S Jun-06	GT-3S Oct-06
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0U	1.0U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		1.0 U	1.0 U	1.0U	1.0U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		1.0 U	1.0 U	1.0U	1.0U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs

Table 5. Summary of Volatile Organic Compounds in Overburden Monitoring Wells, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** **Sample Date:**	VEP-4 Dec-03	VEP-4 Feb-04	VEP-4 Mar-04	VEP-4 May-04	VEP-4 Jun-04	VEP-4 Jul-04	VEP-4 Aug-04	VEP-4 Sep-04	VEP-4 Aug-05	VEP-4 Jun-06	VEP-4 Oct-06
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.4	1.0 U	1.6	1.0 U	1.0 U	2	1.0 U	**7.8**	2.3	3.2
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.2

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs

Table 5. Summary of Volatile Organic Compounds in Overburden Monitoring Wells, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: / Sample Date:	GT-6S Dec-03	GT-6S Feb-04	GT-6S Mar-04	GT-6S May-04	GT-6S Jun-04	GT-6S Jul-04	GT-6S Aug-04	GT-6S Sep-04	GT-6S Oct-04	GT-6S Jun-06	GT-6S Oct-06
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs

Table 6. Summary of Volatile Organic Compounds in Bedrock Monitoring Wells, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** **Sample Date:**	RW-1D Dec-03	RW-1D Feb-04	RW-1D Mar-04	RW-1D May-04	RW-1D Jun-04	RW-1D Jul-04	RW-1D Aug-04	RW-1D Sep-04	RW-1D Oct-04
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		**46**	1.0 U	1.0 U	**26**	1.0 U	1.0 U	4.5	1.0 U	4.2
cis 1,2 - Dichloroethene	5		**45**	**190**	1.0 U	**29**	1.0 U	1.0 U	4.3	1.0 U	2.9

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs
MW - Monitoring Well Designation
RW - Recovery Well Designation
NS - Well was not sampled

Table 6. Summary of Volatile Organic Compounds in Bedrock Monitoring Wells, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	RW-1D Feb-05	RW-1D Aug-05	RW-1D Jun-06	MW-2D1 Dec-03	MW-2D1 Feb-04	MW-2D1 Mar-04	MW-2D1 May-04	MW-2D1 Jun-04	MW-2D1 Jul-04	MW-2D1 Aug-04
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.4	1.0 U	1.6	1.0 U	1.0 U	2
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		**31**	**39**	**26**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		**22**	**12**	**6**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs
MW - Monitoring Well Designation
RW - Recovery Well Designation
NS - Well was not sampled

Table 6. Summary of Volatile Organic Compounds in Bedrock Monitoring Wells, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

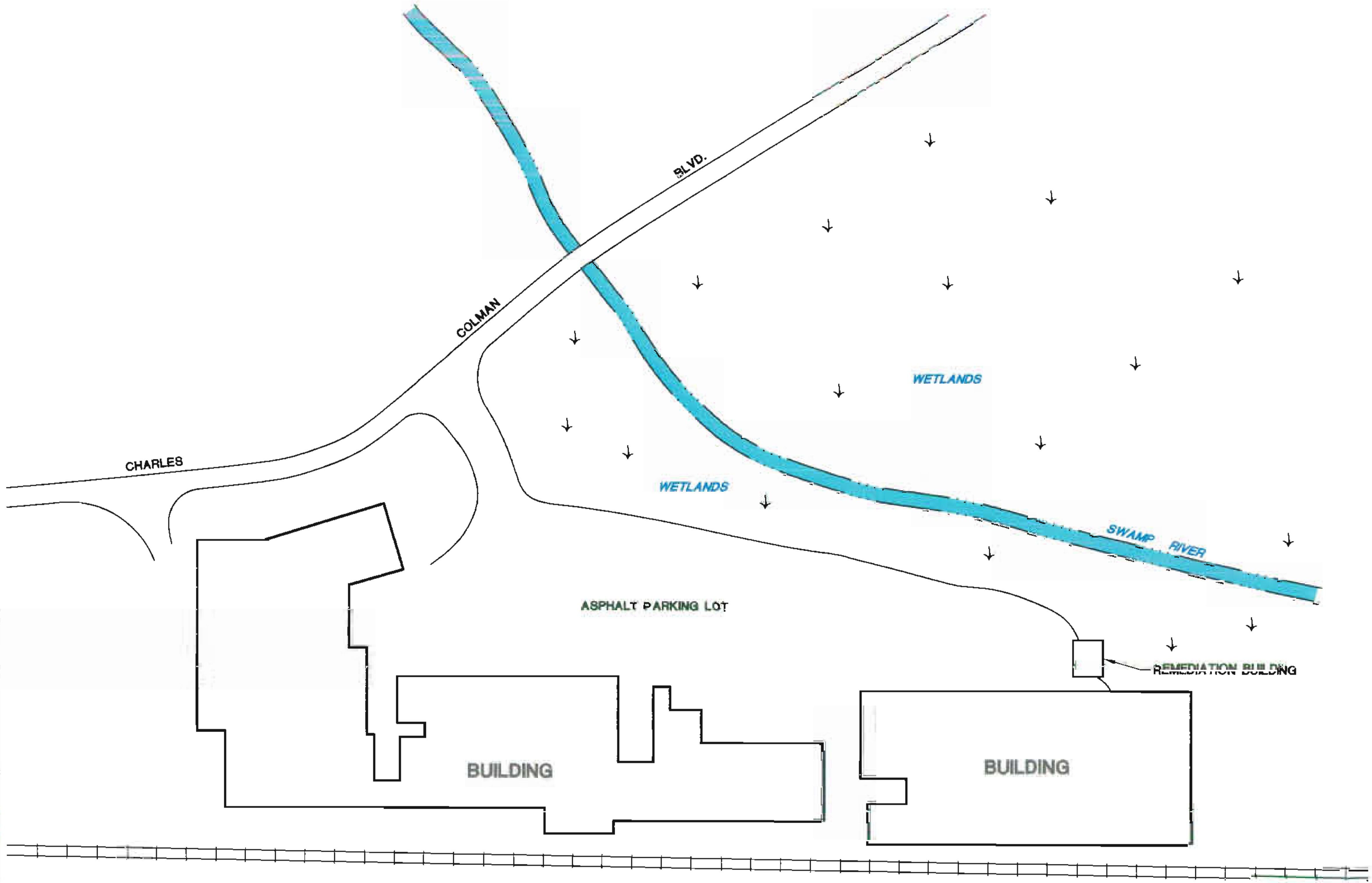
Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:**	MW-2D1	MW-2D1	MW-2D1	MW-2D1	MW-2D1	MW-2D2	MW-2D2	MW-2D2	MW-2D2	MW-2D2	MW-2D2
		Sample Date:	Sep-04	Oct-04	Feb-05	Aug-05	Oct-06	Dec-03	Feb-04	Mar-04	May-04	Jun-04	Jul-04
Toluene	5		1.0 U	1.0 U	1.0 U	1.2	1.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	**85**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		1.0 U	1.0 U	2	1.0 U	**14**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs
MW - Monitoring Well Designation
RW - Recovery Well Designation
NS - Well was not sampled

Table 6. Summary of Volatile Organic Compounds in Bedrock Monitoring Wells, Pawling Corporation, 157 Charles Colman Boulevard, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	MW-2D2 Aug-04	MW-2D2 Sep-04	MW-2D2 Oct-04	MW-2D2 Feb-05	MW-2D2 Aug-05	MW-2D2 Jun-06	MW-2D2 Oct-06
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1
Trichloroethene	5		1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.7
Vinyl Chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**12**
cis 1,2 - Dichloroethene	5		1	1.0 U	1.0 U	1.5	1.0 U	1.0 U	3.2

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed the NYSDEC AWQSGVs
MW - Monitoring Well Designation
RW - Recovery Well Designation
NS - Well was not sampled



Title:

SITE PLAN

Prepared For:

PAWLING CORPORATION

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: M.R.	Date: 12FEB07	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	1
Project Mgr: M.R.	Office: NY	
File No.: [illegible]	Project: [illegible]	

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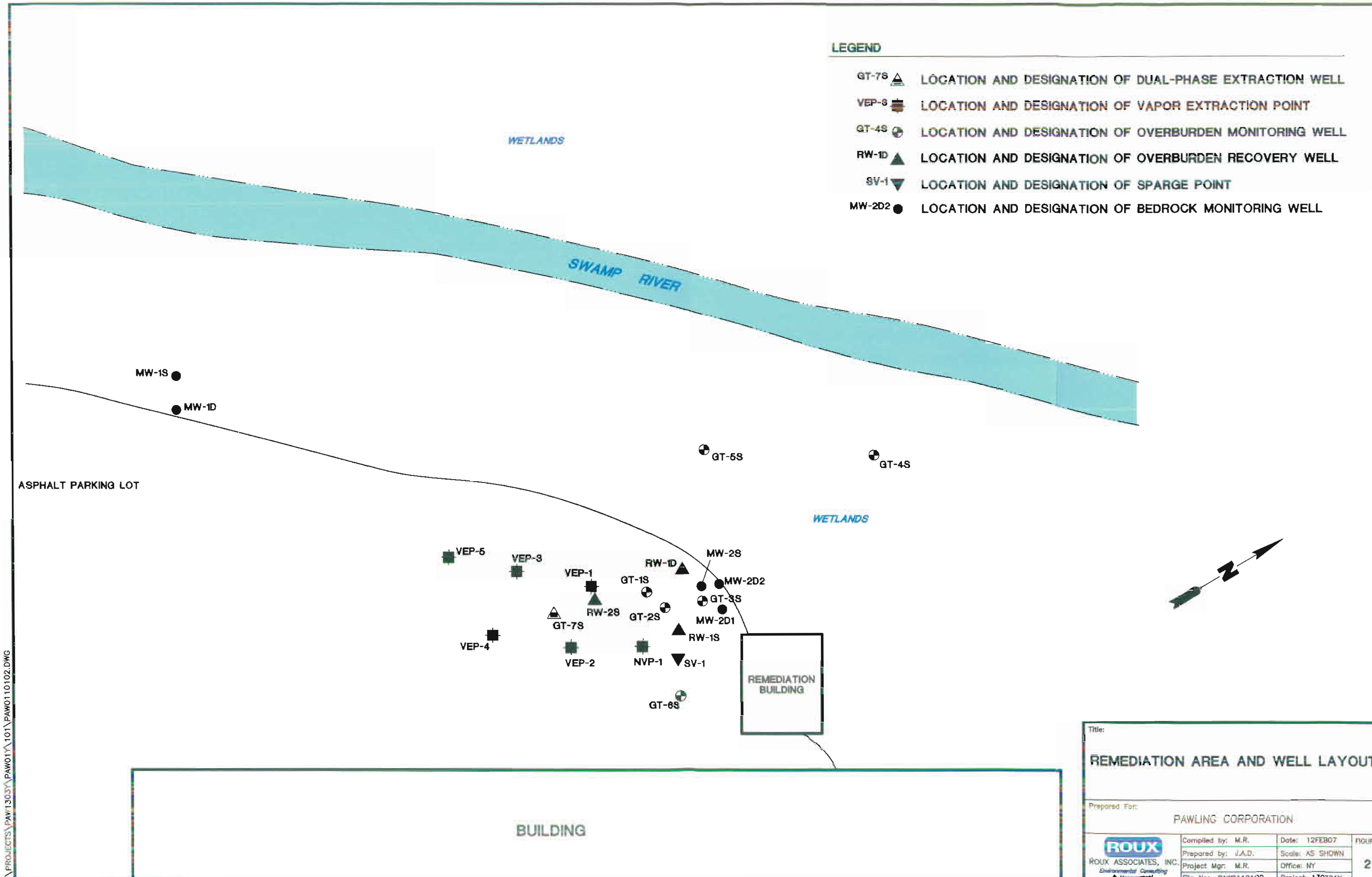

Title: REMEDIATION AREA AND WELL LAYOUT			
Prepared For: PAWLING CORPORATION			
ROUX ASSOCIATES, INC. Environmental Consulting & Management	Compiled by: M.R.	Date: 12FEB07	FIGURE
	Prepared by: J.A.D.	Scale: AS SHOWN	2
	Project Mgr: M.R.	Office: NY	
	File No: PAW0110102	Project: 130301Y	

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APPENDIX A

Historical Groundwater Performance Data

Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation (ft-asl)	Sample Date	Depth to Water (ft)	Water Elevation (ft-asl)	TOLUENE (ug/l)	TRICHLOROETHENE (ug/l)	1,1,1-TRICHLOROETHANE (ug/l)	TETRACHLOROETHENE (ug/l)	TRANS-1,2-DICHLOROETHENE (ug/l)	VINYL CHLORIDE (ug/l)	ETHYLBENZENE (ug/l)	CIS-1,2-DICHLOROETHENE (ug/l)	TOTAL VOCS (ug/l)
GT-3S	438	03/01/92	6.60	431.4									
GT-3S	438	04/01/92	7.88	430.12									
GT-3S	438	05/01/92	7.64	430.36									
GT-3S	438	08/01/92	6.89	431.11									
GT-3S	438	09/01/92	6.51	431.49									
GT-3S	438	10/01/92	7.28	430.72									
GT-3S	438	11/01/92	6.66	431.34									
GT-3S	438	12/01/92	6.68	431.32									
GT-3S	438	01/01/93	6.65	431.35									
GT-3S	438	03/01/93	6.45	431.55									
GT-3S	438	04/01/93	6.20	431.8									
GT-3S	438	05/01/93	6.38	431.62									
GT-3S	438	08/01/93	7.62	430.38									
GT-3S	438	09/01/93	6.96	431.04									
GT-3S	438	10/01/93	7.14	430.86									
GT-3S	438	11/01/93	6.96	431.04									
GT-3S	438	12/01/93	6.62	431.38									
GT-3S	438	02/01/94	6.26	431.74									
GT-3S	438	04/01/94	3.58	434.42									
GT-3S	438	05/01/94	6.36	431.64									
GT-3S	438	06/01/94	6.80	431.2									
GT-3S	438	07/01/94	6.50	431.5									
GT-3S	438	08/01/94	6.45	431.55									
GT-3S	438	[illegible]	[illegible]	[illegible]									
GT-3S	438	10/01/94	6.43	431.57									
GT-3S	438	11/01/94	6.23	431.77									
GT-3S	438	12/01/94	6.10	431.9									
GT-3S	438	01/01/95	6.04	431.96									
GT-3S	438	02/09/95	6.25	431.75	<1	<1	<1	<1	<1	16	<1		16
GT-3S	438	03/01/95	6.54	431.46									
GT-3S	438	04/01/95	6.28	431.72									
GT-3S	438	05/17/95	6.86	431.14	<1	<1	<1	<1	<1	<1	7		7
GT-3S	438	06/01/95	6.91	431.09									
GT-3S	438	07/13/95	8.00	430									
GT-3S	438	08/16/95	7.66	430.38	<1	<1	<1	<1	10	4	<1		14
GT-3S	438	09/18/95	7.95	430.05									
GT-3S	438	10/17/95	6.73	431.27									
GT-3S	438	11/14/95	6.91	431.09	<1	<1	<1	<1	<1	<1	<1		<1
GT-3S	438	12/05/95	6.16	431.84									
GT-3S	438	01/16/96	6.36	431.64									
GT-3S	438	02/15/96	6.11	431.89	<1	<1	<1	<1	<1	<1	<1		ND
GT-3S	438	03/15/96	5.58	432.42									
GT-3S	438	04/11/96	5.62	432.38									
GT-3S	438	05/28/96	6.27	431.73	<1	<1	<1	<1	<1	<1	<1		1
GT-3S	438	06/28/96	6.12	431.88									
GT-3S	438	07/19/96	6.25	431.75									
GT-3S	438	08/19/96	6.48	431.52	<1	<1	<1	<1	<1	120	100		220
GT-3S	438	09/06/96	6.87	431.13									
GT-3S	438	10/09/96	6.16	431.84									
GT-3S	438	11/21/96	6.74	431.26	<1	<1	<1	<1	<1	<1	<1		<1
GT-3S	438	12/16/96	5.53	432.47									
GT-3S	438	01/30/97	6.09	431.91									
GT-3S	438	02/19/97	6.14	431.86	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	04/02/97	5.55	432.45									
GT-3S	438	04/23/97	5.51	432.49									
GT-3S	438	05/13/97	6.20	431.8	<1	<1	<1	<1	<1	<1	<1	10	10
GT-3S	438	06/19/97	5.38	432.62									
GT-3S	438	07/08/97	7.15	430.85									
GT-3S	438	08/08/97	7.11	430.89	<1	86	<1	<1	<1	<1	<1	130	216
GT-3S	438	09/25/97	7.40	430.6									
GT-3S	438	10/22/97	7.74	430.26									
GT-3S	438	11/11/97	6.47	431.53	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	12/10/97	6.30	431.7									
GT-3S	438	01/20/98	6.05	431.95									
GT-3S	438	02/18/98	6.27	431.73	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	03/17/98	6.02	431.98									
GT-3S	438	04/15/98	NG										
GT-3S	438	05/07/98	7.13	430.87	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-3S	438	06/03/98	6.61	431.39									
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
GT-3S	438	08/21/98	6.92	431.08									
GT-3S	438	10/19/98	7.32	430.68									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS.
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-3S	438	12/29/99	6.42	431.58	<1	<1	<1	<1	<1	<1	<1	2	2
GT-3S	438	02/16/00	6.13	431.87	<1	<1	<1	<1	<1	2	NA	15	17
GT-3S	438	08/02/00	6.50	431.5	<1	<1	<1	<1	<1	1	NA	7	8
GT-3S	438	08/29/00	6.93	431.07	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/20/00	6.80	431.2	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/23/01	6.50	431.5	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	05/23/01	6.26	431.74	<1	<1	<1	<1	<1	16	NA	32	48
GT-3S	438	08/28/01	6.40	431.6	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/21/01	7.00	431	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/13/02	6.61	431.39									0
GT-3S	438	05/23/02	6.32	431.68	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	08/29/02	6.90	431.1	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/27/02	6.27	431.73	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/28/03	5.85	432.15	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	06/04/03	NM		<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	09/30/03	5.67	432.33	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	11/20/03	5.41	432.59	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-3S	438	02/26/04	6.25	431.75	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	03/01/92	5.40	432.5									
GT-6S	437.9	04/01/92	6.19	431.71									
GT-6S	437.9	05/01/92	6.07	431.83									
GT-6S	437.9	08/01/92	6.31	431.59									
GT-6S	[illegible]	11/01/92	[illegible]	[illegible]									
GT-6S	[illegible]	12/01/92	[illegible]	[illegible]									
GT-6S	437.9	01/01/93	5.85	432.05									
GT-6S	437.9	03/01/93	6.05	431.85									
GT-6S	437.9	04/01/93	5.16	432.74									
GT-6S	437.9	05/01/93	5.82	432.08									
GT-6S	437.9	09/01/93	7.00	430.9									
GT-6S	437.9	08/01/93	6.67	431.23									
GT-6S	437.9	10/01/93	6.61	431.29									
GT-6S	437.9	11/01/93	6.40	431.5									
GT-6S	437.9	12/01/93	5.92	431.98									
GT-6S	437.9	01/01/94	6.13	431.77									
GT-6S	437.9	02/01/94	5.59	432.31									
GT-6S	437.9	04/01/94	5.04	432.86									
GT-6S	437.9	05/01/94	5.79	432.11									
GT-6S	437.9	06/01/94	6.18	431.72									
GT-6S	437.9	07/01/94	8.21	429.69									
GT-6S	437.9	08/01/94	6.04	431.85									
GT-6S	437.9	09/01/94	5.90	432									
GT-6S	437.9	10/01/94	5.80	432.1									
GT-6S	437.9	11/01/94	5.61	432.29									
GT-6S	437.9	12/01/94	5.36	432.54									
GT-6S	437.9	01/01/95	5.36	432.54									
GT-6S	437.9	02/08/95	5.54	432.36	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	03/01/95	5.57	432.33									
GT-6S	437.9	04/01/95	5.58	432.32									
GT-6S	437.9	05/17/95	5.86	432.04	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	06/01/95	6.13	431.77									
GT-6S	437.9	07/13/95	6.98	430.92									
GT-6S	437.9	08/15/95	6.87	431.03	7	<1	<1	<1	2	<1	<1		9
GT-6S	437.9	09/19/95	7.14	430.76									
GT-6S	437.9	10/17/95	5.91	431.99									
GT-6S	437.9	11/14/95	5.14	432.76	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	12/06/95	5.31	432.59									
GT-6S	437.9	01/16/96	5.64	432.26									
GT-6S	437.9	02/16/96	5.31	432.59	<1	<1	<1	<1	<1	<1	<1		0
GT-6S	437.9	03/15/96	4.87	433.03									
GT-6S	437.9	04/11/96	5.01	432.89									
GT-6S	437.9	05/28/96	5.53	432.37	<1	1	<1	<1	<1	<1	9		10
GT-6S	437.9	06/26/96	5.64	432.26									
GT-6S	437.9	07/18/96	5.49	432.41									
GT-6S	437.9	08/19/96	5.89	432.01	<1	<1	<1	<1	<1	<1	4		4
GT-6S	437.9	09/06/96	6.25	431.65									
GT-6S	437.9	10/09/96	5.55	432.35									
GT-6S	437.9	11/21/96	6.14	431.76	<1	<1	<1	<1	<1	<1	2		2
GT-6S	437.9	12/18/96	4.77	433.13									
GT-6S	437.9	01/30/97	5.33	432.57									
GT-6S	437.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
GT-6S	437.9	04/02/97	4.88	433.02									
[illegible]	[illegible]	[illegible]	4.80	433.1									

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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation (ft-asl)	Sample Date	Depth to Water (ft)	Water Elevation (ft-asl)	TOLUENE (ug/l)	TRICHLOROETHENE (ug/l)	1,1,1-TRICHLOROETHANE (ug/l)	TETRACHLOROETHENE (ug/l)	TRANS-1,2-DICHLOROETHENE (ug/l)	VINYL CHLORIDE (ug/l)	ETHYLBENZENE (ug/l)	CIS-1,2-DICHLOROETHENE (ug/l)	TOTAL VOCS (ug/l)
GT-6S	437.9	07/08/97	6.34	431.56									
GT-6S	437.9	08/09/97	6.29	431.61	<1	1	<1	<1	<1	<1	<1	<1	1
GT-6S	437.9	09/25/97	6.69	431.21									
GT-6S	437.9	10/22/97	7.10	430.8									
GT-6S	437.9	11/11/97	6.04	431.86									
GT-6S	437.9	12/10/97	5.61	432.29									
GT-6S	437.9	01/20/98	5.42	432.48									
GT-6S	437.9	02/16/98	5.58	432.32	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	03/17/98	6.38	431.52									
GT-6S	437.9	04/16/98	5.50	432.4									
GT-6S	437.9	05/07/98	5.99	431.91	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	06/03/98	5.72	432.18									
GT-6S	437.9	07/21/98	5.80	432.1									
GT-6S	437.9	10/19/98	7.72	430.18									
GT-6S	437.9	11/24/98	6.73	431.17									
GT-6S	437.9	12/23/98	6.51	431.39									
GT-6S	437.9	12/29/99	5.93	431.97	<1	<1	<1	<1	<1	<1	<1	<1	0
GT-6S	437.9	02/13/00	5.58	432.32	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	08/02/00	5.78	432.12	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	08/29/00	6.22	431.68	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	11/20/00	6.10	431.8	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	02/23/01	5.82	432.08	<1	<1	<1	<1	<1	<1		<1	0
GT-6S	437.9	05/23/01	5.29	432.61	<1	<1	<1	<1	<1	<1	NA	<1	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<1	<1	NA	<1	0
GT-6S	437.9	11/21/01	6.40	431.5	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	02/13/02	5.93	431.97									0
GT-6S	437.9	05/23/02	5.64	432.26	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	08/28/02	6.35	431.55	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	11/27/02	5.58	432.32	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	02/28/03	5.30	432.6	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	06/04/03	NM		<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	09/30/03	5.19	432.71									NA
GT-6S	437.9	11/20/03	4.90	433	<1	<1	<1	<1	<1	<1	NA	<1	0
GT-6S	437.9	02/26/04	5.80	432.1	<1	1.2	<1	<1	<1	<1	NA	<1	12
GT-6S	437.9	[illegible]	[illegible]	[illegible]									
GT-7S	440.1	03/01/92	7.30	432.8									
GT-7S	440.1	04/01/92	7.30	432.8									
GT-7S	440.1	05/01/92	7.91	432.19									
GT-7S	440.1	06/01/92	10.50	429.6									
GT-7S	440.1	11/01/92	10.48	429.62									
GT-7S	440.1	12/01/92	10.29	429.81									
GT-7S	440.1	01/01/93	9.70	430.4									
GT-7S	440.1	03/01/93	9.80	430.3									
GT-7S	440.1	05/01/93	9.40	430.7									
GT-7S	440.1	08/01/93	8.92	431.18									
GT-7S	440.1	09/01/93	8.63	431.47									
GT-7S	440.1	10/01/93	8.60	431.5									
GT-7S	440.1	11/01/93	8.36	431.74									
GT-7S	440.1	12/01/93	7.75	432.35									
GT-7S	440.1	01/01/94	8.36	431.75									
GT-7S	440.1	02/01/94	7.65	432.45									
GT-7S	440.1	04/01/94	6.73	433.37									
GT-7S	440.1	05/01/94	7.36	432.74									
GT-7S	440.1	06/01/94	8.01	432.09									
GT-7S	440.1	07/01/94	7.09	433.01									
GT-7S	440.1	08/01/94	7.85	432.25									
GT-7S	440.1	09/01/94	7.78	432.32									
GT-7S	440.1	12/01/94	7.10	433									
GT-7S	440.1	01/11/95	6.93	433.17	140,000	10800	<50	140	<50	1400	<50		151540
GT-7S	440.1	02/09/95	7.06	433.04	290,000	9900	<50	<50	<50	1400	300		301600
GT-7S	440.1	03/30/95	7.17	432.93	300,000	11000	<1000	<1000	<1000	<1000	12000		323000
GT-7S	440.1	04/25/95	7.17	432.93	230,000	5800	<500	<500	<500	<500	8400		244300
GT-7S	440.1	05/17/95	7.49	432.61	42,000	<500	<500	<600	<500	2300	8500		52800
GT-7S	440.1	06/20/95	7.60	432.5	380,000	<250	<250	6000	<250	<250	<250		386000
GT-7S	440.1	07/13/95	8.29	431.81	310,000	7900	<100	250	7700	<100	<100		325950
GT-7S	440.1	08/16/95	7.86	432.24	250,000	<50	<50	<50	10000	1100	<50		261100
GT-7S	440.1	10/17/95			57,000	<100	<100	<100	<100	<100	3900		60900
GT-7S	440.1	11/14/95			<1	2	<1	<1	<1	<1	13		15
GT-7S	440.1	12/05/95	7.03	433.07	100,000	<11	<11	<11	<11	<11	1800		101800
GT-7S	440.1	[illegible]	[illegible]	[illegible]	[illegible]						[illegible]		[illegible]
GT-7S	440.1	02/15/96	6.81	433.29	<500	<500	<500	<500	24000	<500	<500		24000
GT-7S	440.1	03/15/96	6.27	433.83									

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Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-7S	440.1	08/19/96	8.41	431.69	<1	30	<1	<1	<1	130	80		240
GT-7S	440.1	09/06/96			<1	4	<1	2	<1	<1	6		13
GT-7S	440.1	10/09/96	6.54	433.56	<1	<1	<1	<1	<1	<1	<1		<1
GT-7S	440.1	11/21/96	8.19	431.91	68,000	<250	<1	<250	<250	<250	980		68980
GT-7S	440.1	12/18/96	6.53	433.57	27,000	<100	<100	<100	<100	NA	NA		27000
GT-7S	440.1	01/30/97	7.41	432.69	130,000	<1000	<1000	<1000	<1000	NA	NA	3500	133500
GT-7S	440.1	02/19/97	7.31	432.79	140,000	<500	<500	<500	<500			4800	145350
GT-7S	440.1	04/02/97	6.87	433.23	110,000	<200	<200	<200	<200			650	110650
GT-7S	440.1	04/23/97	6.85	433.25	160,000	<100	300	<100	<100			3500	163900
GT-7S	440.1	05/13/97	7.42	432.68	15,000	<50	<50	<50	<50	<50	<50	290	15290
GT-7S	440.1	06/09/97	7.56	432.55	60,000	<50	<50	<50	<50	190	<50	410	60600
GT-7S	440.1	07/08/97	8.32	431.78	30,000	<50	<50	<50	<50	<50	<50	500	30500
GT-7S	440.1	08/09/97	8.30	431.8	59,000	<50	<50	<50	<50	<50	<50	180	59180
GT-7S	440.1	09/25/97	8.61	431.49	<50	<50	<50	<50	<50	<50	<50	<50	<50
GT-7S	440.1	10/22/97	9.14	430.96	<50	<50	<50	<50	<50	<50	<50	<50	<50
GT-7S	440.1	11/11/97	8.22	431.88	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	12/10/97	7.60	432.5	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	01/20/98	7.41	432.69	<1	1	<1	<1	1	<1	<1	<1	2
GT-7S	440.1	02/16/98	7.57	432.53	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	03/17/98	7.43	432.67	<1	<1	<1	<1	<1	<1	<1	<1	<1
GT-7S	440.1	04/15/98	7.36	432.74	<1	<1	<1	<1	<1	1	<1	<1	1
GT-7S	440.1	05/07/98	7.88	432.22	<1	1	<1	<1	63	<1	<1	<1	64
GT-7S	440.1	06/03/98	7.51	432.60	1,800	2	<1	<1	110	43	<2	<1	1955
GT-7S	440.1	07/21/98	[illegible]	[illegible]	<1	1	<1	<1	1	<1	<1	<1	2
GT-7S	440.1	08/21/98	7.95	432.15	3	11	<1	1	3	<1	3	<1	20
GT-7S	440.1	09/18/98	5.36	434.74	<1	7	<1	<1	3	<1	<1	<1	9
GT-7S	440.1	10/19/98	8.26	431.84	1	12	<1	1	<1	<1	<1	1	15
GT-7S	440.1	11/24/98	8.40	431.7	4	9	<1	1	2	<1	1	<1	16
GT-7S	440.1	12/23/98	8.47	431.63	<1	4	<1	<1	<1	<1	<1	<1	4
GT-7S	440.1	10/27/99	NG		<1	4	<1	<1	<1	16	<1	6	26
GT-7S	440.1	11/30/99	NG		<1	2	<1	<1	<1	<1	<1	1	3
GT-7S	440.1	12/29/99	7.63	432.47	<1	2	<1	<1	<1	<1	<1	1	3
GT-7S	440.1	01/18/00	7.80	432.3	<1	1	<1	<1	<1	<1	NA	<1	1
GT-7S	440.1	02/16/00	7.75	432.35	<1	3	<1	<1	<1	<1	NA	<1	3
GT-7S	440.1	03/23/00	7.02	433.08	4	2	<1	<1	<1	5	NA	3	14
GT-7S	440.1	04/26/00	7.10	433	8	2	<1	<1	1	2	NA	2	18
GT-7S	440.1	05/02/00	7.35	432.75	<1	1	<1	<1	<1	<1	NA	<1	1
GT-7S	440.1	06/30/01	NM		13,000	150	<50	<50	<50	140	NA	420	13710
GT-7S	440.1	07/21/00	8.64	431.46	14,000	4	<1	<1	5	84	NA	340	14433
GT-7S	440.1	08/29/00	8.58	431.52	12,000	<200	<200	<200	<200	<200	NA	630	12630
GT-7S	440.1	09/20/00	8.38	431.72	10,000	<200	<200	<200	<200	<200	NA	390	10390
GT-7S	440.1	10/12/00	8.89	431.21	14,000	<200	<200	<200	<200	<200	NA	460	14460
GT-7S	440.1	11/20/00	8.72	431.38	12,000	<200	<200	<200	<200	<200	NA	460	12460
GT-7S	440.1	12/20/00	10.02	430.08	12,000	<200	<200	<200	<200	<200	NA	440	12440
GT-7S	440.1	01/29/00	9.45	430.65	15,000	250	<250	<250	<250	<250	NA	660	15910
GT-7S	440.1	02/23/01	7.81	432.29	24,000	260	<250	<250	<250	<250	NA	830	25090
GT-7S	440.1	03/29/01	8.70	431.4	11,000	<250	<250	<250	<250	<250	NA	530	11530
GT-7S	440.1	04/19/01	9.50	430.6	7,200	<250	<250	<250	<250	<250	NA	<250	7200
GT-7S	440.1	05/23/01	8.42	431.68	8,700	<200	<200	<200	<200	<200	NA	260	8960
GT-7S	440.1	06/22/01	7.42	432.68									0
GT-7S	440.1	07/20/01	7.75	432.35									0
GT-7S	440.1	08/29/01	8.89	431.21	<20	49	<20	<20	<20	23	NA	520	592
GT-7S	440.1	09/26/01	NM										0
GT-7S	440.1	10/31/01	9.12	430.98									0
GT-7S	440.1	11/21/01	9.50	430.6	5,600	<200	<200	<200	<200	<200	NA	300	5900
GT-7S	440.1	12/18/01	NM		4,200	<200	<200	<200	<200	<200	NA	<200	4200
GT-7S	440.1	01/29/02	9.50	430.6									0
GT-7S	440.1	02/13/02	9.56	430.54									0
GT-7S	440.1	03/21/02	NM										0
GT-7S	440.1	04/23/02	9.62	430.48	71	<50	<50	<50	<50	<50	NA	<50	71
GT-7S	440.1	05/23/02	8.59	431.51	4,600	<200	<200	<200	<200	<200	NA	<200	4600
GT-7S	440.1	06/17/02	7.89	432.21	8,300	<200	<200	<200	<200	<200	NA	410	8710
GT-7S	440.1	07/17/02	9.83	430.27	1,300	<50	<50	<50	<50	NA	NA	NA	1300
GT-7S	440.1	08/29/02	9.15	430.95	6,600	13	<10	<10	<10	<10	NA	150	6763
GT-7S	440.1	09/27/02	9.85	430.25	390	<10	<10	<10	<10	<10	NA	<10	390
GT-7S	440.1	10/21/02	9.45	430.65	43	<1	<1	<1	<1	NA	NA	NA	43
GT-7S	440.1	11/27/02	9.90	430.2	48	<5	<5	<5	<5	<5	NA	<5	48
GT-7S	440.1	12/17/02	7.80	432.3	3	2	<1	<1	<1	<1	NA	<1	5
GT-7S	440.1	01/28/03	8.97	431.13	52	2	<1	<1	<1	<1	NA	<1	54
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<1	5	NA	10	637
GT-7S	440.1	03/31/03	6.70	433.4	<1	1	<1	<1	<1	<1	NA	<1	1
GT-7S	440.1	04/21/03	7.05	433.05	<1.0	1	<1.0	<1.0	<1.0	<1.0	NA	<1.0	1

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Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
GT-7S	440.1	07/30/03	7.62	432.48	<1	1.2	<1	<1	<1	<1	NA	<1	1.2
GT-7S	440.1	08/30/03	6.98	433.12	<1	10	<1	<1	<1	<1	NA	<1	10
GT-7S	440.1	10/17/03	7.26	432.84	<1	14	<1	1.1	<1	NA	NA	16.2	
GT-7S	440.1	11/20/03	7.26	432.84	<1	12	<1	<1	<1	<1	NA	<1	12
GT-7S	440.1	12/16/03	6.83	433.27	<1	2	<1	<1	<1	<1	NA	<1	2
GT-7S	440.1	01/14/04	6.98	433.12	<1	4.3	<1	<1	<1	<1	NA	<1	4.3
GT-7S	440.1	02/26/04	7.60	432.5	<1	2.9	<1	<1	<1	<1	NA	<1	2.9
GT-7S	440.1	03/27/04	7.84	432.26	<1	1.9	<1	<1	<1	<1	NA	<1	1.9
GT-7S	440.1			440.1									
NVP-1	NM	01/16/96	6.51	NA									
NVP-1	NM	02/15/96	5.83	NA									
NVP-1	NM	03/15/96	5.45	NA									
NVP-1	NM	04/11/96	5.72	NA									
NVP-1	NM	05/28/96	6.15	NA									
NVP-1	NM	06/26/96	6.16	NA									
NVP-1	NM	07/19/96	6.17	NA									
NVP-1	NM	08/19/96	6.53	NA									
NVP-1	NM	09/06/96	DRY	NA									
NVP-1	NM	10/09/96	6.35	NA									
NVP-1	NM	12/16/96	5.19	NA									
NVP-1	NM	01/30/97	5.98	NA									
NVP-1	NM	02/18/97	6.07	NA									
NVP-1	NM	04/02/97	5.55	NA									
NVP-1	NM	04/23/97	5.51	NA									
NVP-1	NM	05/13/97	5.99	NA									
NVP-1	NM	06/08/97	6.52	NA									
NVP-1	NM	07/08/97	6.15	NA									
NVP-1	NM	09/25/97	7.20	NA									
NVP-1	NM	10/22/97	DRY	NA									
NVP-1	NM	01/20/98	5.90	NA									
NVP-1	NM	02/16/98	5.99	NA									
NVP-1	NM	03/17/98	4.79	NA									
NVP-1	NM	05/07/98	5.98	NA									
NVP-1	NM	06/03/98	5.95	NA									
[illegible]	[illegible]	07/24/98	[illegible]	NA									
NVP-1	NM	08/21/98	6.48	NA									
NVP-1	NM	10/19/98	7.10	NA									
NVP-1	NM	11/24/98	7.23	NA									
NVP-1	NM	12/23/98	DRY	NA									
NVP-1	NM	12/29/99	6.70	NA									
NVP-1	NM	02/13/00	6.24	NA									
NVP-1	NM	06/02/00	6.40	NA									
NVP-1	NM	08/29/00	6.95	NA									
NVP-1	NM	11/20/00	6.95	NA									
NVP-1	NM	02/23/01	6.75	NA									
NVP-1	NM	05/23/01	6.87	NA									
NVP-1	NM	08/29/01	7.53	NA									
NVP-1	NM	11/21/01	7.41	NA									
NVP-1	NM	02/13/02	6.76	NA									
NVP-1	NM	05/23/02	6.40	NA									
NVP-1	NM	08/29/02	7.35	NA									
NVP-1	NM	11/27/02	DRY	NA									
NVP-1	NM	02/28/03	7.67	NA									
NVP-1	NM	06/04/03	NM	NA									
NVP-1	NM	09/30/03	NM	NA									
NVP-1	NM	11/20/03	7.32	NA									
NVP-1	NM	02/26/04	7.86	NA									
NVP-1	NM			NA									
RW-1D	NM	02/09/95		NA	1	0	<1	<1	<1	1	1		3
RW-1D	NM	05/17/95		NA	3	5	<1	<1	<1	41	80		129
RW-1D	NM	08/30/95		NA	13	2	<1	2	11	<1	<1		28
RW-1D	NM	11/14/95		NA									
RW-1D	NM	02/15/96	6.66	NA									
RW-1D	NM	05/28/96	6.76	NA	<50	<50	<50	<50	<50	960	650		1610
RW-1D	NM	08/19/96	NG	NA	6	4	<1	<1	<1	820	580		1409
RW-1D	NM	11/21/96	7.35	NA	<1	<1	<1	<1	<1	240	650		890
RW-1D	NM	02/19/97	6.84	NA	<10	<10	<10	<10	<10	30	<10	77	107
RW-1D	NM	05/13/97	6.78	NA	<50	88	<50	<50	<50	<50	<50	110	198
RW-1D	NM	08/09/97	7.51	NA	<20	<20	<20	<20	<20	<20	<20	120	120
RW-1D	NM	11/11/97	7.01	NA	<20	<20	<20	<20	[illegible]	[illegible]	[illegible]	[illegible]	140
RW-1D	NM	02/16/98	6.94	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-1D	NM	05/07/98	6.97	NA	<1	2	<1	<1	160	<1	<1	<1	162

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-1D	NM	12/29/99	7.13	NA	<1	<1	<1	<1	<1	<1	<1	13	13
RW-1D	NM	02/13/00	6.80	NA	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1D	NM	06/02/00	7.08	NA	<1	<1	<1	<1	<1	6	NA	26	32
RW-1D	NM	08/29/00	7.38	NA	<1	<1	<1	<1	<1	24	NA	42	66
RW-1D	NM	11/20/00	7.16	NA	<1	<1	<1	<1	<1	1	NA	<1	1
RW-1D	NM	02/23/01	6.67	NA	3	<1	<1	<1	<1	240	NA	380	623
RW-1D	NM	05/23/01	6.66	NA	1	<1	<1	<1	<1	160	NA	300	461
RW-1D	NM	08/29/01	7.42	NA	<1	<1	<1	<1	<1	2	NA	8	10
RW-1D	NM	11/21/01	7.26	NA	<1	<1	<1	<1	<1	<1	NA	4	4
RW-1D	NM	02/13/02	6.95	NA									0
RW-1D	NM	05/23/02	6.75	NA	<1	<1	<1	<1	<1	<1	NA	5	5
RW-1D	NM	08/29/02	7.16	NA	<1	<1	<1	<1	<1	<1	NA	3	3
RW-1D	NM	11/27/02	6.73	NA	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1D	NM	02/26/03	6.42	NA	<10	<10	<10	<10	<10	69	NA	127	196
RW-1D	NM	06/04/03	NM	NA	<1	<1	<1	<1	<1	22	NA	31	53
RW-1D	NM	09/30/03	6.48	NA	<1	<1	<1	<1	<1	<1	NA	13	13
RW-1D	NM	11/20/03	6.86	NA									
RW-1D	NM			NA									
RW-1S	437.5	03/01/92	5.75	431.75									
RW-1S	437.5	04/01/92	9.32	428.18									
RW-1S	437.5	05/01/92	9.40	428.1									
RW-1S	437.5	06/01/92	6.72	430.78									
RW-1S	437.5	11/01/92	8.45	429.05									
RW-1S	437.5	12/01/92	10.05	427.45									
RW-1S	437.5	01/01/93	10.10	427.4									
RW-1S	437.5	02/01/93	10.10	427.4									
RW-1S	437.5	03/01/93	8.28	429.22									
RW-1S	437.5	04/01/93	10.00	427.5									
RW-1S	437.5	08/01/93	10.05	427.45									
RW-1S	437.5	09/01/93	9.70	427.8									
RW-1S	437.5	10/01/93	8.80	428.7									
RW-1S	437.5	11/01/93	9.90	427.6									
RW-1S	437.5	12/01/93	10.30	427.2									
RW-1S	437.5	01/01/94	10.30	427.2									
RW-1S	[illegible]	[illegible]	[illegible]	[illegible]									
RW-1S	437.5	04/01/94	10.10	427.4									
RW-1S	437.5	05/01/94	49.75	387.75									
RW-1S	437.5	06/01/94	9.41	428.09									
RW-1S	437.5	07/01/94	9.65	427.85									
RW-1S	437.5	08/01/94	9.65	427.85									
RW-1S	437.5	09/01/94	9.64	427.86									
RW-1S	437.5	10/01/94	9.60	427.9									
RW-1S	437.5	11/01/94	9.85	427.65									
RW-1S	437.5	12/01/94	9.50	428									
RW-1S	437.5	01/01/95	9.45	428.05									
RW-1S	437.5	02/09/95	9.70	427.8	13,000	<50	140	<50	<50	940	230		14310
RW-1S	437.5	03/01/95	9.70	427.8									
RW-1S	437.5	04/01/95	9.38	428.12									
RW-1S	437.5	05/17/95	9.60	427.9	18,000	<250	<250	<250	<250	<250	<250		18000
RW-1S	437.5	06/01/95	9.35	428.15									
RW-1S	437.5	07/13/95	9.67	427.83									
RW-1S	437.5	08/16/95	9.64	427.86	23,000	<10	<10	<10	220	920	<10		24140
RW-1S	437.5	09/19/95	9.66	427.84									
RW-1S	437.5	10/17/95	9.64	427.86									
RW-1S	437.5	11/14/95	9.36	428.14	<1	<1	<1	<1	<1	<1	<1		<1
RW-1S	437.5	12/05/95	9.39	428.11									
RW-1S	437.5	01/16/96	8.86	428.64									
RW-1S	437.5	02/15/96	9.47	428.03	2,000				22		45		2067
RW-1S	437.5	03/15/96	8.97	428.53									
RW-1S	437.5	04/11/96	9.65	427.85									
RW-1S	437.5	05/28/96	9.53	427.97	5,900	<50	<50	<50	<50	1400	270		7570
RW-1S	437.5	06/28/96	6.17	431.33									
RW-1S	437.5	07/19/96	9.65	427.85									
RW-1S	437.5	08/19/96	7.33	430.17	<1	<1	<1	<1	<1	<1	<1		<1
RW-1S	437.5	09/08/96	8.58	428.92									
RW-1S	437.5	10/08/96	8.75	428.75									
RW-1S	437.5	11/21/96	9.12	428.38	3,800	<1	<1	<1	<1	14	46		3860
RW-1S	437.5	12/18/96	9.42	428.08									
RW-1S	437.5	01/30/97	9.40	428.1									
RW-1S	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
RW-1S	437.5	04/02/97	9.10	428.4									
RW-1S	437.5	04/23/97	9.07	428.43									

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-1S	437.5	07/08/97	9.27	428.23									
RW-1S	437.5	08/08/97	9.06	428.44	7,800	<20	<20	<20	<20	<20	<20	<20	7800
RW-1S	437.5	09/26/97	9.70	427.8									
RW-1S	437.5	10/22/97	9.55	427.95									
RW-1S	437.5	11/11/97			300	<10	<10	<10	<10	<10	<10	<10	300
RW-1S	437.5	12/10/97	6.02	431.48									
RW-1S	437.5	02/16/98			<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-1S	437.5	03/17/98	10.75	426.75									
RW-1S	437.5	05/07/98	8.75	428.75	24	1	<1	<2	76	<1	<1	<1	101
RW-1S	437.5	07/21/98	6.61	430.89									
RW-1S	437.5	08/21/98	6.68	430.82	100	<1	<1	<1	46	46	<1	<1	193
RW-1S	437.5	10/19/98	5.95	431.55									
RW-1S	437.5	11/24/98	8.95	428.55									
RW-1S	437.5	12/23/98	8.00	429.5									
RW-1S	437.5	12/29/99	6.40	431.1	<1	<1	<1	<1	<1	<1	<1	8	8
RW-1S	437.5	02/13/00	6.42	431.08	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	06/02/00	8.71	428.79	10	<1	<1	<1	<1	<1	NA	18	28
RW-1S	437.5	08/29/00	7.20	430.3	7	<1	<1	<1	<1	<1	NA	<1	7
RW-1S	437.5	11/20/00	10.63	426.87	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/23/01	8.60	428.9	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	05/23/01	5.50	432	1	<1	<1	<1	<1	<1	NA	4	5
RW-1S	437.5	08/29/01	6.94	430.56	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	11/21/01	9.67	427.83	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/13/02	9.05	428.45									0
RW-1S	437.5	05/23/02	11.43	426.07	<1	1	<1	<1	<1	<1	NA	<1	1
RW-1S	437.5	08/29/02	8.45	429.05	8	<1	<1	<1	<1	<1	NA	<1	8
RW-1S	437.5	11/27/02	11.65	425.85	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/28/03	11.67	425.83	1	<1	<1	<1	<1	<1	NA	1	2.2
RW-1S	437.5	06/04/03	NM		<1	<1	<1	<1	<1	<1	NA	1.1	1.1
RW-1S	437.5	09/30/03	NM										
RW-1S	437.5	11/20/03	5.87	431.63	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-1S	437.5	02/28/04	7.48	430.02	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	03/01/92	6.65	431.55									
RW-2S	438.2	04/01/92	8.08	430.12									
RW-2S	438.2	05/01/92	7.93	430.27									
RW-2S	438.2	11/01/92	8.07	430.13									
RW-2S	438.2	12/01/92	7.93	430.27									
RW-2S	438.2	01/01/93	8.10	430.1									
RW-2S	438.2	03/01/93	8.03	430.17									
RW-2S	438.2	04/01/93	8.01	430.19									
RW-2S	438.2	05/01/93	8.40	429.8									
RW-2S	438.2	08/01/93	8.40	429.8									
RW-2S	438.2	09/01/93	7.80	430.4									
RW-2S	438.2	10/01/93	7.57	430.63									
RW-2S	438.2	11/01/93	8.45	429.75									
RW-2S	438.2	12/01/93	7.40	430.8									
RW-2S	438.2	01/01/94	7.40	430.8									
RW-2S	438.2	02/01/94	7.00	431.2									
RW-2S	438.2	04/01/94	7.35	430.85									
RW-2S	438.2	05/01/94	7.13	431.07									
RW-2S	438.2	06/01/94	7.52	430.68									
RW-2S	438.2	07/01/94	7.85	430.35									
RW-2S	438.2	08/01/94	7.42	430.78									
RW-2S	438.2	09/01/94	7.08	431.12									
RW-2S	438.2	10/01/94	7.10	431.1									
RW-2S	438.2	11/01/94	7.10	431.1									
RW-2S	438.2	12/01/94	7.03	431.17									
RW-2S	438.2	01/01/95	7.10	431.1									
RW-2S	438.2	02/09/95	7.51	430.69	<1	3	0	<1	<1	<1	<1		3
RW-2S	438.2	03/01/95	7.50	430.7									
RW-2S	438.2	04/01/95	6.97	431.23									
RW-2S	438.2	05/17/95	7.30	430.9	17	4	<1	<1	<1	<1	18		39
RW-2S	438.2	06/01/95	7.48	430.72									
RW-2S	438.2	07/13/95	7.72	430.48									
RW-2S	438.2	08/16/95	7.50	430.7	36	2	<1	<1	13	<1	<1		49
RW-2S	438.2	11/14/95	7.04	431.16	<1	<1	<1	<1	<1	<1	<1		<1
RW-2S	438.2	12/05/95	6.94	431.26									
RW-2S	438.2	01/16/96	DRY	#VALUE!									
RW-2S	438.2	02/15/96	7.17	431.03	<1	<1	<1	<1	2	<1	<1		2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
RW-2S	438.2	04/11/96	7.30	430.9									
RW-2S	438.2	05/28/96	7.14	431.06	71	9	<10	<10	<10	800	<10		1280

ft-asl = feet above sea level
ug/l = micrograms per liter
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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
RW-2S	438.2	08/19/96	7.13	431.07	<1	<1	<1	<1	<1	<1	5		5
RW-2S	438.2	09/06/96	DRY	#VALUE!									
RW-2S	438.2	10/09/96	7.45	430.75									
RW-2S	438.2	11/21/96	7.65	430.55	<1	<1	<1	<1	<1	<1	5		5
RW-2S	438.2	12/18/96	8.13	430.07									
RW-2S	438.2	01/30/97	8.13	430.07									
RW-2S	438.2	02/19/97	8.52	429.68	<2	<2	<2	<2	<2	4	<2	35	39
RW-2S	438.2	04/02/97	8.03	430.17									
RW-2S	438.2	04/23/97	8.00	430.2									
RW-2S	438.2	05/13/97	8.20	430	<1	1	<1	<1	<1	<1	<1	32	33
RW-2S	438.2	06/09/97	7.10	431.1									
RW-2S	438.2	07/08/97	7.91	430.29									
RW-2S	438.2	08/08/97	7.97	430.23	<1	2	<1	<1	<1	<1	<1	<1	2
RW-2S	438.2	09/26/97	8.74	429.46									
RW-2S	438.2	10/22/97	8.40	429.8									
RW-2S	438.2	11/11/97		438.2	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	12/10/97	7.92	430.28									
RW-2S	438.2	01/20/98	8.38	429.84									
RW-2S	438.2	02/16/98	8.16	430.05	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	03/17/98	7.79	430.41									
RW-2S	438.2	05/07/98	8.81	429.39	<1	<1	<1	<1	<1	<1	<1	<1	<1
RW-2S	438.2	06/03/98	8.09	430.11									
RW-2S	438.2	07/21/98	8.27	429.93									
RW-2S	438.2	08/21/98	7.43	430.77	22	<1	<1	<1	9	2	<1	<1	33
RW-2S	438.2	10/19/98	8.53	429.67									
RW-2S	438.2	11/24/98	8.11	430.09									
RW-2S	438.2	12/23/98	7.90	430.3									
RW-2S	438.2	12/29/99	7.15	431.05	<1	<1	<1	<1	<1	<1	<1	6	6
RW-2S	438.2	02/13/00	7.17	431.03	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	06/02/00	7.35	430.85	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/29/00	8.00	430.2	<1	<1	<1	<1	<1	<1	NA	7	7
RW-2S	438.2	11/20/00	8.00	430.2	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/23/01	8.40	429.8	<1	<1	<1	<1	<1	<1	NA	3	3
RW-2S	438.2	05/23/01	8.50	429.7	8	<1	<1	<1	<1	<1	NA	18	26
RW-2S	438.2	08/20/01	8.74	429.46	<1	<1	<1	<1	<1	<1	NA	5	5
RW-2S	438.2	11/21/01	10.04	428.16	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/13/02	8.30	429.9									0
RW-2S	438.2	08/23/02	9.82	428.68	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/29/02	8.20	430	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	11/27/02	9.87	428.33	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/28/03	9.78	428.42	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/04/03	NM		<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	08/30/03	NM										
RW-2S	438.2	11/20/03	7.17	431.03	<1	<1	<1	<1	<1	<1	NA	<1	0
RW-2S	438.2	02/28/04	7.23	430.97	<1	<1	<1	<1	<1	<1	NA	<1	0
SV-1	NM	01/18/96	5.55	NA									
SV-1	NM	02/15/96	4.74	NA									
SV-1	NM	03/15/96	5.65	NA									
SV-1	NM	04/11/96	5.69	NA									
SV-1	NM	05/28/96	5.98	NA									
SV-1	NM	06/28/96	6.25	NA									
SV-1	NM	07/19/96	DRY	NA									
SV-1	NM	08/19/96	6.59	NA									
SV-1	NM	09/06/96	DRY	NA									
SV-1	NM	10/09/96	6.01	NA									
SV-1	NM	11/21/96	DRY	NA									
SV-1	NM	12/18/96	3.88	NA									
SV-1	NM	01/30/97	4.76	NA									
SV-1	NM	02/19/97	4.87	NA									
SV-1	NM	04/02/97	4.15	NA									
SV-1	NM	04/23/97	4.12	NA									
SV-1	NM	05/13/97	5.88	NA									
SV-1	NM	06/09/97	6.35	NA									
SV-1	NM	07/08/97	5.10	NA									
SV-1	NM	10/22/97	DRY	NA									
SV-1	NM	12/10/97	5.06	NA									
SV-1	NM	01/20/98	4.70	NA									
SV-1	NM	02/16/98	5.45	NA									
SV-1	NM	03/17/98	5.82	NA									
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
SV-1	NM	06/03/98	5.10	NA									
SV-1	NM	07/21/98	6.22	NA									

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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
SV-1	NM	11/24/98	DRY	NA									
SV-1	NM	12/23/98	DRY	NA									
SV-1	NM	12/29/99	DRY	NA									
SV-1	NM	02/13/00	DRY	NA									
SV-1	NM	05/02/00	DRY	NA									
SV-1	NM	08/29/00	DRY	NA									
SV-1	NM	11/20/00	DRY	NA									
SV-1	NM	02/23/01	DRY	NA									
SV-1	NM	05/23/01	DRY	NA									
SV-1	NM	08/29/01	DRY	NA									
SV-1	NM	11/21/01	DRY	NA									
SV-1	NM	02/13/02	DRY	NA									
SV-1	NM	05/23/02	6.01	NA									
SV-1	NM	08/29/02	DRY	NA									
SV-1	NM	11/27/02	6.19	NA									
SV-1	NM	02/26/03	5.98	NA									
SV-1	NM	08/04/03	NM	NA									
SV-1	NM	09/30/03	NM	NA									
SV-1	NM	11/20/03	DRY	NA									
SV-1	NM	02/26/04	DRY	NA									
VEP-1	NM	01/16/96	7.64	NA									
VEP-1	NM	02/15/96	8.28	NA									
VEP-1	NM	03/14/96	8.09	NA									
VEP-1	NM	04/11/96	6.38	NA									
VEP-1	NM	05/28/96	6.61	NA									
VEP-1	NM	06/26/96	6.63	NA									
VEP-1	NM	07/19/96	8.33	NA									
VEP-1	NM	08/19/96	9.14	NA									
VEP-1	NM	09/06/96	7.26	NA									
VEP-1	NM	10/09/96	6.81	NA									
VEP-1	NM	11/21/96	8.31	NA									
VEP-1	NM	12/18/96	6.79	NA									
VEP-1	NM	01/30/97	7.54	NA									
VEP-1	NM	02/19/97	7.65	NA									
VEP-1	NM	04/02/97	7.02	NA									
VEP-1	NM	04/28/97	[illegible]	NA									
VEP-1	NM	05/13/97	6.53	NA									
VEP-1	NM	06/09/97	8.00	NA									
VEP-1	NM	07/08/97	7.42	NA									
VEP-1	NM	08/08/97	7.80	NA									
VEP-1	NM	09/25/97	8.50	NA									
VEP-1	NM	10/22/97	8.77	NA									
VEP-1	NM	12/10/97	6.90	NA									
VEP-1	NM	01/20/98	8.58	NA									
VEP-1	NM	02/16/98	8.60	NA									
VEP-1	NM	03/17/98	6.60	NA									
VEP-1	NM	04/16/98	6.75	NA									
VEP-1	NM	05/07/98	7.63	NA									
VEP-1	NM	06/03/98	7.05	NA									
VEP-1	NM	08/21/98	7.46	NA									
VEP-1	NM	10/19/98	8.78	NA									
VEP-1	NM	11/24/98	8.41	NA									
VEP-1	NM	12/23/98	8.41	NA									
VEP-1	NM	12/29/99		NA									
VEP-1	NM	02/13/00	7.38	NA									
VEP-1	NM	05/02/00	7.90	NA									
VEP-1	NM	08/29/00	8.22	NA									
VEP-1	NM	11/20/00	8.16	NA									
VEP-1	NM	02/23/01	8.13	NA									
VEP-1	NM	05/23/01	8.09	NA									
VEP-1	NM	08/29/01	8.71	NA									
VEP-1	NM	11/21/01	8.71	NA									
VEP-1	NM	02/13/02	8.02	NA									
VEP-1	NM	05/23/02	7.79	NA									
VEP-1	NM	08/29/02	8.60	NA									
VEP-1	NM	11/27/02	7.60	NA									
VEP-1	NM	02/26/03	7.62	NA									
VEP-1	NM	08/04/03	NM	NA									
VEP-1	NM	09/30/03	NM	NA									
VEP-1	NM	[illegible]	[illegible]	NA									
VEP-1	NM	02/26/04	7.66	NA									
VEP-2	NM	02/15/96	5.86	NA	<1	<1	<1	<1	<1	<1	<1		ND

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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
VEP-2	NM	11/21/96	7.58	NA									
VEP-2	NM	02/19/97	8.68	NA									
VEP-2	NM	05/13/97	8.69	NA									
VEP-2	NM	08/09/97	8.85	NA									
VEP-2	NM	02/16/98	6.40	NA									
VEP-2	NM	05/07/98	8.04	NA									
VEP-2	NM	08/21/98	7.24	NA									
VEP-2	NM	11/24/98	7.68	NA									
VEP-2	NM	12/29/99	7.28	NA									
VEP-2	NM	02/13/00	8.91	NA									
VEP-2	NM	06/02/00	6.56	NA									
VEP-2	NM	08/29/00	7.19	NA									
VEP-2	NM	11/20/00	7.51	NA									
VEP-2	NM	02/23/01	7.04	NA									
VEP-2	NM	05/23/01	7.45	NA									
VEP-2	NM	08/29/01	7.90	NA									
VEP-2	NM	11/21/01	8.31	NA									
VEP-2	NM	02/13/02	7.53	NA									
VEP-2	NM	05/23/02	6.85	NA									
VEP-2	NM	08/29/02	7.90	NA									
VEP-2	NM	11/27/02	7.01	NA									
VEP-2	NM	02/26/03	6.80	NA									
VEP-2	NM	06/04/03	NM	NA									
VEP-2	NM	09/30/03	NM	NA									
VEP-2	NM	11/20/03	6.97	NA									
VEP-2	NM	02/26/04	6.37	NA									
VEP-3	NM	02/15/98	DRY	NA									
VEP-3	NM	05/28/98	DRY	NA									
VEP-3	NM	08/19/98	DRY	NA									
VEP-3	NM	11/21/95	DRY	NA									
VEP-3	NM	02/19/97	5.10	NA									
VEP-3	NM	05/13/97	DRY	NA									
VEP-3	NM	08/09/97	DRY	NA									
VEP-3	NM	02/16/98	DRY	NA									
VEP-3	NM	05/07/98	DRY	NA									
VEP-3	NM	08/21/98	DRY	NA									
VEP-3	NM	11/24/98	DRY	NA									
VEP-3	NM	12/28/99		NA									
VEP-3	NM	02/13/00	DRY	NA									
VEP-3	NM	06/02/00	DRY	NA									
VEP-3	NM	08/29/00	DRY	NA									
VEP-3	NM	11/20/00	DRY	NA									
VEP-3	NM	02/23/01	DRY	NA									
VEP-3	NM	05/23/01	DRY	NA									
VEP-3	NM	08/29/01	DRY	NA									
VEP-3	NM	11/21/01	DRY	NA									
VEP-3	NM	02/13/02	DRY	NA									
VEP-3	NM	05/23/02	DRY	NA									
VEP-3	NM	08/29/02	DRY	NA									
VEP-3	NM	11/27/02	DRY	NA									
VEP-3	NM	02/28/03	DRY	NA									
VEP-3	NM	06/04/03	DRY	NA									
VEP-3	NM	09/30/03	NM	NA									
VEP-3	NM	11/20/03	DRY	NA									
VEP-3	NM			NA									
VEP-4	NM	02/09/95		NA	<1	1	<1	<1	<1	<1	<1		1
VEP-4	NM	05/17/95		NA	110	140	<1	2	<1	<1	28		278
VEP-4	NM	08/16/95		NA	8	3	<1	2	<1	<1	<1		14
VEP-4	NM	11/14/95		NA	<1	1	<1	<1	<1	<1	<1		1
VEP-4	NM	02/15/96	7.62	NA	<1	<1	<1	<1	<1	<1	<1		ND
VEP-4	NM	05/28/96	7.27	NA	<1	2	<1	2	<1	<1	<1		4
VEP-4	NM	08/19/96	8.03	NA	<1	2	<1	1	<1	<1	<1		3
VEP-4	NM	11/21/96	8.16	NA	<1	2	<1	<1	<1	<1	<1		2
VEP-4	NM	02/19/97	8.39	NA	<1	10	<1	<1	<1	<1	<1	2	12
VEP-4	NM	05/13/97	7.51	NA	<1	4	<1	1	<1	<1	<1	<1	5
VEP-4	NM	08/08/97	8.71	NA	<1	5	<1	<1	<1	<1	<1	<1	5
VEP-4	NM	11/11/97	8.15	NA	<1	14	<1	<1	<1	<1	<1	<1	14
VEP-4	NM	02/16/98	7.86	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
VEP-4	NM	05/07/98	7.52	NA	<1	2	<1	<1	<1	<1	<1	<1	2
VEP-4	NM	08/21/98	9.85	NA	<1	1	<1	<1	<1	<1	<1	<1	[illegible]
VEP-4	NM	11/24/98	9.36	NA									
VEP-4	NM	12/20/99	8.90	NA	<1	2	<1	<1	<1	<1	<1	<1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]							

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Table 1
Pawling Corporation
Groundwater Monitoring Data and
VOC Concentrations in Groundwater

Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
VEP-4	NM	08/29/00	8.65	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	11/20/00	8.98	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	02/23/01	NM	NA	Well Cap Brkn								
VEP-4	NM	05/23/01	NM	NA	Well Cap Brkn								
VEP-4	NM	08/29/01	NM	NA	Well Cap Brkn								
VEP-4	NM	11/21/01	10.16	NA	<1	6	<1	<1	<1	<1	NA	<1	6
VEP-4	NM	02/13/02	NM	NA	Well Cap Brkn								
VEP-4	NM	05/23/02	8.09	NA		<1	<1	<1	<1	<1	NA	<1	0
VEP-4	NM	08/29/02	9.18	NA		7	<1	<1	<1	<1	NA	2	9
VEP-4	NM	11/27/02	8.42	NA	<1	1	<1	<1	<1	<1	NA	<1	1
VEP-4	NM	02/28/03	NM	NA									
VEP-4	NM	06/04/03	NM	NA									
VEP-4	NM	09/30/03	7.94	NA	<1	2.8	<1	<1	<1	<1	NA	<1	2.8
VEP-4	NM	11/20/03	8.31	NA									
VEP-4	NM	02/26/04	8.83	NA									
VEP-5	NM	02/15/96	DRY	NA									
VEP-5	NM	05/28/96	DRY	NA									
VEP-5	NM	08/19/96	DRY	NA									
VEP-5	NM	11/21/96	DRY	NA									
VEP-5	NM	02/18/97	4.07	NA									
VEP-5	NM	05/13/97	DRY	NA									
VEP-5	NM	08/08/97	DRY	NA									
VEP-5	NM	02/16/98		NA									
VEP-5	NM	05/07/98		NA									
VEP-5	NM	08/21/98	DRY	NA									
VEP-5	NM	11/24/98	4.03	NA									
VEP-5	NM	12/29/99		NA									
VEP-5	NM	02/13/00	DRY	NA									
VEP-5	NM	08/02/00	DRY	NA									
VEP-5	NM	08/29/00	DRY	NA									
VEP-5	NM	11/20/00	DRY	NA									
VEP-5	NM	02/23/01	NM	NA									
VEP-5	NM	05/23/01	DRY	NA									
VEP-5	NM	08/29/01	DRY	NA									
VEP-5	NM	11/21/01	DRY	NA									
VEP-5	NM	02/13/01	DRY	NA									
VEP-5	NM	05/23/01	DRY	NA									
VEP-5	NM	08/29/01	DRY	NA									
VEP-5	NM	11/21/01	DRY	NA									
VEP-5	NM	02/13/02	DRY	NA									
VEP-5	NM	05/23/02	3.72	NA									
VEP-5	NM	08/29/02	DRY	NA									
VEP-5	NM	11/27/02	4.73	NA									
VEP-5	NM	02/28/03	4.18	NA									
VEP-5	NM	06/04/03	3.17	NA									
VEP-5	NM	09/30/03	NM	NA									
VEP-5	NM	11/20/03	2.80	NA									
VEP-5	NM	02/26/04	DRY	NA									
VEP-6	NM	01/16/96	6.51	NA									
VEP-6	NM	02/16/96	5.70	NA									
VEP-6	NM	03/16/96	5.45	NA									
VEP-6	NM	04/11/96	6.21	NA									
VEP-6	NM	05/28/96	6.18	NA									
VEP-6	NM	06/26/96	5.71	NA									
VEP-6	NM	07/19/96	5.93	NA									
VEP-6	NM	08/19/96	6.19	NA									
VEP-6	NM	09/06/96	6.36	NA									
VEP-6	NM	10/09/96	6.17	NA									
VEP-6	NM	11/21/96	7.42	NA									
VEP-6	NM	12/16/96	5.86	NA									
VEP-6	NM	01/30/97	DRY	NA									
VEP-6	NM	02/19/97	5.90	NA									
VEP-6	NM	04/02/97	5.02	NA									
VEP-6	NM	04/23/97	4.99	NA									
VEP-6	NM	05/13/97	5.15	NA									
VEP-6	NM	06/08/97	DRY	NA									
VEP-6	NM	07/08/97	DRY	NA									
VEP-6	NM	10/22/97	DRY	NA									
VEP-6	NM	12/10/97	DRY	NA									
VEP-6	NM	[illegible]	[illegible]	NA									
VEP-6	NM	02/16/98	3.40	NA									
VEP-6	NM	03/17/98	3.33	NA									

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Well ID	Casing Elevation	Sample Date	Depth to Water	Water Elevation	TOLUENE	TRICHLOROETHENE	1,1,1-TRICHLOROETHANE	TETRACHLOROETHENE	TRANS-1,2-DICHLOROETHENE	VINYL CHLORIDE	ETHYLBENZENE	CIS-1,2-DICHLOROETHENE	TOTAL VOCS
	(ft-asl)		(ft)	(ft-asl)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
VEP-6	NM	07/21/98	3.60	NA									
VEP-6	NM	08/21/98	3.40	NA									
VEP-6	NM	10/19/98	3.58	NA									
VEP-6	NM	11/24/98	3.59	NA									
VEP-6	NM	12/23/98	DRY	NA									
VEP-6	NM	12/28/99	3.45	NA									
VEP-6	NM	02/13/00	DRY	NA									
VEP-6	NM	06/02/00	DRY	NA									
VEP-6	NM	08/28/00	3.23	NA									
VEP-6	NM	11/20/00	DRY	NA									
VEP-6	NM	02/23/01	3.28	NA									
VEP-6	NM	05/23/01	DRY	NA									
VEP-6	NM	08/29/01	7.24	NA									
VEP-6	NM	11/21/01	DRY	NA									
VEP-6	NM	02/13/02	6.78	NA									
VEP-6	NM	05/23/02	3.10	NA									
VEP-6	NM	08/29/02	3.20	NA									
VEP-6	NM	11/27/02	4.00	NA									
VEP-6	NM	02/28/03	DRY	NA									
VEP-6	NM	06/04/03	NM	NA									
VEP-6	NM	09/30/03	NM	NA									
VEP-6	NM	11/20/03	3.00	NA									
VEP-6	NM	2/28/2004	DRY	NA									

ft-asl = feet above sea level
ug/l = micrograms per liter
M:\Common\Proj\PawlingCorp\Report2002\Table1

Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS)		GALLONS PUMPED SINCE LAST MONITOR DATE		TOTAL VOC CONCENTRATION (milligrams per liter)		TOTAL POUNDS REMOVED BETWEEN MONITORING DATES			CUMULATIVE POUNDS REMOVED
	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	BOTH	
03/11/92	680	120	680	120	154.07	154.07	0.87	0.15	1.03	**1.03**
04/10/92	1,980	720	1,300	600	154.07	154.07	1.67	0.77	2.44	**3.47**
05/26/92	44,520	1,410	42,540	690	154.07	154.07	54.69	0.89	55.58	**59.05**
06/29/92	72,990	4,040	28,470	2,630	154.07	154.07	36.60	3.38	39.98	**99.03**
09/16/92	73,300	4,080	310	40	76	76	0.20	0.03	0.22	**99.26**
10/16/92	108,540	4,480	35,240	400	76	76	22.35	0.25	22.60	**121.86**
11/20/92	136,240	5,670	27,700	1,190	76	76	17.57	0.75	18.32	**140.18**
12/18/92	156,156	6,610	19,916	940	76	76	12.63	0.60	13.23	**153.41**
01/13/93	164,970	7,080	8,814	470	43.11	0.04	3.17	0.00	3.17	**156.58**
02/01/93	181,860	7,925	16,890	845	43.11	0.04	6.08	0.00	6.08	**162.65**
03/02/93	195,640	8,860	13,780	935	43.11	0.04	4.96	0.00	4.96	**167.61**
04/01/93	214,230	10,470	18,590	1,610	20.66	0.062	3.20	0.00	3.21	**170.82**
04/27/93	224,440	11,260	10,210	790	20.66	0.062	1.76	0.00	1.76	**172.58**
05/06/93	224,700	11,300	260	40	8.95	27.94	0.02	0.01	0.03	**172.61**
06/21/93	240,640	12,190	15,940	890	8.95	27.94	1.19	0.21	1.40	**174.00**
06/28/93	243,920	12,300	3,280	110	8.95	27.94	0.24	0.03	0.27	**174.27**
07/14/93	250,780	12,400	6,860	100	14.74	*	0.84	0.00	0.84	**175.12**
08/11/93	261,310	12,410	10,530	10	19.84	9.4	1.74	0.00	1.74	**176.86**
09/23/93	276,060	12,410	14,750	0	19.84	9.4	2.44	0.00	2.44	**179.30**
10/20/93	285,040	12,410	8,980	0	22.45	0.02	1.68	0.00	1.68	**180.99**
11/17/93	295,230	12,420	10,190	10	22.45	0.02	1.91	0.00	1.91	**182.89**
12/14/93	312,770	12,530	17,540	110	22.45	0.02	3.29	0.00	3.29	**186.18**
01/24/94	344,170	12,570	31,400	40	6.9	0.08	1.81	0.00	1.81	**187.99**
02/25/94	418,930	12,970	74,760	400	32.3	0.21	20.15	0.00	20.15	**208.14**
03/15/94	431,850	15,150	12,920	2,180	32.3	0.21	3.48	0.00	3.49	**211.63**
04/05/94	432,450	16,810	600	1,660	11	6.09	0.06	0.08	0.14	**211.76**
05/03/94	432,950	17,650	500	840	23.6	5	0.10	0.04	0.13	**211.90**
06/30/94	451,560	17,650	18,610	0	23.6	5	3.66	0.00	3.66	**215.56**
07/15/94	456550	17650	4,990	0	24	5.9	1.00	0.00	1.00	**216.56**
08/09/94	465770	17770	9,220	120	14.56	0.46	1.12	0.00	1.12	**217.68**
09/08/94	478090	18280	12,320	510	14.56	0.46	1.50	0.00	1.50	**219.18**
10/13/94	491,700	18,430	13,610	150	7.31	0.24	0.83	0.00	0.83	**220.01**
11/02/94	499,310	18,570	7,610	920	0.05	0.01	0.00	0.00	0.00	**220.01**
12/06/94	512,570	19,540	13,260	970	0.05	0.01	0.01	0.00	0.01	**220.02**
01/11/95	524,290	20,850	11,720	1,310	7.18	0.003	0.70	0.00	0.70	**220.72**
02/09/95	535,650	21,990	11,360	1,140	14.31	0.003	1.36	0.00	1.36	**222.08**
03/15/95	547,870	22,470	12,220	480	13.63	*	1.39	0.00	1.39	**223.47**
04/25/95	560,110	22,810	12,240	340	18.00	0.04	1.84	0.00	1.84	**225.31**

Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS) RW-1	TOTALIZER READINGS (GALLONS) RW-2	GALLONS PUMPED SINCE LAST MONITOR DATE RW-1	GALLONS PUMPED SINCE LAST MONITOR DATE RW-2	TOTAL VOC CONCENTRATION (milligrams per liter) RW-1	TOTAL VOC CONCENTRATION (milligrams per liter) RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-1	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES BOTH	CUMULATIVE POUNDS REMOVED
06/20/95	578,890	22,820	11,050	10	18.00	0.04	1.66	0.00	1.66	**228.13**
07/13/95	584,740	22,820	5,850	0	24.14	0.05	1.18	0.00	1.18	**229.31**
08/15/95	592,820	22,820	8,080	0	24.14	0.05	1.63	0.00	1.63	**230.94**
09/19/95	597,860	22,820	5,040	0	24.14	0.05	1.02	0.00	1.02	**231.96**
10/17/95	605,300	22,820	7,440	0	0.0	0.0	0.00	0.00	0.00	**231.96**
11/14/95	611,600	22,830	6,300	10	0.0	0.0	0.00	0.00	0.00	**231.96**
12/05/95	618,980	22,960	7,380	130	0.0	0.0	0.00	0.00	0.00	**231.96**
01/16/96	630,480	23,090	11,500	130	2.07	0.0	0.20	0.00	0.20	**232.16**
02/15/96	640,000	24,350	9,520	1,260	2.07	0.0	0.16	0.00	0.16	**232.32**
03/15/96	645,550	25,440	5,550	1,090	2.07	0.0	0.10	0.00	0.10	**232.42**
04/11/96	648,614	26,468	3,064	1,028	8.23	1.26	0.21	0.01	0.22	**232.64**
05/29/96	660,510	27,870	11,896	1,402	8.23	1.26	0.82	0.01	0.83	**233.47**
06/26/96	660,510	28,170	0	300	8.23	1.26	0.00	0.00	0.00	**233.47**
07/19/96	665,260	28,350	4,750	180	0.0005	0.0045	0.00	0.00	0.00	**233.47**
08/19/96	667,450	28,570	2,190	220	0.0005	0.0045	0.00	0.00	0.00	**233.47**
09/06/96	667,460	28,580	10	10	0.0005	0.0045	0.00	0.00	0.00	**233.47**
10/09/96	672,710	28,720	5,250	140	3.86	0.005	0.17	0.00	0.17	**233.64**
11/21/96	680,791	29,599	8,081	879	3.86	0.005	0.26	0.00	0.26	**233.90**
12/18/96	687,998	31,391	7,207	1,792	3.86	0.005	0.23	0.00	0.23	**234.13**
01/30/97	698,470	33,085	10,472	1,694	7.94	0.039	0.69	0.00	0.69	**234.82**
02/19/97	703,180	33,653	4,710	568	7.94	0.039	0.31	0.00	0.31	**235.13**
04/02/97	712,501	34,713	9,321	1,060	7.94	0.039	0.62	0.00	0.62	**235.75**
04/23/97	718,960	36,005	6,459	1,292	0.35	0.033	0.02	0.00	0.02	**235.77**
05/13/97	722,865	37,949	3,905	1,944	0.35	0.033	0.01	0.00	0.01	**235.78**
06/09/97	728,810	38,880	5,945	931	0.35	0.033	0.02	0.00	0.02	**235.80**
07/08/97	733,450	38,250	4,640	(630)	7.90	0.0015	0.31	0.00	0.31	**236.11**
08/09/97	735,580	38,450	2,130	200	7.90	0.0015	0.14	0.00	0.14	**236.25**
09/25/97	744,660	39,220	9,080	770	7.90	0.0015	0.60	0.00	0.60	**236.85**
10/22/97	748,550	39,360	3,890	140	0.30	0.0	0.01	0.00	0.01	**236.86**
11/11/97	751,270	39,980	2,720	620	0.30	0.0	0.01	0.00	0.01	**236.87**
12/10/97	751,270	42,750	0	2,770	0.30	0.0	0.00	0.00	0.00	**236.87**
01/20/98	751,270	45,740	0	2,990	0.0	0.0	0.00	0.00	0.00	**236.87**
02/16/98	752,600	47,010	1,330	1,270	0.0	0.0	0.00	0.00	0.00	**236.87**
03/17/98	752,870	48,460	270	1,450	0.0	0.0	0.00	0.00	0.00	**236.87**
04/15/98	755,810	48,750	2,940	290	0.10	0.0	0.01	0.00	0.01	**236.88**
05/27/98	772,810	49,070	17,000	320	0.10	0.0	0.01	0.00	0.01	**236.89**
06/03/98	784,750	50,050	11,940	980	0.10	0.0	0.01	0.00	0.01	**236.90**
07/21/98	787,610	51,930	2,860	1,880	0.193	0.0325	0.00	0.00	0.01	**236.91**

Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR	TOTALIZER READINGS (GALLONS)		GALLONS PUMPED SINCE LAST MONITOR DATE		TOTAL VOC CONCENTRATION (milligrams per liter)		TOTAL POUNDS REMOVED BETWEEN MONITORING DATES			CUMULATIVE POUNDS
DATE	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	RW-1	RW-2	BOTH	REMOVED
09/18/98	793,735	52,495	6,125	565	0.193	0.0057	0.01	0.00	0.01	236.92
10/19/98	796,730	53,310	2,995	815	0.034	0.0057	0.00	0.00	0.00	236.92
11/24/98	826,830	53,970	30,100	660	0.034	0.0057	0.01	0.00	0.01	236.93
12/23/98	838,140	54,530	11,310	560	0.034	0.0	0.00	0.00	0.00	236.93
01/14/99	840,660	54,590	2,460	60	0.819	0.0	0.02	0.00	0.02	236.95
02/11/99	843,310	57,290	2,710	2,700	0.819	0.0	0.02	0.00	0.02	236.97
03/25/99	843,310	57,323	0	33	0.819	0.0	0.00	0.00	0.00	236.97
04/23/99	843,310	57,670	0	347	0.001	0.0	0.00	0.00	0.00	236.97
05/25/99	843,310	57,673	0	3	0.001	0.0	0.00	0.00	0.00	236.97
06/29/99	843,310	58,010	0	337	0.001	0.0	0.00	0.00	0.00	236.97
07/27/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	236.97
08/30/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	236.97
09/21/99	843,310	58,010	0	0	0.492	0.001	0.00	0.00	0.00	236.97
10/27/99	843,310	58,010	0	0	0.008	0.008	0.00	0.00	0.00	236.97
11/30/99	843,478	58,093	168	83	0.008	0.008	0.00	0.00	0.00	236.97
12/29/99	843,478	58,093	0	0	0.008	0.008	0.00	0.00	0.00	236.97
01/18/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	236.97
02/16/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	236.97
03/23/00	843,478	58,093	0	0	0.0	0.0	0.00	0.00	0.00	236.97
04/25/00	843,478	58,093	0	0	0.028	0.0	0.00	0.00	0.00	236.97
06/02/00	141,430	58,100		7	0.028	0.0	0.00	0.00	0.00	236.97
06/19/00	148,160	60,230	6,730	2,130	0.028	0.0	0.00	0.00	0.00	236.97
07/21/00	148,160	60,230	0	0	0.007	0.007	0.00	0.00	0.00	236.97
08/29/00	148,560	60,390	400	160	0.007	0.007	0.00	0.00	0.00	236.97
09/20/00	157,010	63,130	8,450	2,740	0.007	0.007	0.00	0.00	0.00	236.97
10/12/00	163,002	63,630	5,992	500	0.0	0.0	0.00	0.00	0.00	236.97
11/20/00	165,020	64,170	2,018	540	0.0	0.0	0.00	0.00	0.00	236.97
12/20/00	165,240	65,150	220	980	0.0	0.0	0.00	0.00	0.00	236.97
01/29/01	177,958	66,140	12,718	990	0.0	0.003	0.00	0.00	0.00	236.97
02/23/01	182,580	67,900	4,622	1,760	0.0	0.003	0.00	0.00	0.00	236.97
03/29/01	183,030	70,030	450	2,130	0.0	0.003	0.00	0.00	0.00	236.97
04/19/01	183,110	74,590	80	4,560	0.005	0.003	0.00	0.00	0.00	236.97
05/23/01	183,320	75,450	210	860	0.005	0.026	0.00	0.00	0.00	236.97
06/22/01		78,170		2,720	0.005	0.026	0.00	0.00	0.00	236.97
07/20/01	185,630	80,800	185,630	2,630	0.0	0.005	0.00	0.00	0.00	236.97
08/29/01	202,930		17,300		0.0	0.005	0.00	0.00	0.00	236.97
09/26/01	209,700		6,770		0.0	0.005	0.00	0.00	0.00	236.97
10/31/01	209,700		0		0.0	0.0	0.00	0.00	0.00	236.97

Table 3
Pawling Corporation
Groundwater Pumping System Data

MONITOR DATE	TOTALIZER READINGS (GALLONS) RW-1	TOTALIZER READINGS (GALLONS) RW-2	GALLONS PUMPED SINCE LAST MONITOR DATE RW-1	GALLONS PUMPED SINCE LAST MONITOR DATE RW-2	TOTAL VOC CONCENTRATION (milligrams per liter) RW-1	TOTAL VOC CONCENTRATION (milligrams per liter) RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-1	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES RW-2	TOTAL POUNDS REMOVED BETWEEN MONITORING DATES BOTH	CUMULATIVE POUNDS REMOVED
12/18/01	251,063		251,063		0.0	0.0	0.00	0.00	0.00	**236.97**
01/29/02	255,710		4,647		0.000	0.00	0.00	0.00	0.00	**236.97**
02/13/02	257,490		1,780		0.000	0.00	0.00	0.00	0.00	**236.97**
03/21/02					0.000	0.00	0.00	0.00	0.00	**236.97**
04/23/02	260,360		2,870		0.000	0.00	0.00	0.00	0.00	**236.97**
05/23/02	260,630		270		0.001	0.00	0.00	0.00	0.00	**236.97**
06/17/02	268,570		7,940		0.001	0.00	0.00	0.00	0.00	**236.97**
07/17/02	277,410		8,840		0.001	0.00	0.00	0.00	0.00	**236.97**
08/29/02	289,130		11,720		0.008	0.00	0.00	0.00	0.00	**236.97**
09/27/02	290,320		1,190		0.008	0.00	0.00	0.00	0.00	**236.97**
10/21/02					0.008	0.00	0.00	0.00	0.00	**236.97**
11/27/02	80,960		0		0.000	0.00	0.00	0.00	0.00	**236.97**
12/17/02	93,410		12,450		0.000	0.00	0.00	0.00	0.00	**236.97**
01/29/03	115,610		22,200		0.000	0.00	0.00	0.00	0.00	**236.97**
02/28/03	119,710		4,100		0.000	0.00	0.00	0.00	0.00	**236.97**
3/31/2003	121490		1,780		0.000	0.00	0.00	0.00	0.00	**236.97**
4/21/2003	121810		320		0.000	0.00	0.00	0.00	0.00	**236.97**
5/14/2003	122210		400		0.000	0.00	0.00	0.00	0.00	**236.97**
6/4/2003	122650		440		0.001	0.00	0.00	0.00	0.00	**236.97**
7/30/2003			-122,650		0.001	0.00	0.00	0.00	0.00	**236.97**
9/30/2003			0		0.001	0.00	0.00	0.00	0.00	**236.97**
10/17/2003			0		0.001	0.00	0.00	0.00	0.00	**236.97**
11/20/2003			0		0.000	0.00	0.00	0.00	0.00	**236.97**
12/16/2003			0		0.000	0.00	0.00	0.00	0.00	**236.97**
1/14/2004			0		0.000	0.00	0.00	0.00	0.00	**236.97**
2/26/2004	122870		122,870		0.000	0.00	0.00	0.00	0.00	**236.97**
3/27/2004	123210		340		0.000	0.00	0.00	0.00	0.00	**236.97**

Notes: 1. 1.03 pounds removed during initial system shakedown. 2. Total VOCs are from month indicated or closest sampling date.

* Only combined influent sample collected this date. Assume all contribution from RW-1.

APPENDIX B

Laboratory Analytical Data

Adirondack Environmental Services, Inc

Date: *21-Jun-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	RW1S
Work Order:	060609030	**Collection Date:**	6/7/2006
Project:	SPDES	**Lab Sample ID:**	060609030-001
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **SO**
Vinyl chloride	< 1.0	1.0		µg/L	1	6/15/2006
trans-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
cis-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
1,1,1-Trichloroethane	< 1.0	1.0		µg/L	1	6/15/2006
Trichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
Tetrachloroethene	2.0	1.0		µg/L	1	6/15/2006
PURGEABLE AROMATICS E602						Analyst: **SO**
Toluene	< 1.0	1.0		µg/L	1	6/15/2006

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *21-Jun-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	RW2S
Work Order:	060609030	**Collection Date:**	6/7/2006
Project:	SPDES	**Lab Sample ID:**	060609030-002
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **SO**
Vinyl chloride	< 1.0	1.0		µg/L	1	6/15/2006
trans-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
cis-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
1,1,1-Trichloroethane	< 1.0	1.0		µg/L	1	6/15/2006
Trichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
Tetrachloroethene	< 1.0	1.0		µg/L	1	6/15/2006
PURGEABLE AROMATICS E602						Analyst: **SO**
Toluene	< 1.0	1.0		µg/L	1	6/15/2006

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *21-Jun-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	RW1D
Work Order:	060609030	**Collection Date:**	6/7/2006
Project:	SPDES	**Lab Sample ID:**	060609030-003
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **SO**
Vinyl chloride	26	1.0		µg/L	1	6/15/2006
trans-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
cis-1,2-Dichloroethene	6.0	1.0		µg/L	1	6/15/2006
1,1,1-Trichloroethane	< 1.0	1.0		µg/L	1	6/15/2006
Trichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
Tetrachloroethene	< 1.0	1.0		µg/L	1	6/15/2006
PURGEABLE AROMATICS E602						Analyst: **SO**
Toluene	< 1.0	1.0		µg/L	1	6/15/2006

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
T - Tentitively Identified Compound-Estimated Conc.
E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *21-Jun-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	MW-2D2
Work Order:	060609030	**Collection Date:**	6/7/2006
Project:	SPDES	**Lab Sample ID:**	060609030-004
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **SO**
Vinyl chloride	< 1.0	1.0		µg/L	1	6/15/2006
trans-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
cis-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
1,1,1-Trichloroethane	< 1.0	1.0		µg/L	1	6/15/2006
Trichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
Tetrachloroethene	< 1.0	1.0		µg/L	1	6/15/2006
PURGEABLE AROMATICS E602						Analyst: **SO**
Toluene	< 1.0	1.0		µg/L	1	6/15/2006

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
T - Tentitively Identified Compound-Estimated Conc.
E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *21-Jun-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	GT-6S
Work Order:	060609030	**Collection Date:**	6/7/2006
Project:	SPDES	**Lab Sample ID:**	060609030-005
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **SO**
Vinyl chloride	< 1.0	1.0		µg/L	1	6/15/2006
trans-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
cis-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
1,1,1-Trichloroethane	< 1.0	1.0		µg/L	1	6/15/2006
Trichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
Tetrachloroethene	< 1.0	1.0		µg/L	1	6/15/2006
PURGEABLE AROMATICS E602						Analyst: **SO**
Toluene	< 1.0	1.0		µg/L	1	6/15/2006

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *21-Jun-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	VEP-4
Work Order:	060609030	**Collection Date:**	6/7/2006
Project:	SPDES	**Lab Sample ID:**	060609030-006
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **SO**
Vinyl chloride	< 1.0	1.0		µg/L	1	6/15/2006
trans-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
cis-1,2-Dichloroethene	< 1.0	1.0		µg/L	1	6/15/2006
1,1,1-Trichloroethane	< 1.0	1.0		µg/L	1	6/15/2006
Trichloroethene	2.3	1.0		µg/L	1	6/15/2006
Tetrachloroethene	< 1.0	1.0		µg/L	1	6/15/2006
PURGEABLE AROMATICS E602						Analyst: **SO**
Toluene	< 1.0	1.0		µg/L	1	6/15/2006

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
T - Tentitively Identified Compound-Estimated Conc.
E - Value above quantitation range

ondack Environmental Services, Inc

Date: *14-Nov-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	RW-2S
Work Order:	061106006	**Collection Date:**	10/2/2006
Project:	SPDES	**Lab Sample ID:**	061106006-006
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **ML**
Vinyl chloride	< 1.0	1.0	HH	µg/L	1	11/14/2006 12:27:00 PM
trans-1,2-Dichloroethene	< 1.0	1.0	HH	µg/L	1	11/14/2006 12:27:00 PM
cis-1,2-Dichloroethene	< 1.0	1.0	HH	µg/L	1	11/14/2006 12:27:00 PM
1,1,1-Trichloroethane	< 1.0	1.0	HH	µg/L	1	11/14/2006 12:27:00 PM
Trichloroethene	1.4	1.0	HH	µg/L	1	11/14/2006 12:27:00 PM
Tetrachloroethene	< 1.0	1.0	HH	µg/L	1	11/14/2006 12:27:00 PM
PURGEABLE AROMATICS E602						Analyst: **ML**
Toluene	< 1.0	1.0	HH	µg/L	1	11/14/2006 12:27:00 PM

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

...ondack Environmental Services, Inc

Date: *14-Nov-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	VEP-4
Work Order:	061106006	**Collection Date:**	10/2/2006
Project:	SPDES	**Lab Sample ID:**	061106006-002
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **ML**
Vinyl chloride	< 1.0	1.0	HH	µg/L	1	11/14/2006 8:20:00 AM
trans-1,2-Dichloroethene	< 1.0	1.0	HH	µg/L	1	11/14/2006 8:20:00 AM
cis-1,2-Dichloroethene	1.2	1.0	HH	µg/L	1	11/14/2006 8:20:00 AM
1,1,1-Trichloroethane	< 1.0	1.0	HH	µg/L	1	11/14/2006 8:20:00 AM
Trichloroethene	3.2	1.0	HH	µg/L	1	11/14/2006 8:20:00 AM
Tetrachloroethene	< 1.0	1.0	HH	µg/L	1	11/14/2006 8:20:00 AM
PURGEABLE AROMATICS E602						Analyst: **ML**
Toluene	< 1.0	1.0	HH	µg/L	1	11/14/2006 8:20:00 AM

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

ondack Environmental Services, Inc **Date:** *14-Nov-06*

CLIENT: Pawling Corporation
Work Order: 061106006
Project: SPDES
PO#:

Client Sample ID: MW-2D1
Collection Date: 10/2/2006
Lab Sample ID: 061106006-004
Matrix: WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **ML**
Vinyl chloride	85	1.0	HH	µg/L	1	11/14/2006 10:00:00 AM
trans-1,2-Dichloroethene	< 1.0	1.0	HH	µg/L	1	11/14/2006 10:00:00 AM
cis-1,2-Dichloroethene	14	1.0	HH	µg/L	1	11/14/2006 10:00:00 AM
1,1,1-Trichloroethane	< 1.0	1.0	HH	µg/L	1	11/14/2006 10:00:00 AM
Trichloroethene	< 1.0	1.0	HH	µg/L	1	11/14/2006 10:00:00 AM
Tetrachloroethene	< 1.0	1.0	HH	µg/L	1	11/14/2006 10:00:00 AM
PURGEABLE AROMATICS E602						Analyst: **ML**
Toluene	1.2	1.0	HH	µg/L	1	11/14/2006 10:00:00 AM

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
T - Tentitively Identified Compound-Estimated Conc.
E - Value above quantitation range

[illegible]dack Environmental Services, Inc

Date: *28-Dec-06*

[illegible]IENT: Pawling Corporation
Work Order: 061222021
Reference: SPDES /
PO#:

Client Sample ID: GT-6S
Collection Date: 10/2/2006
Lab Sample ID: 061222021-005
Matrix: WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **SO**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	12/22/2006
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	12/22/2006
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	12/22/2006
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	12/22/2006
Trichloroethene	< 1.0	1.0	H	µg/L	1	12/22/2006
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	12/22/2006
PURGEABLE AROMATICS E602						Analyst: **SO**
Toluene	< 1.0	1.0	H	µg/L	1	12/22/2006

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
T - Tentitively Identified Compound-Estimated Conc.
E - Value above quantitation range

_ıondack Environmental Services, Inc

Date: *14-Nov-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	GT-7S
Work Order:	061106006	**Collection Date:**	9/8/2006
Project:	SPDES	**Lab Sample ID:**	061106006-001
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **ML**
Vinyl chloride	< 1.0	1.0	HH	µg/L	1	11/13/2006 7:43:00 PM
trans-1,2-Dichloroethene	< 1.0	1.0	HH	µg/L	1	11/13/2006 7:43:00 PM
cis-1,2-Dichloroethene	< 1.0	1.0	HH	µg/L	1	11/13/2006 7:43:00 PM
1,1,1-Trichloroethane	< 1.0	1.0	HH	µg/L	1	11/13/2006 7:43:00 PM
Trichloroethene	< 1.0	1.0	HH	µg/L	1	11/13/2006 7:43:00 PM
Tetrachloroethene	< 1.0	1.0	HH	µg/L	1	11/13/2006 7:43:00 PM
PURGEABLE AROMATICS E602						Analyst: **ML**
Toluene	< 1.0	1.0	HH	µg/L	1	11/13/2006 7:43:00 PM

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *20-Nov-06*

CLIENT:	Pawling Corporation	**Client Sample ID:**	GT-7S
Work Order:	061106009	**Collection Date:**	10/11/2006
Project:	SPDES	**Lab Sample ID:**	061106009-004
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **ML**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	11/14/2006 1:15:00 PM
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	11/14/2006 1:15:00 PM
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	11/14/2006 1:15:00 PM
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	11/14/2006 1:15:00 PM
Trichloroethene	< 1.0	1.0	H	µg/L	1	11/14/2006 1:15:00 PM
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	11/14/2006 1:15:00 PM
PURGEABLE AROMATICS E602						Analyst: **ML**
Toluene	< 1.0	1.0	H	µg/L	1	11/14/2006 1:15:00 PM

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

dack Environmental Services, Inc

Date: *28-Dec-06*

ENT:	Pawling Corporation	**Client Sample ID:**	GT-7S
Work Order:	061222021	**Collection Date:**	11/22/2006
Reference:	SPDES /	**Lab Sample ID:**	061222021-004
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **SO**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	12/22/2006
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	12/22/2006
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	12/22/2006
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	12/22/2006
Trichloroethene	< 1.0	1.0	H	µg/L	1	12/22/2006
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	12/22/2006
PURGEABLE AROMATICS E602						Analyst: **SO**
Toluene	< 1.0	1.0	H	µg/L	1	12/22/2006

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *19-Jun-07*

CLIENT:	Pawling Corporation	**Client Sample ID:**	RW-1D
Work Order:	070525021	**Collection Date:**	4/26/2007
Reference:	SPDES /	**Lab Sample ID:**	070525021-001
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **MG**
Vinyl chloride	7.1	1.0	H	µg/L	1	6/8/2007 10:16:11 AM
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 10:16:11 AM
cis-1,2-Dichloroethene	7.1	1.0	H	µg/L	1	6/8/2007 10:16:11 AM
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	6/8/2007 10:16:11 AM
Trichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 10:16:11 AM
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 10:16:11 AM
PURGEABLE AROMATICS E602						Analyst: **MG**
Toluene	< 1.0	1.0	H	µg/L	1	6/8/2007 10:16:11 AM

June 06 – VC = 26 ppb
DCE – 6 ppb

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
T - Tentitively Identified Compound-Estimated Conc.
E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *19-Jun-07*

CLIENT:	Pawling Corporation	**Client Sample ID:**	GT-7S
Work Order:	070525021	**Collection Date:**	4/26/2007
Reference:	SPDES /	**Lab Sample ID:**	070525021-002
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **MG**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	6/7/2007 10:09:30 PM
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/7/2007 10:09:30 PM
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/7/2007 10:09:30 PM
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	6/7/2007 10:09:30 PM
Trichloroethene	< 1.0	1.0	SH	µg/L	1	6/7/2007 10:09:30 PM
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	6/7/2007 10:09:30 PM
PURGEABLE AROMATICS E602						Analyst: **MG**
Toluene	< 1.0	1.0	H	µg/L	1	6/7/2007 10:09:30 PM

Qualifiers:
- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quanititation limits
- B - Analyte detected in the associated Method Blank
- X - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- T - Tentitively Identified Compound-Estimated Conc.
- E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *19-Jun-07*

CLIENT:	Pawling Corporation	**Client Sample ID:**	GT-6S
Work Order:	070525021	**Collection Date:**	4/30/2007
Reference:	SPDES /	**Lab Sample ID:**	070525021-003
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **MG**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	6/7/2007 11:05:28 PM
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/7/2007 11:05:28 PM
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/7/2007 11:05:28 PM
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	6/7/2007 11:05:28 PM
Trichloroethene	< 1.0	1.0	SH	µg/L	1	6/7/2007 11:05:28 PM
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	6/7/2007 11:05:28 PM
PURGEABLE AROMATICS E602						Analyst: **MG**
Toluene	< 1.0	1.0	H	µg/L	1	6/7/2007 11:05:28 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
T - Tentitively Identified Compound-Estimated Conc.
E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *19-Jun-07*

CLIENT:	Pawling Corporation	**Client Sample ID:**	VEP-4
Work Order:	070525021	**Collection Date:**	4/30/2007
Reference:	SPDES /	**Lab Sample ID:**	070525021-004
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **MG**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	6/8/2007 12:03:06 AM
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 12:03:06 AM
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 12:03:06 AM
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	6/8/2007 12:03:06 AM
Trichloroethene	< 1.0	1.0	SH	µg/L	1	6/8/2007 12:03:06 AM
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 12:03:06 AM
PURGEABLE AROMATICS E602						Analyst: **MG**
Toluene	< 1.0	1.0	H	µg/L	1	6/8/2007 12:03:06 AM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quanititation limits
B - Analyte detected in the associated Method Blank
X - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
T - Tentitively Identified Compound-Estimated Conc.
E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *19-Jun-07*

CLIENT:	Pawling Corporation	**Client Sample ID:**	GT-3S
Work Order:	070525021	**Collection Date:**	4/30/2007
Reference:	SPDES /	**Lab Sample ID:**	070525021-005
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **MG**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	6/8/2007 1:00:00 AM
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 1:00:00 AM
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 1:00:00 AM
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	6/8/2007 1:00:00 AM
Trichloroethene	< 1.0	1.0	SH	µg/L	1	6/8/2007 1:00:00 AM
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 1:00:00 AM
PURGEABLE AROMATICS E602						Analyst: **MG**
Toluene	< 1.0	1.0	H	µg/L	1	6/8/2007 1:00:00 AM

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quanititation limits
- B - Analyte detected in the associated Method Blank
- X - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- T - Tentitively Identified Compound-Estimated Conc.
- E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *19-Jun-07*

CLIENT:	Pawling Corporation	**Client Sample ID:**	MW-2D2
Work Order:	070525021	**Collection Date:**	4/30/2007
Reference:	SPDES /	**Lab Sample ID:**	070525021-006
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **MG**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	6/8/2007 1:57:17 AM
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 1:57:17 AM
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 1:57:17 AM
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	6/8/2007 1:57:17 AM
Trichloroethene	< 1.0	1.0	SH	µg/L	1	6/8/2007 1:57:17 AM
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 1:57:17 AM
PURGEABLE AROMATICS E602						Analyst: **MG**
Toluene	< 1.0	1.0	H	µg/L	1	6/8/2007 1:57:17 AM

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

Adirondack Environmental Services, Inc

Date: *19-Jun-07*

CLIENT:	Pawling Corporation	**Client Sample ID:**	MW-2D1
Work Order:	070525021	**Collection Date:**	4/30/2007
Reference:	SPDES /	**Lab Sample ID:**	070525021-007
PO#:		**Matrix:**	WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
PURGEABLE HALOCARBONS E601						Analyst: **MG**
Vinyl chloride	< 1.0	1.0	H	µg/L	1	6/8/2007 2:54:13 AM
trans-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 2:54:13 AM
cis-1,2-Dichloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 2:54:13 AM
1,1,1-Trichloroethane	< 1.0	1.0	H	µg/L	1	6/8/2007 2:54:13 AM
Trichloroethene	< 1.0	1.0	SH	µg/L	1	6/8/2007 2:54:13 AM
Tetrachloroethene	< 1.0	1.0	H	µg/L	1	6/8/2007 2:54:13 AM
PURGEABLE AROMATICS E602						Analyst: **MG**
Toluene	< 1.0	1.0	H	µg/L	1	6/8/2007 2:54:13 AM

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

X - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

T - Tentitively Identified Compound-Estimated Conc.

E - Value above quantitation range

ENVIRONMENTAL CONSULTING & MANAGEMENT
ROUX ASSOCIATES INC

ROUX

209 SHAFTER STREET
ISLANDIA, NEW YORK 11749-5074 TEL: 631-232-2600 FAX: 631-232-9898

December 3, 2009

Mr. James Schreyer
New York State Department of Environmental Conservation
21 South Putt Corners
New Paltz, New York 12561

Re: Summary of Investigation – Soil Vapor Intrusion Study
Pawling Corporation, Pawling, New York
NYSDEC Site# 314002

Dear Mr. Schreyer:

On behalf of Pawling Corporation ("Pawling"), Roux Associates, Inc. ("Roux Associates") has prepared the following Summary of Investigation for a soil vapor intrusion study associated with the Pawling facility at 157 Charles Colman Boulevard, Pawling, New York (the "Site"). The soil vapor intrusion study was conducted on March 6, 2009 in accordance with Roux Associates' December 16, 2008 Scope of Work for Soil Vapor Intrusion Study ("Scope of Work") as approved by the New York State Department of Environmental Conservation ("NYSDEC") and New York State Department of Health ("NYSDOH") on January 9, 2009.

Scope of Work

In accordance with the Scope of Work, Roux Associates collected three samples at the locations summarized below and shown in the attached figure (Figure 1):

- One indoor air sample (AS-101) from the marketing closet;
- One outdoor ambient air sample (AS-102); and
- One sub-slab soil vapor sample (SV-103) collected from beneath the floor in the marketing closet.

Soil vapor and air samples were sent to Test America of South Burlington, Vermont, an Environmental Laboratory Approval Program ("ELAP") certified laboratory and analyzed for volatile organic compounds ("VOCs") using USEPA method TO-15.

<u>March 2008 Sampling</u>

On March 6, 2009, three samples were collected concurrently: one indoor ambient air sample (AS-101), one outdoor ambient air sample (AS-102), and one sub-slab soil vapor sample (SV-103). Air sample AS-101 and soil vapor sample SV-103 were collected from a storage room (referred to by Pawling staff as the "marketing closet") located between the shipping area, maintenance shop, and stockroom offices. This room is approximately 10 feet by 12 feet and is located 40 feet from the front of the building. The room has doors that are typically closed and has a former floor drain that is filled with concrete. This area was selected due to its proximity to the source area, potential intrusion pathways along the former floor drain piping, and limited air circulation due to the closed doors (worst case scenario). Outdoor ambient air sample AS-102 was collected outside a pedestrian doorway between the main building and the treatment building approximately 150 feet away from the marketing closet. This location was selected due to its access and as it was protected from the vehicular traffic of the shipping area. The sampling locations were shown to and discussed with you during the sampling event. Sampling locations are shown on Figure 1.

Prior to sample collection, a product inventory of potential chemical interferences and the NYSDOH Indoor Air Survey, which included recording occupancy and describing the location and operational conditions of the building's HVAC system, were completed. A copy of the completed NYSDOH Indoor Air Survey is included as Attachment 1. There were no potential sources of VOCs observed in the area of any sample. Monitoring of the ambient air in the sampling locations as well as adjacent spaces was conducted during sampling with a photoionization detector. Concentration ranges detected during this monitoring are shown on Figure 2. As discussed above, the marketing closet had a former floor drain that was sealed with concrete. The only active utility egresses observed during the building inspection were located in the bathrooms (Figure 1).

Soil vapor sample point SV-103 was installed by drilling a one-inch diameter hole to a depth of six inches beneath the concrete floor. The floor in the marketing closet was measured to be seven inches thick and appeared to be in good condition. A six-inch long stainless steel screen was installed to zero to six inches beneath the concrete slab and connected to an inert sampling tube from the screen to a three-way stopcock at the surface. The annular space around the screen was filled with sand and the annular space between the tubing and the concrete was filled with clay. Additional tubing was connected from the second stopcock port to a vacuum pump and from the third stopcock port to a pre-evacuated six-liter Summa canister.

The stopcock and network of tubing was covered with an enclosure that was filled with helium. The soil vapor sampling point was purged of approximately three tubing volumes using the vacuum pump calibrated to 0.19 L/min. The helium concentration in the enclosure fluctuated near 27 percent (27,000 parts per million "ppm") during purging with 100 to 125 ppm of helium measured from the pump discharge (background measured at 125 ppm).

Following purging, the valve leading to the pump was closed and the valve on the Summa canister was opened. The Summa canister was equipped with a laboratory calibrated flow-controlling regulator that collected the soil vapor sample over a four-hour period.

flow-controlling regulator that collected the soil vapor sample over a four-hour period. Samples were collected concurrently between approximately 11:00 A.M. and 3:00 P.M. During sample collection, the building's heating system was operating under normal conditions.

Results

Analytical results for VOCs in soil vapor and ambient air are presented in Attachment 2, summarized in Table 1, and discussed below. A data usability summary report ("DUSR") is being prepared and will be submitted to NYSDEC under separate cover. Analytical results for samples collected during this soil vapor intrusion study were evaluated using Air Guideline Values and decision matrices presented in the NYSDOH's October 2006 "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" ("Guidance").

Analytical results reported 19 VOCs detected in sub-slab soil vapor, 15 VOCs detected in indoor air, and 6 VOCs detected in outdoor air. Of these detections, there were only 8 VOCs that were detected in both the subslab and indoor air samples. The NYSDOH Guidance includes Air Guideline Values for three VOCs: methylene chloride, tetrachloroethene ("PCE"), and trichloroethene ("TCE"). There were no concentrations of these VOCs detected above their respective NYSDOH Air Guideline Values in any sample.

The NYSDOH Guidance includes decision matrices for four VOCs: carbon tetrachloride, PCE, 1,1,1-trichloroethane ("111-TCA"), and TCE. These decision matrices compare concentrations of indoor air and sub-slab soil vapor to assist in making decisions when soil vapor may be entering buildings. Concentrations of PCE, TCE, carbon tetrachloride, and 1,1,1-trichloroethane ("111-TCA") detected in sub-slab soil vapor, indoor air, and ambient air as well as the NYSDOH recommended action as determined by the NYSDOH decision matrices are summarized in the table below.

Summary of NYSDOH Decision Matrix VOCs

Analyte	Soil-Vapor	Indoor Air	Outdoor Air	NYSDOH Recommended Action
Carbon Tetrachloride	ND	ND	ND	No Action
Tetrachloroethene	8.1	4.2	ND	Identify Sources / Reduce Exposure
1,1,1-Trichloroethane	ND	1.2	ND	Identify Sources / Reduce Exposure
Trichloroethene	ND	ND	ND	No Action

ND - not detected; concentrations reported in micrograms per cubic meter ($\mu g/m^3$)

Discussion

A soil vapor intrusion study was requested by the NYSDEC to evaluate the potential for groundwater to act as a source of VOCs to soil vapor and subsequent exposure of the building.

Pawling has not used chlorinated solvents at the Site since the early 1990's. Following previously reported Site Investigation and Alternative Analysis, Pawling has treated groundwater containing VOCs including PCE, TCE, cis-1,2-dichloroethene ("cis-12-DCE"), and vinyl chloride at the Site between 1992 and March 2009. Active groundwater remediation ceased in March 2009 following several monitoring periods that demonstrated only low level residual VOC concentrations.

Analytical data suggests that the low level residual VOCs in groundwater beneath the Site contribute a *de minimus* amount of VOCs to soil vapor. As an example, PCE was detected in groundwater in May 2009 at a concentration of 2.6 micrograms per liter ("µg/L") and in soil vapor in March 2009 at a concentration of 8.1 $\mu g/m^3$. There were no other VOCs detected in both groundwater and soil vapor.

Chlorinated solvents were detected in indoor air but at very low concentrations. Despite the indoor air being in a potential worst case scenario location (limited air flow, former utility egress, close to former source area) there were no VOCs that exceeded the NYSDOH Air Guidance Values.

Recommendations

Based on the analytical results of the soil vapor intrusion study, no additional soil vapor investigation is recommended at this time.

If you have any questions concerning this Summary of Investigation report, please do not hesitate to contact me.

Sincerely,

ROUX ASSOCIATES, INC.

Michael Roux
Principal Hydrogeologist

Attachments

cc: Anthony Perretta, New York State Department of Health
Susan Thompson, Pawling Corporation
Glenn Netuschil, Roux Associates

Table 1. Summary of Volatile Organic Compounds Detected in Soil Vapor and Air Samples
Pawling Corporation, Pawling, New York

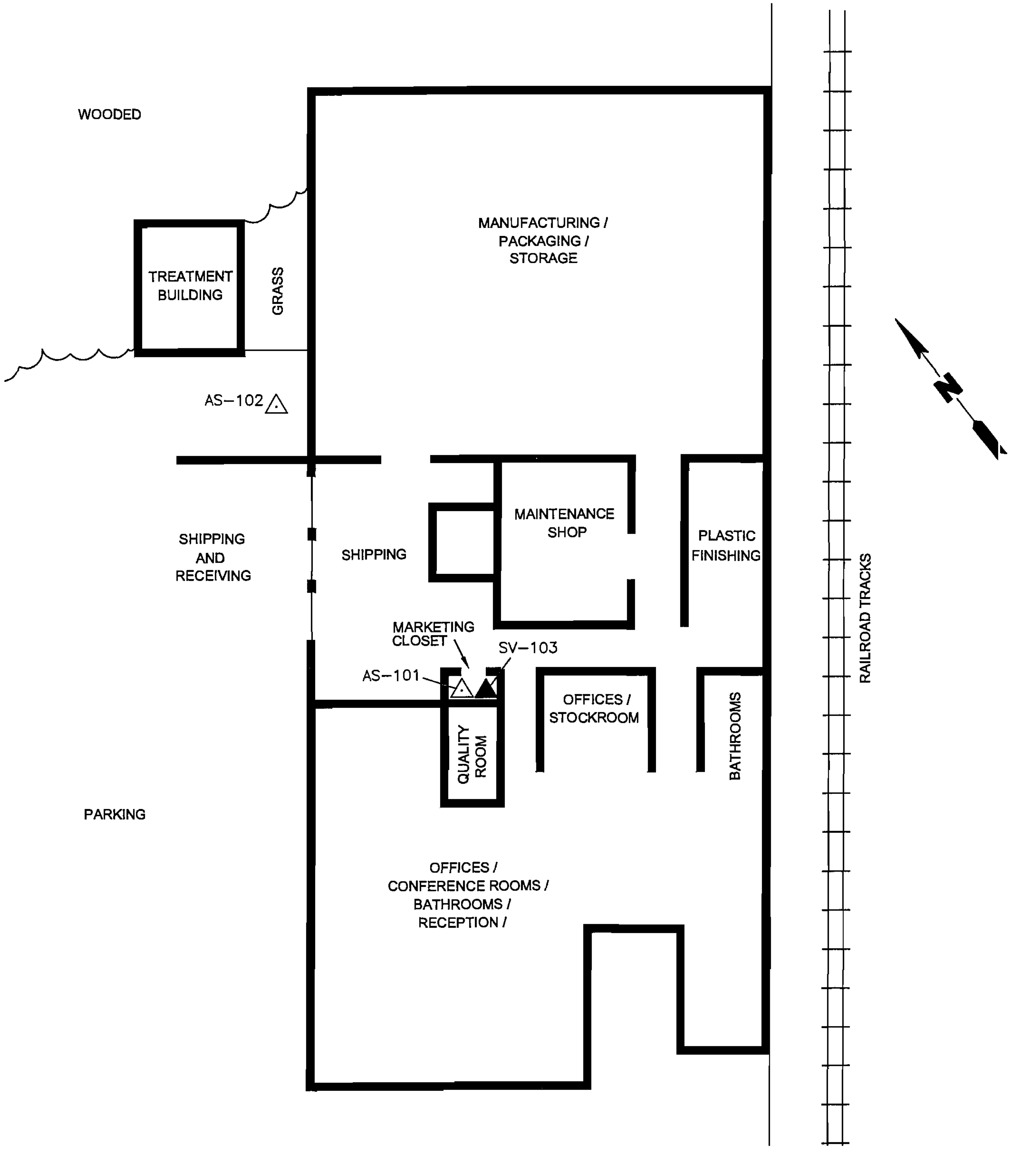
Parameter (Concentrations in ug/m^3)	Sample Designation: / Sample Date: / CAS No.	AS-101 3/5/2009	AS-102 3/5/2009	SV-103 3/5/2009
Dichlorodifluoromethane	75-71-8	4.4	3.1	5.4
1,2-Dichlorotetrafluoroethane (Freon 114)	76-14-2	1.4 U	1.4 U	1.4 U
Chloromethane (Methyl chloride)	74-87-3	1.3	1.2	1 U
Vinyl Chloride	75-01-4	0.51 U	0.51 U	0.51 U
1,3-Butadiene	106-99-0	1.1 U	1.1 U	1.1 U
Bromomethane (Methyl bromide)	74-83-9	0.78 U	0.78 U	0.78 U
Chloroethane (ethyl chloride)	75-00-3	1.3 U	1.3 U	1.3 U
Vinyl bromide	593-60-2	0.87 U	0.87 U	0.87 U
Trichlorofluoromethane (Freon 11)	75-69-4	1.6	1.6	1.6
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.5 U	1.5 U	1.5 U
1,1-Dichloroethene	75-35-4	0.79 U	0.79 U	0.79 U
Acetone	67-64-1	12	12 U	88
Isopropanol	67-63-0	16	12 U	12 U
Carbon disulfide	75-15-0	1.6 U	1.6 U	1.6 U
3-Chloropropene (allyl chloride)	107-05-1	1.6 U	1.6 U	1.6 U
Methylene Chloride	75-09-2	6.6	1.8	1.9
Tertiary butyl alcohol (TBA)	75-65-0	15 U	15 U	15 U
MTBE (Methyl tert-butyl ether)	1634-04-4	1.8 U	1.8 U	1.8 U
1,2-Dichloroethene (trans)	156-60-5	0.79 U	0.79 U	0.79 U
n-Hexane	110-54-3	1.8 U	1.8 U	2.4
1,1-Dichloroethane	75-34-3	0.81 U	0.81 U	0.81 U
Methyl ethyl ketone	78-93-3	3.2	1.5 U	5.3
1,2-Dichloroethene (cis)	156-59-2	1.5	0.79 U	0.79 U
Tetrahydrofuran	109-99-9	15 U	15 U	15 U
Chloroform	67-66-3	0.98 U	0.98 U	0.98 U
** 1,1,1-Trichloroethane	71-55-6	1.2	1.1 U	1.1 U
Cyclohexane	110-82-7	0.69 U	0.69 U	0.76
Carbon tetrachloride	56-23-5	1.3 U	1.3 U	1.3 U
2,2,4-Trimethylpentane	540-84-1	0.93 U	0.93 U	2.4
Benzene	71-43-2	0.86	1.3	1.2
1,2-Dichloroethene (total)	540-59-0	1.5	0.79 U	0.79 U
1,2-Dichloroethane	107-06-2	0.81 U	0.81 U	0.81 U
n-Heptane	142-82-5	0.82 U	0.82 U	2.3
Trichloroethene (TCE)	79-01-6	1.1 U	1.1 U	1.1 U
1,2-Dichloropropane	78-87-5	0.92 U	0.92 U	0.92 U
1,4-Dioxane	123-91-1	18 U	18 U	18 U
Bromodichloromethane	75-27-4	1.3 U	1.3 U	1.3 U
1,3-Dichloropropene (cis)	10061-01-5	0.91 U	0.91 U	0.91 U
Methyl isobutyl ketone	108-10-1	2 U	2 U	2 U
** Toluene	108-88-3	79	5.3	18
1,3-Dichloropropene (trans)	10061-02-6	0.91 U	0.91 U	0.91 U
1,1,2-Trichloroethane	79-00-5	1.1 U	1.1 U	1.1 U
Tetrachloroethene (PCE)	127-18-4	4.2	1.4 U	8.1

Table 1. Summary of Volatile Organic Compounds Detected in Soil Vapor and Air Samples
Pawling Corporation, Pawling, New York

Parameter (Concentrations in ug/m^3)	Sample Designation: / Sample Date: / CAS No.	AS-101 3/5/2009	AS-102 3/5/2009	SV-103 3/5/2009
Methyl Butyl Ketone	591-78-6	2 U	2 U	2 U
Dibromochloromethane	124-48-1	1.7 U	1.7 U	1.7 U
1,2-Dibromoethane	106-93-4	1.5 U	1.5 U	1.5 U
Chlorobenzene	108-90-7	2	0.92 U	0.92 U
Ethylbenzene	100-41-4	0.87 U	0.87 U	6.5
Xylene (m,p)	1330-20-7	2.2 U	2.2 U	28
Xylene (o)	95-47-6	0.87 U	0.87 U	9.6
Styrene	100-42-5	0.85 U	0.85 U	0.94
Bromoform	75-25-2	2.1 U	2.1 U	2.1 U
1,1,2,2-Tetrachloroethane	79-34-5	1.4 U	1.4 U	1.4 U
Xylene (Total)	1330-20-7	0.87 U	0.87 U	38
4-Ethyltoluene (p-Ethyltoluene)	622-96-8	0.98 U	0.98 U	3.3
1,3,5-Trimethylbenzene	108-67-8	0.98 U	0.98 U	2.9
2-Chlorotoluene (o-Chlorotoluene)	95-49-8	1 U	1 U	1 U
1,2,4-Trimethylbenzene	95-63-6	0.98 U	0.98 U	10
1,3-Dichlorobenzene	541-73-1	1.2 U	1.2 U	1.2 U
1,4-Dichlorobenzene	106-46-7	2.3	1.2 U	1.2 U
1,2-Dichlorobenzene	95-50-1	1.2 U	1.2 U	1.2 U
1,2,4-Trichlorobenzene	120-82-1	3.7 U	3.7 U	3.7 U
Hexachlorobutadiene	87-68-3	2.1 U	2.1 U	2.1 U
Naphthalene	91-20-3	2.6 U	2.6 U	2.6 U

Notes:

U - Analyte was not detected at or above the reporting limit
µg/m^3 - micrograms per cubic meter
CAS No. - Chemical Abstracts Service (CAS)



LEGEND

AS–101 △ AIR SAMPLE LOCATION AND DESIGNATION

SV–103 ▲ SOIL SAMPLE SAMPLE LOCATION AND DESIGNATION

Title:

SAMPLING LOCATIONS

Prepared For:

PAWLING CORPORATION

ROUX ASSOCIATES, INC. *Environmental Consulting and Management*	Compiled by: M.R.	Date: 20NOV09	FIGURE
	Prepared by: B.H.C.	Scale: NOT TO SCALE	
	Project Mgr: M.R.	Project: 1303.0001Y002	1
	File: PAW0110601.DWG		

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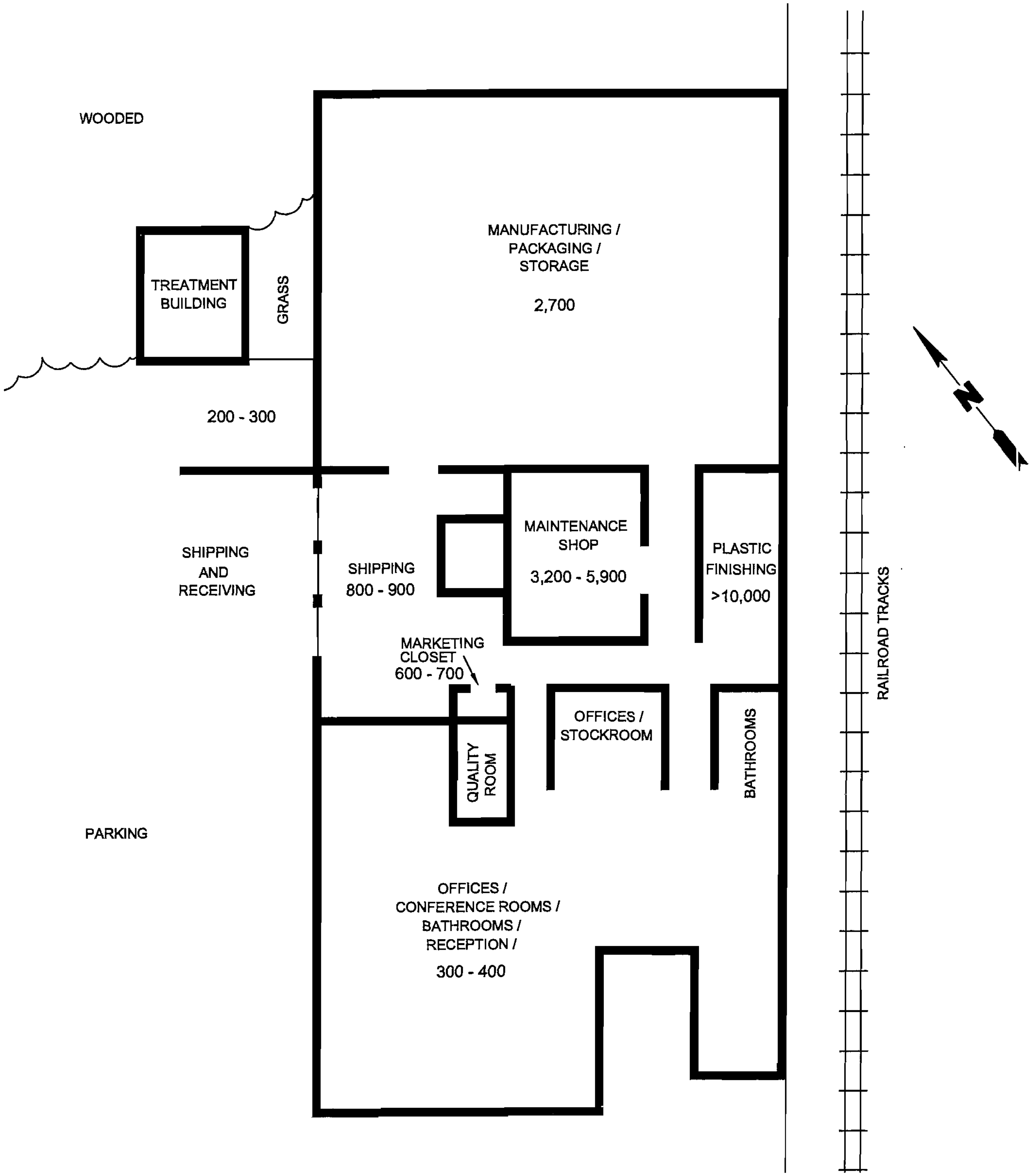

LEGEND

600 - 700 CONCENTRATION OF TOTAL VOCs IN AIR - PARTS PER BILLION

Title:

INDOOR AIR PID MEASUREMENTS

Prepared For:

PAWLING CORPORATION

ROUX

ROUX ASSOCIATES, INC.
Environmental Consulting and Management

Compiled by: M.R.	Date: 20NOV09	FIGURE
Prepared by: B.H.C.	Scale: NOT TO SCALE	2
Project Mgr: M.R.	Project: 1303.0001Y002	
File: PAW0110601.DWG		

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ATTACHMENT 1

NYSDOH
Indoor Air Questionnaire

OSR – 3

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name MICHAEL ROUX Date/Time Prepared MARCH 6, 2009

Preparer's Affiliation ROUX ASSOCIATES, INC. Phone No. 631.232.2600

Purpose of Investigation SOIL VAPOR SAMPLING

1. OCCUPANT:

Interviewed: Y / N

Last Name: THOMPSON First Name: SUSAN

Address: 157 CHARLES COLMAN BLVD, PAWLING, NY

County: DUTCHESS

Home Phone: ________ Office Phone: 845-855-1000

Number of Occupants/persons at this location ______ Age of Occupants ________

2. OWNER OR LANDLORD: (Check if same as occupant X)

Interviewed: Y / N

Last Name: ________ First Name: ________

Address: ________

County: ________

Home Phone: ________ Office Phone: ________

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
(Industrial) [circled]	Church	Other: ________

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:______________

If multiple units, how many? ________

If the property is commercial, type?

Business Type(s) ___________________________________

Does it include residences (i.e., multi-use)? Y / N If yes, how many? ______

Other characteristics:

Number of floors______ Building age______

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

____

____

____

Airflow near source

____

____

____

Outdoor air infiltration

____

____

____

Infiltration into air ducts

____

____

____

5. **BASEMENT AND CONSTRUCTION CHARACTERISTICS** (Circle all that apply)

a. Above grade construction: wood frame (concrete) stone brick

b. Basement type: N/A full crawlspace slab other ________

c. Basement floor: N/A concrete dirt stone other ________

d. Basement floor: N/A uncovered covered covered with ________

e. Concrete floor: unsealed sealed sealed with PAINTED

f. Foundation walls: — poured block stone other ________

g. Foundation walls: — unsealed sealed sealed with ________

h. The basement is: — wet damp dry moldy

i. The basement is: — finished unfinished partially finished

j. Sump present? — Y / N

k. Water in sump? Y / N / not applicable —

Basement/Lowest level depth below grade: ~~AT GRADE~~ AT GRADE

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

FORMER FLOOR DRAIN IN MARKETING CLOSET. SEALED W/ CONCRETE. BATHROOM DRAINS

6. **HEATING, VENTING and AIR CONDITIONING** (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation
(Space Heaters)
Electric baseboard
Heat pump
Stream radiation
Wood stove
Hot water baseboard
Radiant floor
Outdoor wood boiler
Other ________

The primary type of fuel used is:

Natural Gas
Electric
Wood
(Fuel Oil) #6
Propane
Coal
Kerosene
Solar

Domestic hot water tank fueled by: ________

Boiler/furnace located in: Basement Outdoors (Main Floor) Other ________

Air conditioning: Central Air Window units Open Windows (None)

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

N/A

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)
Basement	N/A
1st Floor	MANUFACTURING / PACKAGING / FINISHING / OFFICES STORAGE / SHIPPING
2nd Floor	N/A
3rd Floor	N/A
4th Floor	N/A

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

- **a. Is there an attached garage?** Y / (N)
- **b. Does the garage have a separate heating unit?** Y / N / (NA)
- **c. Are petroleum-powered machines or vehicles stored in the garage** (e.g., lawnmower, atv, car) Y / N / (NA) Please specify
- **d. Has the building ever had a fire?** Y / (N) When?
- **e. Is a kerosene or unvented gas space heater present?** Y / N Where?
- **f. Is there a workshop or hobby/craft area?** (Y) / N Where & Type? MAINTENANCE SHOP
- **g. Is there smoking in the building?** Y / (N) How frequently?
- **h. Have cleaning products been used recently?** Y / N When & Type? —
- **i. Have cosmetic products been used recently?** Y / N When & Type? —

j. Has painting/staining been done in the last 6 months? Y / N Where & When? ——

k. Is there new carpet, drapes or other textiles? Y / N Where & When? ——

l. Have air fresheners been used recently? Y / N When & Type? ——

m. Is there a kitchen exhaust fan? Y / N If yes, where vented? ——

n. Is there a bathroom exhaust fan? Y / N If yes, where vented? NOT OBSERVED

o. Is there a clothes dryer? Y / (N) If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type? ——

Are there odors in the building? (Y) / N
If yes, please describe: SOLVENT ODORS IN PLASTIC FINISHING ROOM

Do any of the building occupants use solvents at work? (Y) / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? TOLUENE

If yes, are their clothes washed at work? Y / (N)

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly)
Yes, use dry-cleaning infrequently (monthly or less)
Yes, work at a dry-cleaning service

No
(Unknown)

Is there a radon mitigation system for the building/structure? Y / (N) Date of Installation: ______
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: (Public Water) Drilled Well Driven Well Dug Well Other: DRILLED WELL AT OTHER PART OF SITE.

Sewage Disposal: (Public Sewer) Septic Tank Leach Field Dry Well Other: ______

10. RELOCATION INFORMATION (for oil spill residential emergency) N/A

a. Provide reasons why relocation is recommended: ______

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement: N/A

First Floor: FIG 1 ATTACHED TO REPORT

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

FIG 1 ATTACHED TO REPORT

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: ______________________________

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N
MARKETING CLOSET	GLASS CLEANER	32oz	U	COMMERCIAL PRODUCTS	—	—
"	SURFACE CLEANER	32oz	U	"	—	—
MAINTENANCE SHOP	GEAR LUBE	55 gal drum	U	—	—	—
"	ETHYLENE GLYCOL	"	U	—	—	—
"	ETHYL KETONE	"	U	-	—	-
"	ISOPROPANOL	"	U	—	—	-
"	OILS 9x	5 gal	U	—	—	—
"	HYDRAULIC FLUID	55 gal	U	—	—	-
"	HEAT TRANSFER FLUID	55 gal	U	—	—	—
"	WASTE OIL	20 gal	U	—	—	—
"	" 3x	5 gal	U	—	—	—
"	CONCRETE EPOXY	4x5 gal	UO	—	—	—
PLASTIC FINISHING	TOLUENE	2x1 gal	U	—	—	—
GENERAL	PROPANE FORK TRUCKS			—	—	-

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

ATTACHMENT 2

Analytical Data

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

March 23, 2009

Mr. Michael Roux
Roux Associates
209 Shafter Street
Islandia, NY 11749

Re: Laboratory Project No. 29000
Case: 29000; SDG: NY130524

Dear Mr. Roux:

Enclosed are the analytical results for the samples that were received by TestAmerica Burlington on March 9th, 2009. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 03/09/09 ETR No: 130524		
787647	AS-101	03/05/09	AIR
787648	AS-102	03/05/09	AIR
787649	SV-103	03/05/09	AIR

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

EPA Method TO-15 – Volatile Organics:
Manual integration of quantitation peaks was performed where necessary. Documentation of each manual integration was provided in the supportive documentation.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Ron Pentkowski
Project Manager

Enclosure

TO-14/15
Result Summary

CLIENT SAMPLE NO.: AS-101

Lab Name: TAL Burlington

SDG Number: NY130524 | Lab Sample No.: 787647

Dilution Factor: 1.00 | Date Analyzed: 03/11/09

Sample Matrix: AIR | Date Received: 03/09/09

Target Compound	CAS Number	Results in ppbv	Q	RL in ppbv	Results in ug/m3	Q	RL in ug/m3
Dichlorodifluoromethane	75-71-8	0.89		0.50	4.4		2.5
1,2-Dichlorotetrafluoroethane	76-14-2	0.20	U	0.20	1.4	U	1.4
Chloromethane	74-87-3	0.64		0.50	1.3		1.0
Vinyl Chloride	75-01-4	0.20	U	0.20	0.51	U	0.51
1,3-Butadiene	106-99-0	0.50	U	0.50	1.1	U	1.1
Bromomethane	74-83-9	0.20	U	0.20	0.78	U	0.78
Chloroethane	75-00-3	0.50	U	0.50	1.3	U	1.3
Bromoethene	593-60-2	0.20	U	0.20	0.87	U	0.87
Trichlorofluoromethane	75-69-4	0.29		0.20	1.6		1.1
Freon TF	76-13-1	0.20	U	0.20	1.5	U	1.5
1,1-Dichloroethene	75-35-4	0.20	U	0.20	0.79	U	0.79
Acetone	67-64-1	5.2		5.0	12		12
Isopropyl Alcohol	67-63-0	6.7		5.0	16		12
Carbon Disulfide	75-15-0	0.50	U	0.50	1.6	U	1.6
3-Chloropropene	107-05-1	0.50	U	0.50	1.6	U	1.6
Methylene Chloride	75-09-2	1.9		0.50	6.6		1.7
tert-Butyl Alcohol	75-65-0	5.0	U	5.0	15	U	15
Methyl tert-Butyl Ether	1634-04-4	0.50	U	0.50	1.8	U	1.8
trans-1,2-Dichloroethene	156-60-5	0.20	U	0.20	0.79	U	0.79
n-Hexane	110-54-3	0.50	U	0.50	1.8	U	1.8
1,1-Dichloroethane	75-34-3	0.20	U	0.20	0.81	U	0.81
Methyl Ethyl Ketone	78-93-3	1.1		0.50	3.2		1.5
cis-1,2-Dichloroethene	156-59-2	0.38		0.20	1.5		0.79
Tetrahydrofuran	109-99-9	5.0	U	5.0	15	U	15
Chloroform	67-66-3	0.20	U	0.20	0.98	U	0.98
1,1,1-Trichloroethane	71-55-6	0.22		0.20	1.2		1.1
Cyclohexane	110-82-7	0.20	U	0.20	0.69	U	0.69
Carbon Tetrachloride	56-23-5	0.20	U	0.20	1.3	U	1.3
2,2,4-Trimethylpentane	540-84-1	0.20	U	0.20	0.93	U	0.93
Benzene	71-43-2	0.27		0.20	0.86		0.64
1,2-Dichloroethene (total)	540-59-0	0.38		0.20	1.5		0.79
1,2-Dichloroethane	107-06-2	0.20	U	0.20	0.81	U	0.81
n-Heptane	142-82-5	0.20	U	0.20	0.82	U	0.82

TO-14/15
Result Summary

CLIENT SAMPLE NO.

AS-101

Lab Name: TAL Burlington

SDG Number: NY130524 Lab Sample No.: 787647

Dilution Factor: 1.00 Date Analyzed: 03/11/09

Sample Matrix: AIR Date Received: 03/09/09

Target Compound	CAS Number	Results in ppbv	Q	RL in ppbv	Results in ug/m3	Q	RL in ug/m3
Trichloroethene	79-01-6	0.20	U	0.20	1.1	U	1.1
1,2-Dichloropropane	78-87-5	0.20	U	0.20	0.92	U	0.92
1,4-Dioxane	123-91-1	5.0	U	5.0	18	U	18
Bromodichloromethane	75-27-4	0.20	U	0.20	1.3	U	1.3
cis-1,3-Dichloropropene	10061-01-5	0.20	U	0.20	0.91	U	0.91
Methyl Isobutyl Ketone	108-10-1	0.50	U	0.50	2.0	U	2.0
Toluene	108-88-3	21		0.20	79		0.75
trans-1,3-Dichloropropene	10061-02-6	0.20	U	0.20	0.91	U	0.91
1,1,2-Trichloroethane	79-00-5	0.20	U	0.20	1.1	U	1.1
Tetrachloroethene	127-18-4	0.62		0.20	4.2		1.4
Methyl Butyl Ketone	591-78-6	0.50	U	0.50	2.0	U	2.0
Dibromochloromethane	124-48-1	0.20	U	0.20	1.7	U	1.7
1,2-Dibromoethane	106-93-4	0.20	U	0.20	1.5	U	1.5
Chlorobenzene	108-90-7	0.43		0.20	2.0		0.92
Ethylbenzene	100-41-4	0.20	U	0.20	0.87	U	0.87
Xylene (m,p)	1330-20-7	0.50	U	0.50	2.2	U	2.2
Xylene (o)	95-47-6	0.20	U	0.20	0.87	U	0.87
Styrene	100-42-5	0.20	U	0.20	0.85	U	0.85
Bromoform	75-25-2	0.20	U	0.20	2.1	U	2.1
1,1,2,2-Tetrachloroethane	79-34-5	0.20	U	0.20	1.4	U	1.4
Xylene (total)	1330-20-7	0.20	U	0.20	0.87	U	0.87
4-Ethyltoluene	622-96-8	0.20	U	0.20	0.98	U	0.98
1,3,5-Trimethylbenzene	108-67-8	0.20	U	0.20	0.98	U	0.98
2-Chlorotoluene	95-49-8	0.20	U	0.20	1.0	U	1.0
1,2,4-Trimethylbenzene	95-63-6	0.20	U	0.20	0.98	U	0.98
1,3-Dichlorobenzene	541-73-1	0.20	U	0.20	1.2	U	1.2
1,4-Dichlorobenzene	106-46-7	0.39		0.20	2.3		1.2
1,2-Dichlorobenzene	95-50-1	0.20	U	0.20	1.2	U	1.2
1,2,4-Trichlorobenzene	120-82-1	0.50	U	0.50	3.7	U	3.7
Hexachlorobutadiene	87-68-3	0.20	U	0.20	2.1	U	2.1
Naphthalene	91-20-3	0.50	U	0.50	2.6	U	2.6

TO-14/15
Result Summary

CLIENT SAMPLE NO.

AS-102

Lab Name: TAL Burlington

SDG Number: NY130524

Lab Sample No.: 787643

Dilution Factor: 1.00

Date Analyzed: 03/11/09

Sample Matrix: AIR

Date Received: 03/09/09

Target Compound	CAS Number	Results in ppbv	Q	RL in ppbv	Results in ug/m3	Q	RL in ug/m3
Dichlorodifluoromethane	75-71-8	0.62		0.50	3.1		2.5
1,2-Dichlorotetrafluoroethane	76-14-2	0.20	U	0.20	1.4	U	1.4
Chloromethane	74-87-3	0.59		0.50	1.2		1.0
Vinyl Chloride	75-01-4	0.20	U	0.20	0.51	U	0.51
1,3-Butadiene	106-99-0	0.50	U	0.50	1.1	U	1.1
Bromomethane	74-83-9	0.20	U	0.20	0.78	U	0.78
Chloroethane	75-00-3	0.50	U	0.50	1.3	U	1.3
Bromoethene	593-60-2	0.20	U	0.20	0.87	U	0.87
Trichlorofluoromethane	75-69-4	0.29		0.20	1.6		1.1
Freon TF	76-13-1	0.20	U	0.20	1.5	U	1.5
1,1-Dichloroethene	75-35-4	0.20	U	0.20	0.79	U	0.79
Acetone	67-64-1	5.0	U	5.0	12	U	12
Isopropyl Alcohol	67-63-0	5.0	U	5.0	12	U	12
Carbon Disulfide	75-15-0	0.50	U	0.50	1.6	U	1.6
3-Chloropropene	107-05-1	0.50	U	0.50	1.6	U	1.6
Methylene Chloride	75-09-2	0.53		0.50	1.8		1.7
tert-Butyl Alcohol	75-65-0	5.0	U	5.0	15	U	15
Methyl tert-Butyl Ether	1634-04-4	0.50	U	0.50	1.8	U	1.8
trans-1,2-Dichloroethene	156-60-5	0.20	U	0.20	0.79	U	0.79
n-Hexane	110-54-3	0.50	U	0.50	1.8	U	1.8
1,1-Dichloroethane	75-34-3	0.20	U	0.20	0.81	U	0.81
Methyl Ethyl Ketone	78-93-3	0.50	U	0.50	1.5	U	1.5
cis-1,2-Dichloroethene	156-59-2	0.20	U	0.20	0.79	U	0.79
Tetrahydrofuran	109-99-9	5.0	U	5.0	15	U	15
Chloroform	67-66-3	0.20	U	0.20	0.98	U	0.98
1,1,1-Trichloroethane	71-55-6	0.20	U	0.20	1.1	U	1.1
Cyclohexane	110-82-7	0.20	U	0.20	0.69	U	0.69
Carbon Tetrachloride	56-23-5	0.20	U	0.20	1.3	U	1.3
2,2,4-Trimethylpentane	540-84-1	0.20	U	0.20	0.93	U	0.93
Benzene	71-43-2	0.41		0.20	1.3		0.64
1,2-Dichloroethene (total)	540-59-0	0.20	U	0.20	0.79	U	0.79
1,2-Dichloroethane	107-06-2	0.20	U	0.20	0.81	U	0.81
n-Heptane	142-82-5	0.20	U	0.20	0.82	U	0.82

TO-14/15
Result Summary

CLIENT SAMPLE NO.

AS-102

Lab Name: TAL Burlington

SDG Number: NY130524

Lab Sample No.: 787648

Dilution Factor: 1.00

Date Analyzed: 03/11/09

Sample Matrix: AIR

Date Received: 03/09/09

Target Compound	CAS Number	Results in ppbv	Q	RL in ppbv	Results in ug/m3	Q	RL in ug/m3
Trichloroethene	79-01-6	0.20	U	0.20	1.1	U	1.1
1,2-Dichloropropane	78-87-5	0.20	U	0.20	0.92	U	0.92
1,4-Dioxane	123-91-1	5.0	U	5.0	18	U	18
Bromodichloromethane	75-27-4	0.20	U	0.20	1.3	U	1.3
cis-1,3-Dichloropropene	10061-01-5	0.20	U	0.20	0.91	U	0.91
Methyl Isobutyl Ketone	108-10-1	0.50	U	0.50	2.0	U	2.0
Toluene	108-88-3	1.4		0.20	5.3		0.75
trans-1,3-Dichloropropene	10061-02-6	0.20	U	0.20	0.91	U	0.91
1,1,2-Trichloroethane	79-00-5	0.20	U	0.20	1.1	U	1.1
Tetrachloroethene	127-18-4	0.20	U	0.20	1.4	U	1.4
Methyl Butyl Ketone	591-78-6	0.50	U	0.50	2.0	U	2.0
Dibromochloromethane	124-48-1	0.20	U	0.20	1.7	U	1.7
1,2-Dibromoethane	106-93-4	0.20	U	0.20	1.5	U	1.5
Chlorobenzene	108-90-7	0.20	U	0.20	0.92	U	0.92
Ethylbenzene	100-41-4	0.20	U	0.20	0.87	U	0.87
Xylene (m,p)	1330-20-7	0.50	U	0.50	2.2	U	2.2
Xylene (o)	95-47-6	0.20	U	0.20	0.87	U	0.87
Styrene	100-42-5	0.20	U	0.20	0.85	U	0.85
Bromoform	75-25-2	0.20	U	0.20	2.1	U	2.1
1,1,2,2-Tetrachloroethane	79-34-5	0.20	U	0.20	1.4	U	1.4
Xylene (total)	1330-20-7	0.20	U	0.20	0.87	U	0.87
4-Ethyltoluene	622-96-8	0.20	U	0.20	0.98	U	0.98
1,3,5-Trimethylbenzene	108-67-8	0.20	U	0.20	0.98	U	0.98
2-Chlorotoluene	95-49-8	0.20	U	0.20	1.0	U	1.0
1,2,4-Trimethylbenzene	95-63-6	0.20	U	0.20	0.98	U	0.98
1,3-Dichlorobenzene	541-73-1	0.20	U	0.20	1.2	U	1.2
1,4-Dichlorobenzene	106-46-7	0.20	U	0.20	1.2	U	1.2
1,2-Dichlorobenzene	95-50-1	0.20	U	0.20	1.2	U	1.2
1,2,4-Trichlorobenzene	120-82-1	0.50	U	0.50	3.7	U	3.7
Hexachlorobutadiene	87-68-3	0.20	U	0.20	2.1	U	2.1
Naphthalene	91-20-3	0.50	U	0.50	2.6	U	2.6

TO-14/15
Result Summary

CLIENT SAMPLE NO.

SV-103

Lab Name: TAL Burlington

SDG Number: NY130524 Lab Sample No.: 787649

Dilution Factor: 1.00 Date Analyzed: 03/11/09

Sample Matrix: AIR Date Received: 03/09/09

Target Compound	CAS Number	Results in ppbv	Q	RL in ppbv	Results in ug/m3	Q	RL in ug/m3
Dichlorodifluoromethane	75-71-8	1.1		0.50	5.4		2.5
1,2-Dichlorotetrafluoroethane	76-14-2	0.20	U	0.20	1.4	U	1.4
Chloromethane	74-87-3	0.50	U	0.50	1.0	U	1.0
Vinyl Chloride	75-01-4	0.20	U	0.20	0.51	U	0.51
1,3-Butadiene	106-99-0	0.50	U	0.50	1.1	U	1.1
Bromomethane	74-83-9	0.20	U	0.20	0.78	U	0.78
Chloroethane	75-00-3	0.50	U	0.50	1.3	U	1.3
Bromoethene	593-60-2	0.20	U	0.20	0.87	U	0.87
Trichlorofluoromethane	75-69-4	0.28		0.20	1.6		1.1
Freon TF	76-13-1	0.20	U	0.20	1.5	U	1.5
1,1-Dichloroethene	75-35-4	0.20	U	0.20	0.79	U	0.79
Acetone	67-64-1	37		5.0	88		12
Isopropyl Alcohol	67-63-0	5.0	U	5.0	12	U	12
Carbon Disulfide	75-15-0	0.50	U	0.50	1.6	U	1.6
3-Chloropropene	107-05-1	0.50	U	0.50	1.6	U	1.6
Methylene Chloride	75-09-2	0.54		0.50	1.9		1.7
tert-Butyl Alcohol	75-65-0	5.0	U	5.0	15	U	15
Methyl tert-Butyl Ether	1634-04-4	0.50	U	0.50	1.8	U	1.8
trans-1,2-Dichloroethene	156-60-5	0.20	U	0.20	0.79	U	0.79
n-Hexane	110-54-3	0.68		0.50	2.4		1.8
1,1-Dichloroethane	75-34-3	0.20	U	0.20	0.81	U	0.81
Methyl Ethyl Ketone	78-93-3	1.8		0.50	5.3		1.5
cis-1,2-Dichloroethene	156-59-2	0.20	U	0.20	0.79	U	0.79
Tetrahydrofuran	109-99-9	5.0	U	5.0	15	U	15
Chloroform	67-66-3	0.20	U	0.20	0.98	U	0.98
1,1,1-Trichloroethane	71-55-6	0.20	U	0.20	1.1	U	1.1
Cyclohexane	110-82-7	0.22		0.20	0.76		0.69
Carbon Tetrachloride	56-23-5	0.20	U	0.20	1.3	U	1.3
2,2,4-Trimethylpentane	540-84-1	0.52		0.20	2.4		0.93
Benzene	71-43-2	0.39		0.20	1.2		0.64
1,2-Dichloroethene (total)	540-59-0	0.20	U	0.20	0.79	U	0.79
1,2-Dichloroethane	107-06-2	0.20	U	0.20	0.81	U	0.81
n-Heptane	142-82-5	0.55		0.20	2.3		0.82

TO-14/15
Result Summary

CLIENT SAMPLE N[illegible].

SV-103

Lab Name: TAL Burlington

SDG Number: NY130524

Lab Sample No.: 787649

Dilution Factor: 1.00

Date Analyzed: 03/11/09

Sample Matrix: AIR

Date Received: 03/09/09

Target Compound	CAS Number	Results in ppbv	Q	RL in ppbv	Results in ug/m3	Q	RL in ug/m3
Trichloroethene	79-01-6	0.20	U	0.20	1.1	U	1.1
1,2-Dichloropropane	78-87-5	0.20	U	0.20	0.92	U	0.92
1,4-Dioxane	123-91-1	5.0	U	5.0	18	U	18
Bromodichloromethane	75-27-4	0.20	U	0.20	1.3	U	1.3
cis-1,3-Dichloropropene	10061-01-5	0.20	U	0.20	0.91	U	0.91
Methyl Isobutyl Ketone	108-10-1	0.50	U	0.50	2.0	U	2.0
Toluene	108-88-3	4.9		0.20	18		0.75
trans-1,3-Dichloropropene	10061-02-6	0.20	U	0.20	0.91	U	0.91
1,1,2-Trichloroethane	79-00-5	0.20	U	0.20	1.1	U	1.1
Tetrachloroethene	127-18-4	1.2		0.20	8.1		1.4
Methyl Butyl Ketone	591-78-6	0.50	U	0.50	2.0	U	2.0
Dibromochloromethane	124-48-1	0.20	U	0.20	1.7	U	1.7
1,2-Dibromoethane	106-93-4	0.20	U	0.20	1.5	U	1.5
Chlorobenzene	108-90-7	0.20	U	0.20	0.92	U	0.92
Ethylbenzene	100-41-4	1.5		0.20	6.5		0.87
Xylene (m,p)	1330-20-7	6.4		0.50	28		2.2
Xylene (o)	95-47-6	2.2		0.20	9.6		0.87
Styrene	100-42-5	0.22		0.20	0.94		0.85
Bromoform	75-25-2	0.20	U	0.20	2.1	U	2.1
1,1,2,2-Tetrachloroethane	79-34-5	0.20	U	0.20	1.4	U	1.4
Xylene (total)	1330-20-7	8.8		0.20	38		0.87
4-Ethyltoluene	622-96-8	0.68		0.20	3.3		0.98
1,3,5-Trimethylbenzene	108-67-8	0.58		0.20	2.9		0.98
2-Chlorotoluene	95-49-8	0.20	U	0.20	1.0	U	1.0
1,2,4-Trimethylbenzene	95-63-6	2.1		0.20	10		0.98
1,3-Dichlorobenzene	541-73-1	0.20	U	0.20	1.2	U	1.2
1,4-Dichlorobenzene	106-46-7	0.20	U	0.20	1.2	U	1.2
1,2-Dichlorobenzene	95-50-1	0.20	U	0.20	1.2	U	1.2
1,2,4-Trichlorobenzene	120-82-1	0.50	U	0.50	3.7	U	3.7
Hexachlorobutadiene	87-68-3	0.20	U	0.20	2.1	U	2.1
Naphthalene	91-20-3	0.50	U	0.50	2.6	U	2.6

ENVIRONMENTAL CONSULTING & MANAGEMENT
ROUX ASSOCIATES, INC.

209 SHAFTER STREET
Islandia, New York 11749-5074 TEL 631-232-2600 FAX 631-232-9898

June 28, 2011

Ms. Robin Hackett
Project Manager
New York State Department of Environmental Conservation
Remedial Bureau C, 11th Floor
625 Broadway
Albany, New York 12233-7014

Re: Groundwater Sampling Results
Pawling Corporation, Pawling, New York
Site No. 314002

Dear Ms. Hackett:

On behalf of Pawling Corporation ("Pawling"), Roux Associates, Inc. ("Roux Associates") has prepared this summary of groundwater sampling conducted at the Pawling facility in Pawling, New York (the "Site"). Groundwater sampling was conducted on May 25, 2011 in accordance with a May 10, 2011 letter from Pawling to the New York State Department of Environmental Conservation ("NYSDEC").

Scope of Work

Groundwater samples were collected from three monitoring wells, GT-6S, GT-7S, and RW-lD using low flow sampling procedures. Each sample was submitted to Adirondack Environmental Services, Inc. of Albany, New York and analyzed for the following volatile organic compounds ("VOCs"): toluene; trichloroethene; tetrachloroethene; 1,l,l-trichloroethane; vinyl chloride; cis-1,2-dichloroethene, and trans-1,2-dichloroethene.

Results

Laboratory analytical results are included as Attachment 1 and summarized below and in Table 1. In addition, Table 1 summarizes historical groundwater data collected from the three monitoring wells between 2007 and 2011.

Four of the seven VOCs analyzed were detected in at least one of the three monitoring wells. There were no VOCs detected in monitoring well GT-6S.

Trichloroethene and cis-1,2-dichloroethene were detected in monitoring well GT-7S at concentrations above their respective NYSDEC Ambient Water Quality Standards and Guidance Values ("AWQSGVs"). Concentrations of these two VOCs have decreased from the previous sampling event in October 2009.

Two degradation products, vinyl chloride and cis-1,2-dichloroethene, were detected in monitoring well RW-1D at concentrations above their respective AWQSGVs. Concentrations of these two VOCs have increased from the previous sampling event in October 2009, but still remain below concentrations observed in the well in 2007.

Recommendations

As previously discussed, Pawling seeks to get permanent delisting of the facility. Based on the analytical results of the May 2011 sampling event and to achieve the goal of delisting the facility, Roux Associates requests that the NYSDEC reclassifies the Site to a Class 4 Inactive Hazardous Waste Site. Furthermore, we propose to prepare a Site Management Plan describing two additional rounds of groundwater sampling (similar to the May 2001 event) to be conducted every fifth quarter (August 2012 and November 2013).

We appreciate your help in achieving a final closure of this project. Feel free to contact Mr. John Rickert of Pawling at 845-855-1000 or Roux Associates at 631-232-2600 should you have any questions.

Sincerely,

ROUX ASSOCIATES, INC.

Glenn Netuschil, P.E.
Senior Engineer

Michael Roux
Principal Hydrogeologist

Attachment

cc: John Rickert, Pawling Corporation

Table 1. Summary of Volatile Organic Compounds in Groundwater, Pawling Corporation, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	GT-6S Jan-07	GT-6S Apr-07	GT-6S Oct-07	GT-6S Apr-08	GT-6S Aug-08	GT-6S May-09	GT-6S Jul-09	GT-6S Oct-09	GT-6S May-11
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis 1,2 - Dichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed AWQSGVs

Table 1. Summary of Volatile Organic Compounds in Groundwater, Pawling Corporation, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	GT-7S Aug-08	GT-7S Aug-08	GT-7S Sep-08	GT-7S Mar-09	GT-7S May-09	GT-7S Jul-09	GT-7S Oct-09	GT-7S May-11
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		**28**	**28**	**6.7**	1	**35**	**92**	**32**	**23**
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		2.5	2.5	1.0 U	1.0 U	2.6	**6.7**	3	1.4
Vinyl Chloride	2		1.0 U	1.0 U	NT	1.0 U	1.0 U	1.0 U	1.0 U	1.2
cis 1,2 - Dichloroethene	5		4.4	**5.7**	NT	1.0 U	1.4	**15**	**24**	**6.6**

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed AWQSGVs

Table 1. Summary of Volatile Organic Compounds in Groundwater, Pawling Corporation, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** **Sample Date:**	RW-1D Jan-07	RW-1D Apr-07	RW-1D Sep-07	RW-1D Oct-07	RW-1D Apr-08	RW-1D Aug-08	RW-1D Aug-08
Toluene	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1 - Trichloroethane	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		**220**	**7.1**	**190**	**8.1**	**20**	**13**	**7.5**
cis 1,2 - Dichloroethene	5		**77**	**7.1**	**41**	**8.2**	**7**	**5.2**	**8**

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed AWQSGVs

Table 1. Summary of Volatile Organic Compounds in Groundwater, Pawling Corporation, Pawling, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** / **Sample Date:**	RW-1D Sep-08	RW-1D May-09	RW-1D Jul-09	RW-1D Oct-09	RW-1D May-11
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1 - Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	2		**NT**	**20**	**4.7**	1.2	**69**
cis 1,2 - Dichloroethene	5		**NT**	2.9	1.1	1.0 U	**9.1**

Notes:
µg/L -Micrograms per liter
U - Compound was analyzed for but not detected
NYSDEC - New York Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
Data highlighted in bold represent detections that exceed AWQSGVs

APPENDIX C

Site Inspection Form

ROUX ASSOCIATES, INC. / REMEDIAL ENGINEERING, P.C.
SITE MONITORING, INSPECTION AND MAINTENANCE FORM

Client: **Pawling Engineered Products**
Site: **157 Charles Coleman Blvd**
DEC Site No.: ____________________
Location: **157 Charles Coleman Blvd**
Pawling, New York

Inspector: ____________________
Inspection Date: ____________________
Roux Project Number: **1303.0001Y002**

Reason for Inspection: **Inspection and Monitoring Event**

Periodic [ ] Emergency [ ]* ____________________

Other [ ] ____________________

* - ***Periodic*** monitoiring required followed groundwater sampling
Emergency following natural disaster.

Groundwater Monitoring: **If "No", refer to Page 3 for additional clarification.**

Yes	No	
		GT-7S
[ ]	[ ]	Locking cover and J-plug intact and locked? Well in good condition?
[ ]	[ ]	Water Elevation Measured?
[ ]	[ ]	Water Quality Parameters Collected?
[ ]	[ ]	Monitoring Well Sampled?

Yes	No	
		RW-1D
[ ]	[ ]	Locking cover and J-plug intact and locked? Well in good condition?
[ ]	[ ]	Water Elevation Measured?
[ ]	[ ]	Water Quality Parameters Collected?
[ ]	[ ]	Monitoring Well Sampled?

Yes	No	
		GT-6S
[ ]	[ ]	Locking cover and J-plug intact and locked? Well in good condition?
[ ]	[ ]	Water Elevation Measured?
[ ]	[ ]	Water Quality Parameters Collected?
[ ]	[ ]	Monitoring Well Sampled?

ROUX ASSOCIATES, INC. / REMEDIAL ENGINEERING, P.C.
SITE MONITORING, INSPECTION AND MAINTENANCE FORM

Client: **Pawling Engineered Products** Inspector: ____________

Site: **157 Charles Coleman Blvd** Inspection Date: ____________

DEC Site No.: ____________ Roux Project Number: **1303.0001Y002**

Location: **157 Charles Coleman Blvd**
Pawling, New York

Reason for Inspection: **Inspection and Monitoring Event**

Periodic [ ] Emergency [ ]* ____________

Other [ ] ____________

* - ***Periodic*** monitoiring required followed groundwater sampling
Emergency following natural disaster.

Additional Comments or Clarification:

ROUX ASSOCIATES, INC. / REMEDIAL ENGINEERING, P.C.
SITE MONITORING, INSPECTION AND MAINTENANCE FORM

Photographs:

Photo 3A:

Photo 3B:

Photo 3C:

Photo 3D:

APPENDIX D

Electronic Database

Appendix D

Information Included in Electronic Database

Site Summary:
A Site Management Plan ("SMP") was prepared for the Pawling Engineered Products ("Pawling") facility located at 157 Charles Colman Boulevard in Pawling, New York (the "Site") at the request of the New York State Department of Environmental Conservation ("NYSDEC") in order to proceed with a reclassification of the Site (Site # 314002) from a Class 2 Inactive Hazardous Waste Site to a Class 4 Inactive Hazardous Waste Site.

Pawling operated several remedial systems at the Site from March 1992 to March 2009 to address an area of impacted soil and groundwater that resulted from historic releases associated with a waste burning trench at the Site. Following completion of the remedial work, some contamination was left in the subsurface at this Site, which is hereafter referred to as "residual contamination." The SMP was prepared to manage residual contamination at the Site until the Declaration of Covenants and Restrictions (Appendix A) is extinguished, and it defines Site-specific implementation procedures as required by the Declaration of Covenants and Restrictions.

Current Site Owner:
Pawling Engineered Products
157 Charles Colman Boulevard
Pawling, New York

Site Location:
157 Charles Colman Boulevard
Pawling, New York

Current Status of Site Remedial Activity:
Remedial action at the Site has been completed and groundwater at the Site is currently being monitored on a periodic basis.

Site Contact:
Mr. John Rickert
phone: 800-431-0101