DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

MEMORANDUM FOR SEE DISTRIBUTION

FROM: AFRPA/DA - Griffiss
153 Brooks Road
Rome, NY 13441-4105

SUBJECT: NYSDEC Spill Numbers: 9202658 and 9503481
Pumphouses 1 and 2 Operation and Maintenance (O & M) Plan for Bioventing and Free Product Recovery Systems; Project Number: JREZ 2000-7007

1. Submitted for your reference, the enclosed subject document identifies work elements that will encompass contractor performance for the O & M portion of the remediation efforts at Pumphouses 1 and 2. Active free product recovery efforts at this site have produced approximately 110 gallons and the recovery wells are currently at a de minimus level. The current remediation efforts for this site will tend toward passive free product recovery and active bioventing as stipulated in the previously submitted (February 2004) work plan for this site.

2. Questions that you may have pertaining to the information provided may be directed to Mark Rabe of my environmental staff at (315) 330-2275.

MICHAEL F. MCDERMOTT
BRAC Environmental Coordinator

Enc.
Pumphouses 1 and 2
O & M Plan

DISTRIBUTION

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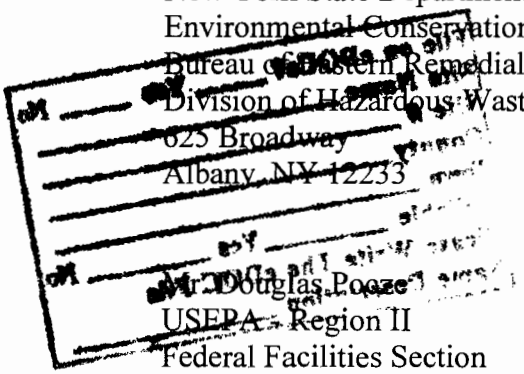

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FINAL

OPERATION, MAINTENANCE AND MONITORING (O & M) PLAN FOR BIOVENTING AND FREE PRODUCT RECOVERY SYSTEMS AT PUMPHOUSE Nos. 1 and 2 PROJECT NO. JREZ-2000-7007 GRIFFISS AIR FORCE BASE, NEW YORK

Contract F41624-01-D-8544
Delivery Order: 0002
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Prepared For:

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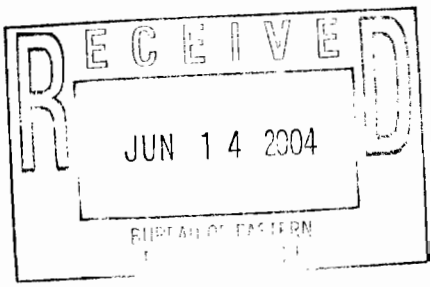

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REVIEWED AND APPROVED BY:

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Technical Manager: Craig Butler [JW] — June 8, 2004 Date

May 2004

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SECTION 1

INTRODUCTION

1.1 BACKGROUND AND INTRODUCTION

This Operation, Maintenance and Monitoring Plan has been prepared for the bioventing and free product recovery (FPR) systems installed at the former Pumphouse No. 1 (former Building 781) and former Pumphouse No. 2 (former Building 779) sites at the former Griffiss Air Force Base (GAFB) in Rome, New York. The plan will be used as a guide for operation and maintenance of the remediation systems during the system operation period for which Parsons is currently contracted.

This report is organized into four sections and nine appendices, as described below. Section 2 of this document describes the operation of the remediation systems. Section 3 details systems maintenance and requirements and provides maintenance schedules. Section 4 describes the systems monitoring that will be conducted to forecast system maintenance needs and provide data on remediation progress. An operation, maintenance and monitoring schedule is provided in Appendix A. Operation, Maintenance, and Monitoring Logs are provided in Appendix B. Equipment manufacturer's information and other relevant service information are provided in Appendix C. Baseline soil vapor analytical data and recovery well free product information is provided in Appendix D. Analytical results for soil and groundwater samples collected during the system installation are provided in Appendix E. "As-built" system drawings are provided in Appendix F. Boring logs are provided in Appendix G. Lockout/Tagout procedures are provided in Appendix H. Quarterly System Monitoring Results Tables and Free Product Recovery Table are in Appendix I.

SECTION 2

REMEDIATION SYSTEMS OPERATION

2.1 PUMPHOUSE NO. 1 FREE PRODUCT RECOVERY (FPR) SYSTEM

2.1.1 Principle of Operation

The objective of the Pumphouse No. 1 free product recovery (FPR) system is to utilize air-operated "skimmer" pumps to remove free-phase liquid hydrocarbons that have accumulated on the groundwater surface of the recovery wells installed in the Pumphouse No. 1 area. Free product that is removed from these wells is discharged into a central collection tank. The skimmer pumps will continue to be operated in each recovery well until the level of free product remaining in each well is reduced to a sheen (i.e., less than 0.1-inch thickness) or less. Additional details regarding the system shutdown are presented in subsequent sections of this report.

2.1.2 System Description and Electrical Equipment

The Pumphouse No. 1 FPR system consists of a series of 2-inch and 4-inch diameter recovery wells that have been installed in the vicinity of the former Pumphouse No. 1 location, as shown on Drawing C-1 (Appendix F). The 2-inch diameter wells were installed as part of various site soil and groundwater investigations that were conducted in the area over the last ten years. These investigations indicated the presence of free phase hydrocarbons on the groundwater surface, and, as a result, four additional 4-inch diameter wells were installed for the specific purpose of product recovery.

The skimmer units installed at Pumphouse No. 1 consist of pneumatic SkimRite™ Pump/Skimmer/Controller units that are lowered into each well. The inlet portions of the SkimRite pumps are positioned within the well to straddle the product/groundwater interface. The skimmer pump inlets rely on the density difference between the two liquids to preferentially draw off the hydrocarbon product layer. The skimmer pumps are equipped with a variable level adjustment to accommodate water table fluctuations of up to 30 inches. Each of the units is equipped with an air supply line, air return line, and a product discharge hose. The product discharge hoses from each well are connected to a piping manifold that discharges into a 500-gallon collection tank. The collection tank is a double-walled steel aboveground tank that is manufactured by Highland Tank Company under the trade name Hazhopper. The tank has a hemispherical top and the outer tank provides full secondary containment for the primary tank. The tank is also configured with a high-level float switch that triggers an alarm light and shuts off the system when the tank is more than 90 percent full.

The system air supply and return lines are connected to an air filter/regulator unit that is installed inside of an insulated, wood framed utility shed. The system air compressor and electrical controls are also installed inside the shed. The system alarm light is mounted on the shed exterior so that the designated maintenance technician from the roadside can verify the

system operating condition. The system is equipped with a RED/GREEN indicator on the outside of the utility shed. The GREEN indicator is illuminated when the system is operating and the RED indicator is illuminated when the system is shut down, or in the event of a system failure. The shed and the central collection tank are installed adjacent to each other on a reinforced concrete surface slab.

Power from Building 788 is run underground to a 60A disconnect switch mounted on a 4-inch by 4-inch wooden post five feet from the FPR utility shed. No. 6 conductors in PVC conduit feed a circuit breaker load center in the wooden house enclosure for Pump House No. 1. The circuits fed from the load center are shown in Drawing E-6 (Appendix F).

The FPR utility shed houses a 2-horsepower air compressor and controls to operate four pneumatic well pumps. The skimmers pump product into a 500-gallon double-walled steel tank located three feet outside the enclosure. A PVC pipe carries three tubes; air supply, product return and vent line to each well location. The PVC carrier pipe is insulated and heat traced with 3 watts-per-foot electric heating cables. The double-walled tank is heat traced on the bottom and lower sidewalls with 10 watts-per-foot electric heat cables and insulated. Two outdoor ambient sensing thermostats control the heat trace. One control each is provided for the tank and one for the product lines. A 900-watt infrared heater, controlled by a wall-mounted thermostat, provides heat for the FPR system utility shed.

The skimmer compressor has a 2-horsepower motor that is connected by a cord and plug and has an integral pressure switch to control on-off operation of the compressor. The system is provided with controls to initiate two alarm conditions and to prevent overfilling the 500-gallon tank. The tank interior is rated a Class 1, Division 1 Hazardous area, and a fixed float in the tank indicates a high level condition. Therefore, the float is monitored by an intrinsically safe relay in the alarm panel. A high level in the tank energizes a relay that is wired to the SkimRite control panel and will shut a solenoid valve cutting off the air supply to the well pumps. A pressure switch is connected to the air compressor discharge line and will activate when the line pressure is below the compressor turn–on pressure indicating a compressor failure. The pressure switch is wired to a relay in the alarm panel.

The electrical classification of the areas associated with the FPR system utility shed are as follows:

- In side utility shed: General;
- 500 gallon tank interior: Class 1, Division 1 explosive atmosphere;
- Inside PVC carrier pipe with product line: Class 1, Division 2.

2.2 PUMPHOUSE NO. 1 BIOVENTING SYSTEM PILOT TEST

2.2.1 Principle of Operation

Bioventing, as employed at Pumphouse No. 1, is the forced injection of ambient air into contaminated soil to provide an oxygen rich environment in order to stimulate indigenous soil bacteria and enhance the *in situ* degradation of hydrocarbons. The Pumphouse No. 1 bioventing

pilot test was conducted to confirm that bioventing is an appropriate remedial technology to address subsurface hydrocarbon contamination in this area. The Pumphouse No. 1 pilot test procedure was implemented based on the results of the Apron 1 bioventing system pilot test, due to the similarities of subsurface site conditions. The blower unit was previously used by AFCEE to conduct the bioventing pilot test at Apron 1, and was provided by AFCEE to Parsons for the Pumphouse No. 1 pilot testing however, April, 2004 the original blower failed and was replaced with a new one.

2.2.2 System Description and Electrical Equipment

The Pumphouse No. 1 bioventing system consists of a Gast Model R4110-2, 1.0-HP blower that supplies air to subsurface soil via air injection well (AIW) No. 1. The system is also installed with three vapor monitoring points (VMPs), designated as 781PVMP-1, 781PVMP-2, and 781PVMP-3. These VMPs are located at distances of 25, 50, and 100 feet from AIW No. 1. The blower is rated to provide a maximum air flow of 92 cubic feet per minute (cfm) and a maximum discharge pressure of 51-inch water column (WC). The bioventing system is also equipped with pressure and temperature gauges, an automatic pressure relief valve, and a manual relief valve (bleed valve) located on the outlet or exhaust side of the blower. The pressure gauge is used to measure outlet pressure on the blower and should read 40-inch WC pressure or less while the blower is in operation. The temperature gauge is used to measure blower temperature and should read less than 125°F while the blower is in operation. The automatic pressure relief valve is located on the outlet side of the blower. This valve provides over-pressurization protection to the blower. This valve has been manually set at 5 psi. In the event that the outlet pressure exceeds 5 psi, the valve will open and will relieve the excess pressure. The bleed air valve is located on the outlet side of the blower. This valve is used to manually control the outlet pressure and airflow to the air injection well.

Griffiss Utility Services Corporation (GUSC) provided electrical power distribution. A 25-kVA pole-mounted transformer is located approximately 30 feet outside Building 788 and feeds a 200A, 220 Volt, single-phase power panel in Building 788. Metering is provided on the feeder from the 25kVA transformer to the 200A power panel. Electric power for the bioventing and free product recovery (FPR) systems is fed from the 200A power panel. A 50A 2-pole breaker serves Pumphouse No. 1, a 100A 2-pole breaker serves the Pumphouse No. 1 bioventing system at former Pumphouse No. 2. A schedule of the circuits fed from the 200A power panel are shown in Drawing E-7 (Appendix F).

Building 788 also houses the blower for the Pumphouse No. 1 bioventing system. The blower is fed from the power panel via a 50A, 220V circuit to a receptacle mounted on the blower skid base. The blower motor is a Gast Model 1-horsepower, thermally protected, totally enclosed, explosion proof motor. There are no other controls associated with the blower. Heat in the concrete block building is provided by a Dayton Model 3UG73, 5kW electric unit heater controlled by a wall mounted thermostat.

2.3 PUMPHOUSE NO. 1 FULL-SCALE BIOVENTING SYSTEM – PHASE II

2.3.1 Pilot Test Conversion To Full Scale Bioventing System

In August 2003, the FPR system was terminated due to limited product recovery and replaced with a rotating passive skimmer recovery method combined with the installation of a full-scale bioventing system to address residual vadose-zone soil contamination. The full-scale bioventing system included the installation of one equipment shed, a blower, an injection well, a vapor monitoring point and additional air injection wells connected to the bioventing pilot test blower. The biovent pilot test blower is renamed the south blower and the new blower is named the north blower. The south blower injects air to five wells on the south side of Patrol Road and the new (north) blower, housed in the north equipment shed injects air to one well on the north side of Patrol Road. See Drawing C-4 in Appendix F for the full-scale biovent system layout.

2.3.2 Blower Selection and Placement

The north blower is housed in a separate 6 feet x 6 feet wooden enclosure located north of Patrol Road and is a $^{1}/_{8}$ hp Gast Regenair Model R1102, which provides approximately 5 cfm at 27 inches W.C. and is equipped with manual on/off controls and discharge pressure gages (0 to 60-inch W.C. Grainger Model No. 1W473) to monitor performance. An electrical plan with equipment layout and details is provided on Drawings E-3, E-5 and E-6 in Appendix F.

2.3.3 Vapor Monitoring Points and Air Injection Wells

Under the original bioventing pilot test, one air injection well, 781PAIW-1, and three vapor monitoring points, 781PVMP-1, 781PVMP-2, 781PVMP-3, were installed and operated with one blower unit. Under the full scale bioventing system, four air injection points were added via installation of air supply lines to existing wells 781PPRW-1, 781PPRW-3, 781PPRW-6, and 781PPRW- 8. In addition, one air injection well 781PAIW-2, one vapor monitoring point 781PVMP-7 and the south blower were installed in December 2003. (Drawing C-4 in Appendix F).

2.4 PUMPHOUSE NO. 2 BIOVENTING SYSTEM

2.4.1 Principle of Operation

Bioventing, as employed at Pumphouse No. 2, is the forced injection of ambient air into contaminated soil to provide an oxygen rich environment in order to stimulate indigenous soil bacteria and enhance the *in situ* degradation of hydrocarbons. The Pumphouse No. 2 bioventing equipment was designed based on the results of the Pumphouse No. 1 respiration testing. One blower unit is employed to inject air into the soil beneath Pumphouse No. 2.

2.4.2 System Description and Electrical Equipment

The Pumphouse No. 2 bioventing system consists of a Gast Model 5HCE-10-M551X, ¾-HP blower, that is rated to provide a maximum of 4 cfm air flow and a maximum discharge pressure of 100 psi. The blower provides air to the subsurface soil through AIW No. 1, that is located approximately 12 feet south of the Pumphouse No. 2 utility shed, as shown on Drawing C-3 (Appendix F). The system is also installed with three VMPs, designated as 779PVMP-4,

779PVMP-5, and 779PVMP-6, that are located perpendicular to Patrol Road at distances of 10, 20 and 40 feet, respectively from AIW No. 1. Additional components of the Pumphouse No. 2 bioventing system include pressure and temperature gauges on the discharge piping, along with a pressure relief valve and a ball valve shutoff.

A 100A circuit is run from the power panel in Building 788 in PVC conduit underground to a location of potential future air injection wells. At this location a 60A fused disconnect switch is mounted on a 4-inch by 4-inch wooden post that is located approximately 100 feet from the building in the northeast direction. No. 6 size conductors are direct buried from the switch to the location of the Pumphouse No. 2 bioventing system where a second 60A fused disconnect switch is mounted on a 4-inch by 4-inch wooden post. No. 6 conductors in PVC conduit feed a circuit breaker load center in the wooden house enclosure for the Pumphouse No. 2 bioventing system. The circuits fed from the load center are shown in Figure E-7 (Appendix F).

The load center has capacity for four circuit breakers, two are provided. One 20A circuit powers the light and GFI receptacle in the enclosure and one 30A circuit powers a receptacle for the blower. The blower receptacle is connected through a motor rated switch to be used to start and stop the motor. The blower has a 3/4-horsepower motor with thermal protection. There are no other controls for the bioventing system. The shed enclosure has no heat appliances.

4.2 REPORTING

Quarterly O&M reports will be provided to the AFRPA and AFCEE. The O&M reports will include summary of the previous months O&M activities and supporting tables of monitoring data that were collected.

4.3 SOIL SAMPLING AND ANALYSIS FOR BIOVENTING SYSTEMS

The objective of site soil sampling is to confirm that the bioventing system has been effective at reducing hydrocarbon contaminant concentrations to below applicable regulatory levels. Initial contaminant analyses from soil samples collected during bioventing system construction established baseline concentrations for the various contaminants. It is not anticipated that additional site soil samples will be collected and analyzed until it is apparent that the bioventing system has reduced contaminant concentrations in the soil to below regulatory concentration levels.

The specific timing of the soil sampling program will be based on the results of quarterly soil gas readings. When the soil gas readings reach asymptotic levels of O_2, CO_2, and TVH concentrations, the confirmatory soil sampling program will be prepared. It is anticipated that the bioventing system will be operated for a period of at least 18 to 24 months prior to conducting the confirmatory sampling program. Following approval of the sampling program by AFCEE and the NYSDEC, the program will be implemented.

Following receipt of the analytical results, a final report will be prepared which will include recommendations for either site closure or further operation. If further operation of the remediation systems is recommended, an estimate of the additional time required to achieve the remedial goals will be made.

4.4 SYSTEM MONITORING AND ANALYSIS FOR FPR SYSTEM

The FPR system will be monitored on a weekly basis, and the volume of collected product will be recorded on the system O&M log. Trends of free product collected will be plotted over time, and will also be evaluated in conjunction with data from other groundwater monitoring wells in the area to determine if system adjustments should be made. This could include modification of cycling times used for the FPR system skimmer pumps to either increase or decrease the time period each day that the pumps are actively removing product from each well. Additional system adjustments may include the following:

- Conversion of wells MW-6 and/or MW-13 from 2-inch diameter wells to 4-inch diameter recovery wells to enhance product recovery rates.
- Conversion of additional groundwater monitoring wells into recovery wells, if free product accumulations are observed to be increasing in these wells.
- Installation of additional 4-inch diameter recovery wells if the extent of the free product plume appears to be expanding in the Pumphouse No. 1 monitoring area.

SECTION 3

SYSTEM MAINTENANCE

3.1 PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING SYSTEMS

3.1.1 General

Recommended maintenance procedures and schedules for the Pumphouse No. 1 and No. 2 bioventing systems are described in detail in this section. A list of recommended equipment and supplies required for maintenance is provided on Table 3.1. An operation, maintenance and monitoring schedule is provided in Appendix A. System maintenance logs are provided in Appendix B. Additional maintenance and trouble-shooting information is provided in the manufacturer's equipment operation and maintenance manuals located in Appendix C.

Prior to conducting any maintenance on the system blowers, the system must be turned off in accordance with the shutdown procedures detailed in Section 4 and the electrical power supply must be locked and tagged out using the procedures described by the equipment manufacture instructions in Appendix C and by Parsons policies in Appendix H. Upon completion of maintenance operations, the system start-up shall be done in accordance with the start-up procedures detailed in Section 4.

3.1.2 Lubrication

The Pumphouse No. 1 and No. 2 blowers will require periodic lubrication in accordance with the manufacturer's recommendations (refer to the maintenance schedule on Table 3.2).

3.1.3 Air Filter Maintenance

To avoid damage caused by passing solids through the blowers, an air filter has been installed on the intake side of each blower at the site. The air filter housing of each blower is equipped with an air filter service indicator to identify when air restriction is occurring due to dust build-up in the air filter. The air filter service indicators should be checked monthly to determine when cleaning or replacement is necessary. When cleaning or replacing filters, care must be taken to ensure that the rubber seals remain in place.

3.1.4 Maintenance/Monitoring Schedule

Following initial start up, system monitoring will also be performed once per day for two days and then once per week. After the first week of bioventing operation, maintenance/ monitoring will be performed in accordance with the long-term maintenance/ monitoring schedule provided in Table 3.2.

3.1.5 Troubleshooting

If a problem with the blower or motor occurs, Parsons will troubleshoot the problem. A system technician will respond to a system problem within 24 hours if the problem develops

during the workweek, and on the next business day if the problem develops on the weekend. AFRPA will be notified within 24 hours during the workweek or during the next workday on the weekend, of any problem. Troubleshooting guides included with the equipment and instrumentation manuals are provided in Appendix C. Lockout and tagout procedures used for equipment are provided in Appendix H.

TABLE 3.1

RECOMMENDED EQUIPMENT AND SUPPLIES NEEDED FOR SYSTEM MAINTENANCE

PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING SYSTEMS

- Tool Box
- Spare Air Filters
- Thermal Anemometer
- Spare gauges
- 5-gallon bucket
- Cleaning detergent
- Paper towels
- Trash bags

PUMPHOUSE NO. 1 FPR SYSTEM

- Tool Box
- Spare Air Filters
- Spare Pump Bladders
- Measuring Tape
- Oil for compressor (type as recommended by mfr.)
- Utility Knife
- Rubber Mallet/Hammer
- Nylon bristle brush
- Muriatic acid solution
- 5-gallon bucket
- Paper towels
- Trash bags

TABLE 3.2

RECOMMENDED SYSTEM MAINTENANCE SCHEDULE FOR THE PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING SYSTEMS

Pumphouse No. 1 and No. 2 Bioventing Systems

Maintenance/Monitoring Item	Maintenance/Monitoring Frequency
Record blower temperature and pressure	Monthly
Measure and balance air flow into each AIW	Monthly
Check Air Filter	Monthly, clean or replace as needed
Change blower oil	Quarterly
Check the system to confirm that controls and associated Go/No Go lighting is functioning properly	Monthly

3.2 PUMPHOUSE NO. 1 FPR SYSTEM

3.2.1 General

Recommended maintenance procedures and schedules for the Pumphouse No. 1 FPR system are described in detail in this section. A list of recommended equipment and supplies required for maintenance is provided on Table 3.1. An operation, maintenance and monitoring schedule is provided in Appendix A. System maintenance logs are provided in Appendix B. Additional maintenance and trouble-shooting information is provided in the manufacturer's equipment operation and maintenance manuals located in Appendix C.

3.2.2 Maintenance/Monitoring Schedule

Following initial start up, system monitoring will be performed once per day for two days and then once per week. After the first week of FPR system operation, maintenance/monitoring will be performed in accordance with the long-term maintenance/monitoring schedule provided in Table 3.2. .

3.2.3 Troubleshooting

If a problem with the skimmer pumps, collection tank, or control module occurs; Parsons will troubleshoot the problem. A system technician will respond to a system problem within 24 hours if the problem develops during the workweek, and on the next business day if the problem develops on the weekend. AFRPA will be notified within 24 hours during the workweek, the next workday on a weekend, of any problem. Troubleshooting guides included with the equipment and instrumentation manuals are provided in Appendix C.

TABLE 3.3

RECOMMENDED SYSTEM MAINTENANCE SCHEDULE FOR THE PUMPHOUSE NO. 1 FPR SYSTEM

Pumphouse No. 1 FPR System

Maintenance/Monitoring Item	Maintenance/Monitoring Frequency
Record product level in collection tank	Weekly
Air Filter Bowl Cleaning	Monthly
Air Compressor Oil Level	Check Monthly
Filter Assembly/ Skimmer Buoy	Check and clean annually
Pump Bladders	Check Annually
Mesh Strainers	Disassemble and clean annually
Check Heat Trace system.	Monthly, clean or replace as needed.
Check compressor operations.	Monthly
Check the system to confirm that controls and associated Go/No Go lighting is functioning properly.	Monthly

SECTION 3

SYSTEM MAINTENANCE

3.1 PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING SYSTEMS

3.1.1 General

Recommended maintenance procedures and schedules for the Pumphouse No. 1 and No. 2 bioventing systems are described in detail in this section. A list of recommended equipment and supplies required for maintenance is provided on Table 3.1. An operation, maintenance and monitoring schedule is provided in Appendix A. System maintenance logs are provided in Appendix B. Additional maintenance and trouble-shooting information is provided in the manufacturer's equipment operation and maintenance manuals located in Appendix C.

Prior to conducting any maintenance on the system blowers, the system must be turned off in accordance with the shutdown procedures detailed in Section 4 and the electrical power supply must be locked and tagged out using the procedures described by the equipment manufacture instructions in Appendix C and by Parsons policies in Appendix H. Upon completion of maintenance operations, the system start-up shall be done in accordance with the start-up procedures detailed in Section 4.

3.1.2 Lubrication

The Pumphouse No. 1 and No. 2 blowers will require periodic lubrication in accordance with the manufacturer's recommendations (refer to the maintenance schedule on Table 3.2).

3.1.3 Air Filter Maintenance

To avoid damage caused by passing solids through the blowers, an air filter has been installed on the intake side of each blower at the site. The air filter housing of each blower is equipped with an air filter service indicator to identify when air restriction is occurring due to dust build-up in the air filter. The air filter service indicators should be checked monthly to determine when cleaning or replacement is necessary. When cleaning or replacing filters, care must be taken to ensure that the rubber seals remain in place.

3.1.4 Maintenance/Monitoring Schedule

Following initial start up, system monitoring will also be performed once per day for two days and then once per week. After the first week of bioventing operation, maintenance/ monitoring will be performed in accordance with the long-term maintenance/ monitoring schedule provided in Table 3.2.

3.1.5 Troubleshooting

If a problem with the blower or motor occurs, Parsons will troubleshoot the problem. A system technician will respond to a system problem within 24 hours if the problem develops

during the workweek, and on the next business day if the problem develops on the weekend. AFRPA will be notified within 24 hours during the workweek or during the next workday on the weekend, of any problem. Troubleshooting guides included with the equipment and instrumentation manuals are provided in Appendix C. Lockout and tagout procedures used for equipment are provided in Appendix H.

TABLE 3.1

RECOMMENDED EQUIPMENT AND SUPPLIES NEEDED FOR SYSTEM MAINTENANCE

PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING SYSTEMS

- Tool Box
- Spare Air Filters
- Thermal Anemometer
- Spare gauges
- 5-gallon bucket
- Cleaning detergent
- Paper towels
- Trash bags

PUMPHOUSE NO. 1 FPR SYSTEM

- Tool Box
- Spare Air Filters
- Spare Pump Bladders
- Measuring Tape
- Oil for compressor (type as recommended by mfr.)
- Utility Knife
- Rubber Mallet/Hammer
- Nylon bristle brush
- Muriatic acid solution
- 5-gallon bucket
- Paper towels
- Trash bags

TABLE 3.2

RECOMMENDED SYSTEM MAINTENANCE SCHEDULE FOR THE PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING SYSTEMS

Pumphouse No. 1 and No. 2 Bioventing Systems

Maintenance/Monitoring Item	Maintenance/Monitoring Frequency
Record blower temperature and pressure	Monthly
Measure and balance air flow into each AIW	Monthly
Check Air Filter	Monthly, clean or replace as needed
Change blower oil	Quarterly
Check the system to confirm that controls and associated Go/No Go lighting is functioning properly	Monthly

3.2 PUMPHOUSE NO. 1 FPR SYSTEM

3.2.1 General

Recommended maintenance procedures and schedules for the Pumphouse No. 1 FPR system are described in detail in this section. A list of recommended equipment and supplies required for maintenance is provided on Table 3.1. An operation, maintenance and monitoring schedule is provided in Appendix A. System maintenance logs are provided in Appendix B. Additional maintenance and trouble-shooting information is provided in the manufacturer's equipment operation and maintenance manuals located in Appendix C.

3.2.2 Maintenance/Monitoring Schedule

Following initial start up, system monitoring will be performed once per day for two days and then once per week. After the first week of FPR system operation, maintenance/monitoring will be performed in accordance with the long-term maintenance/monitoring schedule provided in Table 3.2. .

3.2.3 Troubleshooting

If a problem with the skimmer pumps, collection tank, or control module occurs; Parsons will troubleshoot the problem. A system technician will respond to a system problem within 24 hours if the problem develops during the workweek, and on the next business day if the problem develops on the weekend. AFRPA will be notified within 24 hours during the workweek, the next workday on a weekend, of any problem. Troubleshooting guides included with the equipment and instrumentation manuals are provided in Appendix C.

TABLE 3.3

RECOMMENDED SYSTEM MAINTENANCE SCHEDULE FOR THE PUMPHOUSE NO. 1 FPR SYSTEM

Pumphouse No. 1 FPR System

Maintenance/Monitoring Item	Maintenance/Monitoring Frequency
Record product level in collection tank	Weekly
Air Filter Bowl Cleaning	Monthly
Air Compressor Oil Level	Check Monthly
Filter Assembly/ Skimmer Buoy	Check and clean annually
Pump Bladders	Check Annually
Mesh Strainers	Disassemble and clean annually
Check Heat Trace system.	Monthly, clean or replace as needed.
Check compressor operations.	Monthly
Check the system to confirm that controls and associated Go/No Go lighting is functioning properly.	Monthly

SECTION 4

SYSTEM STARTUP AND MONITORING

4.1 PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING SYSTEMS

The Pumphouse No. 1 and No. 2 bioventing system will be monitored during startup and then monthly to ensure proper air distribution, proper operation of the blowers and to assess the progress of site cleanup. A discussion of system startup and monitoring for the bioventing systems is provided below. A list of equipment required for system monitoring is provided on Table 4.1. Operation, maintenance, and monitoring schedules are provided in Appendix A. Monitoring logs are provided in Appendix B.

4.1.1 Monitoring and Inspection Prior to Startup

Prior to initial startup of the bioventing systems, initial monitoring of the VMPs and nearby monitoring wells will be conducted to establish a baseline for assessing the progress of site cleanup. The baseline monitoring will consist of measuring soil gas concentrations of oxygen, carbon dioxide, and total volatile hydrocarbons (TVH) at each of the VMPs and selected monitoring points listed in Section 4.1.3 for startup monitoring.

The bioventing equipment will be inspected prior to startup of the system. The inspection items will include the following:

- Check for proper operation of the pressure sensor switch
- Check and adjust the pressure relief valve to verify the correct setting.
- Check the blower for proper rotation direction.
- Read the pressure and temperature gauges to ensure the correct calibration of each gauge.

4.1.2 Startup Procedures

The following procedures should be followed during startup or re-start of the bioventing systems:

- Ensure that the disconnect switch located near the blower enclosure is in the off position.
- Turn the circuit breaker switch in the circuit breaker panel to the on position.
- Manually check that the blower rotates freely before blower startup.
- Remove the lockout/tagout equipment and labels.
- Ensure that the air injection well control valves (located within each air injection well sump) are open.

- Open the bleed valve (ball valve located on the pressure side of the blower). During restart, if the handle on the bleed valve has been removed, do not open the valve or otherwise change the setting (it has been preset for a specific flow rate).
- Turn the disconnect switch to the "ON" position.
- Listen to the blower running to verify normal operation.
- Close the bleed valve to direct air flow into the air injection wells.
- Record the blower pressure and temperature readings.
- Adjust the air flow into each air injection well to the desired setting by adjusting the control valves and observing the air flow rate reading from the thermal anemometer (refer to Section 4.1.5.2 Air Injection Flow Rate Monitoring and Control).

4.1.3 System Monitoring and Inspection Following Startup

After steady operating conditions are reached, read and record the following:

- Header differential pressure gage (to determine the total air flow rate in the header pipe).
- Blower pressure and temperature.
- Air flow rate at each air injection well.
- Pressure at Pumphouse No. 1 vapor monitoring points 781PVMP-1, 781PVMP-2, 781PVMP-3, and 781PVMP-7 and Pumphouse No. 2 vapor monitoring points 779PVMP-4, 779PVMP-5, and 779PVMP-6.
- Check for any leakage of air at each air injection well and along all system piping and expansion fittings. Repair leaks if encountered.

In addition, the following measurements will be taken once per day during the first two days following initial system startup and then one week following system startup:

- Soil gas concentrations of oxygen, carbon dioxide, and TVH at Pumphouse No. 1 vapor monitoring points 781PVMP-1, 781PVMP-2, 781PVMP-3, and 781PVMP-7 and Pumphouse No. 2 vapor monitoring points 779PVMP-4, 779PVMP-5, and 779PVMP-6.
- Pressure at Pumphouse No. 1 vapor monitoring points 781PVMP-1, 781PVMP-2, 781PVMP-3, and 781PVMP-7, and Pumphouse No. 2 vapor monitoring points 779PVMP-4, 779PVMP-5, and 779PVMP-6.
- Blower pressure and temperature.
- Blower air injection flow rate.
- Air flow rate at each air injection well.

This monitoring will be conducted to ensure that the bioventing equipment is operating properly and oxygen is being delivered to the entire area of impacted soil. Soil gas sampling data are provided in Appendix D.

4.1.4 Emergency Shutdown Procedures

The following procedures should be followed for emergency shutdown of the bioventing systems:

- Turn the blower disconnect switch located near the blower enclosure to the "OFF" position.
- Turn the circuit breaker switch in the circuit breaker panel to the "off" position.

4.1.5 Long-Term System Operation and Monitoring

Following the initial startup testing, the bioventing system will be monitored on a monthly basis as described below. Measurements that are collected will be recorded on the attached bioventing system operation and maintenance log (Appendix B).

4.1.5.1 Blower Performance

Blower performance monitoring will be completed as follows:

- Record the blower air injection flow rate. Under normal conditions, the Pumphouse No. 1 blower should operate at a flow rate of approximately 48 ACFM. A flow rate significantly below 35 ACFM may indicate excessive blower pressure, a dirty air intake filter, or a blower malfunction. Under normal conditions, the Pumphouse No. 2 blower should operate at a flow rate of approximately 4 ACFM. A flow rate significantly below 2 ACFM may indicate excessive blower pressure, a dirty air intake filter, or a blower malfunction.
- Record the blower pressure and temperature at each blower. Under normal conditions, the Pumphouse No. 1 blower pressure should not exceed 1.44 psi (40-inch WC) pressure, and the blower temperature should not exceed approximately 125° F. Under normal conditions, the Pumphouse No. 2 blower pressure should not exceed 30 psi, and the blower temperature should not exceed approximately 140° F. A pressure higher than this limit may indicate a blocked air supply pipe or a blower malfunction. A temperature higher than this limit may indicate a system blockage, excessive equipment wear, or a blower malfunction.

4.1.5.2 Air Injection Flow Rate Monitoring and Control

Air flow rate at each air injection well is achieved through adjustment of a control valve located at each air injection well. Air flow rate monitoring should be conducted during each monthly monitoring event. The air flow rate should be monitored and controlled as follows:

- Measure the air flow rate at each air injection well using a thermal anemometer. The thermal anemometer assembly is inserted into the air supply piping through the provided velocity port, with the probe inserted into the center of the pipe. The thermal

anemometer measures the air flow velocity in feet per minute (fpm). The expected air flow rate into the Pumphouse No. 1 air injection well is approximately 48 ACFM, based on a velocity of 2,200 fpm for a 2-inch diameter pipe. The expected air flow rate for Pumphouse No. 2 is approximately 4 ACFM , based on a velocity of 185 fpm for a 2-inch diameter pipe.

- Adjust the air flow rate into each air injection well by adjusting the control valves located in each air injection well.
- Following control valve adjustments, re-measure the air flow rate into each air injection well.
- Repeat steps 2 and 3 above until the desired air flow rate into each air injection well is reached.

4.1.5.3 System Performance Criteria Monitoring

Monitoring will also be performed on a quarterly basis to ensure that oxygen is reaching the entire impacted area. This will be conducted by monitoring pressure, oxygen, carbon dioxide, and TVH concentrations at the Pumphouse No. 1 and No. 2 vapor monitoring points and monitoring wells. In addition, soil gas samples will be collected from VMPs using SUMMA canisters or TENAX tubes. One sample will be collected from each of the following VMPs: vapor monitoring points 781PVMP-1, 781PVMP-2, 781PVMP-3, and 781PVMP-7, and Pumphouse No. 2 vapor monitoring point 779PVMP-5, 779PVMP-5, and 779PVMP-6. Samples will be analyzed for VOCs by USEPA Method SW-8260. (See Appendix I)

Pressure response, elevated oxygen concentrations and carbon dioxide concentrations lower than baseline conditions at the VMPs and monitoring wells indicate that oxygen is reaching the VMP. In the event that monitoring indicates that the system is not influencing one or more VMPs (i.e., oxygen concentrations are measured in the VMPs at a concentration of less than 5 percent), system adjustments will be made to direct more air flow toward the injection well near these VMPs. In the event that the pilot test evaluation indicates that bioventing will not be successful in reducing hydrocarbon concentrations at Pumphouse 1, an alternative technology will be selected for pilot testing.

4.1.6 Remediation Progress Monitoring

Routine *in situ* respiration tests will monitor the progress of Pumphouse No. 1 and No. 2 cleanup. *In situ* respiration testing measures the rate of biodegradation of petroleum hydrocarbons. As remediation continues, the rate of biodegradation is expected to decrease, as less petroleum hydrocarbon is available as a food source.

As recommended in Principles and Practices of Bioventing (Leeson and Hinchee, 1995), respiration testing will be conducted twice per year to assess remediation progress. The Pumphouse No. 1 bioventing pilot test was performed using a blower provided by AFCEE that was used to conduct the Apron 1 bioventing pilot test. This blower provides a high air flow rate at a relatively low discharge pressure. The Apron 1 historical operating data were used as the basis for conducting the Pumphouse No. 1 bioventing pilot test. The results of the Pumphouse

No. 1 initial respiration test were then used to design and select the blower for the Pumphouse No. 2 system. The following procedure will be followed when conducting respiration testing:

1. The system will be shut down for over a period of 48 hours to allow soil gas conditions in the VMPs and AIW to stabilize.

2. Following the stabilization period, the AIW and the VMPs will be sampled at each depth interval to determine which points have the lowest O_2 concentration. TVH concentrations will also be measured. Respiration testing will be conducted at the point(s) exhibiting the lowest O_2 concentration.

3. Once the sampling points have been determined, the system will be turned on for a minimum of 24 hours to reoxygenate the soil, and then the system air supply will be shut off to monitor oxygen and carbon dioxide levels. Monitoring will be conducted every two hours for the first eight hours and then every eight hours. The frequency of monitoring should be adjusted based on field measurements so that no more than approximately a 1 percent change in oxygen percentage is measured between readings.

4. The respiration test will be continued for 5 days, or until the oxygen levels fall below 5 percent.

Although the pilot testing phase for most bioventing systems is completed within a month following system startup, AFCEE has elected to extend the pilot testing at Pumphouse No. 1 for several months in order to make a definitive conclusion regarding the viability of bioventing at this location in conjunction with free product recovery.

The decline in oxygen and increase in carbon dioxide over time will be used to estimate rates of bacterial degradation of fuel residuals and monitor cleanup progress. When respiration testing results indicate significant reductions in petroleum concentrations in soil, confirmation soil sampling will be conducted.

4.2 REPORTING

Quarterly O&M reports will be provided to the AFRPA and AFCEE. The O&M reports will include summary of the previous months O&M activities and supporting tables of monitoring data that were collected.

4.3 SOIL SAMPLING AND ANALYSIS FOR BIOVENTING SYSTEMS

The objective of site soil sampling is to confirm that the bioventing system has been effective at reducing hydrocarbon contaminant concentrations to below applicable regulatory levels. Initial contaminant analyses from soil samples collected during bioventing system construction established baseline concentrations for the various contaminants. It is not anticipated that additional site soil samples will be collected and analyzed until it is apparent that the bioventing system has reduced contaminant concentrations in the soil to below regulatory concentration levels.

The specific timing of the soil sampling program will be based on the results of quarterly soil gas readings. When the soil gas readings reach asymptotic levels of O_2, CO_2, and TVH concentrations, the confirmatory soil sampling program will be prepared. It is anticipated that the bioventing system will be operated for a period of at least 18 to 24 months prior to conducting the confirmatory sampling program. Following approval of the sampling program by AFCEE and the NYSDEC, the program will be implemented.

Following receipt of the analytical results, a final report will be prepared which will include recommendations for either site closure or further operation. If further operation of the remediation systems is recommended, an estimate of the additional time required to achieve the remedial goals will be made.

4.4 SYSTEM MONITORING AND ANALYSIS FOR FPR SYSTEM

The FPR system was monitored on a weekly basis, and the volume of collected product will is recorded Pumphouse 1 Free Product Recovery Table in Appendix A. Trends of free product collected will be plotted over time, and will also be evaluated in conjunction with data from other groundwater monitoring wells in the area to determine if system adjustments should be made. This could include modification of cycling times used for the FPR system skimmer pumps to either increase or decrease the time period each day that the pumps are actively removing product from each well. Additional system adjustments may include the following:

- Conversion of wells MW-6 and/or MW-13 from 2-inch diameter wells to 4-inch diameter recovery wells to enhance product recovery rates.
- Conversion of additional groundwater monitoring wells into recovery wells, if free product accumulations are observed to be increasing in these wells.
- Installation of additional 4-inch diameter recovery wells if the extent of the free product plume appears to be expanding in the Pumphouse No. 1 monitoring area.

The aforementioned conditions are all based on monitoring results that indicate free product accumulations on the groundwater surface are increasing at one or multiple recovery and/or monitoring well locations. Each of these scenarios involves installation or modification of recovery wells, along with installation of additional skimmer pumps and equipment to increase the rate of free product recovery.

The other condition that could result in adjustment of the enhanced FPR system operations would be if free product accumulations and free product recovery rates diminish over time. Should this occur, the skimmer pump cycling interval will be reduced in one or more recovery well(s). The ultimate endpoint of the FPR system is to reduce the level of free product at all recovery and monitoring wells to a sheen (levels less than 0.10"). At this point, the skimmer pumps would no longer be effective, and they could be removed from each well. Continued groundwater monitoring would be performed for six months to a year following removal of the skimmer pumps to verify that measurable free product is no longer present.

TABLE 4.1

RECOMMENDED EQUIPMENT NEEDED FOR SYSTEM MONITORING

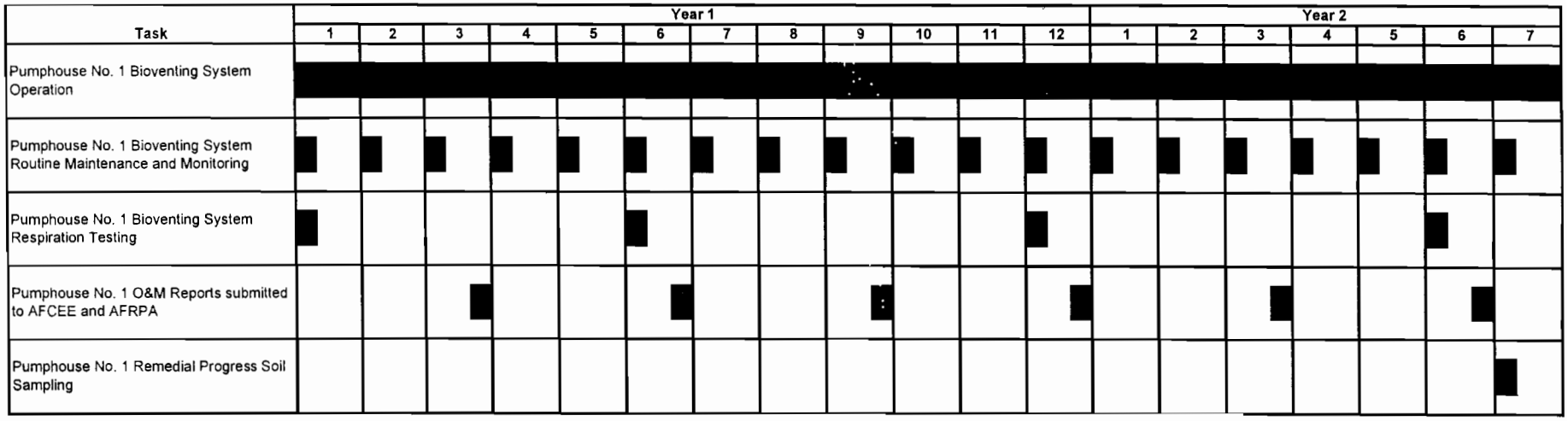
PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING SYSTEMS

- Calibration Gas (Oxygen, Carbon Dioxide, Helium)
- Tedlar Sample Bag (1L)
- Tygon Tubing (3/16-inch I.D)
- Oxygen/Carbon Dioxide Gas Sample Meter
- Total Volatile Hydrocarbon Gas Sample Meter
- Sampling pumps (1-cfm)
- Extension cords
- Magnehelic gauges (various ranges)
- Thermal Anemometer
- Tool box

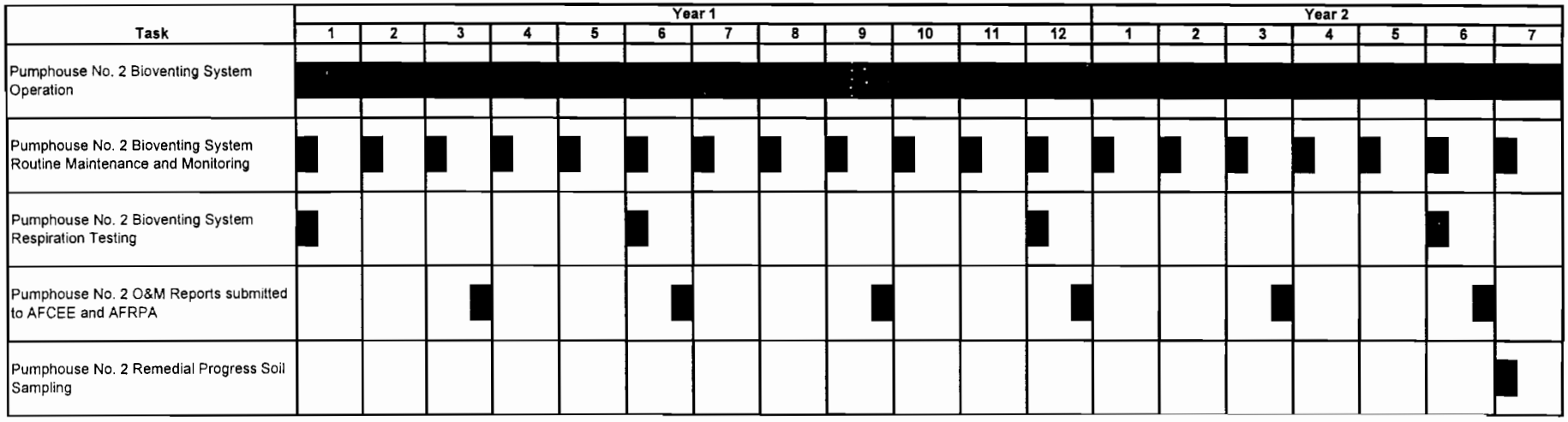
APPENDIX A

OPERATION, MAINTENANCE, AND MONITORING SCHEDULE

Operation, Maintenance and Monitoring Schedule
Pumphouse No. 1 - Griffiss AFB



Operation, Maintenance and Monitoring Schedule
Pumphouse No. 2 - Griffiss AFB



APPENDIX B

OPERATION, MAINTENANCE AND MONITORING LOGS

ATTACHMENT A
PUMPHOUSE No. 1 FREE PRODUCT RECOVERY (FPR) SYSTEM
OPERATION MAINTENANCE AND MONITORING LOG

Inspector: _____ Weather: _____
Date: _____ Temperature: _____
Time: _____ Barometric Pressure: _____

Recovery System Inspection and Maintenance:

DEPTH TO BOTTOM OF TANK (FEET)	DEPTH TO PRODUCT IN TANK (FEET)	DEPTH TO WATER IN TANK (FEET)	(CALCULATED) VOLUME OF PRODUCT IN TANK (GALLONS)	SYSTEM CONTROLS OPERATIONAL (INDICATOR LIGHTS) (YES OR NO)	RECOVERY SYS AIR/PRODUCT LINES/HEAT TRACE CHECKED (YES OR NO)

* # gal liquid = 13 x (in. of liquid present in tank)

RW-1 OPERATING ? (YES OR NO)	RW-2 OPERATING ? (YES OR NO)	MW-13 OPERATING ? (YES OR NO)	MW-6 OPERATING ? (YES OR NO)	RECOVERY COMPRESSOR FILTER CHANGED OR CLEANED ?	RECOVERY COMPRESSOR TANK PRESSURE (PSI)

RECOVERY COMPRESSOR OIL CHECKED OR CHANGED ?	RECOVERY COMPRESSOR CONDENSATE TANKS EMPTIED (YES OR NO)	RECOVERY COMPRESSOR CONDENSATE BOWL EMPTIED (YES OR NO)			RECOVERY SYSTEM AIR / PRODUCT LINE HEATERS (ON / OFF)

Water Level and Product Level Monitoring:

WELL LOCATION	DEPTH TO PRODUCT (FEET)	DEPTH TO WATER (FEET)	PRODUCT THICKNESS (FEET)	PRODUCT FLOW (GPD) / COMMENTS
RW-1				
RW-2				
MW-13				
MW-6				

Comments:

ATTACHMENT C

PUMPHOUSE 1
PRODUCT RECOVERY

WELL	19-Dec	8-Jan	30-Apr	7-May	14-May	21-May	28-May
PRW #1							
Product Recovered - Liters							
Depth to Product- Ft							
Depth to Water - Ft							
Product Thickness -Ft	2.36	2.64					
PRW #2							
Product Recovered - Liters							
Depth to Product - Ft							
Depth to Water - Ft							
Product Thickness -Ft	2.16	2.37					
PRW #3							
Product Recovered - Liters							
Depth to Product - Ft							
Depth to Water - Ft							
Product Thickness -Ft	0	0.02					
PRW #4							
Product Recovered - Liters							
Depth to Product - Ft							
Depth to Water - Ft							
Product Thickness -Ft	0	0.02					
781MW #4							
Product Recovered - Liters							
Depth to Product - Ft							
Depth to Water - Ft							
Product Thickness -Ft	1.1	0.94					
781MW #6							
Product Recovered - Liters							
Depth to Product - Ft							
Depth to Water - Ft							
Product Thickness -Ft	1.3	1.56					
781MW #8							
Product Recovered - Liters							
Depth to Product -Ft							
Depth to Water - Ft							
Product Thickness -Ft	0.08	0.1					
781MW #9							
Product Recovered - Liters							
Depth to Product - Ft							
Depth to Water - Ft							
Product Thickness -Ft	0.02	0.02					
781MW #13							
Product Recovered - Liters							
Depth to Product -Ft							
Depth to Water - Ft							
Product Thickness -Ft	2.72	2.59					
	FPM Mon Rpt Feb 03						

APPENDIX C

EQUIPMENT AND INSTRUMENTATION MANUALS

C.1 PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING BLOWER

C.2 PUMPHOUSE NO. 1 FREE PRODUCT RECOVERY SYSTEM

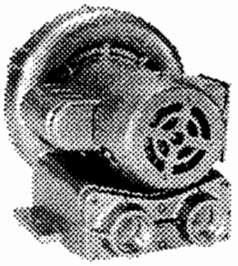
C.1 PUMPHOUSE NO. 1 AND NO. 2 BIOVENTING BLOWERS

Pumphouse 1

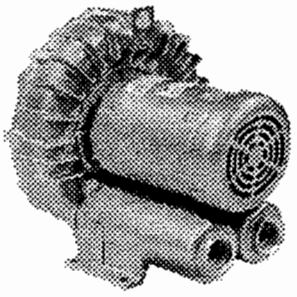
PART NO. 70 - 6000 F2-200 (REV-G)

STANDARD REGENAIR BLOWER

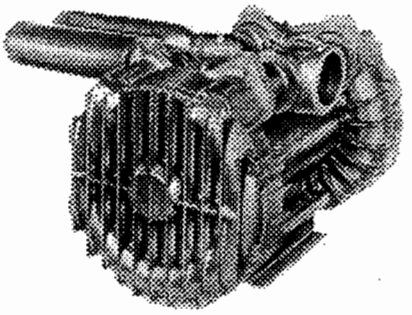
OPERATION & MAINTENANCE MANUAL



Model R1 Shown



Model R6P350A Shown



Model R7P Shown

Thank you for purchasing this Gast product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational and safety instructions and you will receive years of trouble free service.

IMPORTANT: PLEASE READ THIS MANUAL AND SAVE FOR FUTURE REFERENCE.

General information

This manual does not apply to:

- SDR Series blowers without motors
- Blowers powered with Explosion Proof Motors

Product Use Criteria:

- Pump only clean, dry air.
- Operate at 32°F - 104°F (0°C - 40°C).
- Protect unit from dirt & moisture.
- Do not pump flammable or explosive gases or use in an atmosphere that contains such gases.
- Protect all surrounding items from exhaust air. This exhaust air can become very hot.
- Corrosive gases and particulate material will damage unit. Water vapor, oil-based contaminants or other liquids must be filtered out.
- The blower must be installed with the properly sized inlet and inline filters, gauges and relief valves to protect the product from dirt and over-heating.
- Consult your Gast Distributor/Representative before using at high altitudes.

GAST
A Unit of IDEX Corporation

ISO 9001 & 14001 CERTIFIED

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Your safety and the safety of others is extremely important.

We have provided many important safety messages in this manual and on your product. Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to hazards that can kill or hurt you and others. The safety alert symbol and the words "DANGER" and "WARNING" will precede all safety messages. These words mean:

DANGER

You will be killed or seriously injured if you don't follow instructions.

WARNING

You can be killed or seriously injured if you don't follow instructions.

All safety messages will identify the hazard, tell you how to reduce the chance of injury, and tell you what can happen if the safety instructions are not followed.

INSTALLATION

WARNING

Electrical Shock Hazard

Disconnect electrical power at the circuit breaker or fuse box before installing this product.

Install this product where it will not come into contact with water or other liquids.

Install this product where it will be weather protected.

Electrically ground this product.

Failure to follow these instructions can result in death, fire or electrical shock.

Correct installation is your responsibility. Make sure you have the proper installation conditions and that installation clearances do not block air flow.

Blocking air flow over the product in any way can cause the product to overheat.

The blower must be installed with the properly sized inlet filter, gauge and relief valve to protect the product from dirt and over-heating.

Mounting

The single impeller blower should be oriented with the shaft in a horizontal position, unless the model's product features state otherwise. The dual impeller models must be mounted with the shaft in a horizontal position. Mounting the product to a stable, rigid operating surface and using shock mounts will reduce noise and vibration.

Rotation

From the motor side of the blower, check that the blower is rotating clockwise. (The motor side is marked with an arrow on most models.) Proper rotation can also be checked by the air flow at the IN and OUT ports. On blowers powered by a 3-phase motor, incorrectly connecting any two power lines can reverse direction.

Plumbing

Remove any foreign material (burrs, chips, welding drops, slag, pipe cuttings, excess sealant, sand or lime) from plumbing.

Check motor mounting and rotation before connecting to plumbing. Inlet and outlet ports are not designed to support plumbing.

Remove plugs from the IN and OUT ports. Use a small amount of pipe thread lubricant when connecting plumbing to protect the aluminum blower threads. Connect with pipe and fittings that are the same size or larger than the product's threaded ports. When installing two blowers in parallel, use plumbing that is two whole pipe sizes larger in diameter than that of the blower. Be sure to connect the intake and exhaust plumbing to the correct inlet and outlet ports.

Plumbing to remove the hot discharge air of larger blowers may be required to help maintain proper room ambient temperature. Use a relief valve to discharge excess air into the atmosphere. If the blower will be operated at 125mbar (50" H_2O) or higher, metal pipe is required for hot exhaust air.

Accessories

Install two vacuum gauges, one before and one after filter, to monitor restriction through filters. As filters become clogged, performance efficiency will be reduced. Filters should be checked periodically and replaced when necessary. See page 7 for installation.

Install a relief valve to avoid changes in pressure or vacuum that can cause overloading of large blowers. Install an intake filter with a relief valve to prevent foreign material from entering blower if blower is used in a vacuum application in a dirty environment. In applications where there is high humidity or liquids being used in the process, install a moisture separator.

See Recommended Accessories on pages 7-9 or consult your Gast Distributor/Representative for additional filter and accessories recommendations. Do Not install check valves that close with a strong spring. The recommended check valves (page 7) provide minimal pressure drop, positive sealing and are resistant to the high discharge temperatures of large blowers.

Motor Control

It is your responsibility to contact a qualified electrician and assure that the electrical installation is adequate and in conformance with all national and local codes and ordinances.

Select fuses, motor protective switches or thermal protective switches to provide protection. Fuses act as short circuit protection for the motor, not as protection against overload. Incoming line fuses must be able to withstand the motor's starting current. Motor starters with thermal magnetic overload or circuit breakers protect motor from overload or reduced voltage conditions. Motors without automatic restart require thermal protection or magnetic over-current cutout to prevent motor overloading from one phase in a 3-phase circuit, high starting frequency or jammed blower.

The power required will rise as differential pressure increases. The wiring diagram attached to the product or on page 6 of this manual provides required electrical information. Large motors have two diagrams, one for 50Hz wiring specifications and the other for 60Hz wiring specifications. Check that the power source is correct to properly operate the dual-voltage motor. If additional information is required, please consult your Gast Distributor/Representative.

Electrical Connection

⚠ WARNING

Electrical Shock Hazard

This product must be properly grounded.

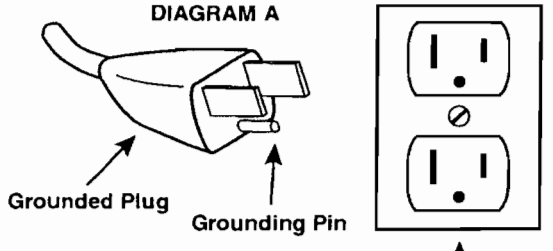
Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.

If repair or replacement of the cord or plug is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation that is green or green with yellow stripes is the grounding wire.

Check the condition of the power supply wiring. Do not permanently connect this product to wiring that is not in good condition or is inadequate for the requirements of this product.

Failure to follow these instructions can result in death, fire or electrical shock.

DIAGRAM A



120-volt grounded connectors shown. 220/240-volt grounded connectors will differ in shape.

Model with a power supply cord:
This product must be grounded. For either 120-volt or 220/240-volt circuits connect power supply cord grounding plug to a matching grounded outlet. **Do not use an adapter.** (See DIAGRAM A)

In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product may be equipped with a power supply cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if you are not sure whether the product is properly grounded. Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.

Model that is permanently wired:
This product must be connected to a grounded, metallic, permanent wiring system, or an equipment grounding terminal or lead on the product.

Power supply wiring must conform to all required safety codes and be installed by a qualified person. Check that supply voltage agrees with that listed on product nameplate.

Extension cords:
Use only a 3-wire extension cord that has a 3-blade grounding plug. Connect extension cord plug to a matching 3-slot receptacle. **Do not use an adapter.** Make sure your extension cord is in good condition. Check that the gage wire of the extension cord is the correct size wire to carry the current this product will draw.

An undersized cord is a potential fire hazard, and will cause a drop in line voltage resulting in loss of power causing the product to overheat. The following table indicates the correct size cord for length required and the ampere rating listed on the product nameplate. **If in doubt, use the next heavier gage cord. The smaller the gage number, the heavier the wire gage.**

Minimum gage for extension cords

Amps	Volts	Length of cord in feet								
	120v	25	50	100	150	200	250	300	400	500
	240v	50	100	200	300	400	500	600	800	1000
0-2		18	18	18	16	16	14	14	12	12
2-3		18	18	16	14	14	12	12	10	10
3-4		18	18	16	14	12	12	10	10	8
4-5		18	18	14	12	12	10	10	8	8
5-6		18	16	14	12	10	10	8	8	8
6-8		18	16	12	10	10	8	6	6	6
8-10		18	14	12	10	8	8	6	6	4
10-12		16	14	10	8	8	6	6	4	4
12-14		16	12	10	8	6	6	6	4	2
14-16		16	12	10	8	6	6	4	4	2
16-18		14	12	8	8	6	4	4	2	2
18-20		14	12	8	6	6	4	4	2	2

OPERATION

⚠ WARNING

Injury Hazard

Install proper safety guards as needed to prevent any close contact with blower suction area.

Keep fingers and objects away from openings and rotating parts.

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Wear hearing protection. Sound level from some models may exceed 85 dBA.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to operate this product at recommended pressures or vacuum duties and room ambient temperatures. Do not operate R4P or larger size blowers without air flowing through the blower. Do not throttle discharge or suction pipe to reducer capacity. Throttle will increase differential pressure causing increasing power absorption and working temperatures.

Start Up

Operate blower for an hour and then check:

1. **Ambient temperature** – Check room and discharge air temperatures. Increased room temperatures may require stronger ventilation especially for larger blowers. Exhaust air should not exceed 215°F (102°C) for all blowers less than 3.5 Hp. Exhaust air should not exceed 275°F (135°C) for all blowers above 3.5 Hp.
2. **Working pressure and vacuum values** – Adjust relief valve pressure or vacuum setting, if needed.
3. **Motor current** – Check that supply current matches recommended current rating on product nameplate.
4. **Electrical overload cutout** – Check that current matches rating on product nameplate.

If motor fails to start or slows down significantly under load, shut off and disconnect from power supply. Check that the voltage is correct for motor and that motor is turning in the proper direction.

MAINTENANCE

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical power supply cord before performing maintenance on this product.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on this product.

Failure to follow these instructions can result in death, fire or electrical shock.

⚠ WARNING

Injury Hazard

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to regularly inspect and make necessary repairs to this product in order to maintain proper operation. Make sure that pressure and vacuum is released from product before starting maintenance.

Check filter elements and noise absorbing foam used in mufflers and clean motor and blower after first 500 hours of operation. Replace filter elements and determine how frequently mufflers should be checked during future operation. This one procedure will help assure the product's performance and service life.

When there is an increase in the differential pressure across the inlet filter it is beginning to clog with dirt. Replace the cartridge when the filter will not come clean.

Small motor bearings (less than 5.5 Hp) never need to be greased. Larger motor bearings (greater than 5.5 Hp) have alemite grease fittings. Use a grease gun and apply one or two strokes of Exxon POLYREX® grease to the fittings to lubricate larger motor bearings.

Hours of Service Per Year	Relubrication Intervals
5,000	3 years
Continual Normal Service	1 year
Seasonal Service (motor idle for 6 months or more)	1 year at beginning of season
Continuous-high ambients, dirty or moist applications	6 months

Check that all external accessories such as relief valves and gauges are not damaged before re-operating product.

WARRANTY

Gast finished products, when properly installed and operated under normal conditions of use, are warranted by Gast to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase from Gast or an authorized Gast Representative or Distributor. In order to obtain performance under this warranty, the buyer must promptly (in no event later than thirty (30) days after discovery of the defect) give written notice of the defect to Gast Manufacturing Incorporated, PO Box 97, Benton Harbor Michigan USA 49023-0097 or an authorized Service Center (unless specifically agreed upon in writing signed by both parties or specified in writing as part of a Gast OEM Quotation). Buyer is responsible for freight charges both to and from Gast in all cases.

This warranty does not apply to electric motors, electrical controls, and gasoline engines not supplied by Gast. Gast's warranties also do not extend to any goods or parts which have been subjected to misuse, lack of maintenance, neglect, damage by accident or transit damage.

THIS EXPRESS WARRANTY EXCLUDES ALL OTHER WARRANTIES OR REPRESENTATIONS EXPRESSED OR IMPLIED BY ANY LITERATURE, DATA, OR PERSON. GAST'S MAXIMUM LIABILITY UNDER THIS EXCLUSIVE REMEDY SHALL NEVER EXCEED THE COST OF THE SUBJECT PRODUCT AND GAST RESERVES THE RIGHT, AT ITS SOLE DISCRETION, TO REFUND THE PURCHASE PRICE IN LIEU OF REPAIR OR REPLACEMENT.

GAST WILL NOT BE RESPONSIBLE OR LIABLE FOR INDIRECT OR CONSEQUENTIAL DAMAGES OF ANY KIND, however arising, including but not limited to those for use of any products, loss of time, inconvenience, lost profit, labor charges, or other incidental or consequential damages with respect to persons, business, or property, whether as a result of breach of warranty, negligence or otherwise. Notwithstanding any other provision of this warranty, BUYER'S REMEDY AGAINST GAST FOR GOODS SUPPLIED OR FOR NON-DELIVERED GOODS OR FAILURE TO FURNISH GOODS, WHETHER OR NOT BASED ON NEGLIGENCE, STRICT LIABILITY OR BREACH OF EXPRESS OR IMPLIED WARRANTY IS LIMITED SOLELY, AT GAST'S OPTION, TO REPLACEMENT OF OR CURE OF SUCH NONCONFORMING OR NON-DELIVERED GOODS OR RETURN OF THE PURCHASE PRICE FOR SUCH GOODS AND IN NO EVENT SHALL EXCEED THE PRICE OR CHARGE FOR SUCH GOODS. GAST EXPRESSLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE WITH RESPECT TO THE GOODS SOLD. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTIONS SET FORTH IN THIS WARRANTY, notwithstanding any knowledge of Gast regarding the use or uses intended to be made of goods, proposed changes or additions to goods, or any assistance or suggestions that may have been made by Gast personnel.

Unauthorized extensions of warranties by the customer shall remain the customer's responsibility.

CUSTOMER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF GAST PRODUCTS FOR CUSTOMER'S USE OR RESALE, OR FOR INCORPORATING THEM INTO OBJECTS OR APPLICATIONS WHICH CUSTOMER DESIGNS, ASSEMBLES, CONSTRUCTS OR MANUFACTURES.

This warranty can be modified only by authorized Gast personnel by signing a specific, written description of any modifications.

ELECTRICAL WIRING DIAGRAMS

Models
R1102, R2103, R2105, R3105-1, R3105-12, R4110-2, R4P115, R5125-2, R6125-2

Low Voltage Single Phase			High Voltage Single Phase	
Blue	P1	Line	P1	Line
Brown	P2		P2	Insulate
Black	5	Tie together & Insulate	5	
Orange	3		3	Tie together & Insulate
White	2		2	
Yellow	4	Tie together Line	4	Line

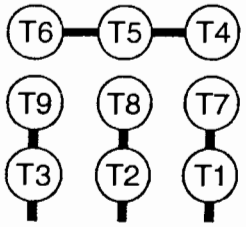
Model
R1S103

	Volt High	Volt Low
Line A	1	1, 3, 5
Line B	4	4
Join	2, 3, 5	–
Join	J, 8	2, J, 8

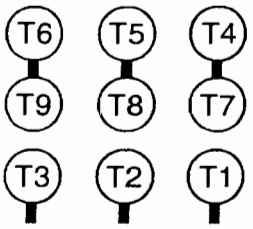
Models
R2303A, R3305A-1, R3305A-13, R4310A-2, R4P315A, R6350A-2, R6P350A, R6PP3110M, R6PS3110M, R7100A-3, R7P3180M, R7S3180M, R93150A

Note: Model R6P355A has two additional leads labeled "J" for an external thermal motor protection circuit.

Connections for 3-Phase, 9 Leads

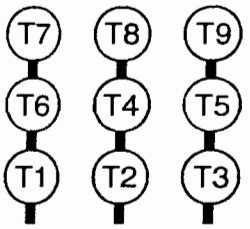


Line
Low Voltage

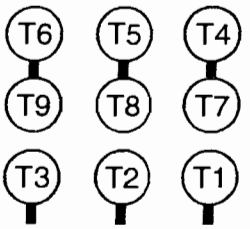


Line
High Voltage

Model R9P3300M Only

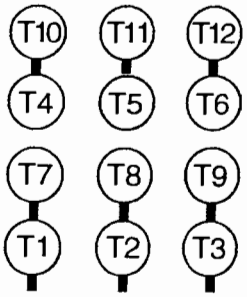


Line
Low Voltage

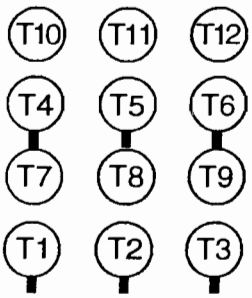


Line
High Voltage

Connections for 3-Phase, 12 Leads
Models R6335A-2, R6P335A

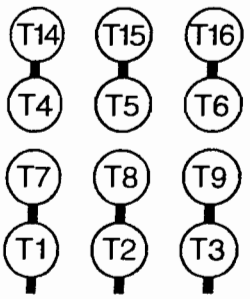


Line
Low Voltage

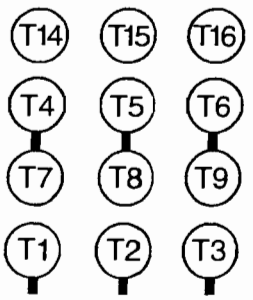


Line
High Voltage

Models R5325A-2, R6325A-2



Line
Low Voltage



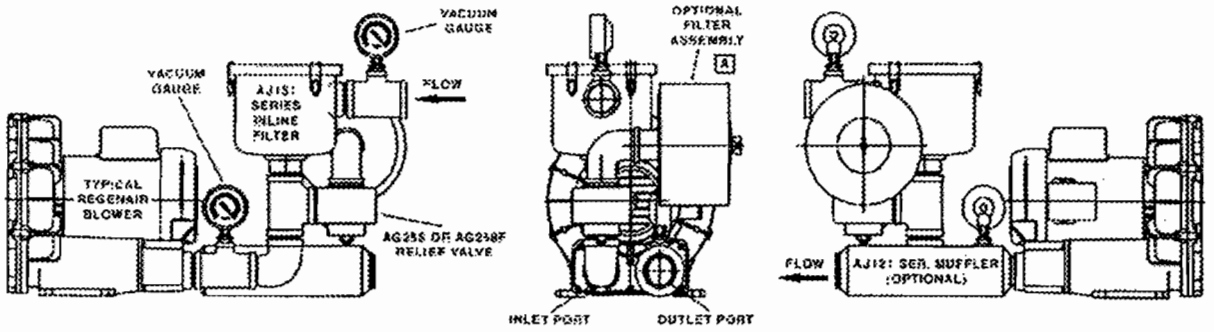
Line
High Voltage

To reverse rotation on any 3-Phase motor, interchange any two external motor line connections to any two line leads.

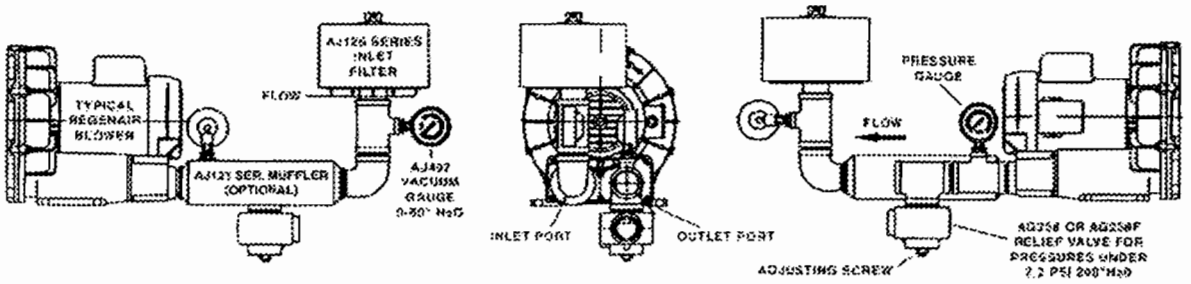
RECOMMENDED ACCESSORIES

The following diagrams are only suggested configurations for these accessories. These accessory configurations may vary depending upon a particular unit's application.

VACUUM ACCESSORIES



PRESSURE ACCESSORIES

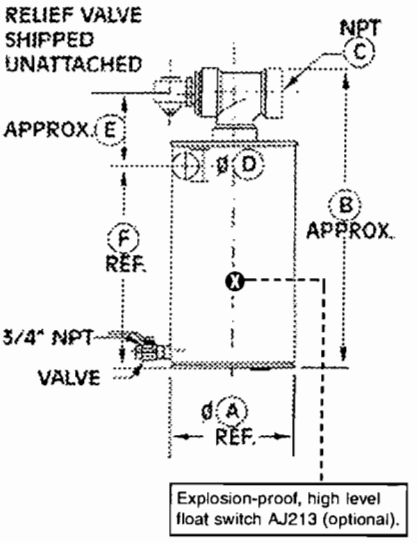


MOISTURE SEPARATOR (FOR VACUUM)

This moisture separator removes liquids from the gas stream in a vacuum process. This helps protect the blower from corrosion and the build up of mineral deposits.

For Model Number	R3, R4, R5	R4, R4H, R4P, R5	R4H, R4M, R5, R6, R6P, R6PS, R7H	R4M, R6, R6P, R6PP, R7, R7H, R7P, R7S, R9, R9S
Part Number	**RMS160**	**RMS200**	**RMS300**	**RMS400**
CFM capacity	160	200	300	400
Liquid capacity (gal.)	10	19	19	40
Diameter (A)	14.8"	19.7"	19.7"	24"
Dimension (B)	37.5"	35"	35"	44"
NPT outlet (C)	2"	2"	2.5"	3"
Inlet diameter (D)	2"	2"	2.5"	3"
Dimension (E)	7.5"	7.5"	7.5"	9.7"
Dimension (F)	26.6"	26.6"	26.6"	29"

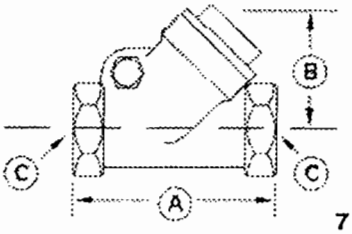
Maximum vacuum allowed: 22" Hg.



HORIZONTAL SWING TYPE CHECK VALVE

This check valve prevents backwash of fluids from entering the blower and air back-streaming. The check valve can be mounted to discharge or inlet either vertically or horizontally. The check valve will open with 3" of water pressure or vacuum.

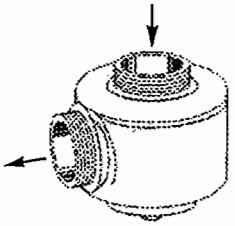
Model Number	R1, R2	R3	R4, R5, SDR4, SDR4, R4P	R6, R6P, SDR6P, SDR6, R6PS	R7, R7S
Part Number	**AH326B**	**AH326C**	**AH326D**	**AH326F**	**AH326G**
Dimension (A)	3.57"	4.19"	4.50"	5.25"	8.00"
Dimension (B)	2.32"	2.69"	2.94"	3.82"	5.07"
Dimension (C)	1.00" NPT	1.25" NPT	1.50" NPT	2.00" NPT	2.50" NPT



RECOMMENDED ACCESSORIES

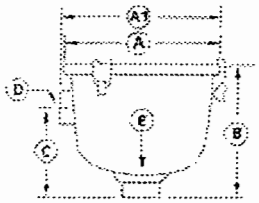
PRESSURE – VACUUM GAUGE

Pressure/Vacuum Gauges				
AJ496	2.50" Dia.	Pressure	1/4" NPT	0-60 in. H_2O and 0-150 mbar
AE133	2.50" Dia.	Pressure	1/4" NPT	0-160 in. H_2O and 0-400 mbar
AE133A	2.50" Dia.	Pressure	1/4" NPT	0-200 in. H_2O
AE133F	3.50" Dia.	Pressure	1/4" NPT	0-15 PSI
AJ497	2.50" Dia.	Vacuum	1/4" NPT	0-60 in. H_2O and 0-150 mbar
AE134	2.50" Dia.	Vacuum	1/4" NPT	0-160 in. H_2O and 0-400 mbar
AE134F	3.50" Dia.	Vacuum	1/4" NPT	0-15 in. HG



PRESSURE – VACUUM RELIEF VALVE

Pressure/Vacuum Relief Valves		
AG258	1.50" NPT	Adjustable 30-200 in. H_2O; 200 cfm max
AJ121D		Silencer for AG258 Relief Valve
AG258F	2.50" NPT	Adjustable 25-200 in. H_2O; 560 cfm max
AJ121G		Silencer for AG258F Relief Valve



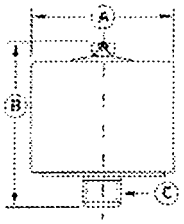
INLINE FILTERS (FOR VACUUM)

The impeller of a blower passes very closely to the housing. It is recommended to have an inlet or in-line filter to ensure a trouble-free service life.

MPT = Male Pipe Thread
FPT = Female Pipe Thread

Model Number	R1	R2	R3	R4	SDR4, R4P, R4H, R5	SDR5, SDR6, R6, R6P, R7H, R7M	R6PP, SDR6P, R6PS, R7, R7S	R7S, R9, R9P, R9S
Part Number	**AJ151A**	**AJ151B**	**AJ151C**	**AJ151D**	**AJ151E**	**AJ151G**	**AJ151H**	**AJ151M**
Dimension (A)	5.88"	7.38"	7.38"	7.38	8.75	8.75"	14.00"	18.50"
Dimension (A1)	–	–	–	–	–	–	16.25"	20.75"
Dimension (B)	4.50"	6.81"	6.81"	6.81"	10.25"	10.50"	27.13"	28.13"
Dimension (C)	2.75"	4.62"	4.62"	4.62"	5.00"	5.50"	18.50"	19.50"
Dimension (D)	1.00" FPT	1.00" FPT	1.25" FPT	1.50" FPT	2.00" FPT	2.50" FPT	3"MPT	5" MPT
Dimension (E)	1.00" FPT	1.00" FPT	1.25" FPT	1.50" FPT	2.00" FPT	2.50" FPT	3"MPT	5" MPT
Replacement Element	AJ135D	AJ135E	AJ135E	AJ135E	AJ135F	AJ135G	AJ135C	AJ135H
Micron	10	10	10	10	10	10	10	10

RECOMMENDED ACCESSORIES

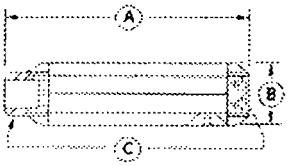


INLET FILTERS (FOR PRESSURE)

All filters are heavy duty for high-particulate service. Inlet filters for Regenair blowers are drip-proof when mounted as shown..

MPT = Male Pipe Thread
FPT = Female Pipe Thread

Model Number	R1, R2	R3	R4, R4H, R4P SDR4, R5	SDR5, R6, SDR6, R5P, R6PP, R6PS	SDR6P, R7, R7H, R7P, R7S	R9, R9P, R9S
Part Number	AJ126B	AJ126C	AJ126D	AJ126F	AJ126G	AJ126M
Dimension (A)	6.00"	6.00"	7.70"	10.62"	10.00"	16.00"
Dimension (B)	4.62"	7.12"	7.12"	4.81"	13.12"	14.62"
Dimension (C)	1.00" MPT	1.25" MPT	1.50" MPT	2.00" FPT	2.50" MPT	5" MPT
Replacement Element	AJ134B	AJ134C	AJ134E	AG340	AJ135A	AJ135H
Micron	10	10	10	10	10	10



MUFFLERS

Designed to reduce noise by up to 5 dbA and remove high-frequency sound associated with all blowers.

Model Number	R1, R2	R3	R4, SDR4, R4P, R5	R4H, R6, R6P, R6PS SDR6P, SDR6	R7, R7S R7H	R6PP, R9 Exhaust	R7P Exhaust	R9P Exhaust	R7 Exhaust
Part Number	AJ121B	AJ121C	AJ121D	AJ121F	AJ121G	AJ121H	AJ121M	AJ121N	AJ121GE
Dimension (A)	7.46"	7.94"	12.75"	17.05"	17.44"	20.30"	33.60"	39.00"	17.63"
Dimension (B)	2.38"	2.62"	3.25"	3.63"	4.25"	4.75"	6.00"	7.00"	4.28
Dimension (C)	1.00" NPT	1.25" NPT	1.50" NPT	2.00" NPT	2.50" NPT	3" NPT	4"NPT	5"NPT	2.50" NPT

PARTS & ORDERING INFORMATION

Please reference the exploded view on Page 11 for the following model and parts table.

REF#	ITEM	QTY	R1102 R1102C R1102K	R1S103	R2103 R2303A	R2105	R2305B	R3105-1 R3305A-1 R3305B-1
1	COVER	1	AJ101A	AJ101AS	AJ101B	AJ101B	AJ101B	AJ101C
2	LOCK NUT	1	BC187	BC187	BC187	BC181	BC181	BC181
3	IMPELLER	1	AJ102A	AJ102A	AJ102BQ	AJ102B	AJ102B	AJ102C
4	SQUARE KEY	1	AH212C	AH212C	AH212	AB136A	AB136A	AB136A
5	SHIM SPACER	Δ	AE686-5	–	AE686-3	AJ109	AE686-3	AJ109
6	RETAINING RING	1	AJ145	–	AJ145	AJ149	AJ145	AJ149
7	HOUSING	1	AJ103A	AJ103AS	AJ103BQ	AJ103B	AJ103B	AJ103C
8	–	–	–	–	–	–	–	–
9	–	–	–	–	–	–	–	–
10A	FOAM	Δ	AJ112A(4)	–	AJ112BQ(6)	AJ112BQ(6)	AJ112BQ(6)	AJ112C(4)
10B	FOAM	2	–	–	–	–	–	AJ112CQ
11	MUFFLER EXTENSION	1	AJ106A	–	AJ106BQ	AJ106BQ	AJ106BQ	AJ106CQ

Δ As required.
Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

PARTS & ORDERING INFORMATION

Please reference the exploded view on the next page for the following model and parts tables.

REF#	ITEM	QTY	R3105-12 R3305A-13	R4110-2 R4310A-2 R4310B-1	R4P115 R4P315A†	R5125-2 R5325A-2 R5325B-1	R6125-2 R6150J-2 R6325A-2 R6335A-2 R6335B R6350A-2 R6350B-2	R6P335A R6P350A R6P350B	R6135J-10
1	COVER	1	AJ101C	AJ101D	AJ101L	AJ101EQ	AJ101FB	AJ101K	AJ101FB
2	LOCK NUT	1	BC181	BC181	BC181	AJ259	AJ259	AJ259	AJ259
3	IMPELLER	1	AJ102CA	AJ102D	AJ102L	AJ102E	AJ102FR	AJ102K	AJ102FR
4	SQUARE KEY	1	AB136A	AB136D	AB136D	AB136	AB136	AB136	AB136
5	SHIM SPACER	Δ	AJ109	AJ109	AJ109	AJ109	AJ109	AJ109	AJ260A
5†	SHIM SPACER†	1	–	–	AJ109A†	–	–	–	–
6	RETAINING RING	1	AJ149	AJ149	AJ149	–	–	–	–
7	HOUSING	1	AJ103C	AJ103DR	AJ103L	AJ103EQ	AJ103FQ	AJ103K	AJ103FQ
8	MUFFLER BOX	1	–	–	–	–	–	AJ104K	–
9	SPRING	2	–	AJ113DR	AJ113DQ	AJ113DQ	AJ113FQ	AJ113FQ	AJ113FQ
9A	SCREEN	2	–	–	AJ123EQ	AJ123EQ	AJ123FB	–	AJ123FB
10A	FOAM	Δ	AJ112C(4)	AJ112DS(4)	AJ112ER(6)	AJ112ER(6)	AJ112FC(6)	AJ112K(8)	AJ112FC(6)
10B	FOAM	2	AJ112CQ	AJ112DR	–	–	–	–	–
11	MUFFLER EXTENSION	1	AJ106CQ	AJ106DQ	AJ106EQ	AJ106EQ	AJ106FR	–	AJ106FR

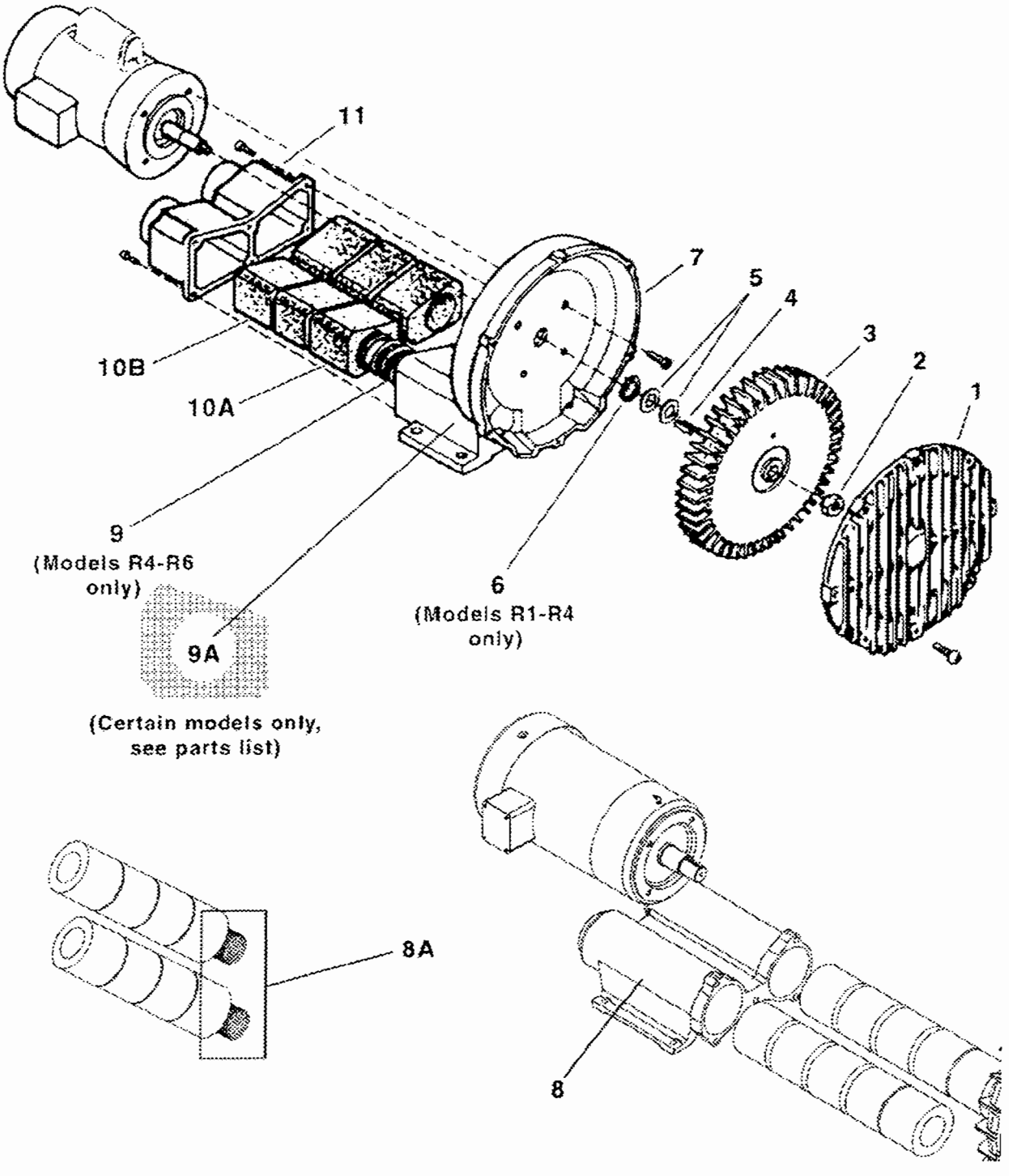
REF#	ITEM	QTY	R6P355A R6P350A R6P350B	R6PP3110M*	R6PS3110M*	R7100A-3	R7100B-1
1	COVER	1	AJ101K	AJ101KA(2)	AJ101KA(2)	AJ101G	AJ101G
2	LOCK NUT/BOLT	1	AJ259	BB750(2)	BB750(2)	BB750	BB750
3	IMPELLER	1	AJ102K	AJ102KA(2)	AJ102KA(2)	AJ102GZ	AJ102GA
4	SQUARE KEY	1	AB136	AB136(2)	AB136(2)	AC628	AC628
5	SHIM SPACER	Δ	AJ109	AJ169F	AJ169F	AJ110	AJ110
6	RETAINING RING	1	–	–	–	–	–
7	HOUSING	1	AJ103K	AJ103KD(2)	AJ103KD(2)	AJ103GA	AJ103GA
8	MUFFLER BOX	1	AJ104K	–	–	AJ104GA	AJ104GA
8A	SCREEN	2	–	–	–	AJ998G	AJ998G
9	SPRING	2	AJ113FQ	–	–	–	–
10A	FOAM	Δ	AJ112K(8)	–	–	AJ112GA(8)	AJ112GA(8)
10B	FOAM	2	–	–	–	–	–
11	MUFFLER EXTENSION	1	–	–	–	–	–
12 **	O-RING	2	–	AJ175	–	–	–
13	GASKET	4	–	AJ107F	AJ107F	–	–

REF#	ITEM	QTY	R7P3180M*	R7S3180M*	R9P3300M*	R9S3300M*	R93150A
1	COVER	1	AJ101G(2)	AJ101G(2)	AJ100M(2)	AJ100M(2)	AJ101M
2	LOCK NUT/BOLT	1	BB750(2)	BB750(2)	BB707(2)	BB707(2)	BB707
3	IMPELLER	1	AJ102GZ(2)	AJ102GZ(2)	AJ102M(2)	AJ102M(2)	AJ102M
4	SQUARE KEY	1	AC628(2)	AC628(2)	AE130A(2)	AE130A(2)	AE130A
5	SHIM SPACER	Δ	AJ110	AJ110	BJ110	BJ110	BJ110A
6	RETAINING RING	1	–	–	–	–	–
7	HOUSING	1	AJ103GA(2)	AJ103GA(2)	AJ103M(2)	AJ103M(2)	AJ103M
8	MUFFLER BOX	1	–	–	–	–	AJ104MP
8A	SCREEN	2	–	–	–	–	AJ998M
9	SPRING	2	–	–	–	–	–
10A	FOAM	Δ	–	–	–	–	AJ112M(10)
10B	FOAM	2	–	–	–	–	–
11	MUFFLER EXTENSION	1	–	–	–	–	–
12 **	O-RING	2	AJ175G	–	AJ175G	–	–

† R4P315A only.
* Dual models.
** Not shown.
Δ As required.

Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

EXPLODED PRODUCT VIEW



TROUBLESHOOTING CHART

Problem	Reason	Remedy
Increased sound.	Noise absorbing foam is damaged. Impeller rubbing inside.	Replace foam. Send unit to a Gast Authorized Service Facility.
Excessive vibration.	Damaged impeller. Motor and/or impeller are dirty.	Replace impeller. Clean motor and impeller periodically.
Ambient and exhaust temperature increases.	Motor and/or blower are dirty. Filters dirty.	Clean motor and blower periodically. Replace filters.
Decreased inlet air pressure	Inlet air filter is clogged.	Clean inlet filter. Replace cartridge.
Unit is very hot.	Wrong wiring. Low voltage. Inlet air filter is clogged. Motor and/or blower are dirty. Operating at too high a pressure or vacuum.	Check wiring. Supply proper voltage. Clean inlet filter. Replace cartridge. Clean motor and blower periodically. Install a relief valve and pressure or vacuum gauge.
Unusual sound.	Impeller is damaged or dirty. Bearing going bad.	Clean or replace impeller. Send unit to a Gast Authorized Service Facility.
Motor overload	Low voltage.	Check power source. Check wire size and wire connections.
Unit does not start.	Incorrect electrical connection or power source. Impeller is damaged.	Check wiring diagram, circuit fusing and circuit capacity. Clean or replace impeller. Install proper filtration.

AUTHORIZED SERVICE FACILITIES

Gast Manufacturing Inc.
2550 Meadowbrook Road
Benton Harbor, MI 49022
TEL: 269-926-6171
FAX: 269-927-0808
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FAX: 201-933-5545

Brenner Fiedler & Assoc.
13824 Bentley Place
Cerritos, CA 90701
TEL: 800-843-5558
TEL: 310-404-2721
FAX: 310-404-7975

Gast Manufacturing Co., Ltd
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Business Centre, Loudwater
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Wainbee Limited
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Pointe Claire, Quebec
Canada H9R 4R7
TEL: 514-697-8810
FAX: 514-697-3070

Wainbee Limited
5789 Coopers Avenue
Mississauga, Ontario
Canada L4Z 3S6
TEL: 905-568-1700
FAX: 905-568-0083

Japan Machinery Co., Ltd.
Central PO Box 1451
Tokyo, 100-91 Japan
TEL: 81-3-3573-5421
FAX: 81-3-3571-7865
or: 81-3-3571-7896

General Correspondence
should be sent to:
Gast Mfg. Inc./A Unit of IDEX Corporation
P O Box 97
Benton Harbor, MI 49023-0097

GAST
A Unit of IDEX Corporation

ISO 9001 & 14001 CERTIFIED

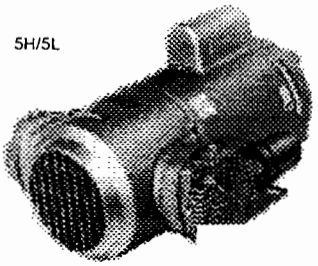
www.gastmfg.com

Pumphouse 2

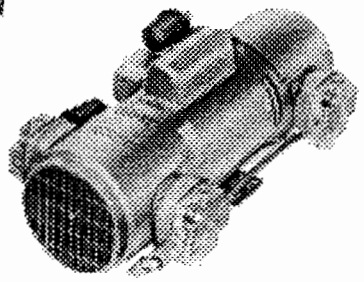
Oilless Piston, Motor Mounted to 10.5 cfm 5H, 5L, 5V Series

5HCE-10-M55IX

5H/5L



5VDF/5VSF



Performance at 60Hz unless otherwise noted

MODEL/SERIES	MAXIMUM PRESSURE (PSI)	MAXIMUM VACUUM (IN. HG)	MAXIMUM OPEN FLOW (CFM)
5H	100	-	4.7
5L	50	-	5.4
5VDF	-	27.5	10.5
5VSF	-	28.5	6.25

PRODUCT FEATURES

- Oilless operation
- Motor mounted
- Rugged construction / low maintenance

INCLUDES

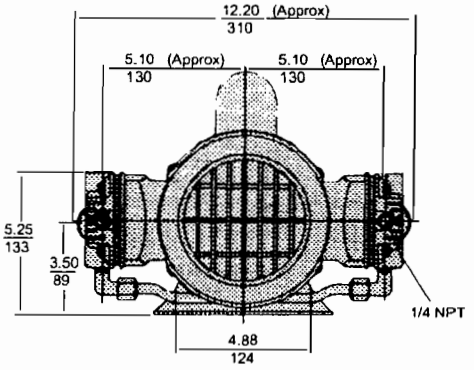
- Muffler/filters B300A (5H), B300F (5L, 5V models)
- Safety valve AT517B (5H), AT517F (5L)

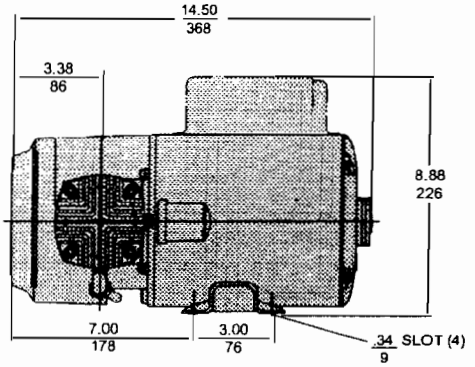
RECOMMENDED ACCESSORIES

- Pressure gauge AF583
- Vacuum gauge AA640
- Vacuum relief valve AA840A
- Repair kit K263 (5H, 5L)
- Repair kit K303 (5VDF, 5VSF)

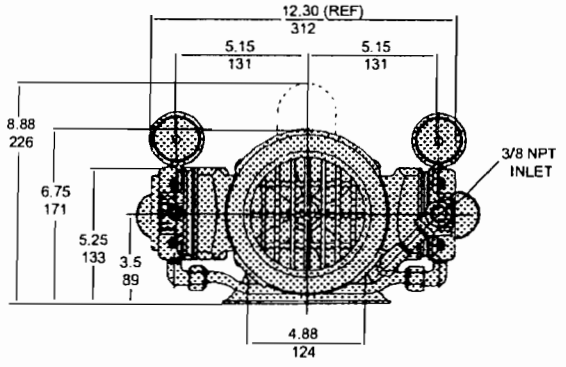
PRODUCT DIMENSIONS (mm) (inches)

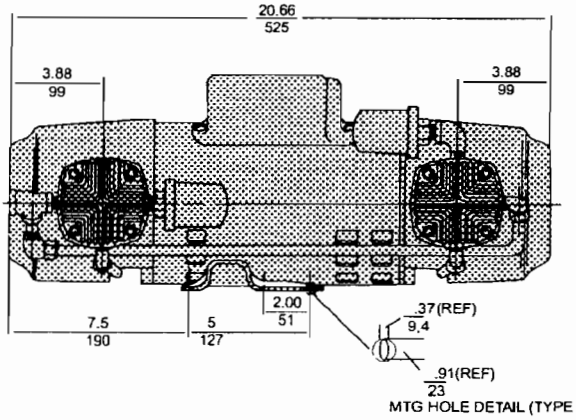
5H/5L





5VDF/5VSF





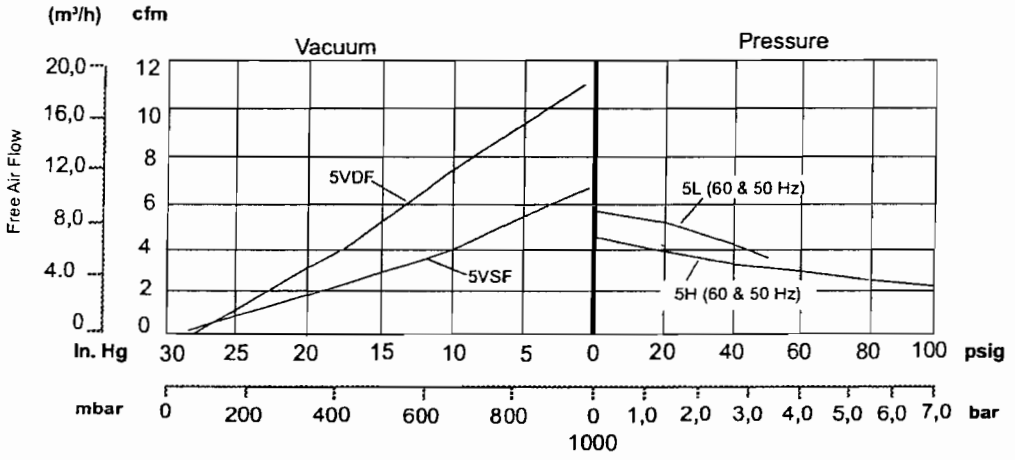
MTG HOLE DETAIL (TYPE .6)

PRODUCT SPECIFICATIONS

Note: 5H, 5L models are pressure, 5V models are vacuum

Model Number	Motor	RPM 60 Hz	RPM 50 Hz	HP	kW	Net. Wt. lbs.	Net. Wt. kg
5HCD-10-M550X	115/230-60-1	1725	1425	3/4	0,56	39	17,7
5HCD-10-M553	200-230/460; 220-240/380-415-60/50-3	1725	1425	3/4	0,56	39	17,7
5HCE-10-M551X	115/208-230;100-110/ 220-240-60/50-1	1725	1425	3/4	0,56	39	17,7
5LCA-10-M550X	115/230-60-1	1725	1425	3/4	0,56	39	17,7
5LCF-10-M551X	115/208-230;100-110/ 220-240-60/50-1	1725	1425	3/4	0,56	39	17,7
5VSF-10-M750X	115/208-230-60-1	1725	-	1 1/2	1,1	53	24,1
5VDF-10-M750X	115/208-230-60-1	1725	-	1 1/2	1,1	53	24,1

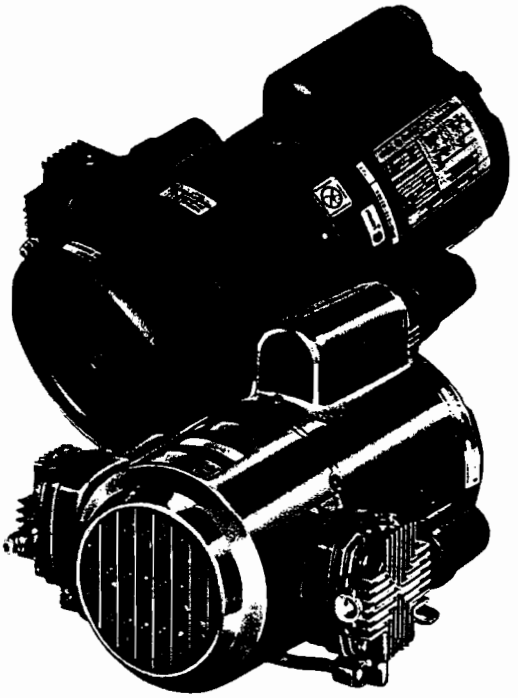
PRODUCT PERFORMANCE **(Metric, U.S.)**



Oilless Piston, Motor Mounted to 4.7 cfm

GAST

5H Series



MODEL 5H SERIES
100 PSI MAX. PRESSURE, 4.7 CFM OPEN FLOW

MODEL 5H, QUIET SERIES
SAME PERFORMANCE AS STANDARD LINE PLUS SPECIAL HEAD DESIGN AND SOUND SUPPRESSION COMPONENTS THAT REDUCE SOUND LEVEL BY 7 dBA @ 100 PSIG (MEASURED AT 1 METER)

PRODUCT FEATURES

- Oilless operation
- Motor mounted
- Rugged construction/low maintenance

INCLUDES

- Safety valve AF570S
- Filter/silencers B300A

COMMON MOTOR OPTIONS

- 115/230V, 60 Hz, single phase
- 230/460V, 60 Hz, three phase
- 110/220V, 50 Hz, single phase
- 220/240V, 50 Hz, single phase

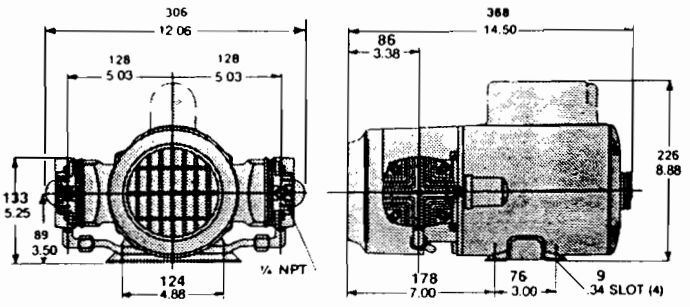
RECOMMENDED ACCESSORIES

- Pressure gauge AF583
- Repair kit K263

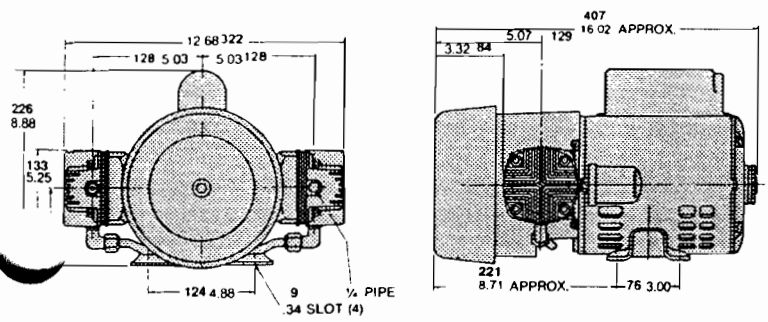
Important Notice:

Pictorial and dimensional data is subject to change without notice.

Product Dimensions Metric (mm) U.S. Imperial (inches)



Model 5HCD-10-M500X



Model 5HCD-Q10-M500X (QUIET SERIES)

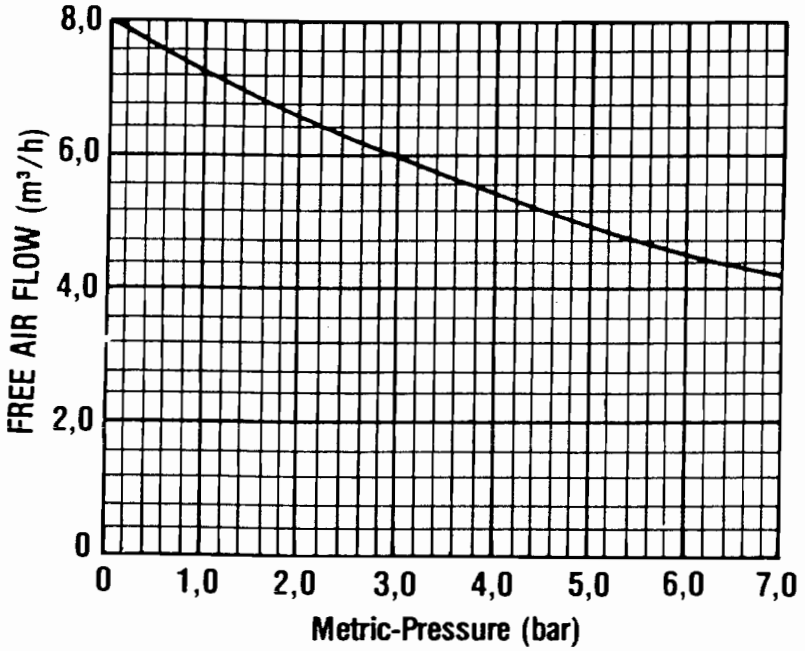
Product Specifications

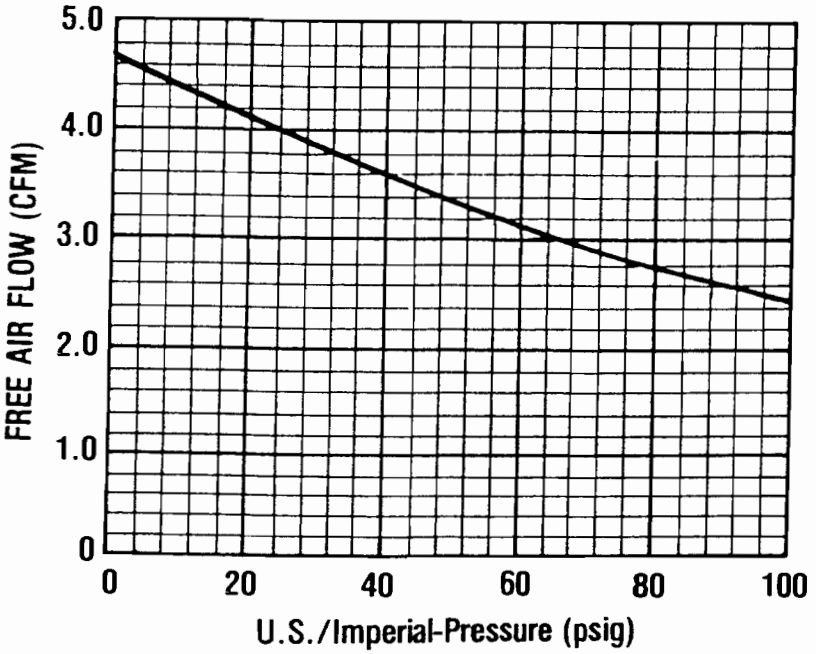
Model Number	Motor	RPM		HP	kW	Net Wt.	
		60 cycle	50 cycle			lbs.	kg
5HCD-10-M500X	115/230-60-1	1725	–	3/4	0,56	39	17,7
5HCD-10-M502	230/460-60-3	1725	–	3/4	0,56	39	17,7
5HCE-10-M501X	110/220-50-1	–	1425	3/4	0,56	39	17,7
*5HCE-10-P75Y	220/240-50-1	–	1425	3/4	0,56	39	17,7
•5HCD-Q10-M500X	115/230-60-1	175	–	3/4	0,56	42	19,1
•5HCE-Q10-M501X	110/220-50-1	–	1425	3/4	0,56	42	19,1

*Available only in Europe.
•Quiet Series

Product Performance (Metric U.S. Imperial)

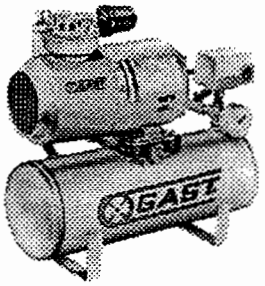
Black line on curve is for both 50 and 60 cycle performance.



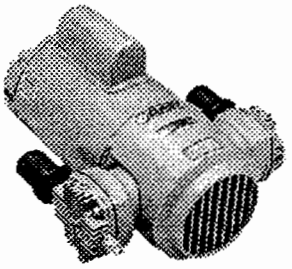


OIL-LESS PISTON VACUUM PUMPS & COMPRESSORS

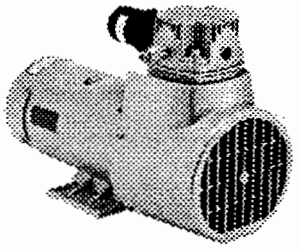
OPERATION & MAINTENANCE MANUAL



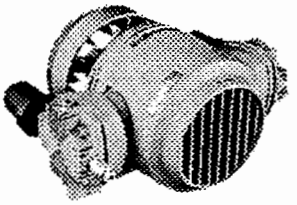
Model 1HAB Shown



Model 3HBB Shown



Model 3HEB Shown



Model PCD Shown

Thank you for purchasing this Gast product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational and safety instructions and you will receive years of trouble free service.

IMPORTANT: PLEASE READ THIS MANUAL AND SAVE FOR FUTURE REFERENCE.

Product Use Criteria:

- Pump only clean, dry air.
- Operate at 32°F - 104°F (0°C - 40°C).
- Protect unit from dirt & moisture.
- Do not pump flammable or explosive gases or use in an atmosphere that contains such gases.
- Protect all surrounding items from exhaust air. This exhaust air can become very hot.
- Corrosive gases and particulate material will damage unit. Water vapor, oil-based contaminants or other liquids must be filtered out.
- Consult your Gast Distributor/Representative before using at high altitudes.
- These pumps are oil-less and require NO lubrication. The Teflon-filled rings are self-lubricating and require no oil.
- The motor bearings are grease-packed for the lifetime of the bearings.

GAST
A Unit of IDEX Corporation

ISO 9001 & 14001 CERTIFIED

www.gastmfg.com

Your safety and the safety of others is extremely important.

We have provided many important safety messages in this manual and on your product. Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to hazards that can kill or hurt you and others. The safety alert symbol and the words "DANGER" and "WARNING" will precede all safety messages. These words mean:

DANGER

You will be killed or seriously injured if you don't follow instructions.

WARNING

You can be killed or seriously injured if you don't follow instructions.

All safety messages will identify the hazard, tell you how to reduce the chance of injury, and tell you what can happen if the safety instructions are not followed.

INSTALLATION

WARNING

Electrical Shock Hazard

Disconnect electrical power at the circuit breaker or fuse box before installing this product.

Install this product where it will not come into contact with water or other liquids.

Install this product where it will be weather protected.

Electrically ground this product.

Failure to follow these instructions can result in death, fire or electrical shock.

Correct installation is your responsibility. Make sure you have the proper installation conditions and that installation clearances do not block air flow.

Lift the unit by the motor shell, motor foot or flywheel (depending upon model design). Do Not lift unit by shroud, filters or mufflers. These parts are not designed to support the weight of the unit.

Blocking air flow over the product in any way can cause the product to overheat.

Install safety guards as required to prevent potential injury hazards or damage to surrounding objects.

Mounting
This product can be installed in any orientation. Mounting the product to a stable, rigid operation surface and using shock mounts will reduce noise and vibration.

Plumbing
Remove plugs from the IN and OUT ports. Connect with pipe and fittings that are the same size or larger than the product's threaded ports. Be sure to connect the intake and exhaust plumbing to the correct inlet and outlet ports. Ports will not support plumbing.

Accessories
If unit will be used in a system where it will be required to start against any system of back pressure, a positive sealing, one-way check valve should be installed in the air line between system and unit. This check valve is included with all tank mounted compressor units.

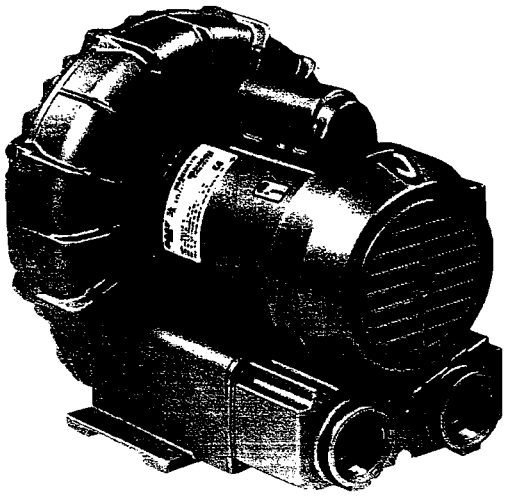
The product's intake and exhaust filters will provide adequate filtration in most applications. Check filters periodically and replace when necessary. Please consult your Gast Distributor/Representative for additional filter recommendations.

Install relief valves and gauges at inlet or outlet, or both, to monitor performance. Check valves may be required to prevent back streaming through the unit.

Motor Control
It is your responsibility to contact a qualified electrician and assure that the electrical installation is adequate and in conformance with all national and local codes and ordinances. Grounding is required.

Determine the correct overload setting required to protect the motor (see motor starter manufacturer's recommendations). Select fuses, motor protective switches or thermal protective switches to provide protection. Fuses act as short circuit protection for the motor, not as protection against overload. Incoming line fuses must be able to withstand the motor's starting current. Motor starters with thermal magnetic overload or circuit breakers protect motor from overload or reduced voltage conditions.

The wiring diagram supplied with the product provides required electrical information. Check that power source is correct to properly operate the dual-voltage motors.



R4 SERIES
MODELS R4110-2, R4310A-2, R4310B-1

MAX. PRESSURE – 52"$H_2$0 (60 Hz), 38"$H_2$0 (50 Hz)
MAX. VACUUM – 48"$H_2$0 (60 Hz), 35"$H_2$0 (50 Hz)
MAX. AIR FLOW – 92 CFM (60 Hz), 75 CFM (50 Hz)

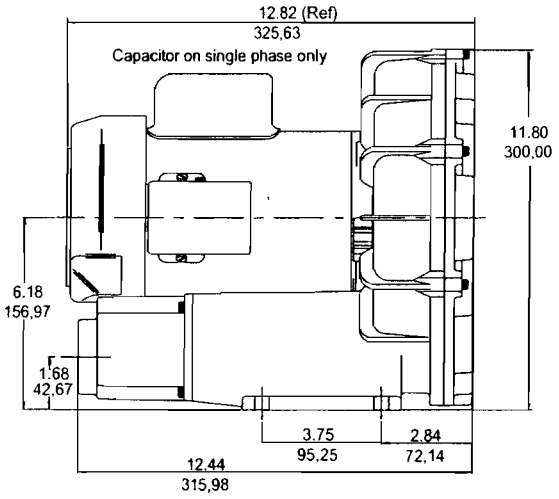
PRODUCT FEATURES

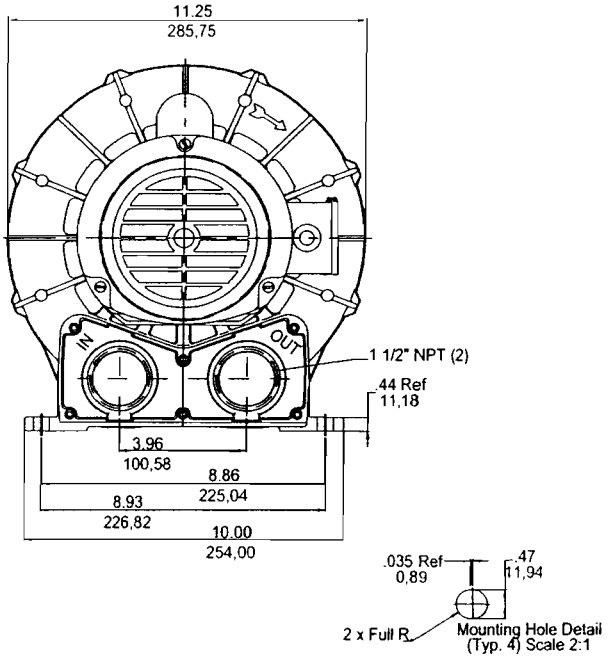
- Rugged construction, low maintenance
- Oilless operation
- UL and CSA approved TEFC motors with permanently sealed ball bearings
- Automatic restart thermal protection on single phase motors
- Aluminum blower housing, impeller and cover
- Can be operated with no air flow through unit
- Can be mounted in any plane
- Inlet and outlet have internal muffling

RECOMMENDED ACCESSORIES

- Pressure gauge AJ496
- Inlet filter AJ126D (pressure)
- Vacuum gauge AJ497
- Inline filter AJ151D (vacuum)
- Muffler AJ121D
- Relief valve AG258
- Liquid separator RMS160 (vacuum)

Product Dimensions (in. mm)



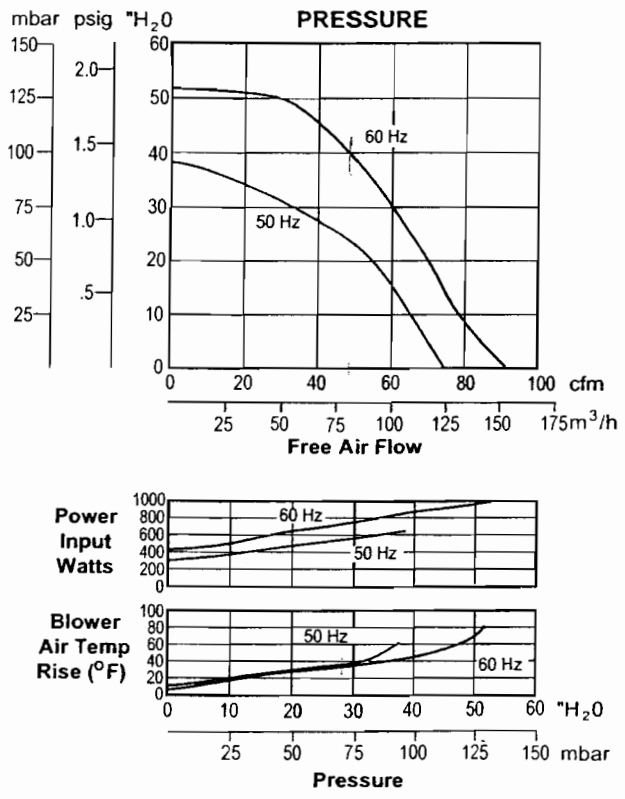


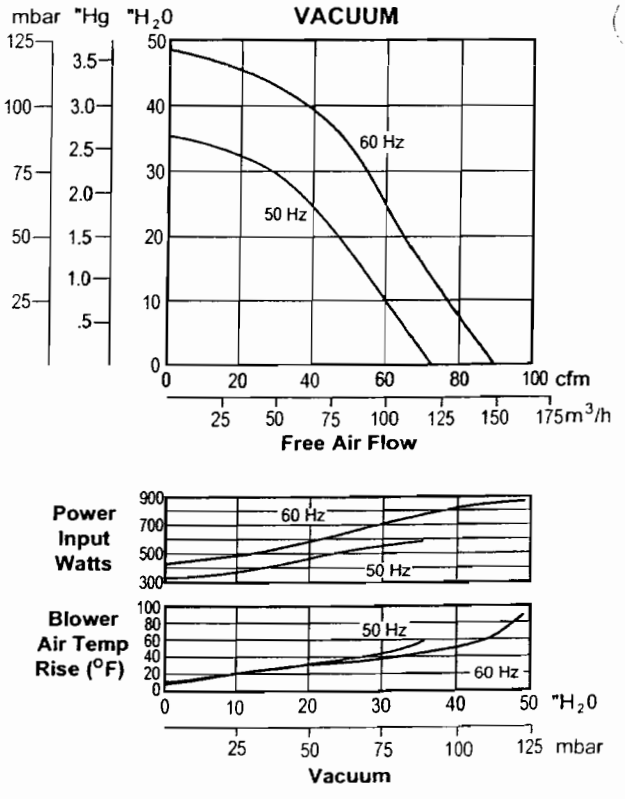
Gast Manufacturing Inc., A Unit of IDEX Corporation, Benton Harbor, MI USA • ph 616-926-6171 • fx 616-925-8288 • www.gastmfg.com

Product Specifications

MODEL NUMBER		R4110-2	R4310A-2	R4310B-1
Motor Enclosure		TEFC	TEFC	TEFC
HP/kW ✓	60 Hz	1.0/0,75	1.0/0,75	1.0/0,75
	50 Hz	.6/0,45	.6/0,45	-
Voltage ✓	60 Hz	115/208-230-1	208-230/460-3	575-3
	50 Hz	110/220-240-1	190-220/380-415-3	-
Amps ✓	60 Hz	9.8/5.2-4.9	3.4-3.2/1.6	1.25
	50 Hz	9.0/4.5-5.7	2.6-3.3/1.3-1.4	-
Starting Amps ✓	60 Hz	31.2 @ 230V	26.5 @ 230V	7.6
	50 Hz	34 @ 220V	28.4 @ 220V	-
Insulation Class		B	B	B
Recommended NEMA Starter Size		0/00	00/00	00
Net Weight (lbs/kg)		41/18,6	41/18,6	41/18,6

Product Performance





Electrical Connection

WARNING

Electrical Shock Hazard

This product must be properly grounded.

Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.

If repair or replacement of the cord or plug is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation that is green or green with yellow stripes is the grounding wire.

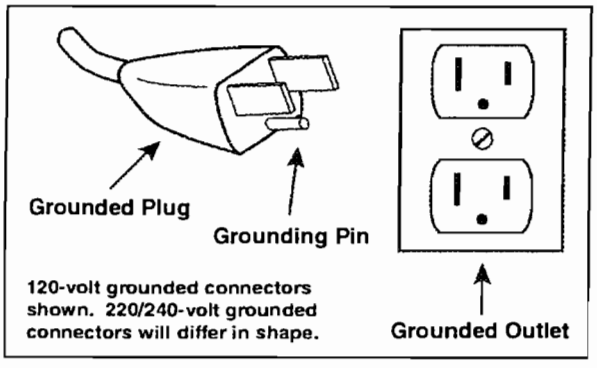
Check the condition of the power supply wiring. Do not permanently connect this product to wiring that is not in good condition or is inadequate for the requirements of this product.

Failure to follow these instructions can result in death, fire or electrical shock.

Model with a power supply cord:
This product must be grounded. For either 120-volt or 220/240-volt circuits connect power supply cord grounding plug to a matching grounded outlet. Do not use an adapter. (See diagram.)

In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product may be equipped with a power supply cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if you are not sure whether the product is properly grounded. Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.



120-volt grounded connectors shown. 220/240-volt grounded connectors will differ in shape.

Model that is permanently wired:
This product must be connected to a grounded, metallic, permanent wiring system, or an equipment grounding terminal or lead on the product.

Power supply wiring must conform to all required safety codes and be installed by a qualified person. Check that supply voltage agrees with that listed on product nameplate.

Extension cords:
Use only a 3-wire extension cord that has a 3-blade grounding plug. Connect extension cord plug to a matching 3-slot receptacle. Do not use an adapter. Make sure your extension cord is in good condition. Check that the gage wire of the extension cord is the correct size wire to carry the current this product will draw.

An undersized cord is a potential fire hazard, and will cause a drop in line voltage resulting in loss of power causing the product to overheat. The following table indicates the correct size cord for length required and the ampere rating listed on the product nameplate. **If in doubt, use the next heavier gage cord. The smaller the gage number, the heavier the wire gage.**

Minimum gage for extension cords

Amps	Volts	Length of cord in feet								
	120v	25	50	100	150	200	250	300	400	500
	240v	50	100	200	300	400	500	600	800	1000
0-2		18	18	18	16	16	14	14	12	12
2-3		18	18	16	14	14	12	12	10	10
3-4		18	18	16	14	12	12	10	10	8
4-5		18	18	14	12	12	10	10	8	8
5-6		18	16	14	12	10	10	8	8	8
6-8		18	16	12	10	10	8	6	6	6
8-10		18	14	12	10	8	8	6	6	4
10-12		16	14	10	8	8	6	6	4	4
12-14		16	12	10	8	6	6	6	4	2
14-16		16	12	10	8	6	6	4	4	2
16-18		14	12	8	8	6	4	4	2	2
18-20		14	12	8	6	6	4	4	2	2

OPERATION

WARNING

Injury Hazard

Install proper safety guards as needed.

Keep fingers and objects away from openings and rotating parts.

When provided, motor terminal covers must be in place for safe operation.

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Wear hearing protection. Sound level from motor may exceed 70 dBA.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to operate this product at recommended pressures or vacuum duties and room ambient temperatures. Do not start against a vacuum or pressure load. Do not remove relief valve head while unit is operating.

Start Up
If motor fail to start or slows down significantly under load, shut off and disconnect from power supply. Check that voltage is correct for motor and that motor is turning in the proper direction. If the motor is turning in the wrong direction, it will overheat.

MAINTENANCE

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical power supply cord before performing maintenance on this product.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on this product.

Failure to follow these instructions can result in death, fire or electrical shock.

⚠ WARNING

Injury Hazard

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to:
- **Regularly inspect and make necessary repairs to product in order to maintain proper operation.**
- **Make sure that pressure and vacuum is released from product before starting maintenance.**

If unit is operated at maximum duties in a fairly clean, 65°F - 75°F (18°C - 24°C) ambient environment with 35% relative humidity, complete first inspection and maintenance after 4000 hours of operation. Earlier maintenance may be required depending upon the environment.

Check intake and exhaust filters after first 500 hours of operation. Clean filters and determine how frequently filters should be checked during future operation. This one procedure will help assure the product's performance and service life.

Check the thickness of the rider ring. It should measure greater than .055". Change all rings if thickness measures .055" or less.

1. Disconnect electrical power supply to unit.
2. Vent all air lines.
3. Remove filter cover.
4. Check filter felt. Replace felt if it is covered with contamination or shows signs of increasing differential pressure.
5. Reinstall felt and filter cover.

Check that all external accessories such as relief valves and gauges are attached and are not damaged before re-operating product.

Pressure or Vacuum Tank Systems
Check the air filter cartridge. A dirty filter restricts air flow and causes unit to run hotter resulting in longer operating cycles.

Check the air receiver for moisture regularly. The humidity in the environment will determine how quickly moisture will accumulate and need to be drained.

Clean the pump and motor regularly. Dirt and film buildup on the outer shell affects the unit's ability to dissipate heat.

SHUTDOWN PROCEDURES

It is your responsibility to follow proper shutdown procedures to prevent product damage.
NEVER ADD OIL TO THIS OIL-LESS PUMP.

Proper shutdown procedures must be followed to prevent pump damage. Failure to do so may result in premature pump failure. Gast Manufacturing Oil-Less Piston Vacuum Pumps and Compressors are constructed of ferrous metals or aluminum which are subject to rust and corrosion when pumping condensable vapors such as water. Follow the steps below to assure correct storage and shutdown between operating periods.

1. Disconnect plumbing.
2. Operate product for at least 5 minutes without plumbing.
3. Run at maximum vacuum for 10 - 15 minutes.
4. Repeat step 2.
5. Disconnect power supply.
6. Plug open ports to prevent dirt or other contaminants from entering product.

SERVICE KIT INSTALLATION

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical power supply cord before installing Service Kit.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before installing Service Kit.

Vent all air lines to release pressure or vacuum.

Failure to follow these instructions can result in death, fire or electrical shock.

Gast will NOT guarantee field-rebuilt product performance. For performance guarantee, the product must be returned to a Gast Authorized Service Facility.

Service Kit contents vary. Most contain head and cylinder gaskets, valves, piston rings and seals, rider rings and felt filters.

1. Disconnect electrical power to pump.
2. Disconnect air supply and vent all air lines to release pressure or vacuum.
3. Remove shroud, cylinder head and valve components.
4. Remove cylinder and rings.
5. Clean all parts with water or non-petroleum based solvent such as Gast AH255B Solvent. Do Not use kerosene or ANY other combustible solvents.
6. Install piston seals, piston rings and rider rings on piston. Locate ring joints approximately opposite each other.
7. Use cylinder screws with washers to attach cylinder to bracket. Tighten screws only until they are finger tight.
8. Move pistons to top dead center position. Adjust each cylinder flush with top of piston.
9. Torque cylinder screws to 150-160 in. lbs.
10. Replace valve components in original order.
11. Install cylinder head and head screws. The exhaust ports have been marked on the cylinder heads by omitting the ends of two of the fins. Do not tighten screws at this time.
12. Install manifold nuts and seals on manifold. Insert into cylinder head and manifold.
13. Torque head screws to 150-160 in. lbs.
14. Turn fan by hand to check that rod assembly is not hitting head. If rod hits head, loosen cylinders and adjust.
15. Install manifold and tighten manifold nut one-quarter to one-half turn beyond finger tight.
16. Operate unit for 10 minutes. Tighten screws again.
17. Install fan shroud.

Check that all external accessories such as relief valves and gauges are attached to cover and are not damaged before re-operating product.

If pump still does not produce proper vacuum or pressure, send unit to a Gast Authorized Service Facility for repair.

SPECIFIC PROBLEMS AND REMEDIES

Unit stalls after vacuum or pressure starts building up in receiver:

1. Disconnect electrical power supply from unit.
2. Check that voltage from power source matches that listed on nameplate.
3. Check wiring connections against diagram on nameplate. Single voltage motors will operate only at designated voltage.

Motor will not start:

1. Disconnect electrical power supply from unit.
2. Check that voltage from power source matches that listed on nameplate.
3. Check wiring connections against diagram on nameplate. Single voltage motors will operate only at designated voltage.
4. Reconnect electrical supply to unit. Check that power is on. If extension cord is used, check that it is the correct size and length to adequately supply power to the unit.
5. If unit will still not operate, contact your Gast Distributor/Representative or a Gast Authorized Service Facility.

Motor starts at 0 PSI but will not start under pressure:

1. Replace the check valve.
2. Wait for the thermal overload switch to reset before attempting to operate.
3. If unit will not restart, the thermal overload switch may need to be replaced. If there isn't a thermal overload switch, the motor may be damaged and requires service.

Motor starts intermittently:

1. Disconnect electrical power supply from unit.
2. Check points in the pressure or vacuum switch for wear or dirt.
3. Check for dirt buildup or uneven wear.
4. Replace parts as required.

Unit cycles On-Off more often than when first installed:

1. Check air receiver and drain water that has accumulated.

Unit or motor is running more often than when first installed:

1. Check system for air leaks. If new or different pneumatic equipment has been added, the air requirements may have changed.
2. Check and clean filters.
3. Check for buildup of foreign material on head.
4. Check valves and rings for wear and damage.

Air receiver loses pressure:

1. Check for system leaks through pipes, fittings and seals.
2. Inspect the check valve to see if it is allowing air pressure to leak back into unit.
3. Pressure pumps will have bubbles around head assembly during operation. Stop operating the pump for a few minutes and check for air leaks at pump.
4. Vacuum systems should have the check valve removed and inspected for dirt buildup. It may be necessary to need an AV460 filter installed prior to tank to eliminate contaminants.

A leak is located at the unit:

1. Vent all pressure from inside the air receiver until gauge reads 0 PSI.
2. Inspect check valve for dirt buildup, wear and proper operation.
3. Replace check valve if necessary.

PARTS & ORDERING INFORMATION

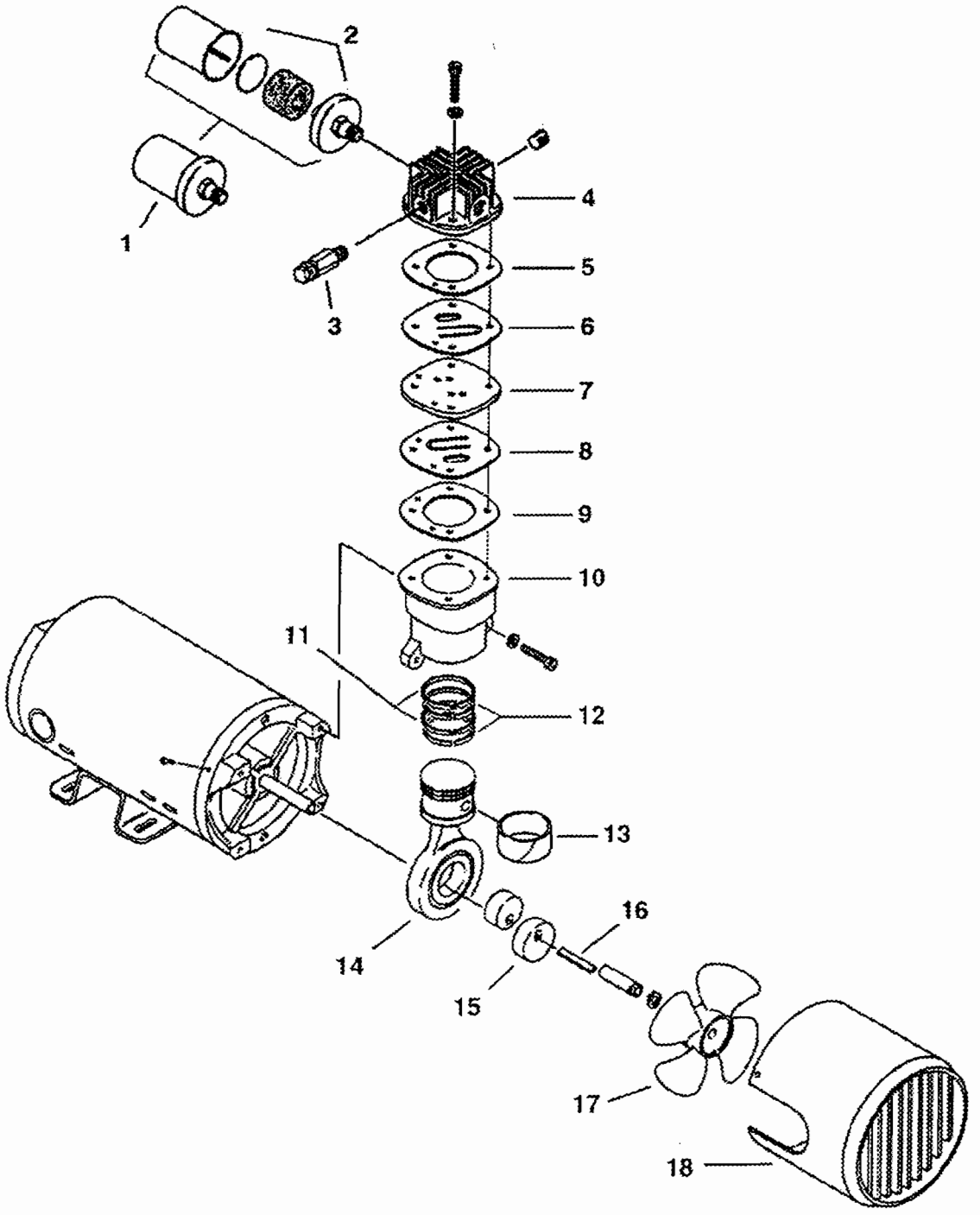
Please reference the exploded view on the opposite page for the following model and parts table.

1HAA / 1HAB SERIES

REF	DESCRIPTION	QTY	1HAA	1HAB	1HAE	1LAA	1VAF	2HAH	2LAF	3HEB	3HEE	3LEM
1	INLET FILTER ASSEMBLY	1	B300A	B300A	B300A	B300A	B300A	B300A	B300F	B300F	B300F	B300F
2 Δ	FELT	1	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A
3	SAFETY VALVE	1	AT517F	AT517	AT517	AT517D	–	AT517	AT517D	AT517	AT517	AT517D
4	CYLINDER HEAD	1	AF508	AF508	AF508	AF508	AF508	AF508	AF508	AH691	AH691	AH691
5 Δ	HEAD GASKET	1	AF518	AF518	AF518	AF518	AF518	AF518	AF518	AF520A	AF520A	AF520A
6 Δ	OUTLET VALVE	1	AF531	AF531	AF531	AF531	AF531	AF531	AF531	AF545	AF545	AF545
7	PLATE VALVE	1	AF529	AF529	AF529	AF529	AF529	AF529	AF529	AK779	AK779	AK779
8 Δ	INLET VALVE	1	AF530	AF530	AF530	AF530	AF530	AF530	AF530	AF544	AF544	AF544
9 Δ	CYLINDER GASKET	1	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF521	AF521	AF521
10	CYLINDER	1	AF510	AF510	AF510	AF510	AF510	AF510	AF510	AF509	AF509	AF509
11 Δ	PISTON RING	2	AF527	AF527	AF527	AF527	AF527	AF527	AF527	AF541	AF541	AF541
12 Δ	PISTON SEAL	2	AF526	AF526	AF526	AF526	AF526	AF526	AF526	AF540	AF540	AF540
13 Δ	RIDER RING	1	AF594	AF594	AF594	AF594	AF594	AF594	AF594	AF595	AF595	AF595
14	PISTON ROD ASSEMBLY	1	AF560A	AF560B	AF560E	AF560A	AF560F	AF560H	AF560F	AK893B	AK893E	AK893M
15	COUNTER WEIGHT	1	AF517A	AF517B	AF517E	AF517A	AF517D	AF517C	AF517D	AT780B	AK780E	AK780A
16	FLAT KEY	1	AF524	AF524	AF524	AF524	AF524	AF524	AF524	AB136	AB136	AB136
17	FAN	1	AF533	AF533	AF533	AF533	AF533	AF547	AF547	AF547	AF547	AF547
18	SHROUD	1	AF534	AF534	AF534	AF534	AF534	AF534	AF534	AT343	AT343	AT343
***	TANK ASSEMBLY	1	–	AF599-1	–	AK329-1	–	AF599-1	–	–	–	–
***	SERVICE KIT	1	K264	K264	K264	K264	K264	K264	K264	K577	K514A	K514A

Model 1HAB shown.
*** Item not shown.
Δ Denotes parts included in the Service Kit.
Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

EXPLODED PRODUCT VIEW – MODEL 1HAB



PARTS & ORDERING INFORMATION

Please reference the exploded view on the opposite page for the following model and parts tables.

1VBF – 3LBD SERIES

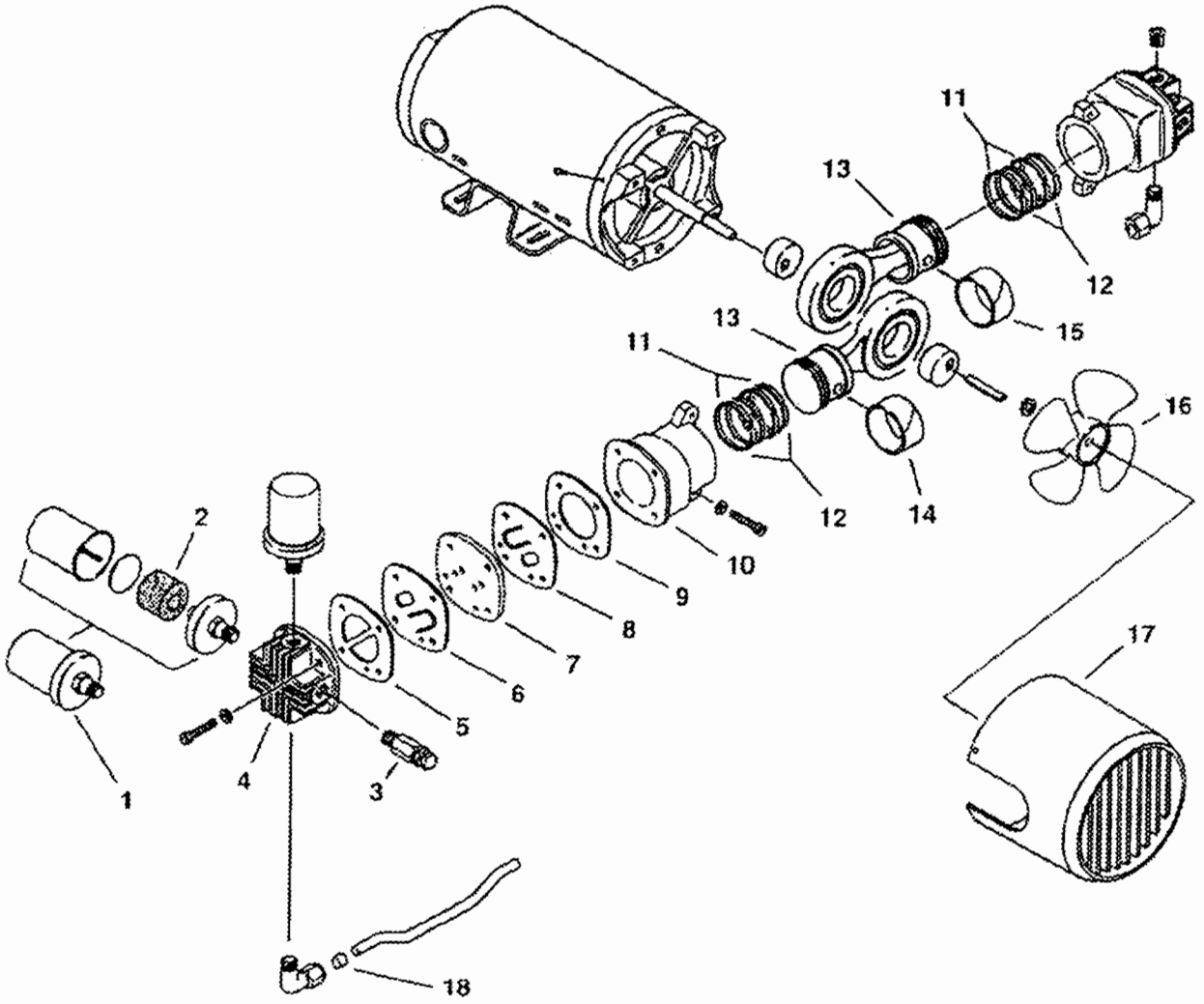
REF	DESCRIPTION	QTY	1VBF	1VSF	2LBB	2HBB	2HBC	3HBB	3HBE	3LBA	3LBD
1	INLET FILTER ASSEMBLY	1		B300A							
		2	B300A		B300A	B300A	B300A	B300A	B300A	B300A	B300A
2 Δ	FELT	2	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A
3	SAFETY VALVE	1	–	–	AT517D	AT517	AT517	AT517	AT517	AT517D	AT517D
4	CYLINDER HEAD	2	AF508	AF508	AF508	AF508	AF508	AF508	AF508	AF508	AF508
5 Δ	HEAD GASKET	2	AF518	AF518	AF518	AF518	AF518	AF518	AF518	AF518	AF518
6 Δ	OUTLET VALVE	2	AF531	AF531	AF531	AF531	AF531	AF531	AF531	AF531	AF531
7	PLATE VALVE	2	AF529	AF529	AF529	AF529	AF529	AF529	AF529	AF529	AF529
8 Δ	INLET VALVE	2	AF530	AF530	AF530	AF530	AF530	AF530	AF530	AF530	AF530
9 Δ	CYLINDER GASKET	2	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A
10	CYLINDER	2	AF510	AF510	AF510	AF510	AF510	AF510	AF510	AF510	AF510
11 Δ	PISTON RING	4	AF527	AF527	AF527	AF527	AF527	AF527	AF527	AF527	AF527
12 Δ	PISTON SEAL	4	AF526	AF526	AF526	AF526	AF526	AF526	AF526	AF526	AF526
13	PISTON ROD ASSEMBLY	2	AF560F	AF560F	AF560B	AF560B	AF560C	AF560B	AF560E	AF560A	AF560D
14 Δ	RIDER RING	2	AF594	AF594	AF594	AF594	AF594	AF594	AF594	AF594	AF594
15	FLAT KEY	1	AF524	AF524	AF524	AF524	AF524	AF524	AH984	AF524	AH984
16	FAN/FAN ASSEMBLY	1	AF533	AF533	AF533	AF533	AF533	AF533	AF547	AF533	AF547
17	SHROUD	1	AF535	AF535	AF535	AF535	AF535	AF535	AF535	AF535	AF535
18 Δ	MANIFOLD SLEEVE	2	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A
***	SERVICE KIT	1	K260	K260	K260	K260	K260	K260	K260	K260	K260

4VCF – 6HCA SERIES

REF	DESCRIPTION	QTY	4VCF	4VSF	4HCJ	4LCB	4HCC	5LCA	5HCD	5HCE	6HCN	6HCA
1	INLET FILTER ASSEMBLY	1		B300F								
		2	B300F		B300A	B300A	B300A	B300F	B300A	B300A	B300F	B300F
2 Δ	FELT	2	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A
3	SAFETY VALVE	1	–	–	AT517A	AT517E	AT517A	AT517F	AT517B	AT517B	AT517C	AT517C
4	CYLINDER HEAD	2	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507
5 Δ	HEAD GASKET	2	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A
6 Δ	OUTLET VALVE	2	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545
7	PLATE VALVE	2	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543
8 Δ	INLET VALVE	2	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544
9 Δ	CYLINDER GASKET	2	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521
10	CYLINDER	2	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509
11 Δ	PISTON RING	4	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541
12 Δ	PISTON SEAL	4	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540
13	PISTON ROD ASSEMBLY	2	AF561F	AF561F	AF561J	AF561B	AF561C	AF561A	AF561D	AF561E	AF561N	AF561A
14 Δ	RIDER RING	2	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595
15	KEY	1	AB136D	AB136D	AB136D	AB136D	AB136D	AB136D	AB136D	AB136D	AB136F	AB136F
16	FAN/FAN ASSEMBLY	1	AF547	AF547	AF547	AF547	AF547	AF547	AF547	AF547	AF747	AF747
17	SHROUD	1	AF549	AF549	AF549	AF549	AF549	AF549	AF549	AF549	AF656	AF656
18 Δ	MANIFOLD SLEEVE	2	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A
***	SERVICE KIT	1	K263	K263	K263	K263	K263	K263	K263	K263	K263	K263

Model 1VBF shown.
*** Item not shown.
Δ Denotes parts included in the Service Kit.
Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

EXPLODED PRODUCT VIEW – MODEL 1VBF



PARTS & ORDERING INFORMATION

Please reference the exploded views on the next page for the following model and parts tables.

PAB – VAB SERIES

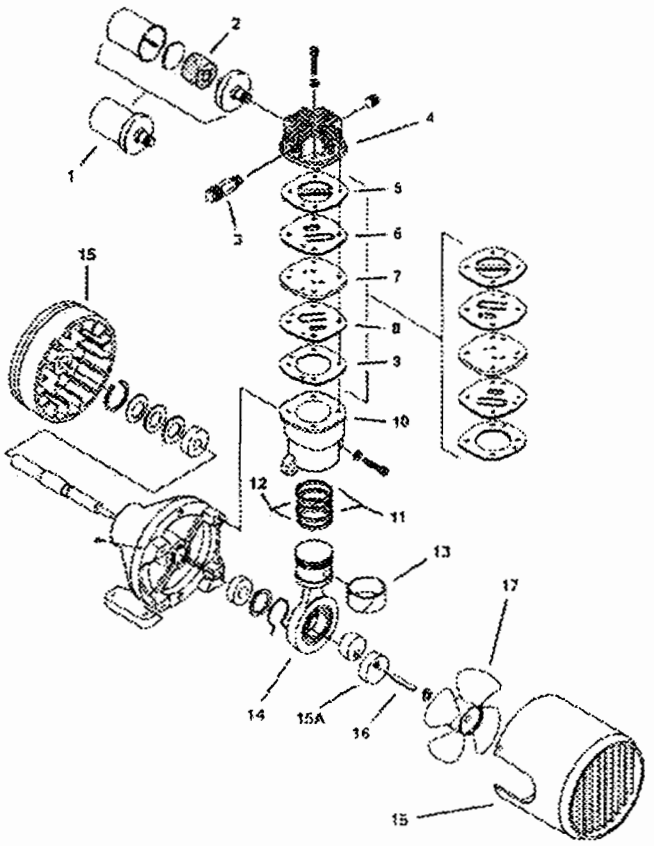
REF	DESCRIPTION	QTY	PAB	VAB
1	FILTER ASSEMBLY	1	B300A	B300A
2 Δ	FELT	1	B344A	B344A
3	SAFETY VALVE	1	AT517	–
4	CYLINDER HEAD	1	AF508	AF508
5 Δ	HEAD GASKET	1	AF518	AF518
6 Δ	OUTLET VALVE	1	AF531	AF531
7	PLATE VALVE	1	AF529	AF529
8 Δ	INLET VALVE	1	AF530	AF530
9 Δ	CYLINDER GASKET	1	AF519A	AF519A
10	CYLINDER	1	AF510	AF510
11 Δ	PISTON RING	2	AF527	AF527
12 Δ	PISTON SEAL	2	AF526	AF526
13 Δ	RIDER RING	1	AF594	AF594
14	PISTON ROD ASSEMBLY	1	AF560B	AF560B
15	PULLEY	1	AB140C	AB140C
15A	COUNTER WEIGHT	1	AF517B	AF517B
16	FLAT KEY	1	AF524	AF524
17	FAN	1	AF533	AF533
18	SHROUD	1	AF534	AF534
***	SERVICE KIT	1	K264	K264

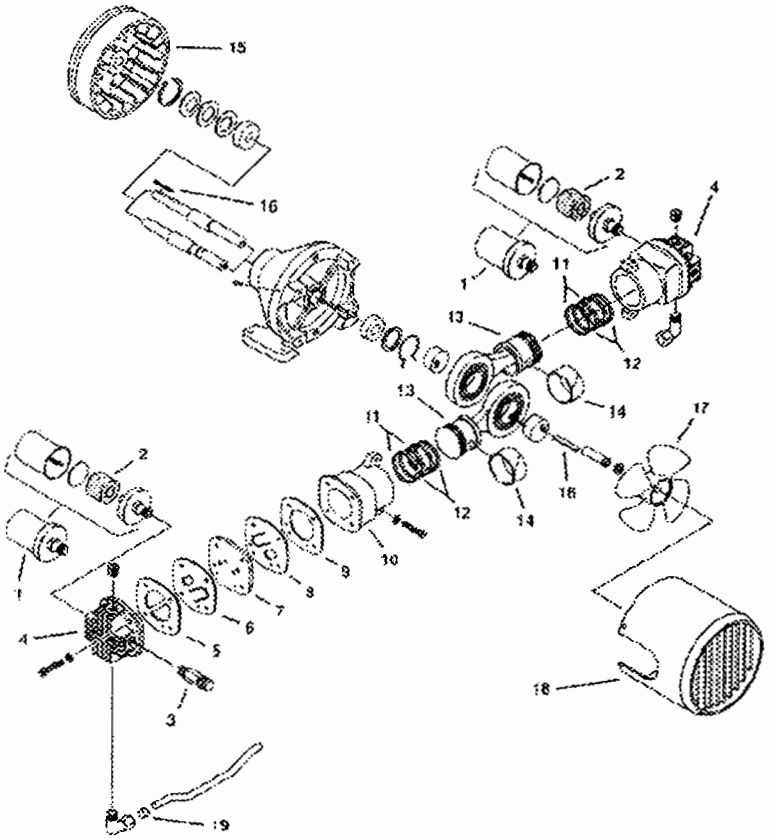
VBB – PCA-10 SERIES

REF	DESCRIPTION	QTY	VBB	VCD	PBB	PCA-10
1	FILTER ASSEMBLY	1	B300A	B300A	B300A	B300F
2 Δ	FELT	2	B344A	B344A	B344A	B344A
3	SAFETY VALVE	1	–	–	AT517	AF517C
4	CYLINDER HEAD	1	AF508	AF507	AF508	AF507
5 Δ	HEAD GASKET	1	AF518	AF520A	AF518	AF520A
6 Δ	OUTLET VALVE	1	AF531	AF545	AF531	AF545
7	PLATE VALVE	1	AF529	AF543	AF529	AF543
8 Δ	INLET VALVE	1	AF530	AF544	AF530	AF544
9 Δ	CYLINDER GASKET	1	AF519A	AF521	AF519A	AF521
10	CYLINDER	1	AF510	AF509	AF510	AF509
11 Δ	PISTON RING	2	AF527	AF541	AF527	AF541
12 Δ	PISTON SEAL	2	AF526	AF540	AF526	AF540
13	PISTON ROD ASSEMBLY	1	AF560B	AF561D	AF560B	AF561A
14 Δ	RIDER RING	1	AF594	AF595	AF594	AF595
15	PULLEY	1	AB140C	AK670	AB140C	AK670
16	FLAT KEY	1	AF524	AB136	AF524	AB136
17	FAN	1	AF533	AF547	AF533	AF661
18	SHROUD	1	AF535	AF549	AF535	AF656
19	MANIFOLD SLEEVE	2	AF567A	AF567A	AF567A	AF567A
***	SERVICE KIT	1	K260	K263	K260	K263

Models PAB and PBB shown.
** Item not shown.
Δ Denotes parts included in the Service Kit.
Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

EXPLODED PRODUCT VIEWS – MODEL PAB (TOP) & MODEL PBB (BOTTOM)





PARTS & ORDERING INFORMATION

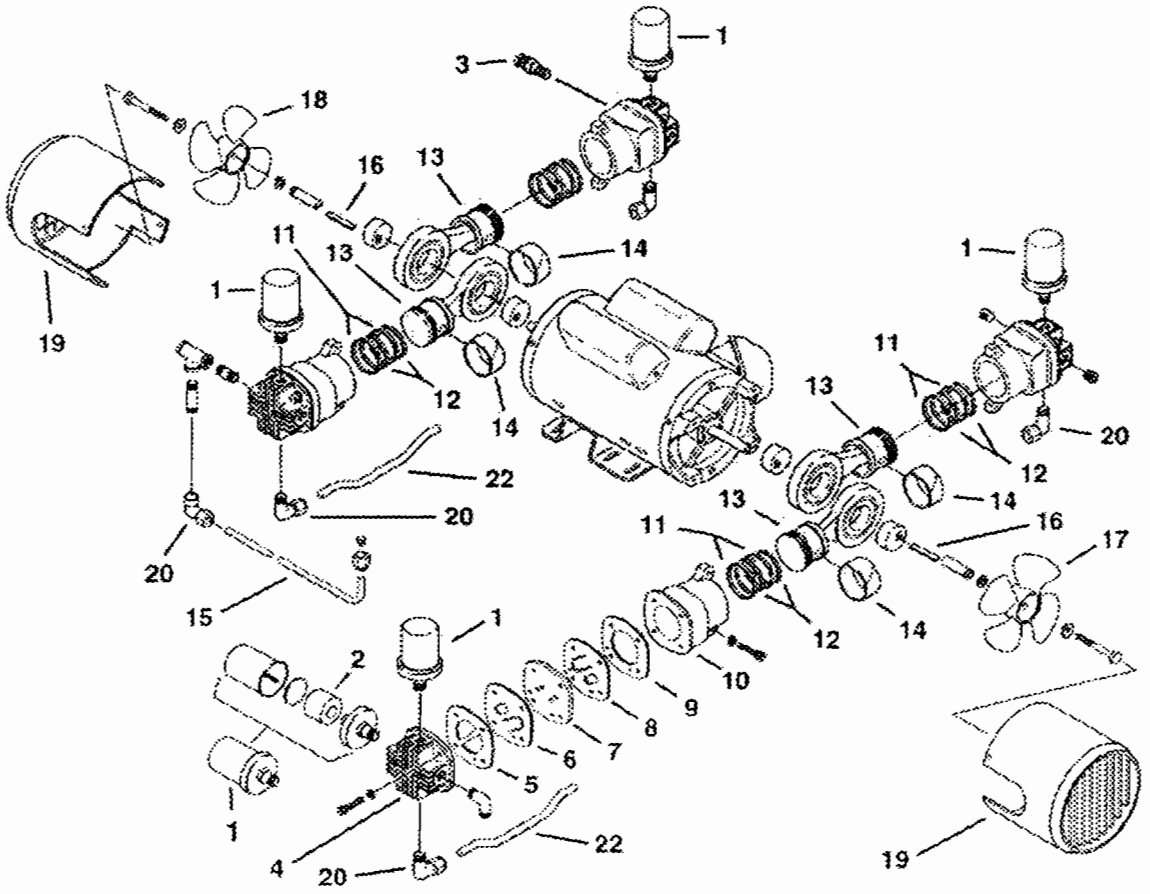
Please reference the exploded view on the next page for the following model and parts table.

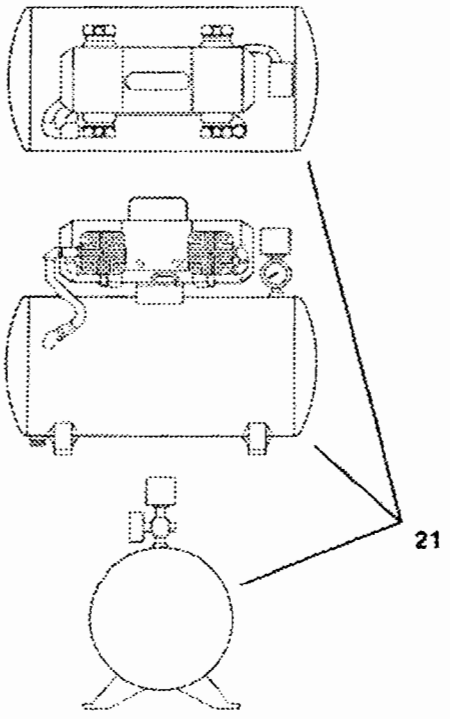
5VDF – 8LDF SERIES

REF	DESCRIPTION	QTY	5VDF	5VSF	6LCF **	6HDK	7LDE	7HDD	7HDE	8HDM	8HDN	8LDF
1	INLET FILTER ASSEMBLY	2		B300F	B300F							
		4	B300F			B300A	B300F	B300A	B300A	B300F	B300F	B300F
2 Δ	FELT	2		B344A	B344A							
		4	B344A			B344A	B344A	B344A	B344A	B344A	B344A	B344A
3	SAFETY VALVE	1	–	–	AF720	AF720A	AF720	AF720A	AF720A	AF720A	AF720A	AF720
4	CYLINDER HEAD	4/2 **	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507
5 Δ	HEAD GASKET	4/2 **	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A
6 Δ	OUTLET VALVE	4/2 **	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545
7	PLATE VALVE	4/2 **	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543
8 Δ	INLET VALVE	4/2 **	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544
9 Δ	CYLINDER GASKET	4/2 **	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521
10	CYLINDER	4/2 **	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509
11 Δ	PISTON RING	8/4 **	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541
12 Δ	PISTON SEAL	8/4 **	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540
13	PISTON ROD ASSEMBLY	4/2 **	AF561F	AF561F	AF561F	AF561K	AF561E	AF561D	AF561E	AF561M	AF561N	AF561F
14 Δ	RIDER RING	4/2 **	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595
15	MANIFOLD	1	AF659	AF659	–	AF659	AF659	AF659	AF659	AF659	AF659	AF659
16	SQUARE KEY	2/1 **	AB136F	AB136F	AB136F	AB136F	AB136F	AB136F	AB136F	AB136F	AB136F	AB136F
17	FAN/FAN ASSEMBLY-CCW	1	AF748	AF748	AF748	AF748	AF748	AF748	AF748	AF748	AF748	AF748
18	FAN ASSEMBLY-CW	1	AF747	AF747	AF747	AF747	AF747	AF747	AF747	AF747	AF747	AF747
19	SHROUD	2/1 **	AF656	AF656	AF656	AF656	AF656	AF656	AF656	AF656	AF656	AF656
20	MANIFOLD SLEEVE	2	–	–	AF567A	–	–	–	–	–	–	–
20	MANIFOLD SLEEVE	5	AF567A	AF567A	–	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A
21	TANK ASSEMBLY	1	–	–	AF606-1	AF606-1	AF606-1	AF606-1	–	AF606-1	AF606-1	–
22	MANIFOLD	2/1 **	AF550E	AF550E	AF550E	AF550C	AF550D	AF550B	AF550D	AF550A	AF550A	AF550E
***	SERVICE KIT	1	K303	K303	K303	K303	K303	K303	K303	K303	K303	K303

Model 5VDF shown.
** 6LCF is a two-cylinder unit. Other models are four-cylinder units.
*** Item not shown.
Δ Denotes parts included in the Service Kit.
Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

EXPLODED PRODUCT VIEW – MODEL 5VDF





WARRANTY

Gast finished products, when properly installed and operated under normal conditions of use, are warranted by Gast to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase from Gast or an authorized Gast Representative or Distributor. In order to obtain performance under this warranty, the buyer must promptly (in no event later than thirty (30) days after discovery of the defect) give written notice of the defect to Gast Manufacturing Incorporated, PO Box 97, Benton Harbor Michigan USA 49023-0097 or an authorized Service Center (unless specifically agreed upon in writing signed by both parties or specified in writing as part of a Gast OEM Quotation). Buyer is responsible for freight charges both to and from Gast in all cases.

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This warranty can be modified only by authorized Gast personnel by signing a specific, written description of any modifications.

MAINTENANCE RECORD

DATE	PROCEDURE PERFORMED

MAINTENANCE RECORD

DATE	PROCEDURE PERFORMED

PART NO. 70 - 2100 G441PL (REV-H)

TROUBLESHOOTING CHART

Low		High		Pump	Motor	Excess	Reason and remedy
Vacuum	Pressure	Vacuum	Pressure	Overheat	Overload	Noise	for problem.
	•			•	•	•	Filter dirty. Clean or replace.
•			At pump	•	•	•	Muffler dirty. Clean or replace.
•	•					•	Valves dirty or valves bent. Clean or replace.
•	•					•	Damaged or worn piston rings. Repair or replace.
	•			•	•		Leaky relief valve. Inspect and adjust.
•	•					•	Damaged valves. Replace.
•		At pump	•	•	•	•	Plugged vacuum/pressure line. Inspect and repair.
•	•			•	•		Low voltage, won't start. Check power source.
•	•					•	Worn rings/piston hitting cylinder. Replace.
	•			•	•	•	Cylinder misadjustment. Realign.
•	•					•	Leaky hose or check valve. Replace.
•	•			•	•	•	Dirt or liquid on top of piston. Inspect and clean.
•	•					•	Blown head gasket. Replace.

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Tokyo, 100-91 Japan
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or: 81-3-3571-7896

General Correspondence
should be sent to:
Gast Mfg. Inc./A Unit of IDEX Corporation
P O Box 97
Benton Harbor, MI 49023-0097

C.2 PUMPHOUSE NO. 1 FREE PRODUCT RECOVERY SYSTEM

SkimRite™

Equipment Manual

ENVIRO PRODUCTS INC.
1431 Rensen Street • Suite A • Lansing, Michigan 48910
(517) 887-1222 • 1-800-ENVIRO 4 • Fax: (517) 887-8374

Table of Contents

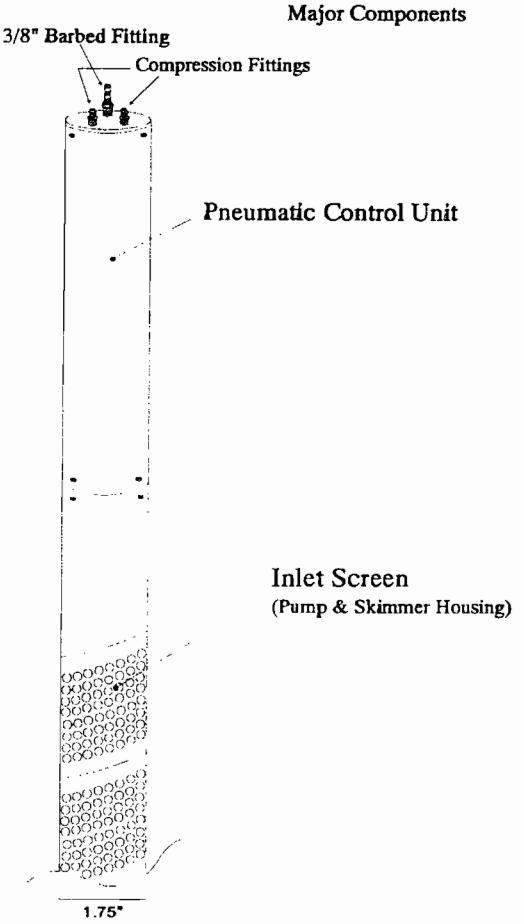
System Components

Your **SkimRite™** system includes the following components:

1. **SkimRite™**(skimmer/pump/controller assembly).
2. 1 1/2 HP air compressor.
3. Air Filter/tank overfill protection panel.
4. 100 feet 5/16" O.D. nylon air supply line.
5. 100 feet 3/8" O.D. nylon air vent line.
6. 10 feet 5/16" O.D. nylon air line.
7. Locking well cap (lock not included).
8. 100 feet (30.5 meters) 3/8" I.D. discharge hose.
9. Tank overfill float switch assembly.
10. Parts kit containing the following:

    4 hose clamps
    4 compression nuts (5/16")
    4 compression nuts (3/8")
    4 nylon ferrules (5/16")
    4 nylon ferrules (3/8")
    4 screws, 6-32 flat head, slotted

SkimRite™
Major Components



IMPORTANT: Always wear eye protection when using pneumatic equipment.

Assembly Instructions

Each component of your SkimRite™ system has been tested prior to shipping.
Minimal assembly is required.

The compressor you received with your system has been drained of oil for shipping purposes. Fill with oil before using (see compressor manual).

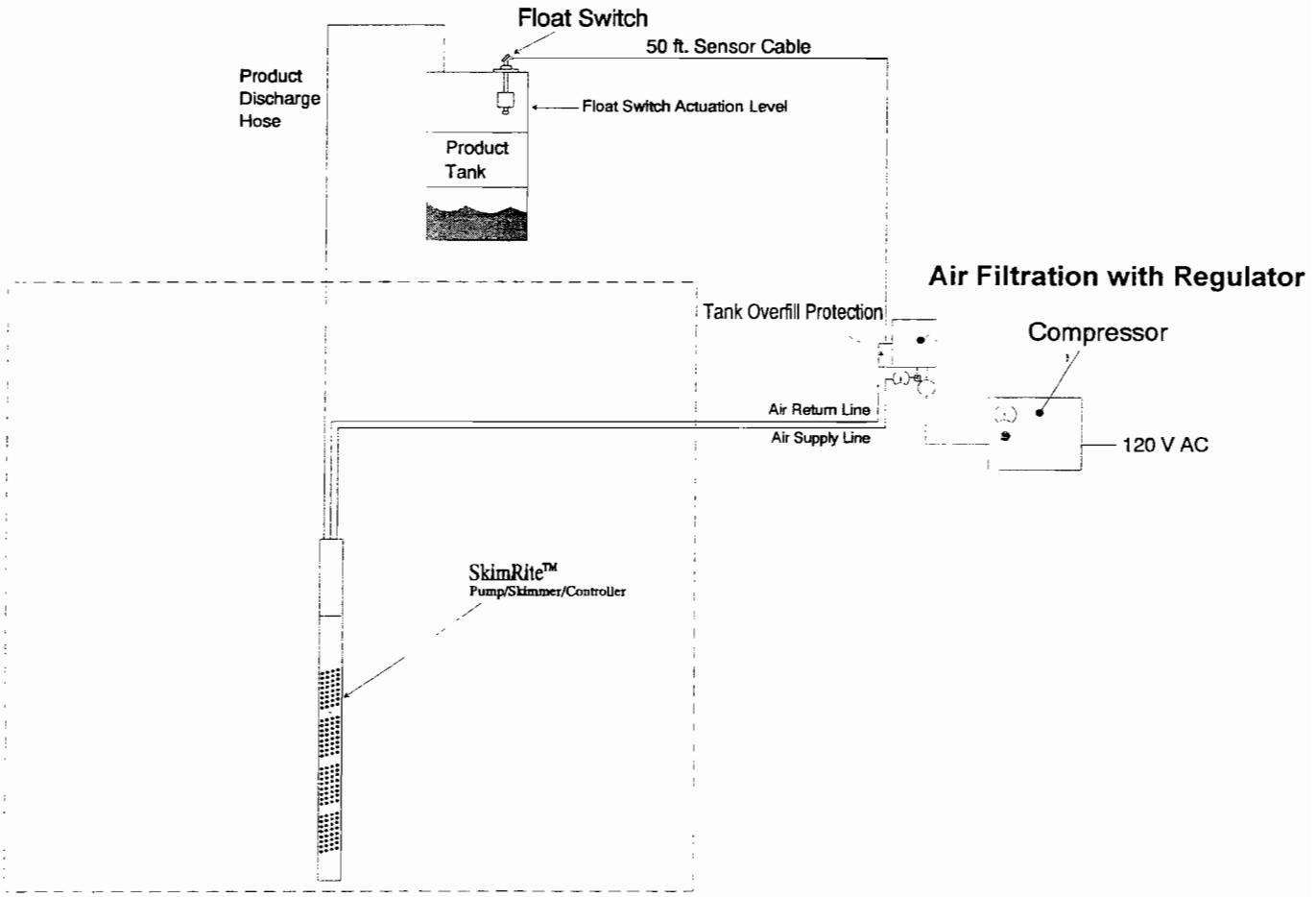
Small pieces of nylon tubing have been inserted into the compression fittings on the **SkimRite™**, air dryer, and compressor. These are used to prevent damage to the fittings during shipping, and must be removed and discarded.

SkimRite™ Typical System Layout

The diagram below shows how the system is set up.

Note that the air return line and the air supply line both go from the SkimRite™ to the air dryer.

NOTE: It is extremely important to prevent blockage of the air return line. If water enters this line or it is blocked, the controller **will malfunction and damage may result**.

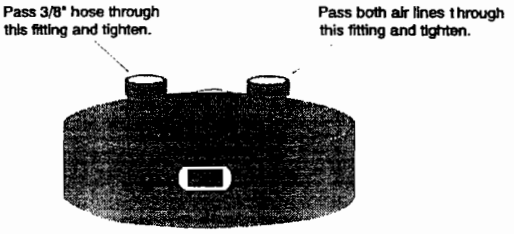


Installation *(Consult the diagram on page 3 for a schematic of the system configuration.)*

Pump/Skimmer/Controller

*The **SkimRite**™ can be used in well sizes as small as 2 inches diameter.*
The minimum water level in the well is 19 inches.

1. Measure from the top of the casing to the surface of the top liquid level in the selected well. Subtract 36.00 inches from this measurement.

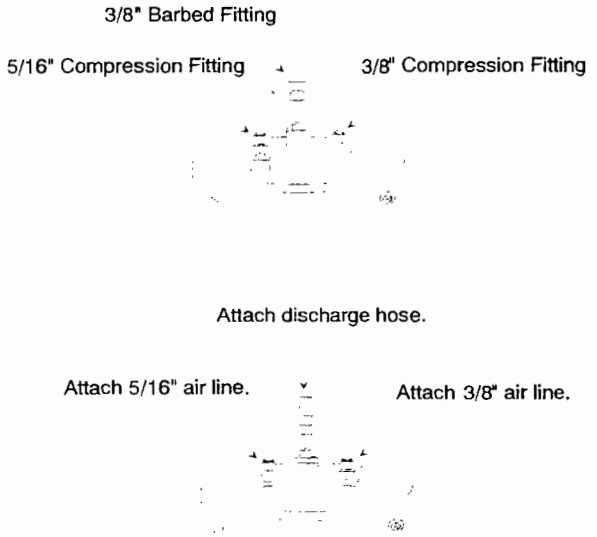


Locking Well Cap

2. Using the resulting value, pull this length of the 3/8" discharge hose through one of the fittings on the well cap. Loosen the knurled nut on the fitting to allow the hose to easily slip through, then hand tighten until it clamps firmly onto the hose. Next, pull the same length of 3/8" and 5/16" air line through the other fitting and tighten gently.

3. Connect the 3/8" discharge hose to the top of the **SkimRite**™ and secure using the supplied ear clamp.

NOTE: *The **SkimRite**™ will be suspended by this hose so be certain that the connection is tight.*



Top of SkimRite Control Canister

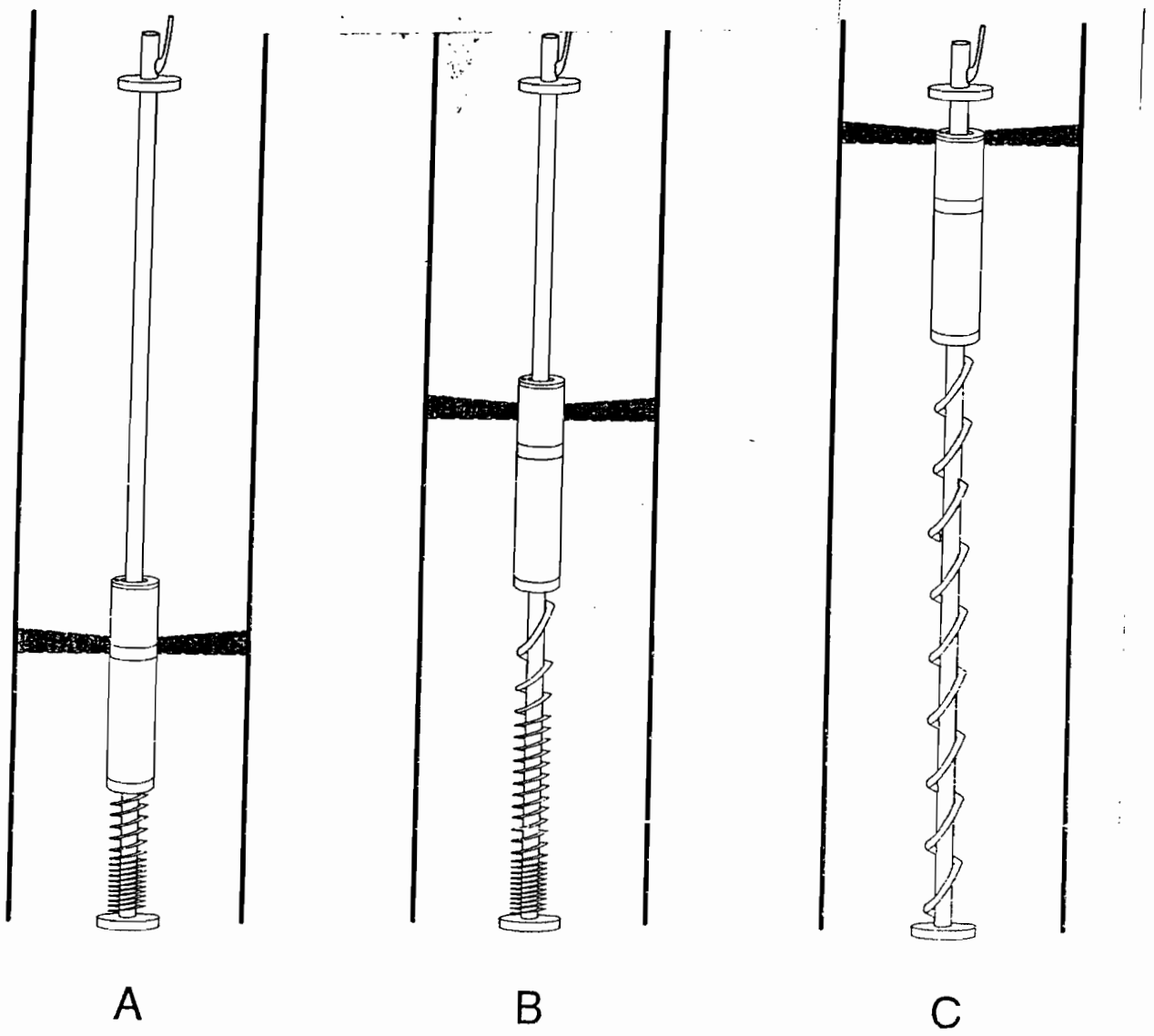
Connect the 3/8" air line to the 3/8" compression fitting on the top of the **SkimRite**™. Loosen the nut, push the tube into the fitting as far as it will go, then tighten with a wrench until secure.

Connect the 5/16" air line to the 5/16" compression fitting.

4. Lower the **SkimRite**™ into the well until the well cap rests on the top of the well casing.

5. Secure the well cap to the casing by tightening the set screws located on the inner ring of the well cap.

SkimRite™ Buoy Flotation



Recommended installation of the **SkimRite™** is shown in Figure B.

When a large quantity of product is recovered, the water table will rise and the buoy will float higher as shown in Figure C. In this position, water will be in full contact with the filter and the buoy may be fully submerged in water. This submersion will allow water to enter the buoy through the orifice on the top of the filter. Also, the filter material will be damaged if submerged in water for any length of time.

Reposition the **SkimRite™** in the well by raising the **SkimRite™** by one foot so that the buoy is floating as shown in Figure A. Check the performance. It may be necessary to reposition the **SkimRite™** more than once before optimum performance is realized.

Discharge Hose and Air Lines

NOTE: *The discharge hose and air lines should be protected from damage by using conduit and / or underground installation.*

1. The discharge hose must be connected to your product holding tank. It will be the discharge line for recovered hydrocarbon fuels.

2. The 5/16" air line is used to supply air to the pump. This line must be run from the **SkimRite™** to the air filter.

3. The 3/8" air line is the air exhaust line for the pump and controller. This line should be run back from the **SkimRite™** to the air filter along with the 5/16" line. Protect the end of this line from moisture and blockage.

IMPORTANT: *If the 3/8" line is blocked or moisture is allowed into it, the control* ***will malfunction.***

Air Filter Panel

1. Mount the filter panel in an upright position.

2. Connect the 10 ft. length of 5/16" air line to the SUPPLY port of the filter panel using the supplied compression fittings. Connect the other end to the compressor.

3. Connect the 5/16" pump air line to the PUMP port. Connect the other end of this line to your **SkimRite™** pump.

4. Connect the 3/8" air return line to your **SkimRite™** pump and allow this line to vent in a non-hazardous environment, free from moisture. Blockage of this line will impair performance of the system.

5. Connect the tank full sensor to the terminals marked "1" and "2". Plug the panel into 120V AC using the supplied plug. Lift the float. Only the green indicator on the tank over fill protection module should be lit. When the float is down, both the green and yellow indicators should be lit.

6. Prepare the compressor for operation. Please refer to supplied manual for additional air compressor information.

Note: The air filter panel must be mounted in a location that will prevent exposure to freezing temperatures.

Tank Overfill Protection

Before the system will operate, the tank over fill sensor must be installed and tested.

1. The tank overfill protection circuitry is located inside of the air filter control panel. A float switch is provided for the monitored tank, and must be installed. The float switch will fit in a 2" bung opening on the tank and must be installed on the top for proper operation.

2. Run the 50' control cable from the float switch to the air filter panel. Protect this cable from damage.

NOTE: *When the float is in the down position, the float switch is closed and will allow the system to operate.*

If the cable to the float switch is severed, the control circuitry will shut down the system.

3. Strip the ends of this cable (at the air dryer) and connect to terminals "1" and "2" inside the air dryer panel.

The control cable connections to the air dryer will have a sensing voltage on them which has no polarity and is at a low level. This voltage has been filtered through an intrinsic barrier located inside the air dryer.

Air Compressor

IMPORTANT: *The compressor supplied with your system **must be filled with oil before use**. See compressor manual for maintenance instructions.*

1. Turn the air valve on the compressor to the off position. After servicing the compressor, connect it to a 120V AC, 60 Hz, power source. The compressor will build pressure - indicated by the gauge on the tank.

2. When the compressor has stopped running, adjust the regulator on the compressor to 80 PSI. Verify that all air lines are connected (see appropriate sections).

3. Turn the valve at the compressor to the on position. Check for leaks at all fittings.

4. Adjust the regulator inside the air filter panel to 60 PSI.

5. Verify proper operation of the tank full sensor before putting the system into service.

6. The pump will be operating now. Check the 3/8" air return line for exhaust air. The controller of the pump cycles approximately 12 times per minute, therefore, a pulse of air should be noticeable approximately every 5 seconds.

IMPORTANT: *If pulses of air are not present at the air return line, consult the* Troubleshooting *section of the manual (page 24).*

Maintenance

Air Compressor

IMPORTANT: *The air compressor supplied with your* **SkimRite™** *system may have been shipped* ***without oil. Fill with oil before using if necessary.***

Follow the manufacturer's instructions for maintenance and proper use of the compressor.

Air Filter

1. Monthly, clean accumulated oil and water emulsion from the filter bowl(s).

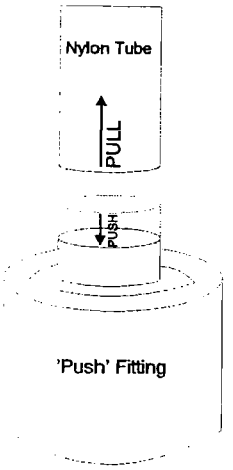
2. Periodically, verify proper tank over fill protector operation.

Replacement of the Bladder

If the bladder in the pump becomes damaged or worn, replacement is required.

Removing the Bladder (Refer to the diagrams on pages 21 and 22.)

1. Remove the screened portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/skimmer.



2. At the top of the pump, remove the formed loop of 5/32" nylon tubing from its fittings. These fittings are "push fittings". The tube can be removed by pushing on the small brass ring where the tube enters the fitting, while pulling the tube in the opposite direction (out of the fitting).

3. Hold the check valve with a wrench. Unscrew the control canister from the pump by removing the coupling from the top check valve.

   Remove the buoy's coiled hose from the 1/8 brass barbed elbow fitting at the bottom of the pump.

4. Remove the retaining rings at the top and bottom of the pump body. Pull the upper bladder barb fitting out of the pump body to expose the bladder. Cut the bladder off this fitting.

5. Pull the bottom bladder barb fitting (with bladder attached) out of the pump body. Remove the bladder from this fitting.

Installing the Bladder (Refer to the diagrams on pages 21 and 22.)

1. Inspect the O-rings on each barbed fitting and replace if necessary. Lubricate the barbed fitting with light oil. Push the bladder onto the bottom barbed fitting. Leave 1/16" clearance between the end of the bladder and the 'stop' on the barbed fitting.

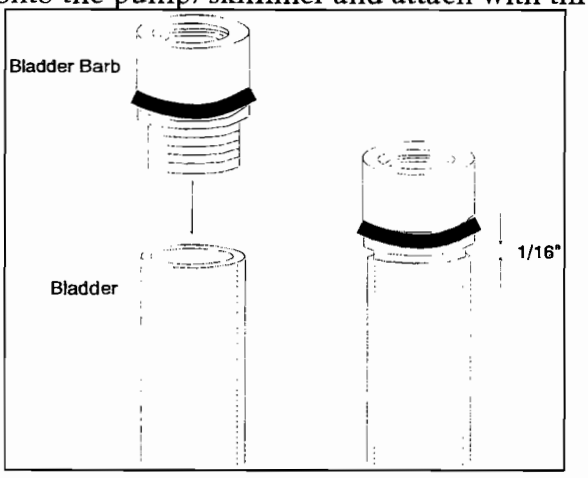
2. Insert the bladder into the pump body. Push the fitting into the body until there is room for the retaining ring to seat in the groove of the body. Install the retaining ring.

IMPORTANT: The recommended method for installing the bladder fittings into the body is by pressing them in. If you need to use a hammer for this operation, use one with a soft face (dead blow - type) and tap gently. Otherwise, damage to the check valve and fittings may result.

3. Using pliers, pull the bladder out of the top side of the pump body and hold. Install the barbed fitting on the bladder and insert into the top of the body. Push the fitting into the body until there is room for the retaining ring to seat in the groove of the body. Install the retaining ring. Gently pull on the fittings at either end of the pump body to seat the bladder.

4. Hold the check valve with a wrench to avoid twisting the bladder inside the pump housing. Attach the control canister to the pump and connect the nylon air tube to the 'push' fittings. Be careful not to kink this tube.

5. Attach the buoy's coiled hose to the barbed fitting at the bottom of the pump. Slide the screened outer housing onto the pump/skimmer and attach with three slotted screws.



Replacement of the Check Valves

If a check valve requires replacement, use the following procedure.

IMPORTANT: The check valves must be handled with care. Damage will result if they are dropped or subjected to rough handling.

Removing the Lower Check Valve (Refer to the diagram on page 22.)

1. Remove the screened portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/skimmer.

2. Remove the coiled hose from the barb elbow by first pulling the nylon hose sleeve off of the fitting. Then, pull the hose from the fitting.

3. Hold the lower check valve with a wrench. Loosen the strainer and attached fittings from the check valve by using a wrench on the upper hex of the strainer.

4. Remove the retaining ring from the pump. This will allow the bladder barb fitting to be pulled out. Carefully pull out on the check valve to expose the bladder barb fitting.

5. Firmly grip the exposed portion of the bladder barb fitting with locking pliers.

IMPORTANT: Do not grip the O-ring or bladder. Damage will result.

6. Use a wrench on the check valve to loosen it from the bladder barb fitting.

Installing the Lower Check Valve (Refer to the diagram on page 22.)

1. Fit a replacement check valve into the bladder barb fitting. The direction arrow on the check valve must be pointing toward the bladder barb fitting.

2. Hold the bladder barb fitting as stated in the removal procedure. Tighten the check valve onto this fitting.

3. Push the bladder barb fitting into the pump housing until there is room for the retaining ring to seat in the groove of the body. Install the retaining ring.

IMPORTANT: The recommended method for installing the bladder fittings into the pump housing is by pressing them. If you need to use a hammer for this operation, use one with a soft face (dead blow - type), and tap gently.

4. Hold the check valve with a wrench to prevent the bladder barb from turning. Tighten the strainer and attached fittings onto the check valve by using a wrench on the upper hex of the strainer.

   Orient these fittings so that the brass barb elbow is aligned with the coiled hose and the through-hole in the bottom centralizer.

5. Attach the coiled hose to the barb elbow using the nylon hose sleeve. The sleeve will press down onto the fitting and secure the hose. Take care not to cut the tubing when installing the sleeve.

6. Replace the screened portion of the pump/skimmer assembly using the slotted screws.

Removing the Upper Check Valve (Refer to the diagram on page 21.)

1. Remove the screened portion of the pump /skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/skimmer.

2. Remove the formed loop of 5/32" nylon tubing from its fittings. These fittings are "push fittings". The tube can be removed by pushing on the small brass ring where the tube enters the fitting, while pulling the tube in the opposite direction (out of the fitting).

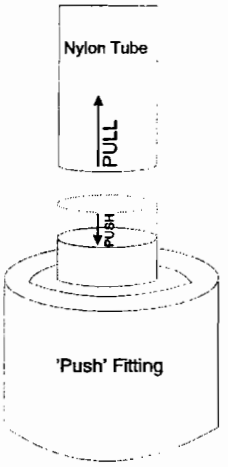
3. Hold the upper check valve with a wrench. Loosen the entire control canister assembly by using a wrench to loosen the brass coupling and attached fittings from the check valve.

4. Remove the retaining ring from the pump. This will allow the bladder barb fitting to be pulled out. Carefully pull out on the check valve to expose the bladder barb fitting.

5. Firmly grip the exposed portion of the bladder barb fitting with locking pliers.

IMPORTANT: Do not grip the O-ring or bladder. Damage will result.

6. Use a wrench on the check valve to loosen it from the bladder barb fitting.



Installing the Upper Check Valve (Refer to the diagram on page 21.)

1. Fit a replacement check valve into the bladder barb fitting. The direction arrow on the check valve must be pointing away from the bladder barb fitting.

2. Hold the bladder barb fitting as stated in the removal procedure. Tighten the check valve onto this fitting.

3. Push the bladder barb fitting into the pump housing until there is room for the retaining ring to seat in the groove of the body. Install the retaining ring.

IMPORTANT: The recommended method for installing the bladder fittings into the pump housing is by pressing them. If you need to use a hammer for this operation, use one with a soft face (dead blow - type), and tap gently.

4. Hold the check valve with a wrench to prevent the bladder barb from turning. Tighten the coupling with attached fittings and control canister onto the check valve by using a wrench on the coupling.

5. Attach the formed loop of 5/32" tubing to the push fitting by pushing it into the fittings. Check for a secure connection by pulling outward on the tube.

   Take care not to kink the tube as leaks may develop.

6. Replace the screened portion of the pump/skimmer assembly using the three slotted screws.

Replacement of the **SkimRite**™ Filter Assembly (Refer to the diagrams on pages 22 and 23.)

If the filter becomes damaged, use the following procedure for replacement.

Removing the Filter Assembly

1. Remove the screened portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/skimmer.

2. Remove the coiled hose from the barb elbow by first pulling the nylon hose sleeve off of the fitting. Then, pull the hose from the fitting.

3. Hold the lower check valve with a wrench. Loosen the strainer and attached fittings from the check valve by using a wrench on the upper hex of the strainer.

4. Remove the bottom centralizer from the pump housing by loosening screws. The buoy/filter assembly can now be removed from the SkimRite™.

5. Remove the two screws which hold the buoy together. The buoy weight, lower buoy assembly, and upper buoy assembly can now be moved downward to expose the 1/8" barb fitting on the filter assembly. Cut the coiled hose from the barb fitting.

6. The filter assembly can now be removed.

Cleaning the Filter Material

If the filter material appears to be clogged with foreign particles, follow this procedure.

1. Clean the porous polyethylene filter material using a toothbrush and rinse with a small amount of the very same "free-product" that is being recovered from the well. DO NOT USE ANY SOAPS OR DETERGENTS!

2. Wet the filter with a refined petroleum fuel.

If organic growth appears to be the cause of the blockage, soak buoy in a 50% muriatic acid / water mixture for 24 hours. Then, rinse with clean water and dry thoroughly before using. Follow step #1 above

If cleaning the buoy does not rectify the problem, the buoy requires replacement.

Installing the Filter Assembly

1. Connect the coiled hose, extending from the upper buoy assembly, to the 1/8" barb fitting on the filter assembly.

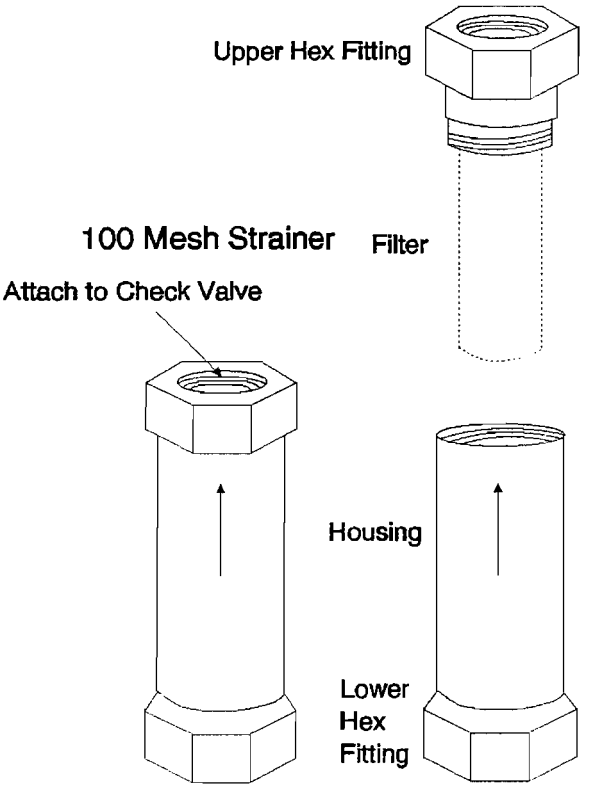
2. Connect the buoy weight, lower buoy assembly, and upper buoy assembly to the filter assembly using the long screws.

3. Slide the assembled buoy onto the pump housing. Replace the bottom centralizer 1/4" from the bottom of the pump housing.

4. Hold the lower check valve with a wrench. Tighten the strainer and attached fittings to the check valve by using a wrench on the upper hex of the strainer. Align the barb elbow with the hole in the bottom centralizer.

5. Attach the coiled hose to the barb elbow using the nylon hose sleeve. Take care not to cut the coiled hose when tightening the sleeve onto the fitting.

6. Replace the screened portion of the pump/skimmer assembly using the slotted screws.



Cleaning the 100 Mesh Strainer

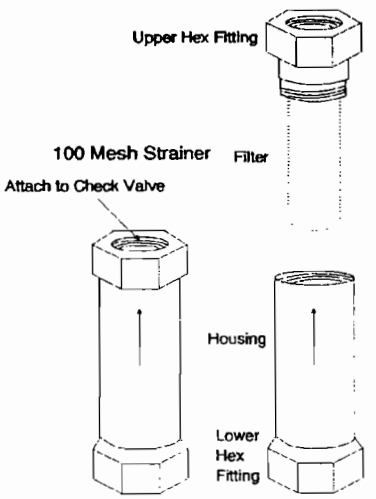
If the strainer requires cleaning, follow this procedure.

1. Remove the screened portion of the pump/skimmer assembly by unscrewing three slotted screws at the top of the screen. Then, slide the screen off of the pump/skimmer.

2. Remove the coiled hose from the barb elbow by first pulling the nylon hose sleeve off of the fitting. Then, pull the hose from the fitting.

3. Hold the lower check valve with a wrench. Loosen the strainer and attached fittings from the check valve by using a wrench on the upper hex of the strainer.

4. Now, remove the inner assembly of the strainer by loosening the upper hex fitting from the housing. The filter (attached to the upper fitting) can now be cleaned.



5. Rinse particulates and debris from the filter using clean water.

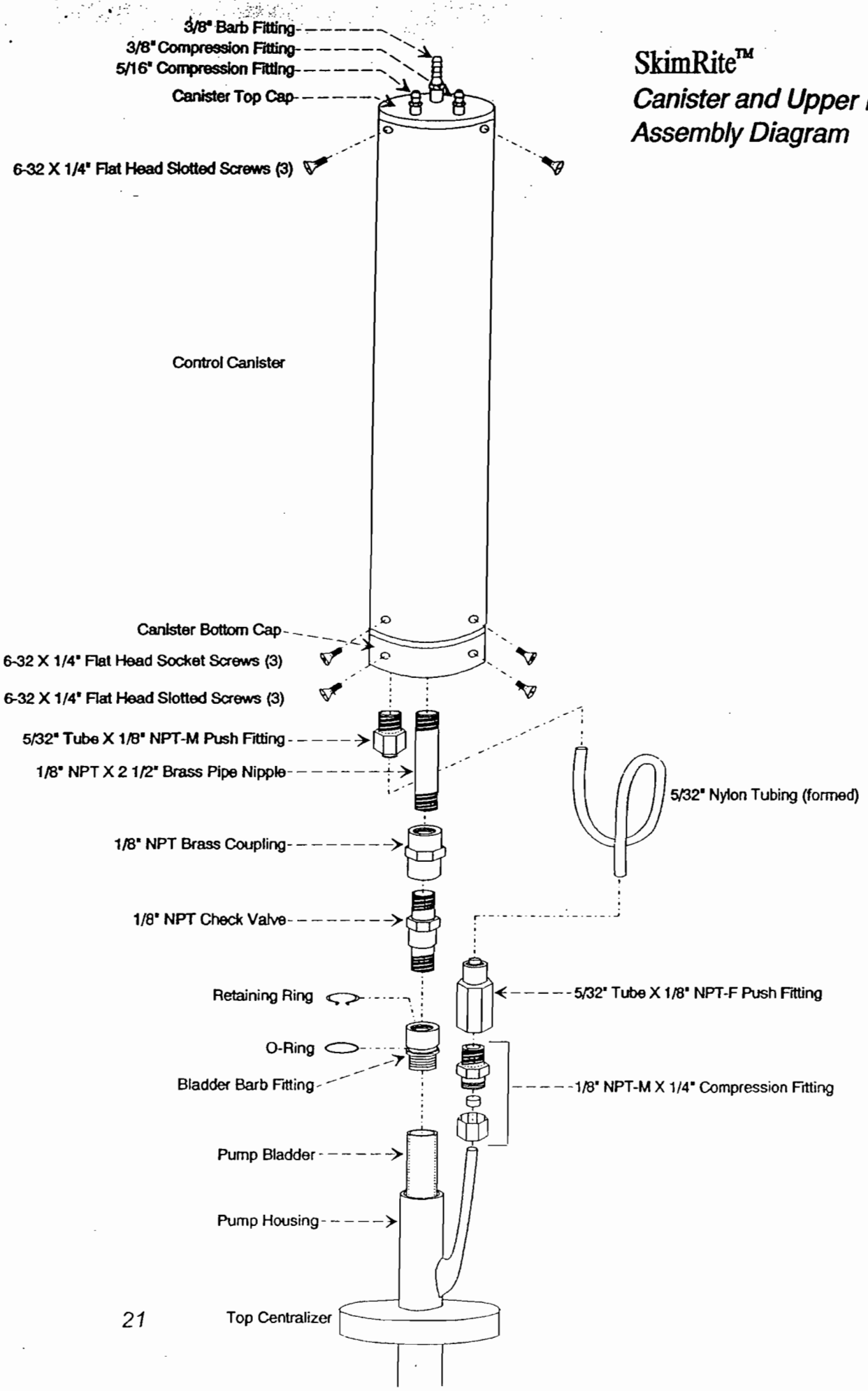
6. Reassemble the strainer. Tighten the strainer with attached fittings onto the lower check valve. Note the direction arrow on the strainer. This must point toward the pump when reassembling. Hold the check valve with a wrench to avoid rotating the bladder in the pump.

   Orient these fittings so that the brass barb elbow is aligned with the coiled hose and through-hole in the bottom centralizer.

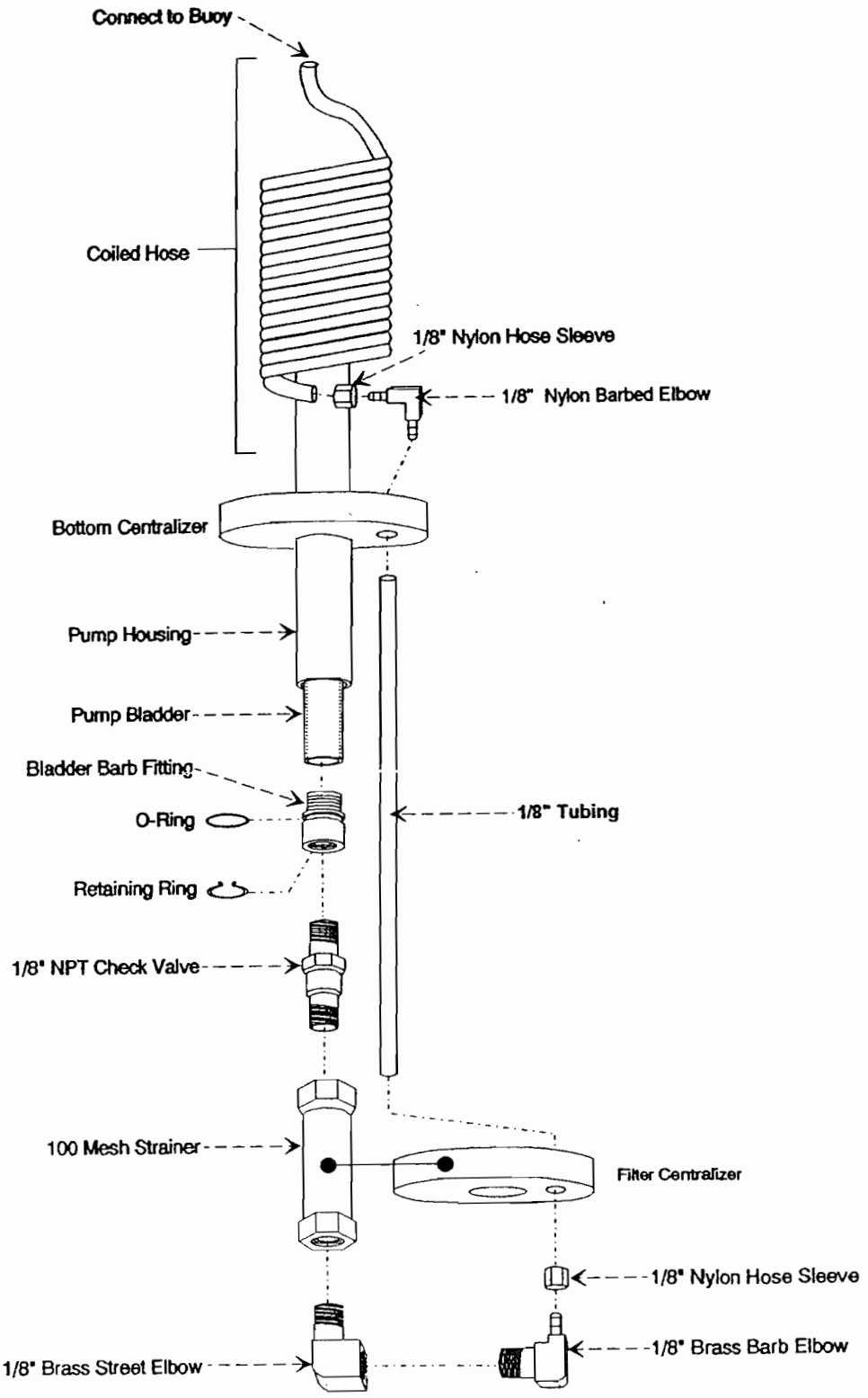
7. Attach the coiled hose to the barb elbow using the nylon hose sleeve. The sleeve will press down onto the fitting and secure the hose. Take care not to cut the tubing when installing the sleeve.

8. Replace the screened portion of the pump/skimmer assembly using the slotted screws.

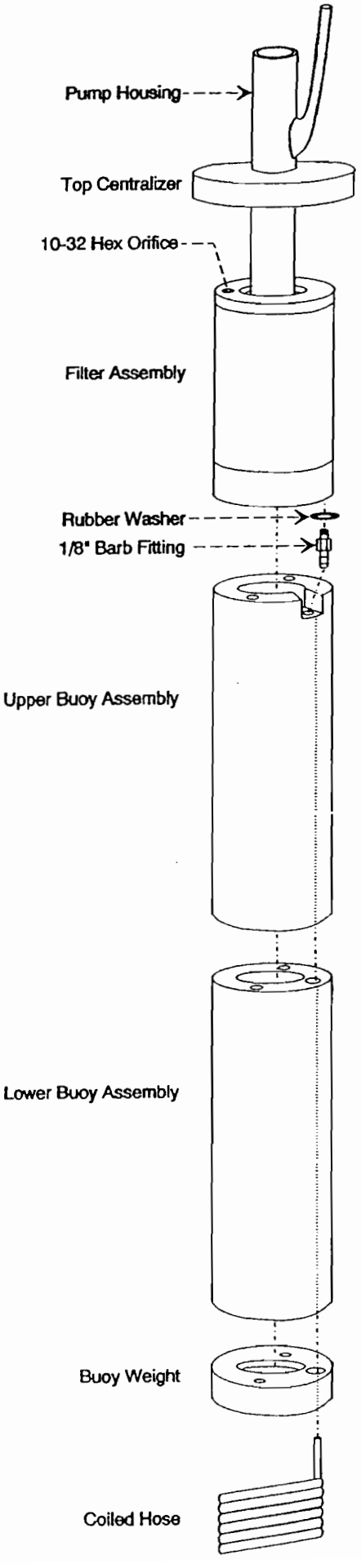
SkimRite™
Canister and Upper Pump Assembly Diagram



SkimRite™
Lower Pump Assembly Diagram



SkimRite™
Filter Buoy Assembly Diagram



Troubleshooting Guide (continued on page 25)

Problem	Cause	Corrective Action
No product being pumped. Air is discharged through the product hose.	1. Product has been removed from well.	1. None
	2. Product level is below the skimmer buoy.	2. Change placement of the SkimRite in the well. See the 'Installation' section of the manual.
	3. The air pressure is low.	3. Set the regulators as given in the 'Installation' section.
	4. The SkimRite has been used in a well that is too deep.	4. At 60 PSI, the SkimRite will pump from 120 feet.
	5. The product viscosity is too low.	5. Product will not flow through the filter.
Pump discharges water.	1. The skimmer buoy is below the water level.	1. Adjust the placement of the SkimRite in the well. See the 'Installation' section of the manual.
	2. Filter material surface tension has been reduced due to age or type of product.	2. Replace the filter assembly as given on pages 17-19.
No product or air being discharged through the product hose.	1. The product tank is full.	1. Empty the product tank. Check the operation/installation of the tank overfill float switch and control cable.
	2. The filter material in the buoy has been fouled by particulates in the product.	2. Clean or replace the filter as given on pages 17-19.
	3. The 100 mesh strainer has fouled.	3. Disassemble and clean the 100 mesh strainer as given on page 20.
	4. The air supply is very low or has been shut off.	4. Check the air supply pressure and set as given in the 'Installation' section. Check all shut off valves and air lines.
	5. The controller is malfunctioning.	5. Check for blockage of 1/4" air return line.

The air compressor is not operating.	1. Power loss to the compressor.	1. Check the fuse/breaker box for the compressor. The fuse/breaker may be under rated for the compressor.
	2. Compressor is turned off.	2. Turn the power switch on the compressor to the 'ON' position.
The air compressor runs continuously.	1. There is an air leak in the air supply lines.	1. Check all lines for leaks.
	2. There are too many pumps connected to the system.	2. A maximum of 4 SkimRite pumps can be used with the standard compressor supplied with the system.
	3. The controller is malfunctioning.	3. Check for pulses of air at the 1/4" air return line. If there is a steady flow of air, the controller requires service.

Product Service

For product questions, problems, or application assistance, please contact **Enviro Products, Inc.** 9AM to 5PM EST, Monday through Friday.

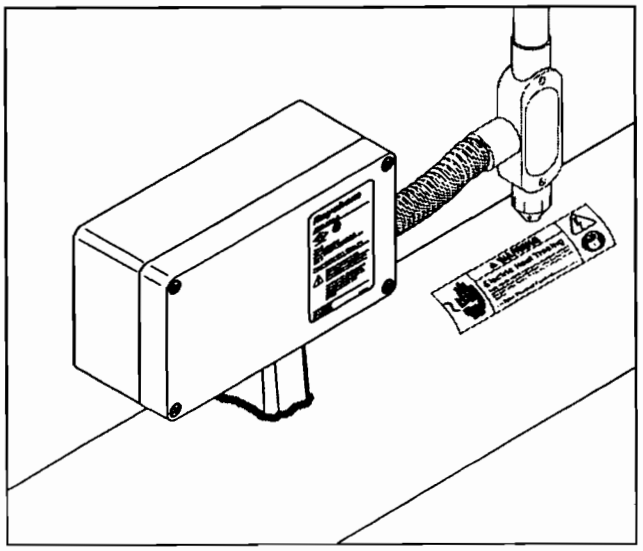
Enviro Products, Inc.
1431 Rensen Street, Suite A
Lansing, MI 48910
(517) 887-1222
1-800-ENVIRO-4
Fax: (517) 887-8374
www.**enviroproducts**.com
e-mail: service@**enviroproducts**.com

Raychem

JBM-100-A

Power Connection, Powered Splice, Powered Tee, Dual Power Connection, Splice or Tee with Junction Box

Installation Instructions



Description

The JBM-100-A is a NEMA 4X-rated connection kit. It is designed for use with Raychem® BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT and VPL-CT industrial parallel heating cables. The kit can be used to connect one, two, or three heating cables to power, to connect two separate heat-trace circuits, or to splice or tee up to three heating cables.
Note: For two or more heating cables powered by one circuit, the total length of all heating cables entering the box must not exceed the maximum circuit length published in the applicable heating cable data sheet.

This kit may be installed at temperatures as low as –40°F (–40°C). For easier installation store above freezing until just before installation.

For technical support call Tyco Thermal Controls at (800) 545-6258.

Approvals

	Hazardous Locations
CLI, ZN1, AEx e II [1]	Class I, Div. 2, Groups A, B, C, D Class II, Div. 1 and 2, Groups E, F, G Class III

[1] Except VPL

Tools Required

- Wire cutters
- Utility knife
- Needle nose pliers
- 3/8" hex key (required for splice and tee connections)
- Marking pen
- 1/4" or smaller slotted screwdriver
- Large slotted screwdriver
- Adjustable pliers
- Wire stripper (for VPL-CT)

Additional Materials Required

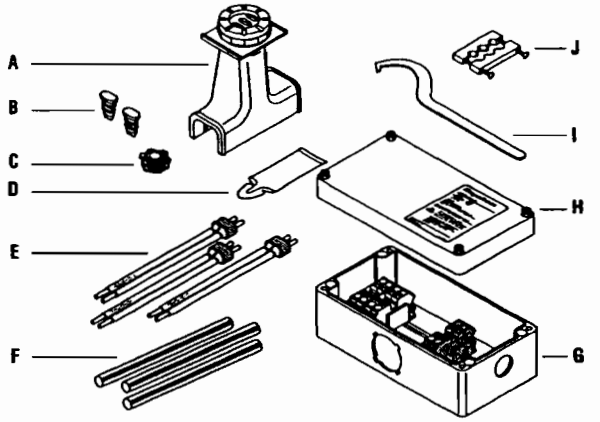
- Pipe strap
- GT-66 or GS-54 glass cloth tape

Optional Materials

- Recommended conduit drain: JB-DRAIN-PLUG-3/4IN P/N 278621-000
- Small pipe adapter for 1" (25 mm) and smaller pipes: Catalog number JBM-SPA P/N D55673-000

Kit Contents

Item	Qty	Description
A	1	Stand assembly
B	2	Grommet plugs
C	1	Box plug, o-ring, and locknut
D	1	Cable lubricant
E	3	Core sealers
F	3	Green/yellow tubes
G	1	Box with terminals (max: 3/4" conduit & 8 AWG wire)
H	1	Lid
I	1	Spanner
J	1	Strain relief



⚠ WARNING:

This component is an electrical device that must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all of the installation instructions.

- To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with the requirements of Tyco Thermal Controls, agency certifications, and the National Electrical Code, ground-fault equipment protection must be used. Arcing may not be stopped by conventional circuit breakers.
- The power connection may be powered by more than one circuit. Be sure all power sources are de-energized before opening box.
- Component approvals and performance are based on the use of Tyco Thermal Controls-specified parts only. Do not use substitute parts or vinyl electrical tape.
- The black heating cable core and fibers are conductive and can short. They must be properly insulated and kept dry.
- Damaged bus wires can overheat or short. Do not break bus wire strands when scoring the jacket or core.
- Keep components and heating cable ends dry before and during installation.
- Use only fire-resistant insulation materials, such as fiberglass wrap or flame-retardant foam.

⚠ CAUTION:

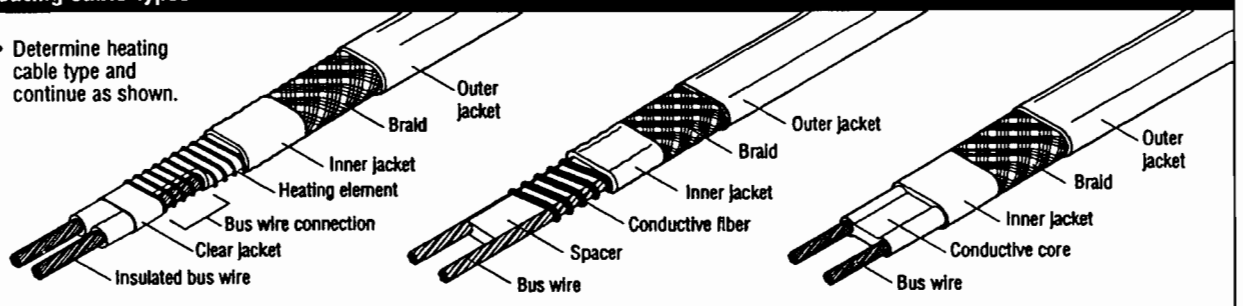
Health Hazard: Prolonged or repeated contact with the sealant in the core sealer may cause skin irritation. Wash hands thoroughly. Overheating or burning the sealant will produce fumes that may cause polymer fume fever. Avoid contamination of cigarettes or tobacco. Consult MSDS RAY5510 for further information.

CHEMTREC 24-hour emergency telephone: (800) 424-9300.

Non-emergency health and safety information: (800) 545-6258.

Heating cable types

- Determine heating cable type and continue as shown.



VPL
Go to Step 1a

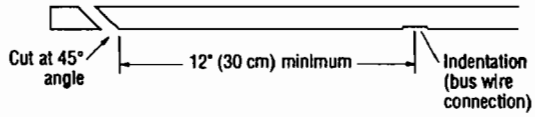
XTV-CT, KTV-CT
Go to Step 1b

BTV-CR, BTV-CT, QTVR-CT
Go to Step 1b

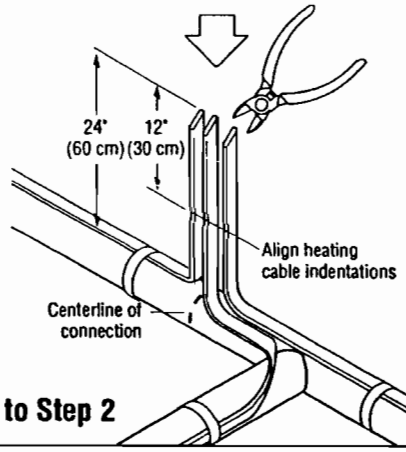
1a

VPL

- Cut each heating cable 12" (30 cm) from the center of the first indentation, cut at a 45° angle.



- After heating cable has been cut, align indentations. Allow approximately 24" (60 cm) of heating cable for installation.

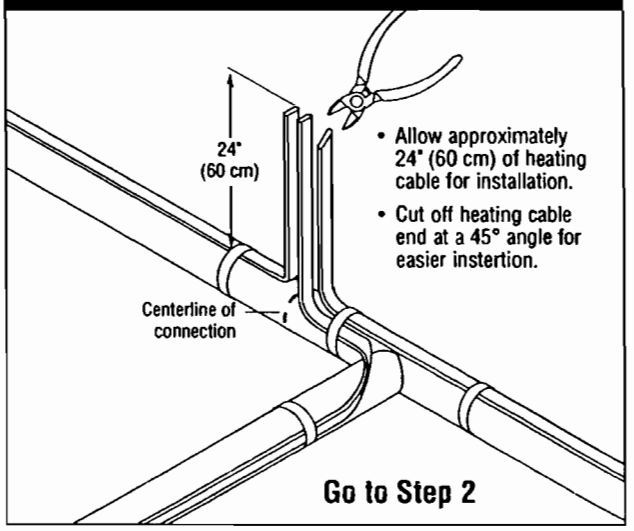


Go to Step 2

1b

XTV, KTV

BTV, QTVR

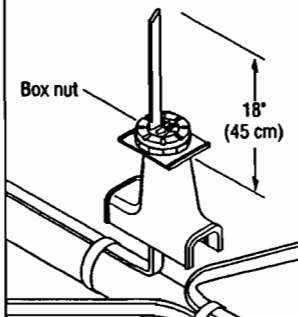


- Allow approximately 24" (60 cm) of heating cable for installation.
- Cut off heating cable end at a 45° angle for easier instertion.

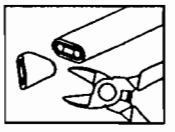
Go to Step 2

2

Complete steps 2 through 6 for each heating cable before going on to the next length of heating cable.



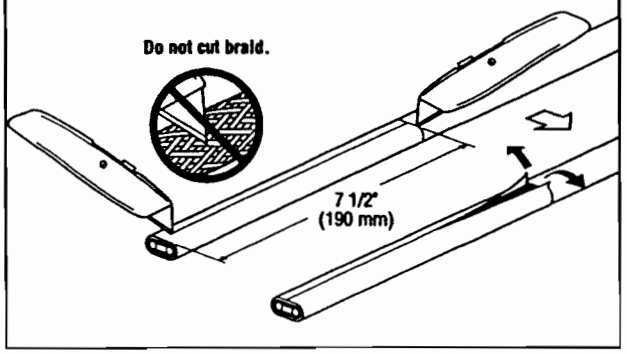
- **Do not remove box nut from stand.** Push heating cable through stand and nut as shown. Use cable lubricant if needed.
- Square off cable end with 90° angle cut.



- Do not attach stand to pipe until step 8.

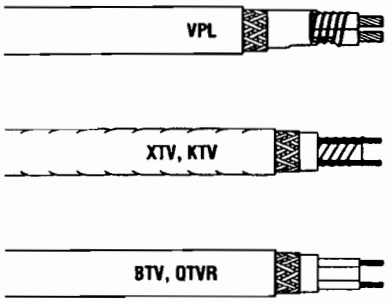
3

- Lightly score outer jacket around and down as shown.
- Bend heating cable to break jacket at score, then peel off jacket.



4

- Determine heating cable type and continue as shown.

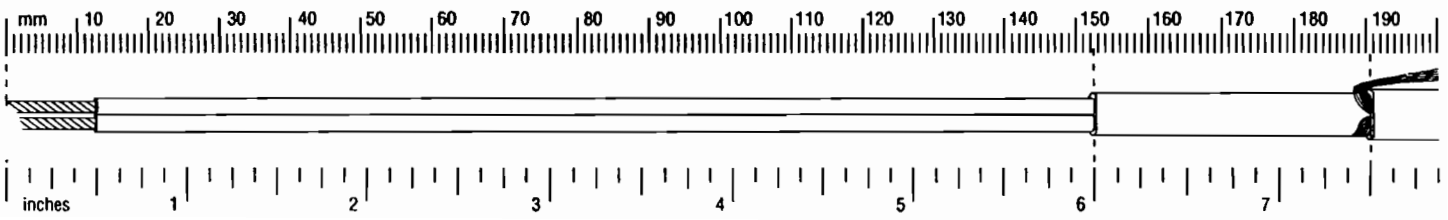


5a

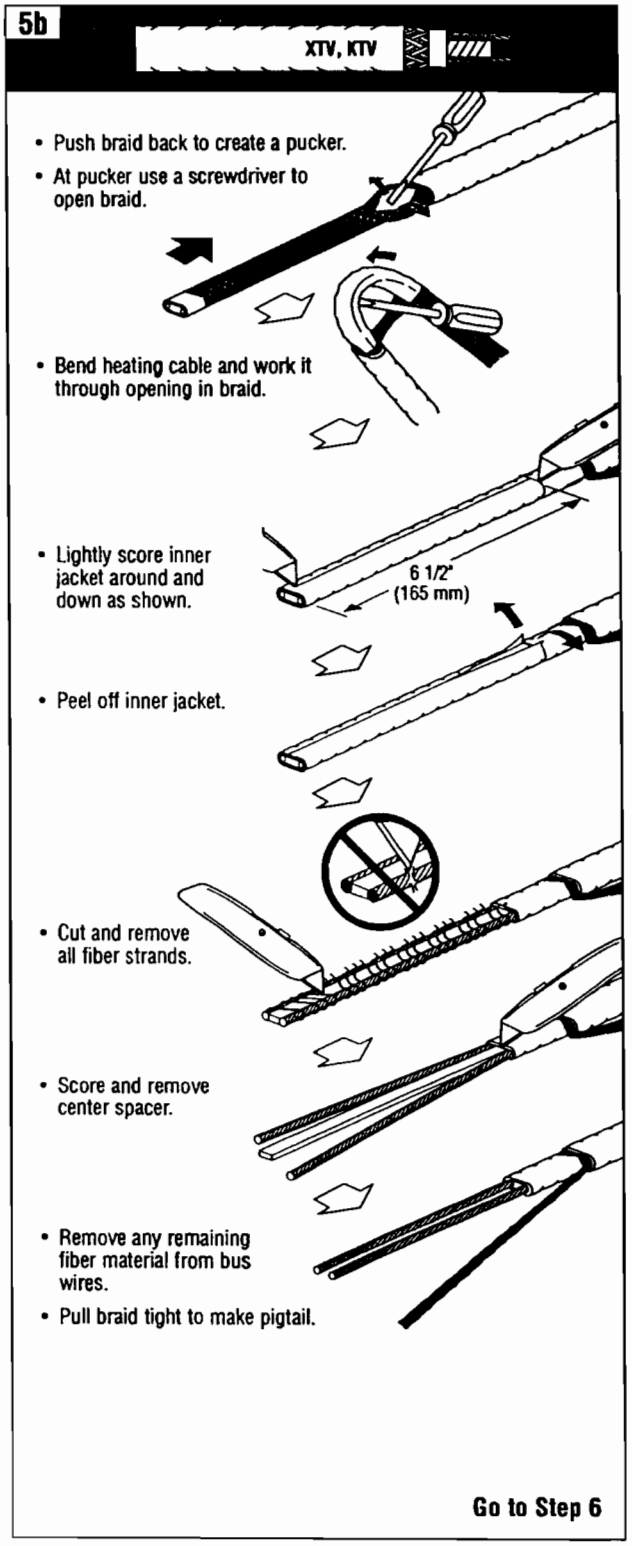
VPL

- Push braid back and bunch as tight as possible.
- Lightly score inner jacket around and down as shown.
- Peel off inner jacket.
- Unwind heating element, cut and remove as shown.
- Lightly score clear jacket around and down as shown.
- Bend heating cable to break jacket at the score then peel off jacket.
- Push braid forward. Use a screwdriver to open braid.
- Bend heating cable and work it through opening in braid.
- Remove insulation from ends of bus wires.
- Pull braid tight to make pigtail.

Go to Step 6

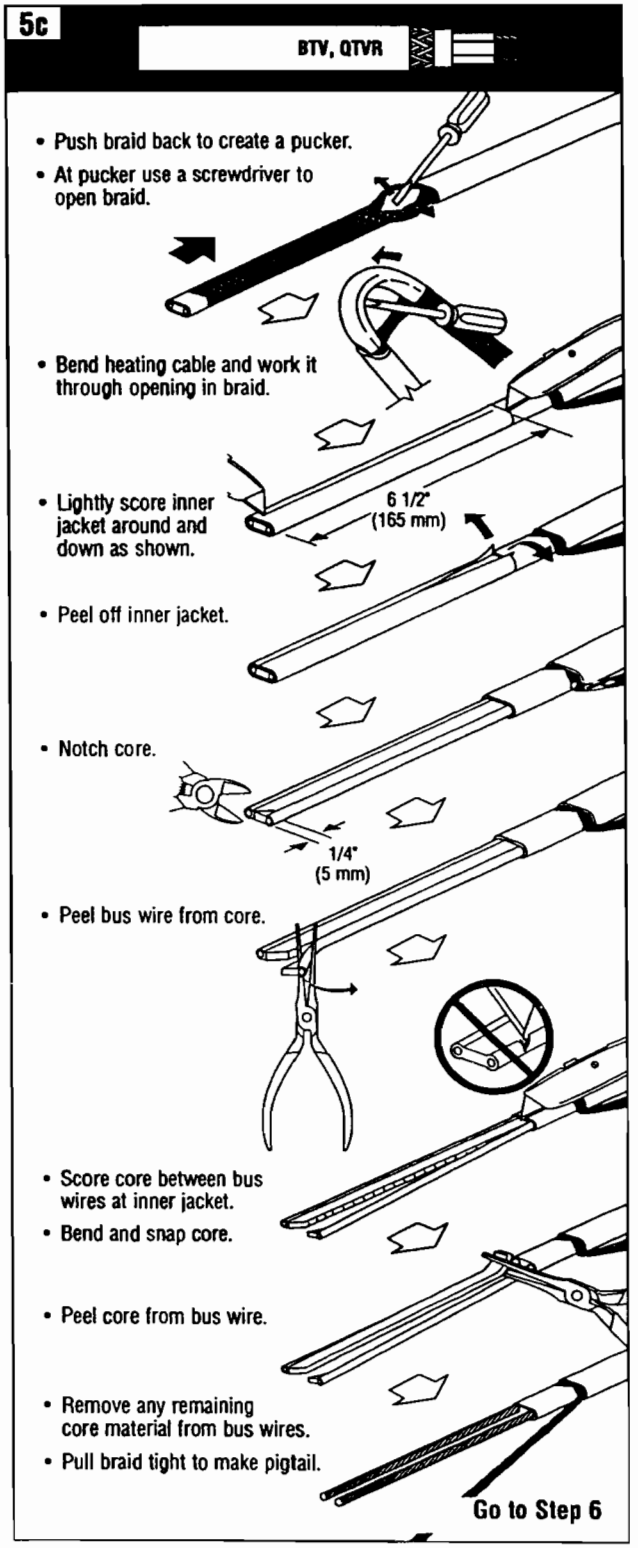


5b XTV, KTV

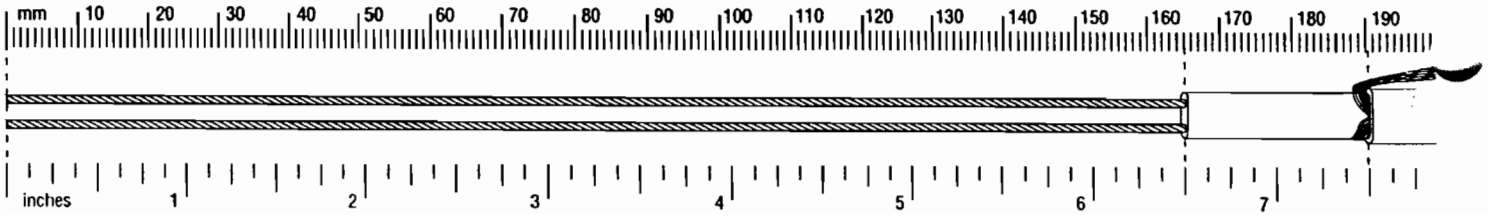


Go to Step 6

5c BTV, QTVR

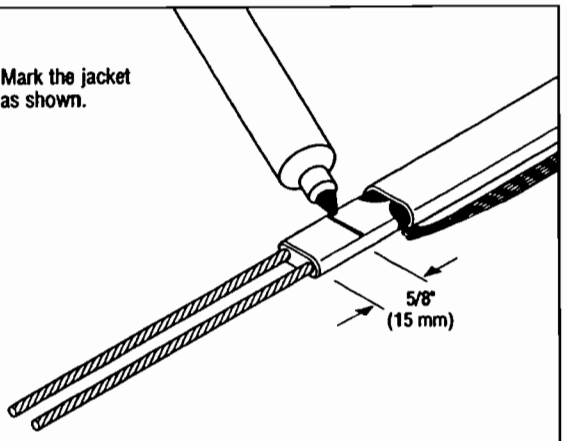


Go to Step 6

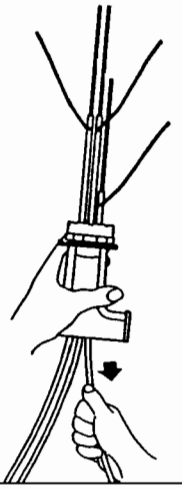


6

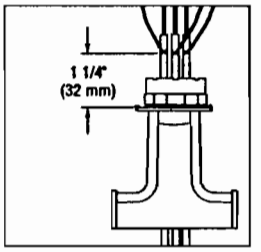
- Mark the jacket as shown.



7



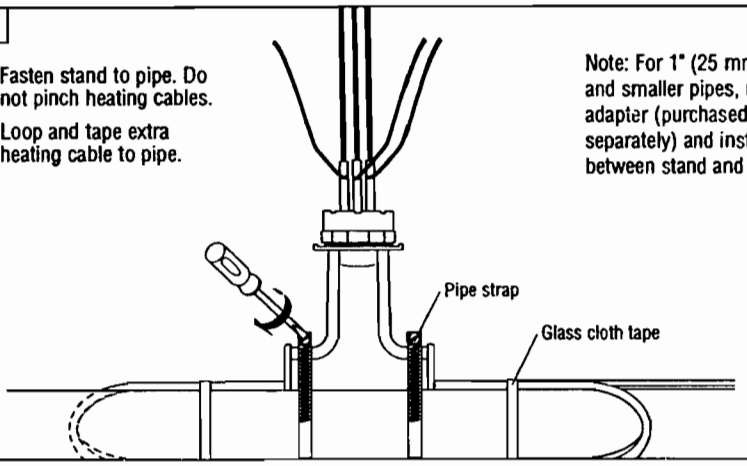
- Pull heating cable back into stand as shown. Use cable lubricant if needed.



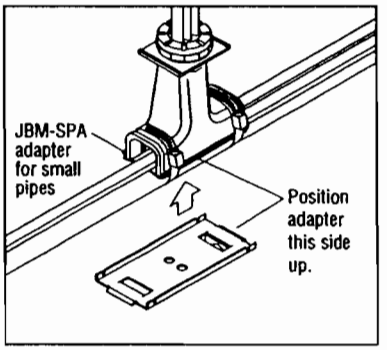
- Repeat steps 2 through 7 for other heating cables before continuing to step 8.

8

- Fasten stand to pipe. Do not pinch heating cables.
- Loop and tape extra heating cable to pipe.

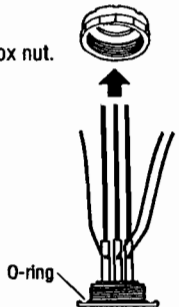


Note: For 1" (25 mm) and smaller pipes, use adapter (purchased separately) and install between stand and pipe.

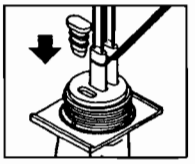


9

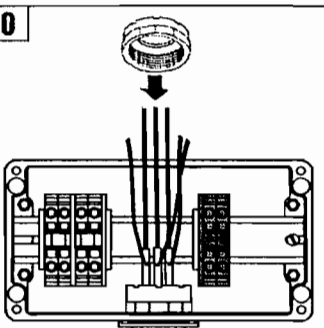
- Remove box nut.



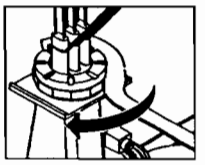
- Install grommet plugs in unused openings.

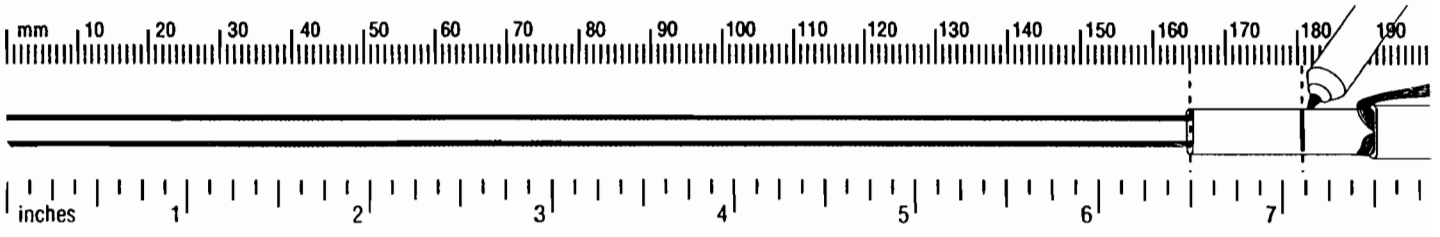


10

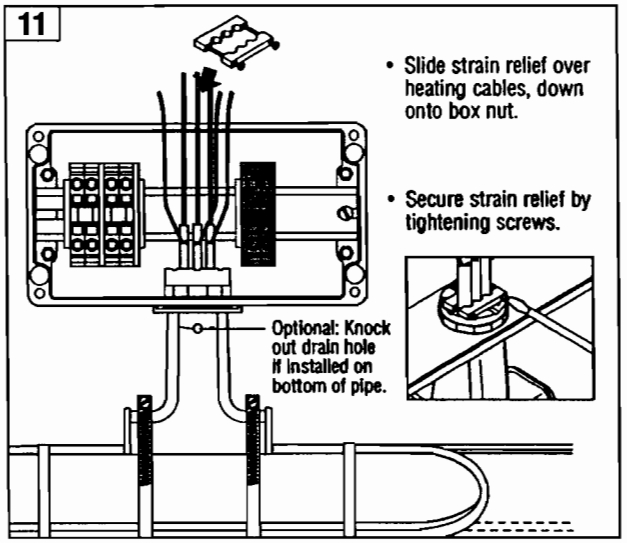


- Place junction box onto stand. Align key ways in large box hole with alignment feature on stand.
- Put box nut back onto stand.
- Tighten box nut with spanner.





11



- Slide strain relief over heating cables, down onto box nut.
- Secure strain relief by tightening screws.

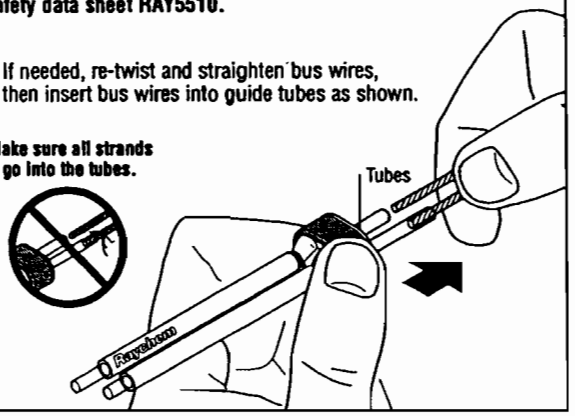
12

⚠ **CAUTION: Health Hazard.**

Wash hands after contact with sealant. Consult material safety data sheet RAY5510.

- If needed, re-twist and straighten bus wires, then insert bus wires into guide tubes as shown.

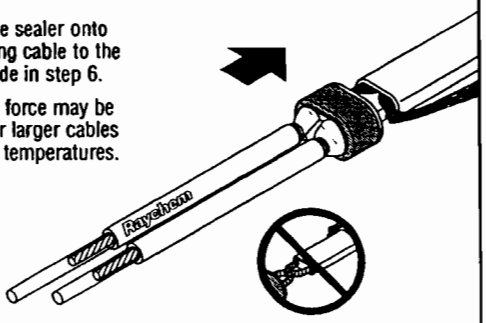
Make sure all strands go into the tubes.



13

- Push core sealer onto the heating cable to the mark made in step 6.

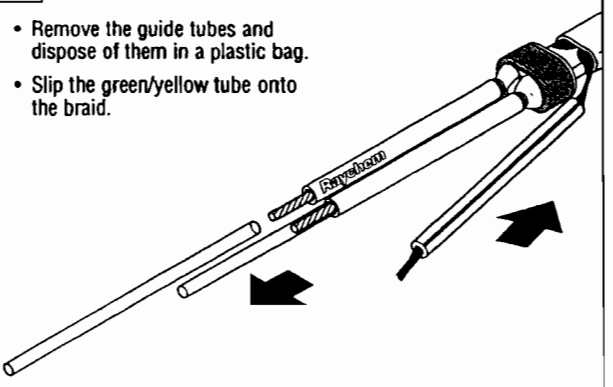
Note: Extra force may be required for larger cables or at lower temperatures.



Make sure the bus wires do not kink, bunch, or crossover.

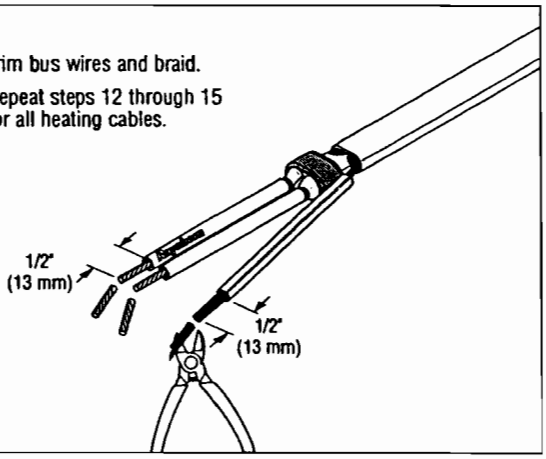
14

- Remove the guide tubes and dispose of them in a plastic bag.
- Slip the green/yellow tube onto the braid.



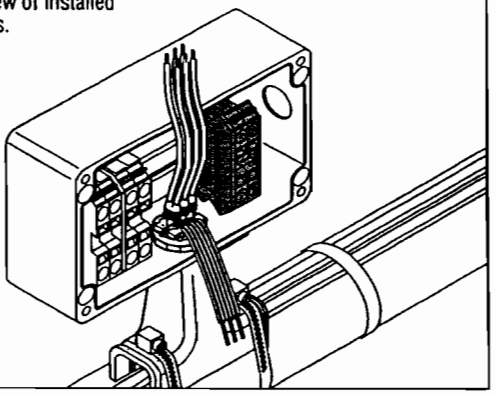
15

- Trim bus wires and braid.
- Repeat steps 12 through 15 for all heating cables.



16

Finished view of installed core sealers.

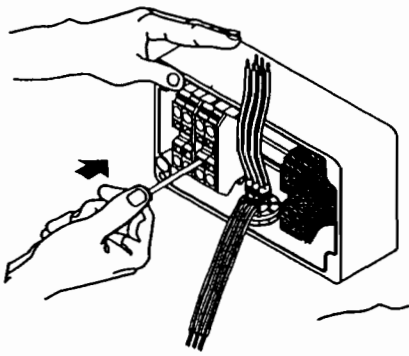


17

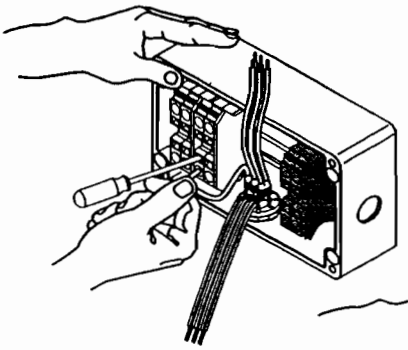
This kit uses spring clamp style terminals.

Terminals use a steel spring to clamp the wire to provide improved vibration resistance, reduced maintenance and faster installation.

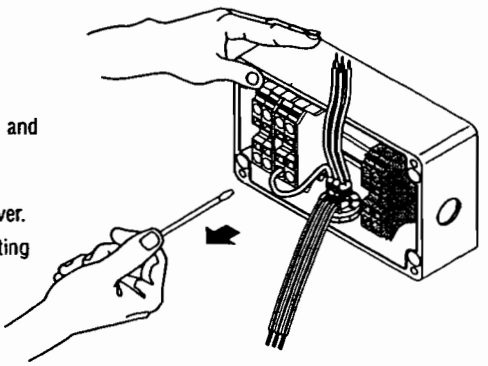
To connect wires, firmly insert a slotted screwdriver into the square hole (①) to open the spring. When fully inserted, the screwdriver will lock into place, allowing you to remove your hand and insert the wire into the round hole (②). Remove the screwdriver to clamp the wire. The wire is held securely against the bus bar for low contact resistance over time without the need to periodically retighten screws.



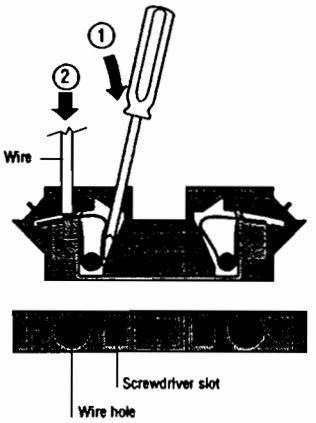
- Refer to wiring diagram, step 18a, 18b, or 18c.
- Push screwdriver FIRMLY into square hole.



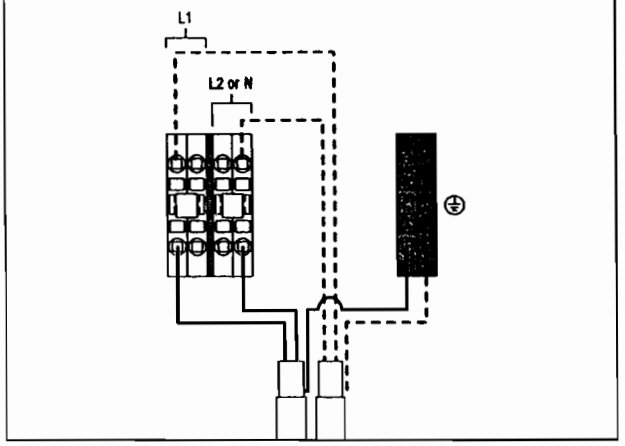
- Insert wire into round hole.
- Use green terminal for braid and ground wires.



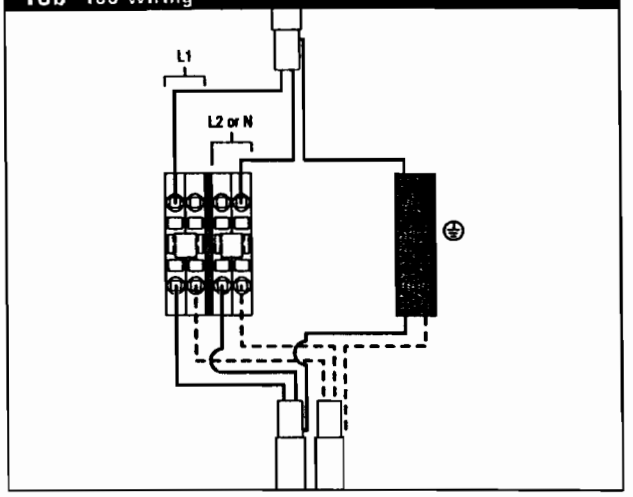
- Remove screwdriver.
- Repeat for all heating cables.



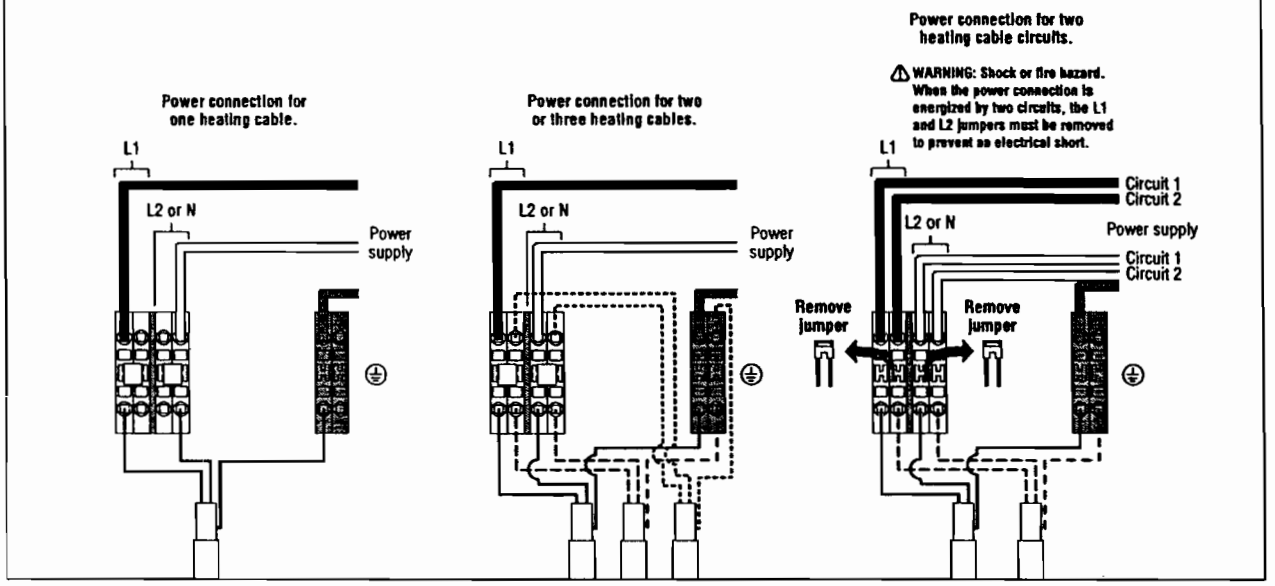
18a Splice Wiring



18b Tee Wiring

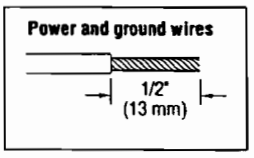


18c Power Connection Wiring



19a If used as a power connection

- Install conduit and fittings as shown. To minimize loosening due to vibration, use flexible conduit.
- Pull in power and ground wires, strip off insulation, and terminate.

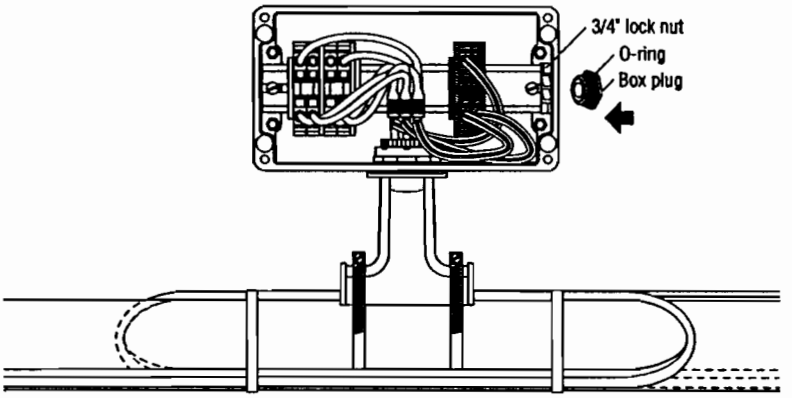


Make sure conductors are not exposed.

- Tyco Thermal Controls recommends the use of a conduit drain to prevent water condensation build-up.

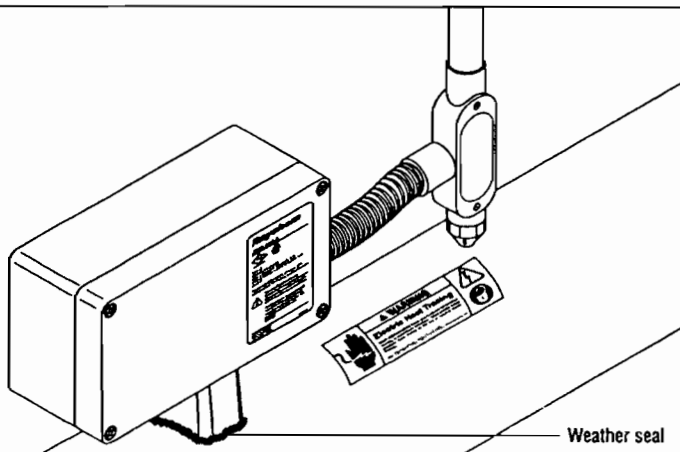
19b If used as a splice or tee connection

- Install box plug.



20

- Install lid.
- Apply insulation and cladding.
- Weather-seal the stand entry.
- Leave these instructions with the end user for future reference.



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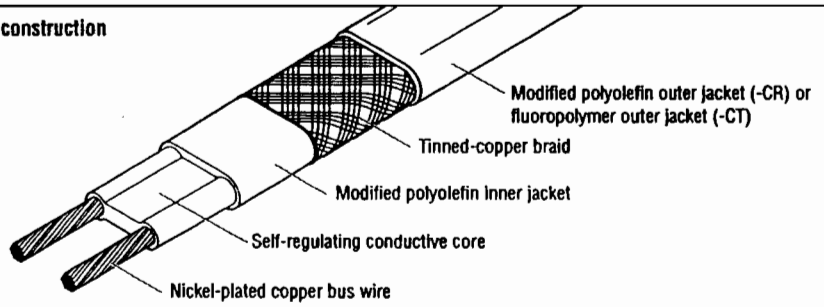
Self-regulating heating cables

Electrical freeze protection for both nonhazardous and hazardous (classified) locations

The BTV family of self-regulating heating cables provides the solution to freeze-protection and process-temperature maintenance applications. BTV heating cables maintain process temperatures up to 150°F (65°C) and can withstand intermittent exposure to temperatures up to 185°F (85°C). The heating cables are configured for use in nonhazardous and hazardous (classified) locations, including areas where corrosives may be present.

Raychem® BTV cables meet the requirements of the U.S. National Electrical Code and the Canadian Electrical Code. For additional information, contact your Tyco Thermal Controls representative or call Tyco Thermal Controls at (800) 545-6258.

Heating cable construction



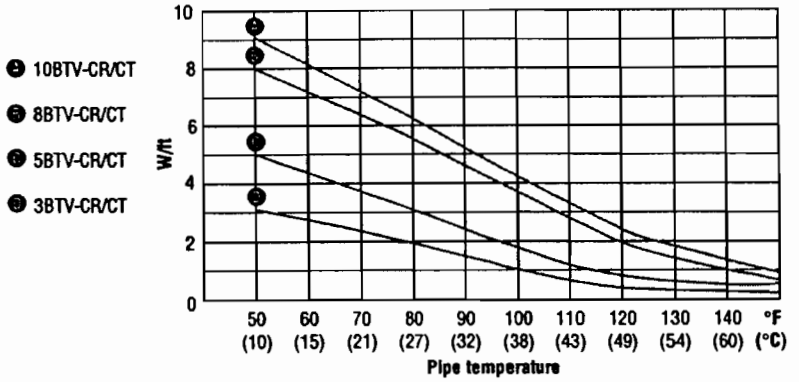
Application	
Area classification	Nonhazardous and hazardous locations
Traced surface type	Metal and plastic
Chemical resistance	Exposure to aqueous inorganic chemicals: Use -CR (modified polyolefin outer jacket) Exposure to organic chemicals or corrosives: Use -CT (fluoropolymer outer jacket) For aggressive organics and corrosives: Consult your Tyco Thermal Controls representative.
Supply voltage	
BTV1	100–130 Vac
BTV2	200–277 Vac
Temperature rating	
Maximum maintain or continuous exposure temperature (power on)	150°F (65°C)
Maximum intermittent exposure temperature, 1000 hours (power on)	185°F (85°C)
Temperature ID number (T-rating)	T6: 185°F (85°C) Temperature ID numbers are consistent with North America national electrical codes.
Approvals	**Hazardous Locations** FM APPROVED, UL LISTED: Class I, Div. 2, Groups A, B, C, D Class II, Div. 2, Groups F, G Class III(1) SP: Class I, Div. 1 & 2(2), Groups A, B, C, D Class II, Div. 1 & 2(2), Groups E, F, G Class III **Zone Approvals** FM APPROVED: CLI, ZN1, AEx e II(3) BTV heating cables also have many other approvals including BASEEFA, PTB, DNV, and ABS.
Design and Installation	For proper design and installation, use TraceCalc® Pro software or the Design section of the *Industrial Product Selection and Design Guide.* Also, refer to the *Installation & Maintenance Manual—Ordinary and CID2 Locations* (H54484). Literature is available through the Tyco Thermal Controls Fax-on-Demand system and via the Tyco Thermal Controls Web site, www.tycothermal.com.

(1) FM Approved only.
(2) BTV-CR is CSA Certified for Division 2 only.
(3) BTV-CT only.

Nominal power output rating on metal pipes at 120 V/240 V

	Adjustment factors	
	Power output	Circuit length
208 V		
3BTV2-CR/CT	0.82	0.96
5BTV2-CR/CT	0.85	0.94
8BTV2-CR/CT	0.89	0.92
10BTV2-CR/CT	0.89	0.92
277 V		
3BTV2-CR/CT	1.13	1.08
5BTV2-CR/CT	1.12	1.09
8BTV2-CR/CT	1.08	1.11
10BTV2-CR/CT	1.08	1.11

To choose the correct heating cable for your application, use the Design section of the *Industrial Product Selection and Design Guide.* For more detailed information, use TraceCalc Pro design software.



Maximum circuit lengths based on circuit-breaker sizes

	Ambient temperature at start-up	Maximum continuous circuit length (in feet) per circuit breaker							
		120 V				240 V			
		15 A	20 A	30 A	40 A	15 A	20 A	30 A	40 A
3BTV-CR/CT	50°F	330	330	330	330	660	660	660	660
	0°F	200	265	330	330	395	530	660	660
	–20°F	175	235	330	330	350	465	660	660
	–40°F	155	205	310	330	310	410	620	660
5BTV-CR/CT	50°F	230	270	270	270	460	540	540	540
	0°F	140	190	270	270	285	380	540	540
	–20°F	125	165	250	270	250	330	500	540
	–40°F	110	145	220	270	220	295	440	540
8BTV-CR/CT	50°F	150	200	210	210	300	400	420	420
	0°F	100	130	200	210	200	265	400	420
	–20°F	85	115	175	210	175	235	350	420
	–40°F	80	105	155	210	155	210	315	420
10BTV-CR/CT	50°F	120	160	180	180	240	315	360	360
	0°F	80	110	160	180	160	215	325	360
	–20°F	70	95	140	180	145	190	285	360
	–40°F	65	85	125	170	125	170	255	340

Note: Tyco Thermal Controls and national electrical codes require both ground-fault protection of equipment and a grounded metallic covering on all heating cables. Following are some of the ground-fault breakers that satisfy this equipment protection requirement: Square D Type QOB-EPD or QO-EPD; Raychem/Square D Type GFPD EHB-EPD (277 Vac); Cutler Hammer (Westinghouse) Type QBGFEP.

Product characteristics

	3BTV 5BTV	8BVT 10BTV
Minimum bend radius	@68°F (20°C):1/2 in (12.7 mm)	@68°F (20°C): 1/2 in (12.7 mm)
Weight (lb per 10 ft, nominal)	0.7	1.0
Bus wire size	16 AWG	16 AWG
Outer jacket color	Black	Black
Heating cable dimensions	0.46 x 0.25 in	0.65 x 0.26 in

Components

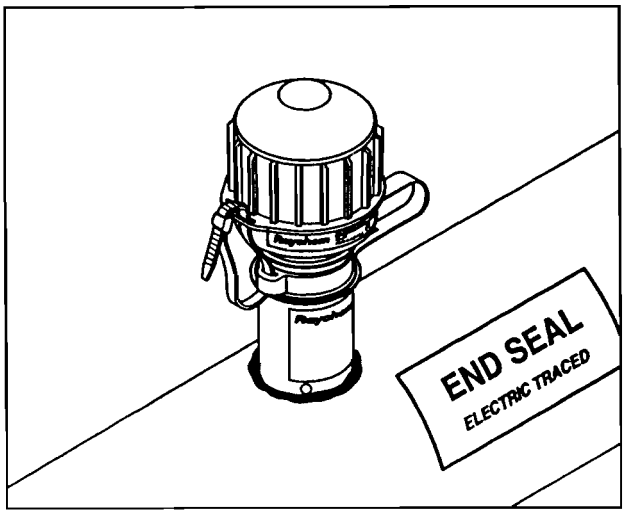
Tyco Thermal Controls offers a full range of components for power connections, splices, and end seals. These components must be used to ensure proper functioning of the product and compliance with warranty, code, and approvals requirements.

Raychem

E-100-L

High-Profile End Seal with Light

Installation Instructions



Description

The E-100-L is a NEMA 4X-rated end seal kit with a light that indicates voltage at the end of the circuit. It is designed for use with Raychem® BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT, and VPL-CT industrial parallel heating cables. Once installed, the end seal is easily re-entered for maintenance. The LED indicator light provides excellent visibility.

This kit may be installed at temperatures as low as –40°F (–40°C). For easier installation store above freezing until just before installation.

Two units are available:

E-100-L1 for 100–120 volts.
E-100-L2 for 200–277 volts.

Make sure voltage rating of light is the same as that of the heat-tracing circuit.

For technical support call Tyco Thermal Controls at (800) 545-6258.

Tools Required

- Wire cutters
- Utility knife
- Needle nose pliers
- Slotted screwdriver or nutdriver
- Panduit CT-100 crimp tool or equivalent

Additional Materials Required

- Pipe strap
- GT-66 or GS-54 glass cloth tape

Optional Materials

- Small pipe adapter for 1" (25 mm) and smaller pipes: Catalog number JBS-SPA P/N E90515-000

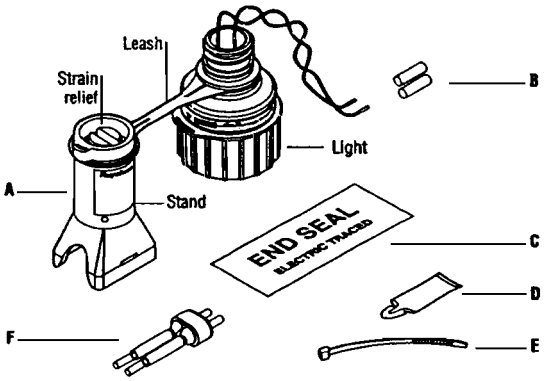
Approvals

	Hazardous Locations
CLI, ZN1, AEx em II [1]	Class I, Div. 2, Groups A, B, C, D
	Class II, Div. 1 and 2, Groups E, F, G
	Class III

[1] Except VPL

Kit Contents

Item	Qty	Description
A	1	End seal and light assembly
B	2	Insulated parallel crimps
C	1	End seal label
D	1	Cable lubricant
E	1	Cable tie
F	1	Core sealer



⚠ WARNING:

This component is an electrical device that must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all of the installation instructions.

- To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with the requirements of Tyco Thermal Controls, agency certifications, and the National Electrical Code, ground-fault equipment protection must be used. Arcing may not be stopped by conventional circuit breakers.
- Component approvals and performance are based on the use of Tyco Thermal Controls-specified parts only. Do not use substitute parts or vinyl electrical tape.
- The black heating cable core and fibers are conductive and can short. They must be properly insulated and kept dry.
- Damaged bus wires can overheat or short. Do not break bus wire strands when scoring the jacket or core.
- Keep components and heating cable ends dry before and during installation.
- Bus wires will short if they contact each other. Keep bus wires separated.
- Use only fire-resistant insulation materials, such as fiberglass wrap or flame-retardant foam.
- Leave these installation instructions with the user for future use.

⚠ CAUTION:

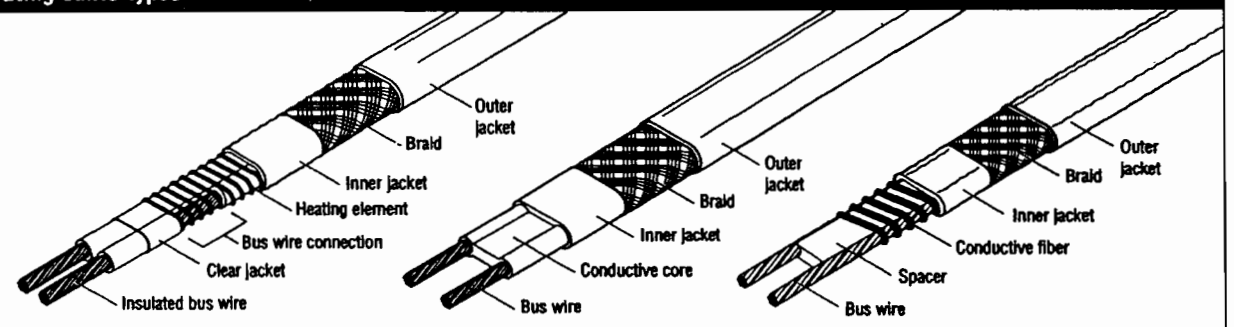
Health Hazard: Prolonged or repeated contact with the sealant in the core sealer may cause skin irritation. Wash hands thoroughly. Overheating or burning the sealant will produce fumes that may cause polymer fume fever. Avoid contamination of cigarettes or tobacco. Consult MSDS RAY5510 for further information.

CHEMTREC 24-hour emergency telephone: (800) 424-9300.

Non-emergency health and safety information: (800) 545-6258.

E-100-L Installation Instructions

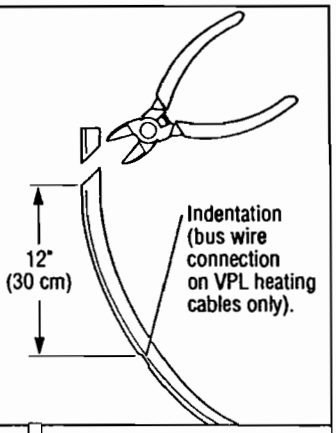
Heating cable types



VPL-CT **BTV-CR, BTV-CT, QTVR-CT** **XTV-CT, KTV-CT**

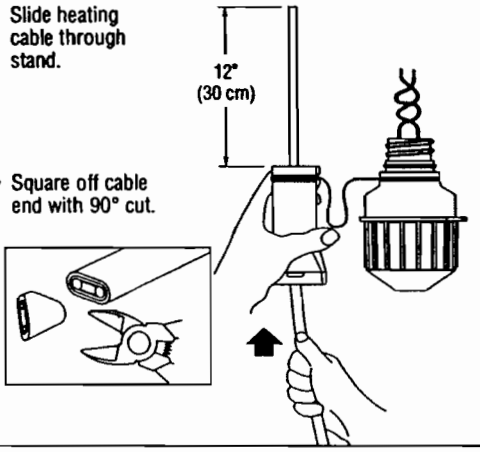
1

- Allow approximately 24" (60 cm) of heating cable for installation. For VPL, cut cable 12" (30 cm) from bus indentation.
- Cut off heating cable end at about 45° for easier insertion.
- Apply lubricant for easier insertion into stand.

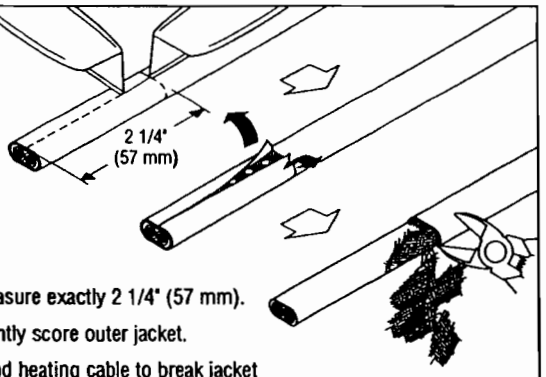


2

- Slide heating cable through stand.
- Square off cable end with 90° cut.



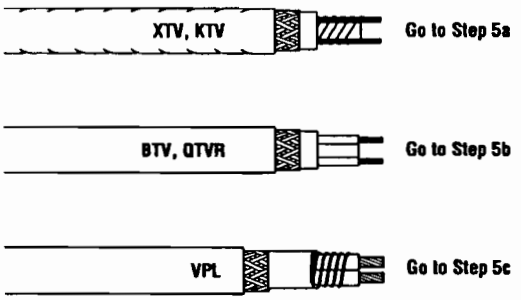
3



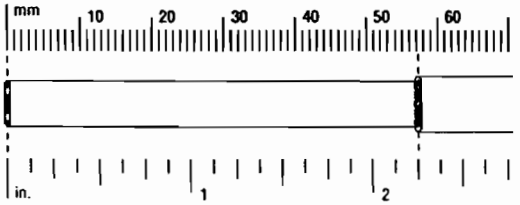
- Measure exactly 2 1/4" (57 mm).
- Lightly score outer jacket.
- Bend heating cable to break jacket at score; peel off jacket.
- Remove all exposed braid.

4

- Determine heating cable type and continue as shown.



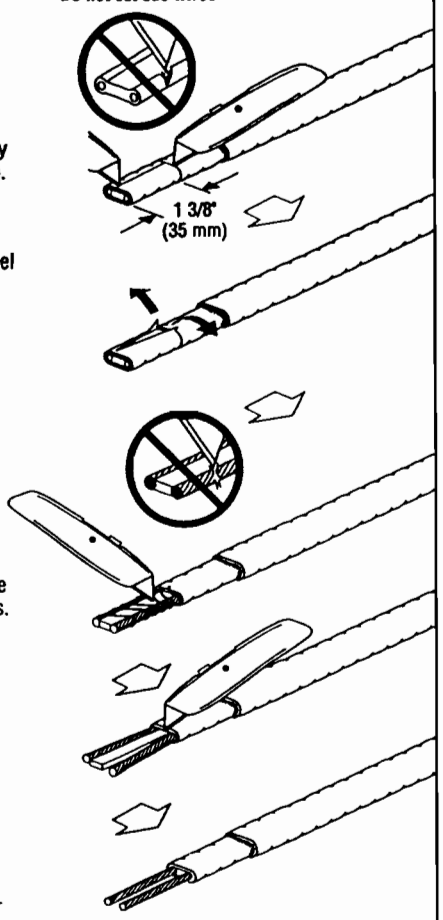
Strip length guide



5a XTV, KTV

Do not cut bus wires

- Measure exactly 1 3/8" (35 mm).
- Lightly score inner jacket; peel off jacket.
- Cut and remove all fiber strands.
- Score and remove center spacer.
- Remove any remaining fiber material from bus wires.

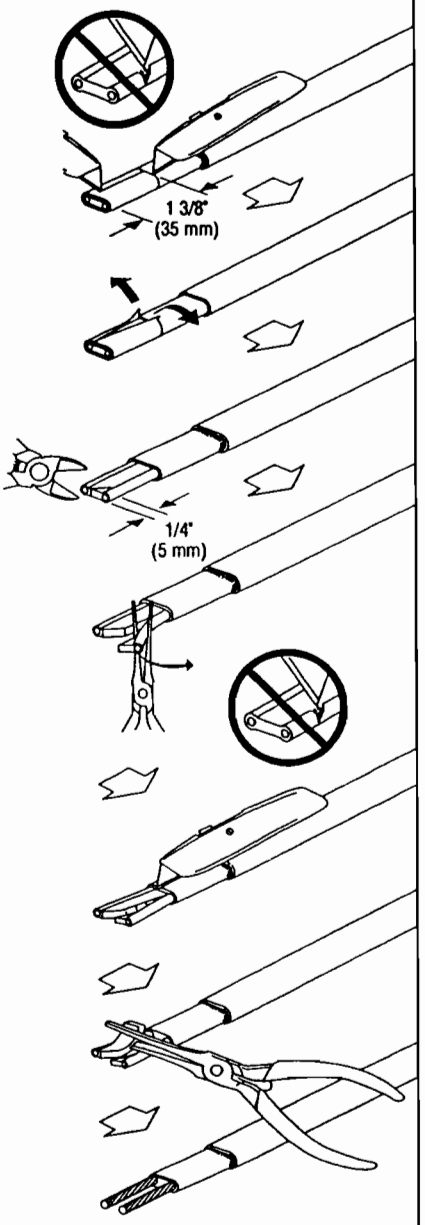


Go to Step 6

5b BTV, QTVR

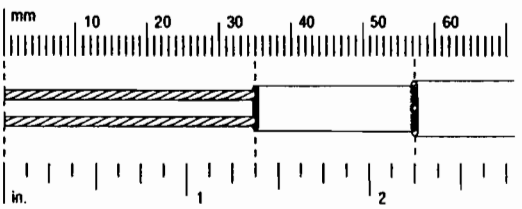
Do not cut bus wires

- Measure exactly 1 3/8" (35 mm).
- Lightly score inner jacket; peel off jacket.
- Notch core.
- Peel bus wire from core.
- Score core between bus wires at inner jacket.
- Bend and snap core.
- Peel core from bus wire.
- Remove any remaining core material from bus wires.

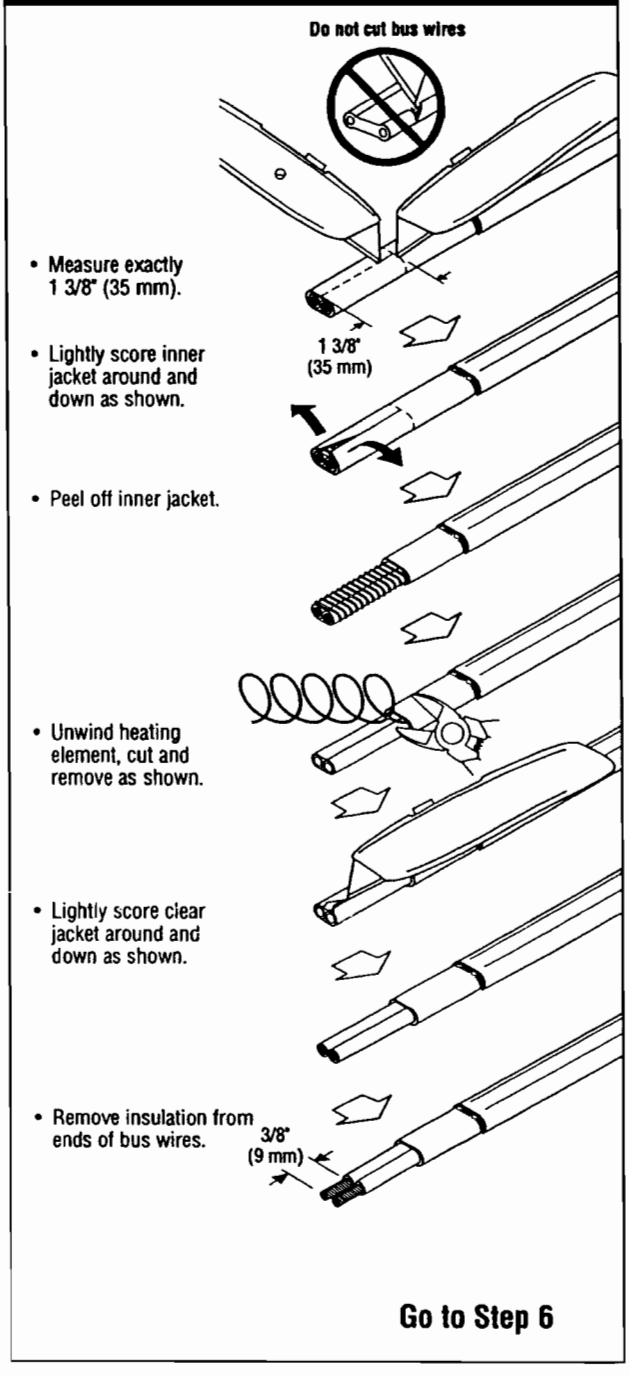


Go to Step 6

Strip length guide for XTV, KTV, BTV and QTVR

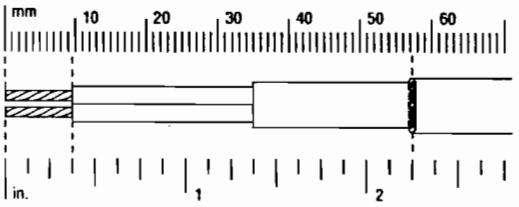


5c VPL



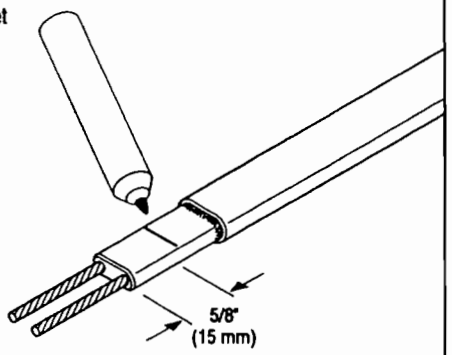
Go to Step 6

Strip length guide for VPL



6

- Mark the jacket as shown.



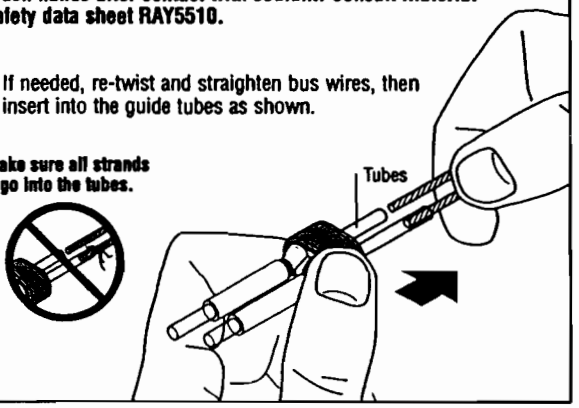
7

⚠ **CAUTION: Health Hazard.**

Wash hands after contact with sealant. Consult material safety data sheet RAY5510.

- If needed, re-twist and straighten bus wires, then insert into the guide tubes as shown.

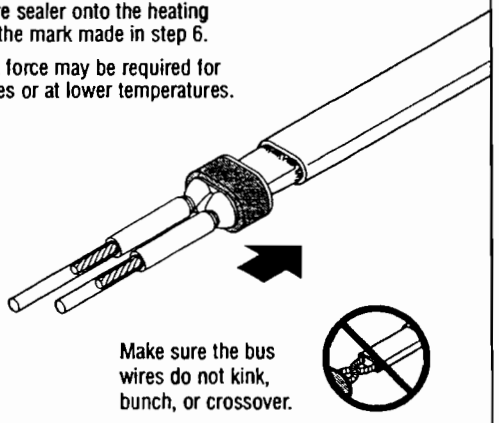
Make sure all strands go into the tubes.



8

- Push core sealer onto the heating cable to the mark made in step 6.

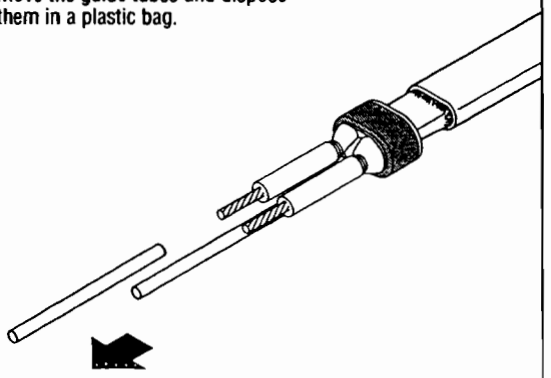
Note: Extra force may be required for larger cables or at lower temperatures.



Make sure the bus wires do not kink, bunch, or crossover.

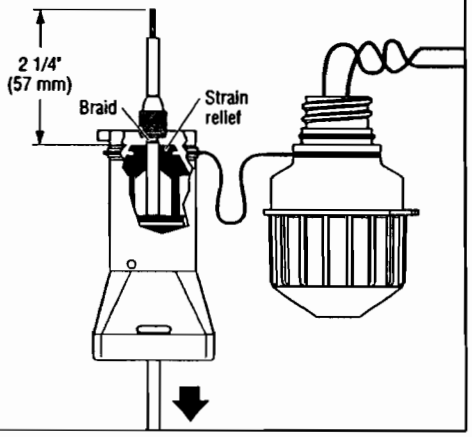
9

- Remove the guide tubes and dispose of them in a plastic bag.



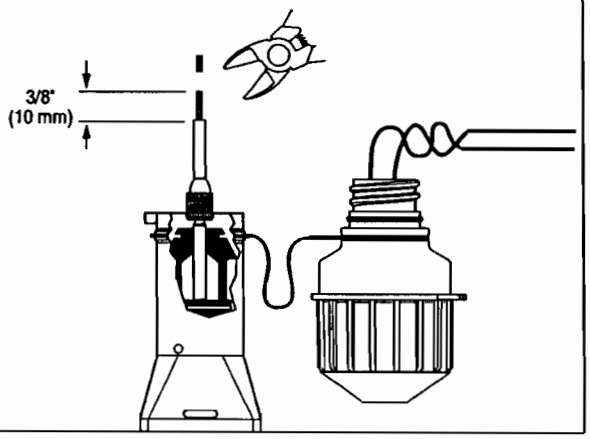
10

- Pull cable back through end seal stand until braid is just visible above strain relief.



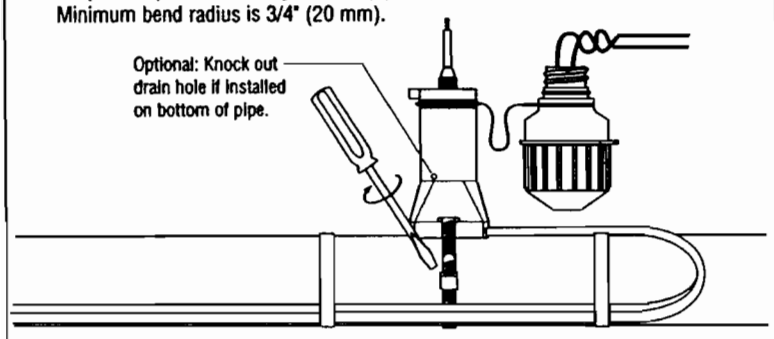
11

- Trim exposed conductors.

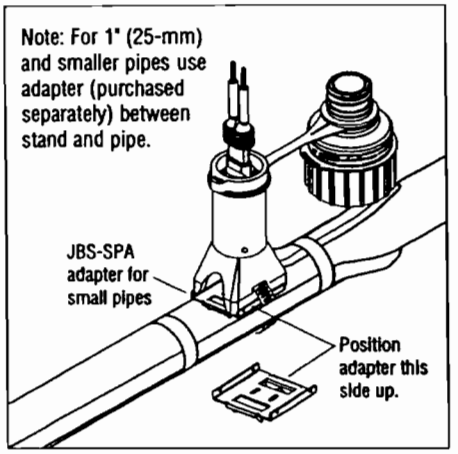


12

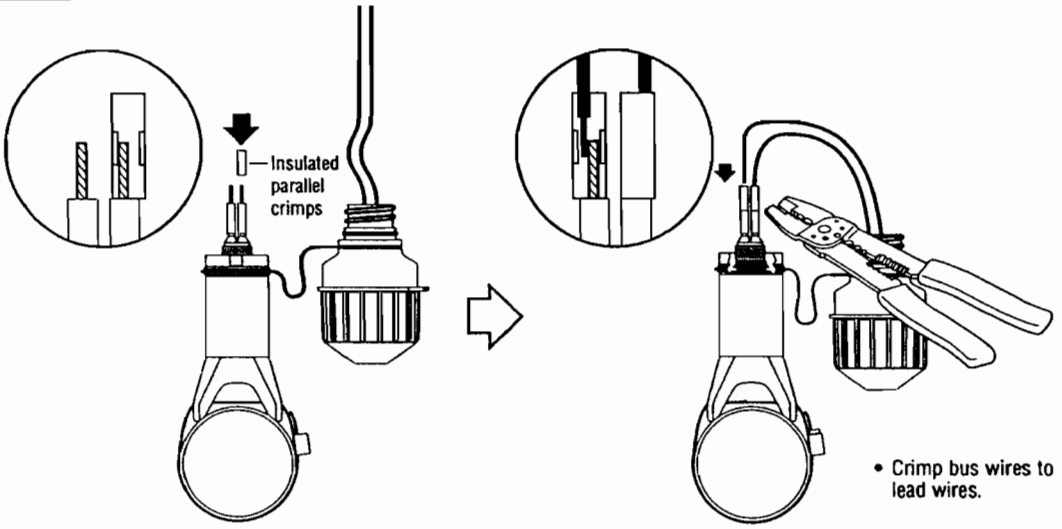
- Fasten end seal stand to pipe with pipe strap. Do not pinch heating cable. Be sure pipe strap is under heating cable.
- Loop and tape extra heating cable to pipe. Minimum bend radius is 3/4" (20 mm).



Note: For 1" (25-mm) and smaller pipes use adapter (purchased separately) between stand and pipe.



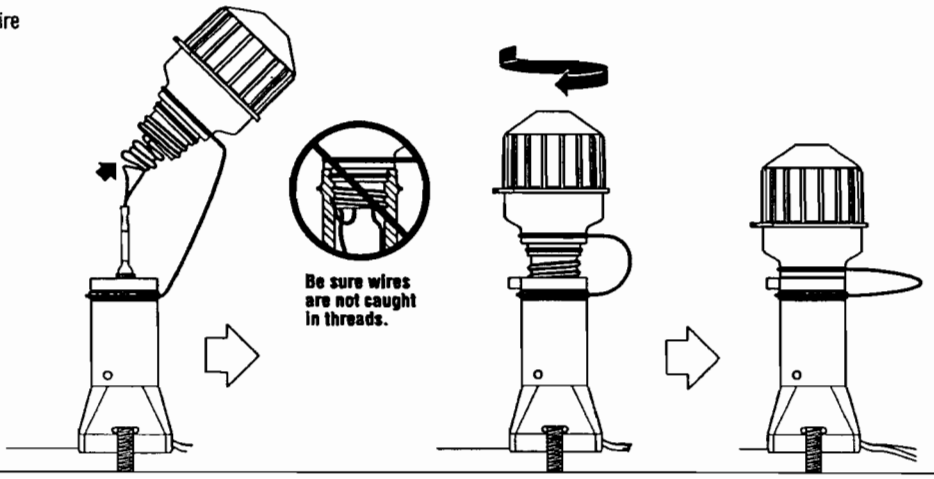
13



- Crimp bus wires to lead wires.

14

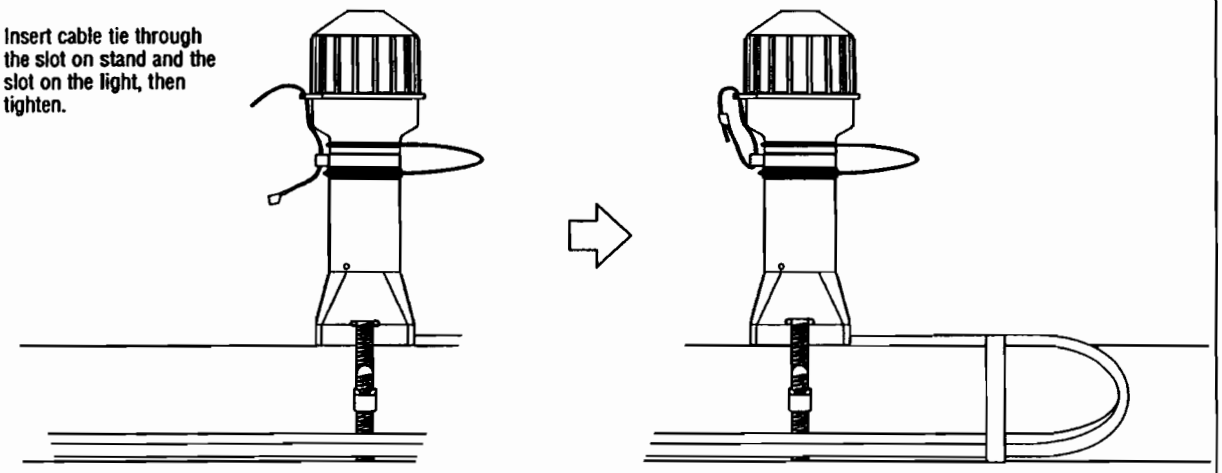
- Push excess wire inside light.



- Tighten light onto end seal stand.

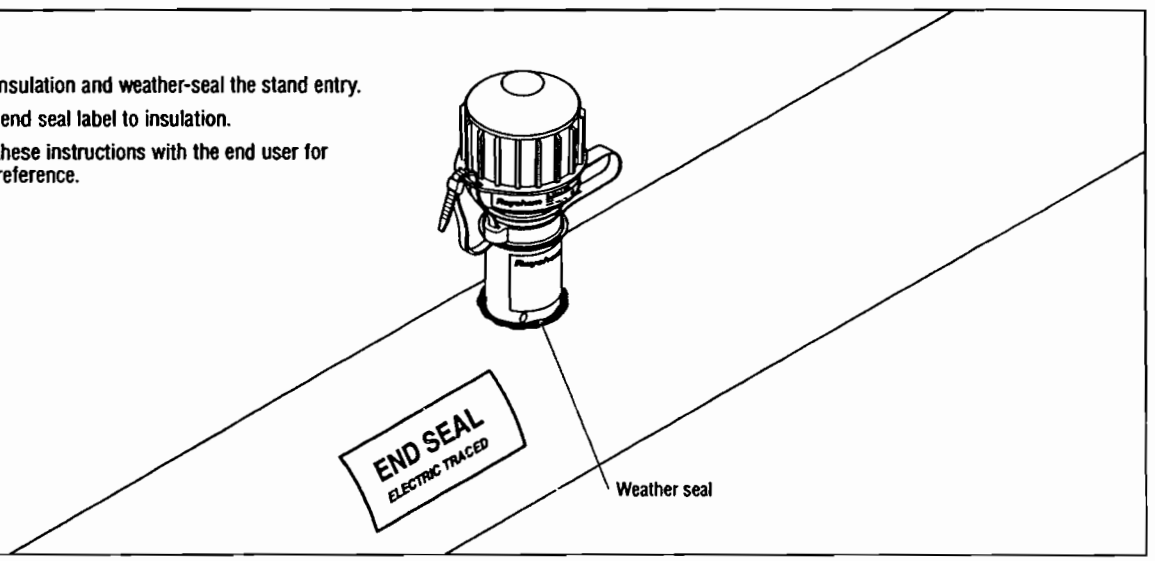
15

- Insert cable tie through the slot on stand and the slot on the light, then tighten.



16

- Apply insulation and weather-seal the stand entry.
- Fasten end seal label to insulation.
- Leave these instructions with the end user for future reference.



Troubleshooting Guide

Problem	*Troubleshooting steps*
Light is dim or off.	1. Check that light voltage rating matches supply voltage for heat-tracing circuit. Supply voltage lower or higher than light rating will cause malfunctions. 2. Check that heat-tracing circuit is energized. Although the circuit breaker is on, control devices such as thermostats may switch heating cable off. 3. Following electrical safety procedures, disconnect supply voltage, unscrew light from end seal base and check that crimp connections to heating cable bus wires are tight and not crossed or shorted. Loose connections or shorts will cause malfunctions. 4. With circuit off, attach volt meter leads to crimps. Energize circuit and measure voltage at light. Use the following table to determine whether the voltage measured is within the acceptable range.

Catalog name	Nominal voltage	Acceptable voltage range
E-100-L1	100–120 Vac	58–132 Vac
E-100-L2	200–277 Vac	145–305 Vac

- *If voltage at light is in acceptable range and connections are good*, the light may be defective or damaged. Replace light.
- *If there is no voltage at the light*, there may be breaks in the heating cable between the power connection and the end seal. Check for splice or tee connections that may be left open.
- *If voltage at light is above specified limits*, the light may be off. Voltages above specified range can damage light. Replace light with correct version for line supply voltage or adjust supply voltage accordingly.
- *If voltage at light is present but below specified limits*, the light may be dim or off. The following table lists typical causes for low voltages and possible solutions.

Cause	Solution
Supply voltage at start of circuit is low (light is designed to work with supply voltages within 10% of nominal).	Increase power wire gauge size to reduce voltage drop between panel and heating cable power connection.
Heating cable length is too long (light is designed to work with published maximum circuit lengths).	Split heating cable into multiple circuits. Shorten length of heating cable.
Heating cable is started under very cold conditions (heating-cable voltage drop is very high for first minutes of very cold start-up).	Wait for heating cable to warm up. Voltage at light will increase.
Heating cable controller is reducing voltage (light may not work with controllers that phase fire to reduce line voltage).	Turn off phase firing function in heating cable controller.

Problem	*Troubleshooting steps*
Cap cannot be tightened completely.	1. Check that heating cable is installed and stripped correctly. The top of the insulated parallel crimps should be 2 3/8" (60 mm), or less, above the top of the plastic strain relief in the stand. 2. Check that core sealer is positioned properly. The end of the core sealer must be flush against the plastic strain relief in the stand. 3. Check that the threads on the light and stand are clean. The connection wires between the heating cable and the light should not be caught in stand threads.

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info@tycothermal.com
www.tycothermal.com

Attachment Products

Catalog number	Part number	Description
GT-66	C77220-000	66-ft (20-m) roll of glass tape for attaching heating cable to pipe. Not for stainless-steel pipes or for installation temperatures below 40°F (4.4°C).
GS-54	C77221-000	54-ft (16.5-m) roll of glass tape for attaching heating cable to pipe. For stainless-steel pipes or for any installation below 40°F (4.4°C).
AT-180	158139-000	180-ft (55-m) roll of aluminum tape for attaching heating cables and thermostat sensors to pipes and tanks.

Pipe Straps

PS-01	C77211-000	1/4–1 in	(6–25 mm)
PS-03	C77212-000	1–2 in	(25–75 mm)
PS-10	C77213-000	2–10 in	(75–250 mm)
PS-20	C77216-000	10–20 in	(250–500 mm)

Used to secure connection components and brackets to pipes. Order by pipe diameter, as shown above.

Labels

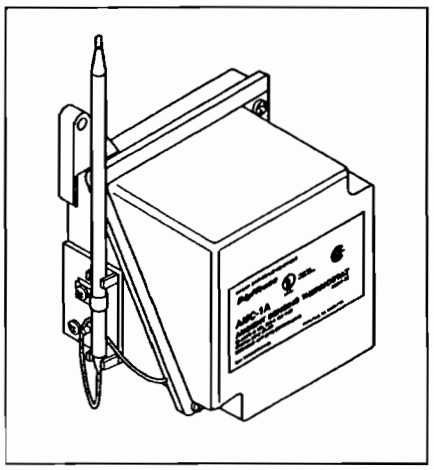
Catalog number	Part number	Description
ETL	C77203-000	"Electric Traced" label for identifying traced pipes and tanks.

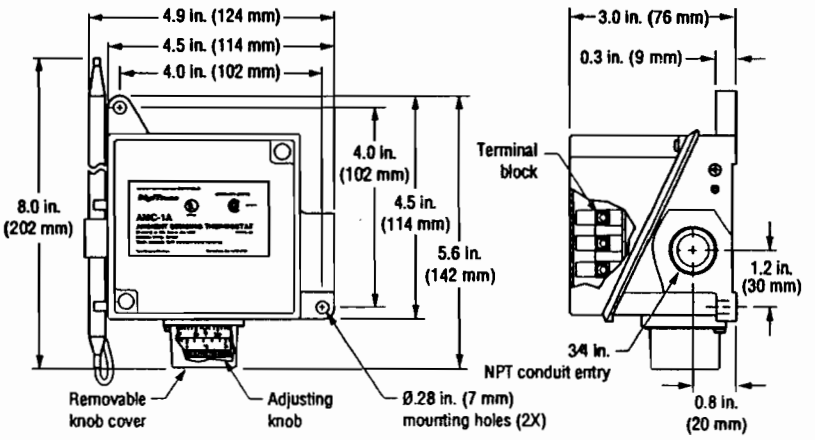
DigiTrace

AMC-1A

Ambient-sensing thermostat for nonhazardous locations

Installation Instructions





Description

The AMC-1A thermostat is designed for controlling freeze protection heat-tracing systems in nonhazadous locations. The thermostat responds to ambient temperature changes. The AMC-1A can be used to control a heat-tracing circuit directly (see Figure 1 on back page) or it can be used to control a contactor coil (see Figure 2).

Specifications

Enclosure	NEMA 4X, polyurethane-coated cast-aluminum housing, stainless-steel hardware
Entries	One 3/4" NPT conduit hub
Set point range	15°F to 140°F (–9°C to 60°C)
Sensor exposure limits	–40°F to 160°F (–40°C to 71°C)
Housing exposure limits	–40°F to 160°F (–40°C to 71°C)
Switch	SPDT
Electrical rating	22 A at 125/250/480 Vac
Accuracy	±6°F (±3.3°C)
Deadband	2°F to 12°F (1.1°C to 6.7°C) above actuation temperature
Set point repeatability	±3°F (±1.7°C)
Sensor type	Fixed fluid-filled (silicone) bulb and capillary
Sensor material	300 series stainless steel
Connection terminals	Screw terminals, 10–14 AWG (2–5 mm²)

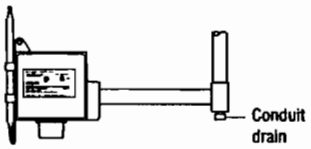
Approvals

⚠ WARNING:

This component is an electrical device. It must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all the installation instructions.
Component approvals and performance are based on the use of specified parts only. Do not use substitute parts or vinyl electrical tape to make connections.

AMC-1A Installation Instructions

Installing the Thermostat



1. Verify that the thermostat is suitable for the area where it is to be installed.
2. Check the line voltage and the heat-tracing load to ensure that the thermostat ratings are not exceeded.
3. Mount the unit in a position that prevents condensation from draining into the enclosure from the connecting conduit (see diagram at left).

Positioning

4. Mount ambient-sensing units in the area exposed to the coldest temperature and the most wind. **Do not mount on the side of a warm building or in a location that is exposed to warm air currents or direct sun light.**

Setting and Adjusting

5. Set the thermostat dial to the desired temperature and finish wiring.

Wiring

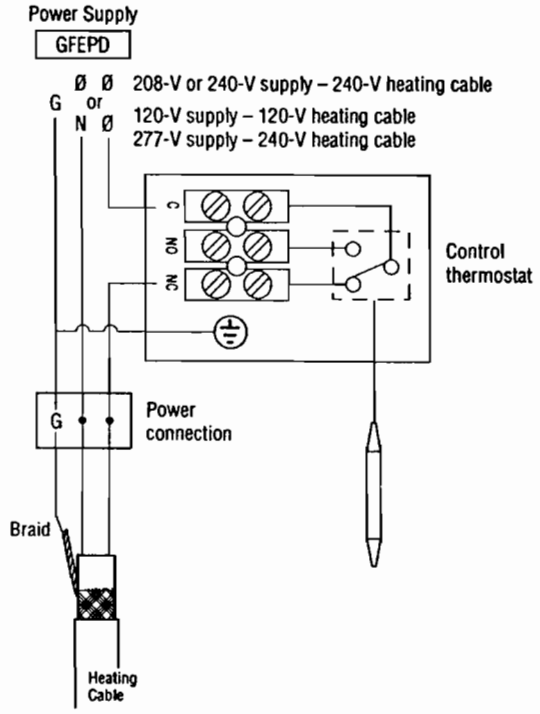


Figure 1. Heat-tracing control

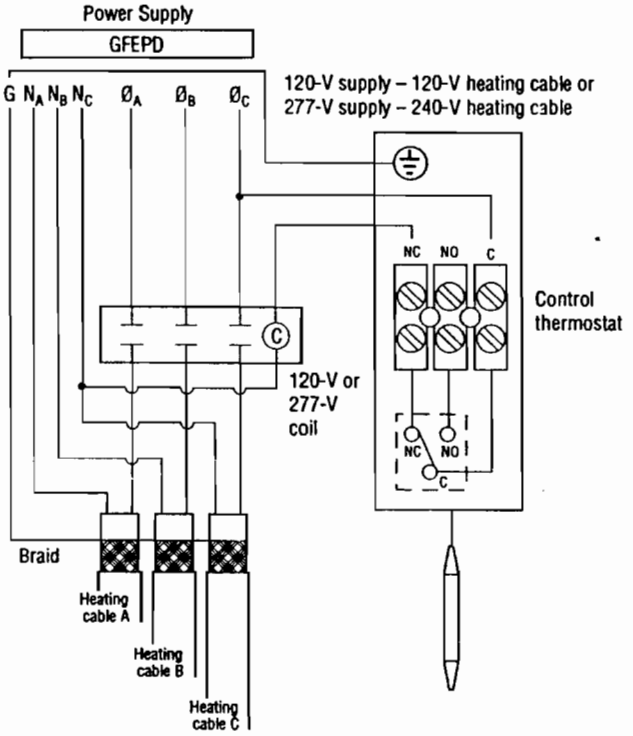


Figure 2. Controlling a contactor

For switching heat-tracing loads greater than 22 A or switching multiple heat-tracing circuits.

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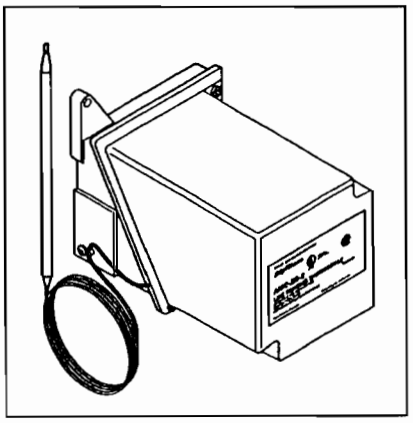
info@tycothermal.com
www.tycothermal.com

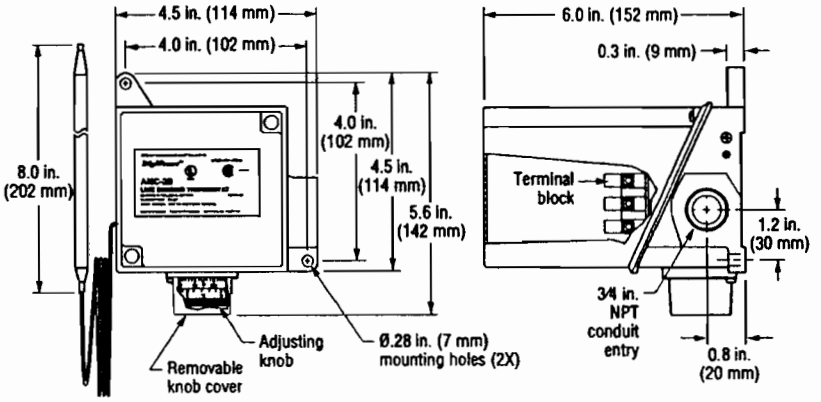
DigiTrace

AMC-2B-2

Double pole line-sensing thermostat for nonhazardous locations

Installation Instructions





Description

The AMC-2B-2 thermostat is designed for controlling heat-tracing systems in nonhazardous locations. The thermostat functions as a DPST switch.

The DPST switch will enable and disable current flow in both buses of the heat-tracing cable.

The AMC-2B-2 can be used to control heat-tracing circuits in a pipe-sensing mode directly (see Figure 1 on back).

Note: Do not use this thermostat to control two separate heat-tracing circuits.

Additional Material Required

AT-180 aluminum tape

Specifications

Enclosure	NEMA 4X, polyurethane-coated cast-aluminum housing, stainless-steel hardware
Entries	One 3/4" NPT conduit hub
Setpoint range	25°F to 325°F (–4°C to 163°C)
Sensor exposure limits	–40°F to 420°F (–40°C to 215°C)
Housing exposure limits	–40°F to 160°F (–40°C to 71°C)
Switch	DPST
Electrical rating	22 A at 208/240 Vac
Relay coil	208–240 Vac, 4 VA
Accuracy	±6°F (±3.3°C)
Deadband	2°F to 12°F (1.1°C to 6.7°C) above actuation temperature
Setpoint repeatability	±3°F (±1.7°C)
Sensor type	Fluid-filled (silicone) bulb and 9 ft (2.7 m) capillary
Sensor material	300 series stainless steel
Connection terminals	Screw terminals, 10–14 AWG (2–5 mm²)

Approvals

UL LISTED CSA

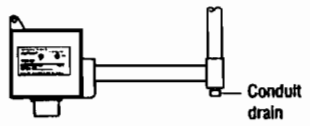
⚠ WARNING:

This component is an electrical device. It must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all the installation instructions.

Component approvals and performance are based on the use of specified parts only. Do not use substitute parts or vinyl electrical tape to make connections.

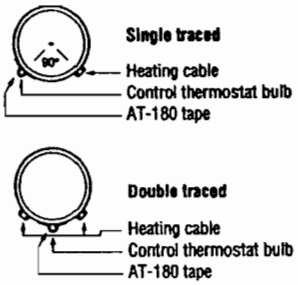
AMC-2B-2 Installation Instructions

Installing the Thermostat



1. Verify that the thermostat is suitable for the area where it is to be installed.
2. Check the line voltage and the heat-tracing load to ensure that the thermostat ratings are not exceeded.
3. Mount the unit using unistrut or the Raychem Universal Mounting Bracket (UMB-263757) in a position that prevents condensation from draining into the enclosure from the connecting conduit (see diagram at left).

Positioning the Sensor Bulb



4. Position the bulb in the lower quadrant of the pipe as shown in the diagram to the left. **Place the bulb at least three feet from pipe supports, valves, or other heat sinks; protect the capillary from kinks or bends less than 1/2 inch in radius.**
5. Tape the bulb firmly to the pipe with AT-180 aluminum tape, making sure there is no air space between the bulb and pipe. **Do not overlap the bulb and heating cable with the same piece of AT-180 tape.**
6. For metal-tank-wall sensing, use the BCK-35 bulb clamp (purchased separately from Raychem) and install the clamp per the instructions provided. Make sure there is no air space between the tank wall and the bulb.

   For installation on plastic tanks, contact Tyco Thermal Controls at (800) 545-6258.

Setting the Thermostat

7. Set the thermostat dial to the desired temperature, then finish wiring.
8. Complete insulating. Do not turn the system on until the bulb is covered with thermal insulation.
9. Fill the piping or tank. Once the thermostat has begun to cycle, check the fluid temperature with an immersed thermostat (best for plastic systems) or an accurate temperature indicator. Adjust the dial setting, if necessary.

Wiring

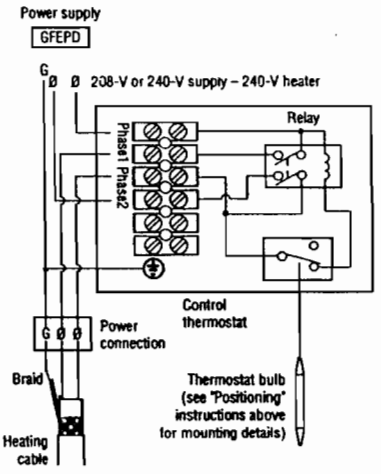


Figure 1. Heat-tracing control

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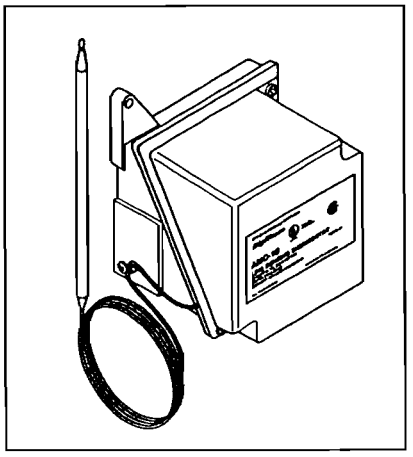
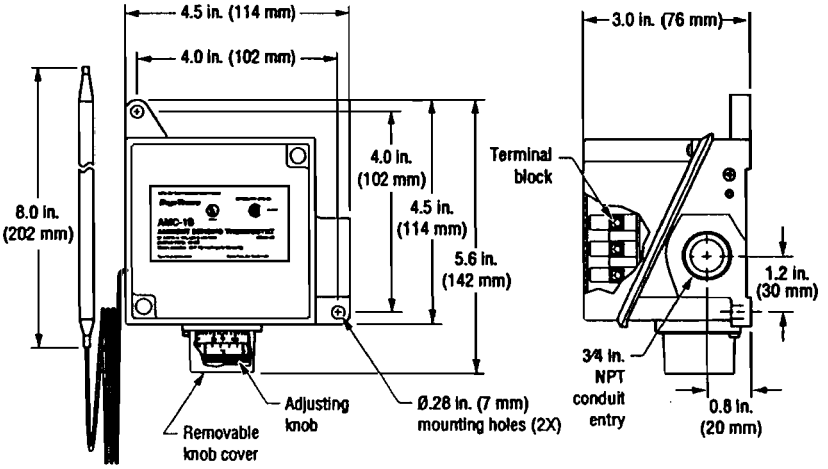
DigiTrace

AMC-1B

Line-sensing thermostat for nonhazardous locations

Installation Instructions





Description

The AMC-1B thermostat is designed for controlling heat-tracing systems in nonhazardous locations. The AMC-1B can be used to control heat-tracing circuits in a pipe-sensing mode (see Figure 1 on back), to indicate low-temperature (Figure 2) or high temperature (Figure 3) alarm conditions, or to control the coil on a contactor (Figure 4).

Specifications

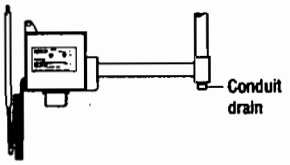
Enclosure	NEMA 4X, polyurethane-coated cast-aluminum housing, stainless-steel hardware
Entries	One 3/4" NPT conduit hub
Set point range	25°F to 325°F (–4°C to 163°C)
Sensor exposure limits	–40°F to 420°F (–40°C to 215°C)
Housing exposure limits	–40°F to 160°F (–40°C to 71°C)
Switch	SPDT
Electrical rating	22 A at 125/250/480 Vac
Accuracy	±6°F (±3.3°C)
Deadband	2°F to 12°F (1.1°C to 6.7°C) above actuation temperature
Set point repeatability	±3°F (±1.7°C)
Sensor type	Fluid-filled (silicone) bulb and 9 ft (2.7 m) capillary
Sensor material	300 series stainless steel
Connection terminals	Screw terminals, 10–14 AWG (2–5 mm²)

Approvals

⚠ WARNING:

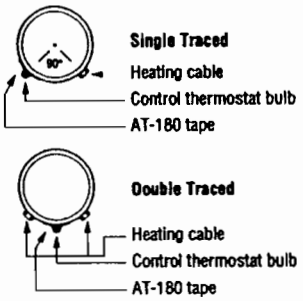
This component is an electrical device. It must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all the installation instructions.
Component approvals and performance are based on the use of specified parts only. Do not use substitute parts or vinyl electrical tape to make connections.

Thermostat Installation Instructions



1. Verify that the thermostat is suitable for the area where it is to be installed.
2. Check the line voltage and the heat-tracing load to ensure that the thermostat ratings are not exceeded.
3. Mount the unit using unistrut or the Raychem Universal Mounting Bracket (UMB-263757) in a position that prevents condensation from draining into the enclosure from the connecting conduit (see diagram at left).

Positioning the Sensor Bulb



4. Position the bulb in the lower quadrant of the pipe as shown in the diagrams to the left. **Place the bulb at least three feet from pipe supports, valves, or other heat sinks; protect the capillary from kinks or bends less than 1/2 inch in radius.**
5. Tape the bulb firmly to the pipe with AT-180 aluminum tape, making sure there is no air space between the bulb and pipe. **Do not overlap the bulb and heating cable with the same piece of AT-180 tape.**
6. For metal-tank-wall sensing, use the BCK-35 bulb clamp (purchased separately from Raychem) and install the clamp per the instructions provided. Make sure there is no air space between the tank wall and the bulb.

   For installation on plastic tanks, contact Tyco Thermal Controls at (800) 545-6258.

Setting the Thermostat

7. Set the thermostat dial to the desired temperature, then finish wiring.
8. Complete insulating. Do not turn the system on until the bulb is covered with thermal insulation.
9. Fill the piping or tank. Once the thermostat has begun to cycle, check the fluid temperature with an immersed thermostat (best for plastic systems) or an accurate temperature indicator. Adjust the dial setting, if necessary.

Wiring

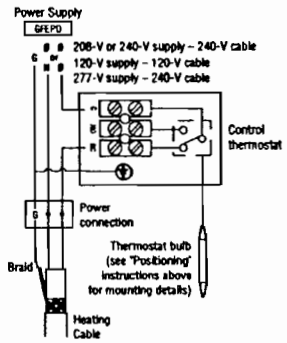


Figure 1. Pipe-sensing

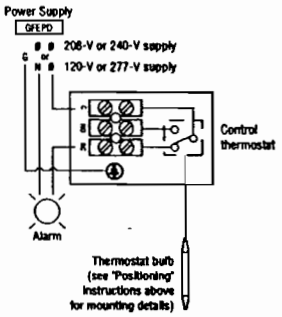


Figure 2. Low-temperature alarm

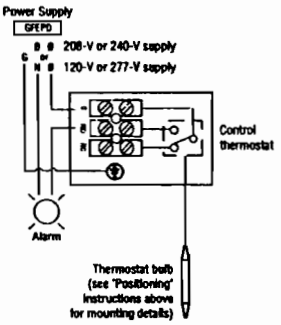


Figure 3. High-temperature alarm

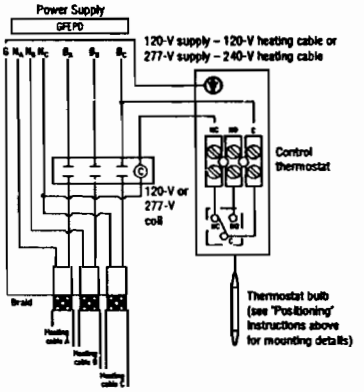


Figure 4. Contactor control

For switching heat-tracing loads greater than 22 A or switching multiple heat-tracing circuits.

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Tank & Pipe Fabrication Board

General Information

Tank & Pipe Fabrication Board is a resin bonded, basalt rock fibrous insulation board product. Tank & Pipe Fabrication Board is specifically designed and manufactured to provide the superior machining characteristics required by producers of bias-cut and faced tank & piped wrap products. Tank & Pipe Fabrication Board provides superior physical integrity during rigorous fabrication processes. Tank & Pipe Fabrication Board may be applied to surfaces operating from -120°F to a maximum of 1,000°F

Features	Benefits
- Superior thermal conductivity	- Maximum prevention of heat loss
- Wide range of service temperatures	- Continuous service, -120°F to 1,000°F
- Low in-service shrinkage; 0% @ 1,050°F (551°C)	- Less potential for gaps forming at joints from elevated operating temperatures
- Light weight	- Minimum labour
- Minimal fabrication dust	- Cleaner to handle
- Good compressive strength	- Tough, durable finished product
- Non-wicking	- Negligible water damage
- Easy to fabricate	- Maximize machine time yields

Physical Properties

Thermal conductivity (ASTM C177)	"K" Factor BTU in./hr.sqft.°F
75°F mean	.25
100°F mean	.26
200°F mean	.33
400°F mean	.52
600°F mean	.81
Service Temperature Range	-120°F to 1,000°
Nominal Density (per ASTM C-612-83)	F
Flame Spread (E-84)	4.0lb./cu. ft.
Smoke Developed (E-84)	5
Fuel Contributed (E-84)	0
Moisture Absorption	0
Does not promote corrosion of metallic surfaces	< 1%
Does not promote fungi or bacterial	

growth
Non-wicking

Packaging
Standard Package Quantity - Contact Customer Service
Standard Package - Heat-Shrink Poly
Standard Sizes - 2" thickness 24" x 48"
3" or 4" thickness 36" x 48"
Non-standard sizes and packaging available.
Please inquire as to non-standard pricing and availability.

Test Method & Specification Compliance
ASTM C-795-92
ASTM C-612
ASTM C-177
NRC 1.36
Fed. Spec. HH-I-558B
MIL -I-24244B

Notes:
1) Adequate vapour barrier finish must be provided for application to systems operating below ambient temperature.
2) Orders for material requiring certification of testing. ie. NRC 1.34, are to be considered SPECIAL ORDERS and required special pricing.
- Thermal conductivity data given is for TANK & PIPE FABRICATION BOARD. Thermal performance of a bias-sawn tank or pipe insulation will differ substantially

Customer Service: . 1-800-265-7514
Customer Service Fax: . 1-800-363-4440
Phone: . 1-519-336-7770
Technical Assistance: . 1-800-585-8857
info@fibrex.on.ca

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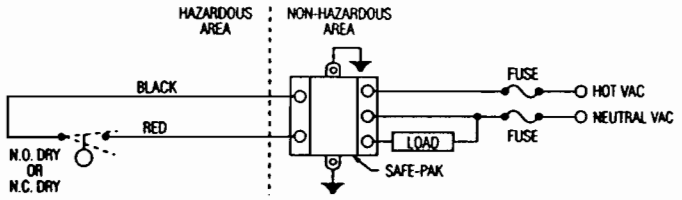
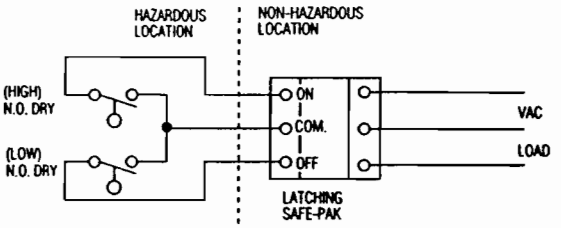
Best Viewed at 800 x 600

Typical Wiring Diagrams

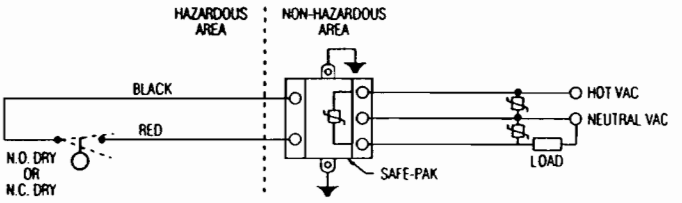


SAFE-PAK, Part Numbers 25872, 25873, 44075, 64101 or 144600 with sensor switch in hazardous location.



Latching SAFE-PAK, Part Number 41705 or 41715 handling high and low level sensors located in hazardous area for pump-down control. For pump-up, use two N.C. dry switches.

Transient Protection for SAFE-PAK (AC Loads) Use a properly sized metal oxide varistor (MOV) as shown below.



Installation and maintenance must be in accordance with the National Electrical Code and the applicable GEMS INSTRUCTION, INSTALLATION and SERVICE bulletin.

Tank Tracing
1. Gather information
2. Calculate tank heat loss
3. Choose heating technology
4. Product selection
5. Select thermostatic control

HEATING CABLE COMPONENT SELECTION FOR SELF-REGULATING AND POWER-LIMITING CABLES

Now that you have determined your heating cable type and length, use the following chart to select the proper components.

Note: Tyco Thermal Controls offers a full range of components for power connections, splices, and end seals. These components must be used to ensure proper functioning of the product and compliance with warranty, code, and approvals requirements.

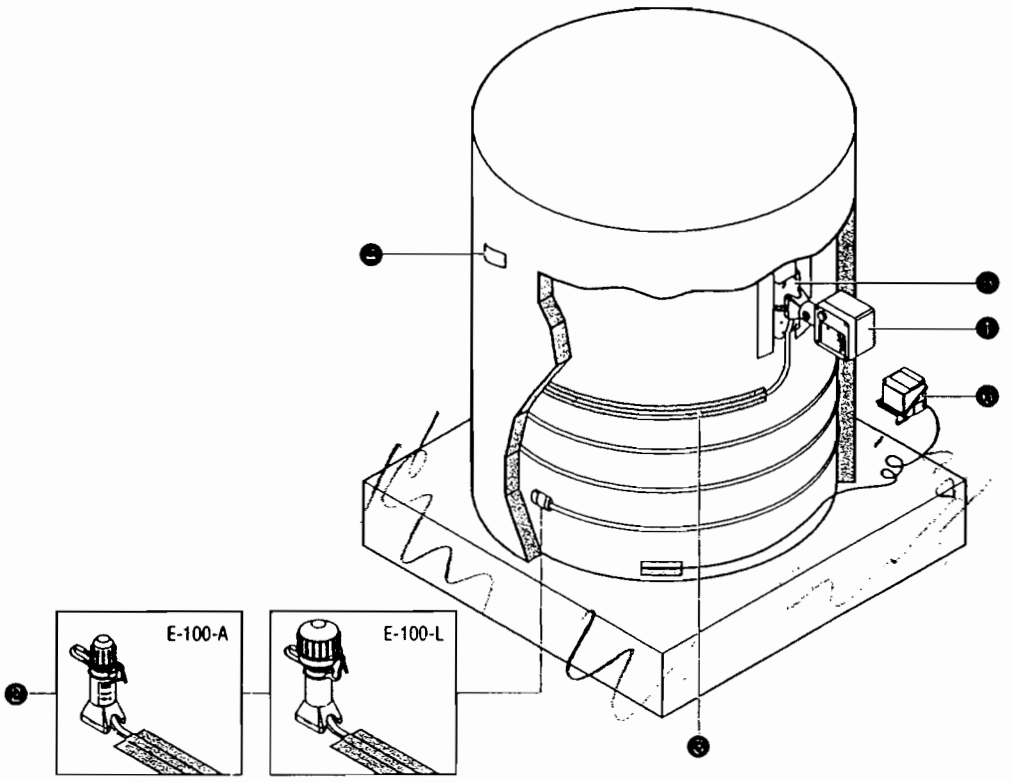


Fig. 9 Tank-tracing system components and accessories

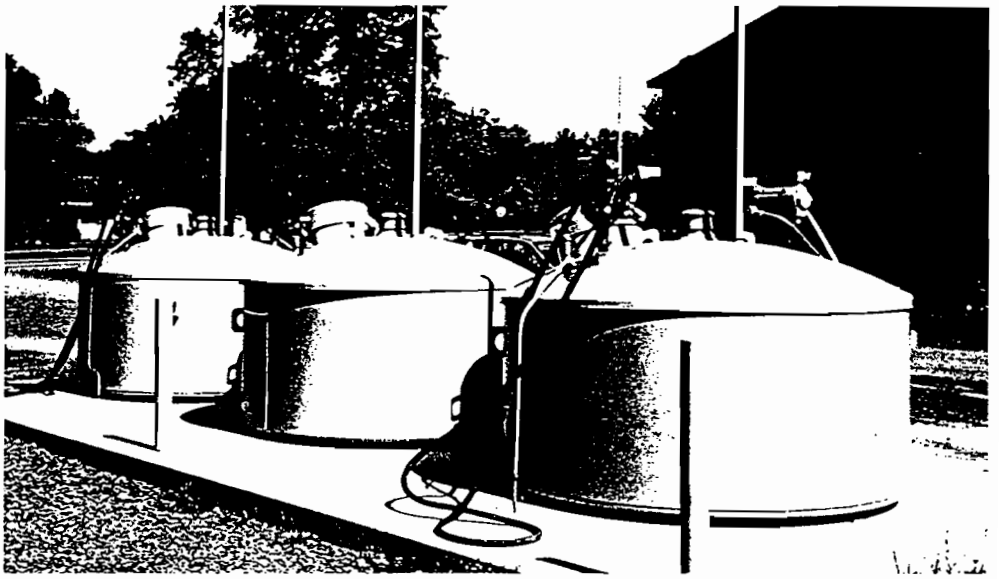
⚠ WARNING: Fire hazard.
To prevent fire or shock, Raychem brand specified components must be used. Do not substitute parts or use vinyl electrical tape.

Table 4 Component and Accessory Selection for Self-Regulating and Power-Limiting Cables

Description		Catalog number
Components		
❶	Power connection kit (not shown)	JBS-100-A
	Power connection kit with light	JBS-100-L-A
	Splice connection (not shown)	S-150 (not for use with VPL)
❷	End seal	
	Below insulation	E-150 (not for use with VPL)
	Above insulation	E-100-A
	Above insulation, with light	E-100-L1-A, 100–120 V E-100-L2-A, 200–277 V
Accessories		
❸	Aluminum tape	AT-180
❹	Labels	ETL
❺	Support bracket	SB-100-T
Controls		
❻	Thermostat (see *Control and Monitoring Design* (H56889)	

Hyland Tank

Hopper Series Tanks



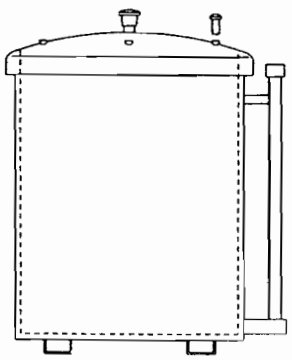
Innovative Aboveground Storage

Highland Hoppers are state-of-the-art technology for low profile, secondarily contained aboveground storage. Suitable for the containment of all types of liquid fuels, new and used oils, waste solvents and antifreeze, they are available in nine convenient capacities to meet every need. Highland Hoppers are designed and built to UL-142 specifications. Each Hopper consists of an inner tank, placed in the second tub-like steel container, providing a minimum of 110% secondary containment.

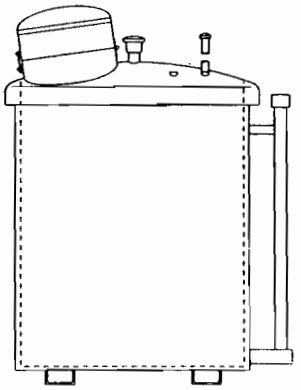
Our unique, extended-dome top design prevents rain, snow and debris from collecting in the secondary containment and provides emergency venting of the containment hopper. Elevation supports and a top-view interstitial monitoring tube are included on all models.

Nominal Capacity (Gallons)	Tank Diameter	Tank Depth	Overall Diameter	Overall Height	Thickness	Approximate Wt. (lbs.)
120	30"	40"	36"	46"	12 ga.	411
185	38"	40"	44"	47"	12 ga.	516
285	46"	40"	52"	51"	12 ga.	671
500	62"	40"	68"	53"	12 ga.	970
1,000	84"	42"	92"	54"	7 ga.	1,693
1,500	96"	48"	108"	60"	7 ga.	3,643
2,000	108"	51"	120"	63"	7 ga.	3,888
2,500	108"	62"	120"	75"	7 ga.	4,635
3,000	108"	76"	120"	91"	7 ga.	5,143

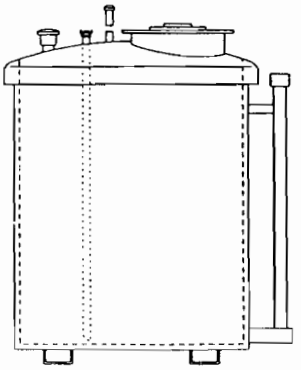
Fuel-Hopper



Petro-Hopper



Haz-Hopper™



APPENDIX D

BASELINE SOIL GAS DATA

Building 781 Baseline Soil Vapor Sampling
(Units in PPB by volume)

Sample Location	781PVMP-1	781PVMP-2	781PVMP-3
Sample ID	781VMA01DAA	781VMA02DAA	781VMA03MAA
Date of Collection	12/11/2002	12/11/2002	12/11/2002
Sample Depth (ft TOIC)	51 - 51.5	51 - 51.5	44.25 - 44.75
1,1,1-Trichloroethane	U	U	U
1,1,2,2-Tetrachloroethane	U	U	U
1,1,2-Trichloro-1,2,2-trifluoroethane	U	U	U
1,1,2-Trichloroethane	U	U	U
1,1-Dichloroethane	U	U	U
1,1-Dichloroethene	U	U	U
1,2,4-Trichlorobenzene	U	U	U
1,2,4-Trimethylbenzene	3200	3800	U
1,2-Dibromoethane	U	U	U
1,2-Dichlorobenzene	U	U	U
1,2-Dichloroethane	U	U	U
1,2-Dichloropropane	U	U	U
1,3,5-Trimethylbenzene	1900	2400	U
1,3-Dichlorobenzene	U	U	U
1,4-Dichlorobenzene	U	U	U
Benzene	22000	11000	U
Bromomethane	U	U	U
Carbon Tetrachloride	U	U	U
Chlorobenzene	U	U	U
Chloroethane	U	U	U
Chloroform	U	U	U
Chloromethane	U	U	U
cis-1,2-Dichloroethene	U	U	U
cis-1,3-Dichloropropene	U	U	U
Dichlorodifluoromethane	U	U	U
Dichlorotetrafluoroethane	U	U	U
Ethylbenzene	8200	9000	U
Hexachlorobutadiene	U	U	U
m/p-Xylenes	24000	22000	580
Methylene chloride	U	U	U
o-Xylene	7700	9100	U
Styrene	U	U	U
Tetrachloroethene	U	U	U
Toluene	36000	33000	U
trans-1,3-Dichloropropene	U	U	U
Trichloroethene	U	U	U
Trichlorofluoromethane	U	U	U
Vinyl chloride	U	U	U

U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

Building 779 Baseline Soil Vapor Sampling
(Units in PPB by volume)

Sample Location	779PVMP-5		
Sample ID	779VMA5BA	779VMA5DA	779VMA5SDB
Date of Collection	2/26/2003	7/16/2003	4/19/2004
Sample Depth (ft TOIC)	43.75-44.25	43.75-44.25	34.75-35.25
1,1,1-Trichloroethane	U	U	U
1,1,2,2-Tetrachloroethane	U	U	U
1,1,2-Trichloro-1,2,2-trifluoroethane	U	U	U
1,1,2-Trichloroethane	U	U	U
1,1-Dichloroethane	U	U	U
1,1-Dichloroethene	U	U	U
1,2,4-Trichlorobenzene	U	U	U
1,2,4-Trimethylbenzene	U	32	4.8
1,2-Dibromoethane	U	U	U
1,2-Dichlorobenzene	U	U	U
1,2-Dichloroethane	U	U	U
1,2-Dichloropropane	U	U	U
1,3,5-Trimethylbenzene	U	12	2.1
1,3-Dichlorobenzene	U	U	U
1,4-Dichlorobenzene	U	U	U
Benzene	U	U	U
Bromomethane	U	U	U
Carbon Tetrachloride	U	U	U
Chlorobenzene	U	U	U
Chloroethane	U	U	U
Chloroform	U	U	U
Chloromethane	U	U	U
cis-1,2-Dichloroethene	U	U	U
cis-1,3-Dichloropropene	U	U	U
Dichlorodifluoromethane	U	U	U
Dichlorotetrafluoroethane	U	U	U
Ethylbenzene	U	9.6	U
Hexachlorobutadiene	U	U	U
m/p-Xylenes	U	28	2.0
Methylene chloride	U	U	U
o-Xylene	U	3.5	0.59
Styrene	U	U	U
Tetrachloroethene	U	3.8	2.0
Toluene	U	U	0.83
trans-1,3-Dichloropropene	U	U	U
Trichloroethene	U	U	U
Trichlorofluoromethane	U	U	U
Vinyl chloride	U	U	U

Notes:

U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

RW-1

Griffiss Pumphouse 1 Free Product Recovery (FPR) System

Initial System Startup / Pumpdown Protocol

	Well No.	Time	Depth to Free Product	Depth to Groundwater	Free Product Thickness
2/19/03	RW-1	1300	—	59.65	—
		1330	59.64	59.66	0.02
		1400	59.64	59.67	0.03
		1430	59.64	59.68	0.04
		1530	59.64	59.74	0.10
		1630	59.64	59.76	0.12
		1730	59.65	59.80	0.15'
		1830	59.65	59.83	0.18'
		1930	59.67	59.86	0.19'
		2030	59.68	59.89	0.21'
2/20/03	RW1	0730	59.69	60.02	0.33'
		1300	59.62	59.98	0.36"

In 2 hours prior to the start of recovery test 13 liters of product were removed.

MW-6

Griffiss Pumphouse 1 Free Product Recovery (FPR) System

Initial System Startup / Pumpdown Protocol

	Well No.	Time	Depth to Free Product	Depth to Groundwater	Free Product Thickness
9/03	MW-6	1240	62.95'	63.15'	0.20'
		1310	62.92	63.15	0.23'
35 minutes		1345	62.92	63.16	0.24'
25 minutes		1410	62.92	63.17	0.26'
		1510	62.94	63.18	0.24'
		1610	62.94	63.20	0.26'
		1710	62.95	63.20	0.25'
		1810	62.95	63.21	0.26'
		1910	62.97	63.22	0.25'
		2010	62.97	63.25	0.28
10/03	MW6	0730	63.01	63.31	0.30'
		1040	62.96	63.27	0.31'

modest recovery

In 2 hrs 40 mins 5 liters of product and 17 liters of water (timer float sticking) was removed from the MW prior to start recovery test.

APPENDIX E

SOIL SAMPLING RESULTS

Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
SVOCs (µg/Kg)										
Di-n-Octyl Phthalate	8100	U	U	U	U	U	U	U	U	U
Dibenz(a,h)Anthracene	50000	U	U	U	U	U	U	U	U	U
Dibenzofuran	14*	U	U	U	U	U	U	U	U	U
Diethyl phthalate	--	U	U	U	U	U	U	U	U	U
Dimethyl phthalate	7100	U	U	U	U	U	U	U	U	U
Fluoranthene	2000	U	U	U	U	U	U	U	U	U
Fluorene	50000	U	U	U	U	U	U	U	U	U
Hexachlorobenzene	50000	U	U	U	U	U	U	U	U	U
Hexachlorobutadiene	410	U	U	U	U	U	U	U	U	U
Hexachloroethane	--	U	U	U	U	U	U	U	U	U
Indeno(1,2,3-c,d)pyrene	--	U	U	U	U	U	U	U	U	U
Isophorone	3200	U	U	U	U	U	U	U	U	U
n-Nitrosodiphenylamine	4400	U	U	U	U	U	U	U	U	U
n-Nitrosodi-n-Propylamine	--	U	U	U	U	U	U	U	U	U
Naphthalene	13000	U	U	U	2600	U	U	U	U	23000
Nitrobenzene		U	U	U	U	U	U	U	U	U
Phenanthrene	50000	U	U	U	U	U	U	U	U	U
Pyrene	50000	U	U	U	U	U	U	U	U	U
2,4,5-Trichlorophenol	100	U	U	U	U	U	U	U	U	U
2,4,6-Trichlorophenol	--	U	U	U	U	U	U	U	U	U
2,4-Dichlorophenol	400	U	U	U	U	U	U	U	U	U
2,4-Dimethylphenol	--	U	U	U	U	U	U	U	U	U
2,4-Dinitrophenol	200*	U	U	U	U	U	U	U	U	U
2-Chlorophenol	800	U	U	U	U	U	U	U	U	U
2-Methylphenol	100*	U	U	U	U	U	U	U	U	U
2-Nitrophenol	330*	U	U	U	U	U	U	U	U	U
4,6-Dintro-2-Methylphenol	--	U	U	U	U	U	U	U	U	U
4-Chloro-3-Methylphenol	240*	U	U	U	U	U	U	U	U	U
4-Methylphenol	900	U	U	U	U	U	U	U	U	U
4-Nitrophenol	100*	U	U	U	U	U	U	U	U	U
Benzoic Acid	--	U	U	U	U	U	U	U	U	U
Pentachlorophenol	1,000*	U	U	U	U	U	U	U	U	U
Phenol	30*	U	U	U	U	U	U	U	U	U

Notes:

B - Result is a positive value, however analyte was detected in associated blank at concentration above the RL

F - Analyte was positively identified above the MDL, however the concentration is below the reporting limit (RL).

U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
SVOCs (µg/Kg)										
1,2,4-Trichlorobenzene	--	U	U	U	U	U	U	U	U	U
1,2-Dichlorobenzene	7900	U	U	U	U	U	U	U	U	U
1,3-Dichlorobenzene	1600	U	U	U	U	U	U	U	U	U
1,4-Dichlorobenzene	8500	U	U	U	U	U	U	U	U	U
2,4-Dinitrotoluene	--	U	U	U	U	U	U	U	U	U
2,6-Dinitrotoluene	1000	U	U	U	U	U	U	U	U	U
2-Chloronaphthalene	--	U	U	U	U	U	U	U	U	U
2-Methylnaphthalene	36400	U	U	U	3400	U	U	U	U	32000
2-Nitroaniline	430*	U	U	U	U	U	U	U	U	U
3-Nitroaniline	500*	U	U	U	U	U	U	U	U	U
3,3'-Dichlorobenzidine	N/A	U	U	U	U	U	U	U	U	U
4-Bromopheyl Phenyl Ether	--	U	U	U	U	U	U	U	U	U
4-Chloroanaline	220*	U	U	U	U	U	U	U	U	U
4-Chlorophenyl phenyl ether	--	U	U	U	U	U	U	U	U	U
4-Nitroaniline	500*	U	U	U	U	U	U	U	U	U
Acenaphthylene	41000	U	U	U	U	U	U	U	U	U
Acenaphthene	50000	U	U	U	U	U	U	U	U	U
Anthracene	50000	U	U	U	U	U	U	U	U	U
Benzo(a)anthracene	224*	U	U	U	U	U	U	U	U	U
Benzo(a)pyrene	61*	U	U	U	U	U	U	U	U	U
Benzo(k)flouranthene		U	U	U	U	U	U	U	U	U
Benzo(b)flouranthene	1100	U	U	U	U	U	U	U	U	U
Benzo(g,h,I)peryiene	50000	U	U	U	U	U	U	U	U	U
Benzyl alcohol	--	U	U	U	U	U	U	U	U	U
Bis(2-chloroethoxy) methane		U	U	U	U	U	U	U	U	U
Bis(2-chloroethyl) ether	--	U	U	U	U	U	U	U	U	U
Bis(2-ethylhexyl) phthalate	--	540 F	300 F	270 F	160 F	310 F	520 F	U	320 F	U
Benzyl butyl phthalate	50000	U	U	U	U	U	U	U	U	U
Chrysene	50000	U	U	U	U	U	U	U	U	U
Di-n-Butyl phthalate	400	U	U	U	U	U	U	U	U	U

Notes:

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U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
Bromomethane	--	U	U	1.8 R	U	1.9 R	1.6 R	1.7 R	U	U
Carbon Tetrachloride	600	U	U	U	U	U	U	U	U	U
Chlorobenzene	1700	U	U	U	U	U	U	U	U	U
Chloroethane	1900	U	U	U	U	U	U	U	U	U
Chloroform	300	U	U	U	U	U	U	U	U	U
Chloromethane		U	U	U	U	U	U	U	U	U
Cis-1,2-Dichloroethylene		U	U	U	U	U	U	U	U	U
Cis 1,3 Dichloropropene		U	U	U	U	U	U	U	U	U
Dibromochloromethane		U	U	U	U	U	U	U	U	U
Dibromomethane	--	U	U	U	U	U	U	U	U	U
Dichlorodifluoromethane	5500	0.97 R	0.94 R	1.0 R	120 R	1.1 R	U	0.93 R	0.93 R	U
Ethylbenzene	--	U	U	U	3000	U	U	U	U	40000
Hexachlorobutadiene	2300	U	U	U	U	U	U	U	U	U
Isopropylbenzene	1200	U	U	U	1200	U	U	U	U	11000
m,p,-Xylene (Sum of Isomers)	100	U	U	1.4 F	13000	U	U	U	1.2 F	160000
Methylene Chloride		3.0 F	3.0 F	3.5 F	U	4.0 F	2.0 R	2.7 F	3.1 F	U
tert-Butyl Metyl Ether	--	U	U	U	U	U	U	U	U	U
Methyl Ethyl Ketone		U	U	U	800	U	U	U	5.5 F	U
2-Hexanone		U	4.7 F	U	U	U	U	U	U	U
n-Butylbenzene	10000	U	U	U	3000	U	U	U	U	24000
n-Propylbenzene	3700	U	U	U	3300	U	U	U	U	30000
Naphthalene	13000	5	3.9 F	3.8 F	2900	U	U	U	7.4	24000
o-Xylene	1200	U	U	U	6100	U	U	U	U	70000
p-Cymene		U	U	U	1500	U	U	U	U	12000
sec-Butylbenzene	10000	U	U	U	1900	U	U	U	U	16000
Styrene	--	U	U	U	U	U	U	U	U	U
t-Butylbenzene	10000	U	U	U	1500	U	U	U	U	12000
Tetrachloroethylene (PCE)	1400	U	U	U	U	U	U	U	U	U
Toluene	1500	U	U	U	2900 B	U	U	U	U	90000 B
trans-1,2-Dichloroethene	300	U	U	U	U	U	U	U	U	U
trans-1,3-Dichloropropene		U	U	U	U	U	U	U	U	U
Trichloroethylene (TCE)	700	U	U	1.3 F	U	U	U	U	U	U
Trichlorofluoromethane		U	U	0.78 R	U	0.83 R	U	0.72 R	0.72 R	U
Vinyl Chloride	200	U	U	U	U	U	U	U	U	U

Notes:

B - Result is a positive value, however analyte was detected in associated blank at concentration above the RL.

F - Analyte was positively identified above the MDL, however the concentration is below the reporting limit (RL).

U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
1,1,1,2-Tetrachloroethane	--	U	U	U	U	U	U	U	U	U
1,1,1-Trichloroethane	800	U	U	U	U	U	U	U	U	U
1,1,2,2-Tetrachloroethane	600	U	U	U	U	U	U	U	U	U
1,1,2-Trichloroethane	--	U	U	U	U	U	U	U	U	U
1,1-Dichloroethane	200	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	400	U	U	U	U	U	U	U	U	U
1,1-Dichloropropene	--	U	U	U	U	U	U	U	U	U
1,2,3-Trichlorobenzene	--	U	U	U	U	U	U	U	U	U
1,2,3-Trichloropropane	--	U	U	U	U	U	U	U	U	U
1,2,4-Trichlorobenzene	3400	U	U	U	U	U	U	U	U	U
1,2,4-Trimethylbenzene	10000	U	U	2.3 F	19000	U	U	U	2.6 F	170000
1,2-Dichloroethane	100	U	U	U	U	U	U	U	U	U
1,2-Dichlorobenzene	100	U	U	U	U	U	U	U	U	U
1,2-Dibrome-3-Chloropropane		U	U	U	U	U	U	U	U	U
1,2-Dichloropropane	400	U	U	U	U	U	U	U	U	U
1,2-Dibromoethane		U	U	U	U	U	U	U	U	U
1,3,5-Trimethylbenzene	3300	U	U	U	6500	U	U	U	U	57000
1,3-Dichlorobensene	1600	U	U	U	U	U	U	U	U	U
1,3-Dichloropropane	300	U	U	U	U	U	U	U	U	U
1,4-Dichlorobenzene	8500	U	U	U	U	U	U	U	U	U
1-Chlorohexane		U	U	U	U	U	U	U	U	U
2,2 Dichloropropane	--	U	U	U	U	U	U	U	U	U
2-Chlorotoluene	--	U	U	U	U	U	U	U	U	U
4-Chlorotoluene	--	U	U	U	U	U	U	U	U	U
Acetone	--	33	18	26	U	19	U	19	16	U
Benzene	60	U	U	U	U	U	U	U	U	6500
Bromobensene		U	U	U	U	U	U	U	U	U
Bromochloromethane		U	U	U	U	U	U	U	U	U
Bromodichloromethane		U	U	U	U	U	U	U	U	U
Bromoform		U	U	U	U	U	U	U	U	U

Notes:

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U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
2,4,6-Trichlorophenol	--	U	U	U	U	U	U	U	U	U
2,4-Dichlorophenol	400	U	U	U	U	U	U	U	U	U
2,4-Dimethylphenol	--	U	U	U	U	U	U	U	U	U
2,4-Dinitrophenol	200*	U	U	U	U	U	U	U	U	U
2-Chlorophenol	800	U	U	U	U	U	U	U	U	U
2-Methylphenol	100*	U	U	U	U	U	U	U	U	U
2-Nitrophenol	330*	U	U	U	U	U	U	U	U	U
4,6-Dinitro-2-Methylphenol	--	U	U	U	U	U	U	U	U	U
4-Chloro-3-Methylphenol	240*	U	U	U	U	U	U	U	U	U
4-Methylphenol	900	U	U	U	U	U	U	U	U	U
4-Nitrophenol	100*	U	U	U	U	U	U	U	U	U
Benzoic Acid	--	U	U	U	U	U	U	U	U	U
Pentachlorophenol	1,000*	U	U	U	U	U	U	U	U	U
Phenol	30*	U	U	U	U	U	U	U	U	U

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Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
2-Nitroaniline	430*	U	U	U	U	U	U	U	U	U
3-Nitroaniline	500*	U	U	U	U	U	U	U	U	U
3,3'-Dichlorobenzidine	N/A	U	U	U	U	U	U	U	U	U
4-Bromopheyl Phenyl Ether	--	U	U	U	U	U	U	U	U	U
4-Chloroanaline	220*	U	U	U	U	U	U	U	U	U
4-Chlorophenyl phenyl ether	--	U	U	U	U	U	U	U	U	U
4-Nitroaniline	500*	U	U	U	U	U	U	U	U	U
Acenaphthylene	41000	U	U	U	U	U	U	U	U	U
Acenaphthene	50000	U	U	U	U	U	U	U	U	U
Anthracene	50000	U	U	U	U	U	U	U	U	U
Benzo(a)anthracene	224*	U	U	U	U	U	U	U	U	U
Benzo(a)pyrene	61*	U	U	U	U	U	U	U	U	U
Benzo(k)flouranthene		U	U	U	U	U	U	U	U	U
Benzo(b)flouranthene	1100	U	U	U	U	U	U	U	U	U
Benzo(g,h,I)perylene	50000	U	U	U	U	U	U	U	U	U
Benzyl alcohol	--	U	U	U	U	U	U	U	U	U
Bis(2-chloroethoxy) methane		U	U	U	U	U	U	U	U	U
Bis(2-chloroethyl) ether	--	U	U	U	U	U	U	U	U	U
Bis(2-ethylhexyl) phthalate	--	540 F	300 F	270 F	160 F	310 F	520 F	U	320 F	U
Benzyl butyl phthalate	50000	U	U	U	U	U	U	U	U	U
Chrysene	50000	U	U	U	U	U	U	U	U	U
Di-n-Butyl phthalate	400	U	U	U	U	U	U	U	U	U

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Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
SVOCs (µg/Kg)										
Di-n-Octyl Phthalate	8100	U	U	U	U	U	U	U	U	U
Dibenz(a,h)Anthracene	50000	U	U	U	U	U	U	U	U	U
Dibenzofuran	14*	U	U	U	U	U	U	U	U	U
Diethyl phthalate	--	U	U	U	U	U	U	U	U	U
Dimethyl phthalate	7100	U	U	U	U	U	U	U	U	U
Flouranthene	2000	U	U	U	U	U	U	U	U	U
Flourene	50000	U	U	U	U	U	U	U	U	U
Hexachlorobenzene	50000	U	U	U	U	U	U	U	U	U
Hexachlorobutadiene	410	U	U	U	U	U	U	U	U	U
Hexachloroethane	--	U	U	U	U	U	U	U	U	U
Indeno(1,2,3-c,d)pyrene	--	U	U	U	U	U	U	U	U	U
Isophorone	3200	U	U	U	U	U	U	U	U	U
n-Nitrosodiphenylamine	4400	U	U	U	U	U	U	U	U	U
n-Nitrosodi-n-Propylamine	--	U	U	U	U	U	U	U	U	U
Naphthalene	13000	U	U	U	2600	U	U	U	U	23000
Nitrobenzene		U	U	U	U	U	U	U	U	U
Phenanthrene	50000	U	U	U	U	U	U	U	U	U
Pyrene	50000	U	U	U	U	U	U	U	U	U
2,4,5-Trichlorophenol	100	U	U	U	U	U	U	U	U	U

Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
Carbon Tetrachloride	600	U	U	U	U	U	U	U	U	U
Chlorobenzene	1700	U	U	U	U	U	U	U	U	U
Chloroethane	1900	U	U	U	U	U	U	U	U	U
Chloroform	300	U	U	U	U	U	U	U	U	U
Chloromethane		U	U	U	U	U	U	U	U	U
Cis-1,2-Dichloroethylene		U	U	U	U	U	U	U	U	U
Cis 1,3 Dichloropropene		U	U	U	U	U	U	U	U	U
Dibromochloromethane		U	U	U	U	U	U	U	U	U
Dibromomethane	--	U	U	U	U	U	U	U	U	U
Dichlorodifluoromethane	5500	0.97 R	0.94 R	1.0 R	120 R	1.1 R	U	0.93 R	0.93 R	U
Ethylbenzene	--	U	U	U	3000	U	U	U	U	40000
Hexachlorobutadiene	2300	U	U	U	U	U	U	U	U	U
Isopropylbenzene	1200	U	U	U	1200	U	U	U	U	11000
m,p,-Xylene (Sum of Isomers)	100	U	U	1.4 F	13000	U	U	U	1.2 F	160000
Methylene Chloride		3.0 F	3.0 F	3.5 F	U	4.0 F	2.0 R	2.7 F	3.1 F	U
tert-Butyl Metyl Ether	--	U	U	U	U	U	U	U	U	U
Methyl Ethyl Ketone		U	U	U	800	U	U	U	5.5 F	U
2-Hexanone		U	4.7 F	U	U	U	U	U	U	U
n-Butylbenzene	10000	U	U	U	3000	U	U	U	U	34000
n-Propylbenzene	3700	U	U	U	3300	U	U	U	U	30000
Naphthalene	13000	5	3.9 F	3.8 F	2900	U	U	U	7.4	24000
o-Xylene	1200	U	U	U	6100	U	U	U	U	70000
p-Cymene		U	U	U	1500	U	U	U	U	12000
sec-Butylbenzene	10000	U	U	U	1900	U	U	U	U	16000
Styrene	--	U	U	U	U	U	U	U	U	U
t-Butylbenzene	10000	U	U	U	1500	U	U	U	U	12000
Tetrachloroethylene (PCE)	1400	U	U	U	U	U	U	U	U	U
Toluene	1500	U	U	U	2900 B	U	U	U	U	90000 B
trans-1,2-Dichloroethene	300	U	U	U	U	U	U	U	U	U
trans-1,3-Dichloropropene		U	U	U	U	U	U	U	U	U
Trichloroethylene (TCE)	700	U	U	1.3 F	U	U	U	U	U	U
Trichlorofluoromethane		U	U	0.78 R	U	0.83 R	U	0.72 R	0.72 R	U
Vinyl Chloride	200	U	U	U	U	U	U	U	U	U

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Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
SVOCs (µg/Kg)										
1,2,4-Trichlorobenzene	--	U	U	U	U	U	U	U	U	U
1,2-Dichlorobenzene	7900	U	U	U	U	U	U	U	U	U
1,3-Dichlorobenzene	1600	U	U	U	U	U	U	U	U	U
1,4-Dichlorobenzene	8500	U	U	U	U	U	U	U	U	U
2,4-Dinitrotoluene	--	U	U	U	U	U	U	U	U	U
2,6-Dinitrotoluene	1000	U	U	U	U	U	U	U	U	U
2-Chloronaphthalene	--	U	U	U	U	U	U	U	U	U
2-Methylnaphthalene	36400	U	U	U	3400	U	U	U	U	32000

Sample Location	TAGM Soil Cleanup Objective (µg/Kg)	781SB-1					781SB-2			
Sample ID		781SB1B50AB	781SB1C50AB	781SB1A50AB	781SB1D52AB	781SB1C56AB	781SB2A52AB	781SB2B52AB	781SB2C52AB	781SB2D52AB
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Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
1,1,1,2-Tetrachloroethane	--	U	U	U	U	U	U	U	U	U
1,1,1-Trichloroethane	800	U	U	U	U	U	U	U	U	U
1,1,2,2-Tetrachloroethane	600	U	U	U	U	U	U	U	U	U
1,1,2-Trichloroethane	--	U	U	U	U	U	U	U	U	U
1,1- Dichloroethane	200	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	400	U	U	U	U	U	U	U	U	U
1,1-Dichloropropene	--	U	U	U	U	U	U	U	U	U
1,2,3-Trichlorobenzene	--	U	U	U	U	U	U	U	U	U
1,2,3-Trichloropropane	--	U	U	U	U	U	U	U	U	U
1,2,4-Trichlorobenzene	3400	U	U	U	U	U	U	U	U	U
1,2,4-Trimethylbenzene	10000	U	U	2.3 F	19000	U	U	U	2.6 F	170000
1,2-Dichloroethane	100	U	U	U	U	U	U	U	U	U
1,2-Dichlorobenzene	100	U	U	U	U	U	U	U	U	U
1,2-Dibromo-3-Chloropropane		U	U	U	U	U	U	U	U	U
1,2-Dichloropropane	400	U	U	U	U	U	U	U	U	U
1,2-Dibromoethane		U	U	U	U	U	U	U	U	U
1,3,5-Trimethylbenzene	3300	U	U	U	6500	U	U	U	U	57000
1,3-Dichlorobenzene	1600	U	U	U	U	U	U	U	U	U
1,3-Dichloropropane	300	U	U	U	U	U	U	U	U	U
1,4-Dichlorobenzene	8500	U	U	U	U	U	U	U	U	U
1-Chlorohexane		U	U	U	U	U	U	U	U	U
2,2 Dichloropropane	--	U	U	U	U	U	U	U	U	U
2-Chlorotoluene	--	U	U	U	U	U	U	U	U	U
4-Chlorotoluene	--	U	U	U	U	U	U	U	U	U
Acetone	--	33	18	26	U	19	U	19	16	U
Benzene	60	U	U	U	U	U	U	U	U	6500
Bromobenzene		U	U	U	U	U	U	U	U	U
Bromochloromethane		U	U	U	U	U	U	U	U	U
Bromodichloromethane		U	U	U	U	U	U	U	U	U
Bromoform		U	U	U	U	U	U	U	U	U

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Date of Collection		10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/15/2002	10/15/2002
Sample Depth (ft TOIC)		50	50	50	52	56	52	52	52	52
VOCs (µg/Kg)										
Bromomethane	--	U	U	1.8 R	U	1.9 R	1.6 R	1.7 R	U	U

APPENDIX F

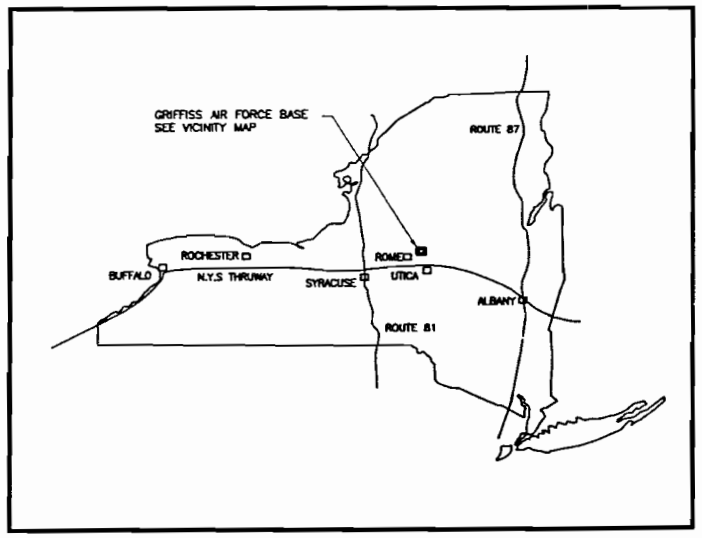
AS-BUILT DRAWINGS

FINAL DESIGN DRAWINGS
PUMPHOUSE #1 FREE PRODUCT RECOVERY (FPR) SYSTEM
PUMPHOUSE #1 AND #2 BIOVENTING SYSTEMS
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

SITE VICINITY MAP

DRAWING INDEX

DRAWING No.	DRAWING TITLES
G-1	TITLE SHEET AND DRAWING INDEX
G-2	GRIFFISS AIR FORCE BASE REMEDIATION SITE PLAN
C-1	PUMP HOUSE #1 FPR SYSTEM SITE PLAN
C-2	PUMP HOUSE #1 BIOVENTING PILOT TEST SYSTEM SITE PLAN
C-3	PUMP HOUSE #2 BIOVENTING SYSTEM SITE PLAN
C-4	PUMP HOUSE #1 (PHASE II) AS-BUILT SITE PLAN FULL SCALE BIOVENTING SYSTEM
E-1	PUMP HOUSE #1 FPR SYSTEM ELECTRICAL PLAN AND DETAILS
E-2	PUMP HOUSE #1 (PHASE II) BIOVENTING SYSTEM ELECTRICAL PLAN AND DETAILS
E-3	PUMP HOUSE #2 BIOVENTING SYSTEM ELECTRICAL PLAN AND DETAILS
E-4	PUMP HOUSE "#1 FPR SYSTEM ELECTRICAL SCHEMATIC
E-5	PUMP HOUSE #1 BIOVENTING SYSTEM ONE-LINE DIAGRAM
E-6	PUMP HOUSE #1 BIOVENTING SYSTEM POWER PANEL SCHEDULE
E-7	PUMP HOUSE #1 FPR SYSTEM, AND PUMP HOUSE #2 BIOVENTING SYSTEM SUB-PANEL AND LOAD CENTER SCHEDULES



N.Y. STATE MAP

Rev	Date	Description	By
0	3/28/03	ISSUED FOR FINAL REPORT	SEH

Job No. 740882
Designed MBB
Drawn SEH
Checked CFB
Reviewed
Approved
Reg. No.
Date

Issue Certification

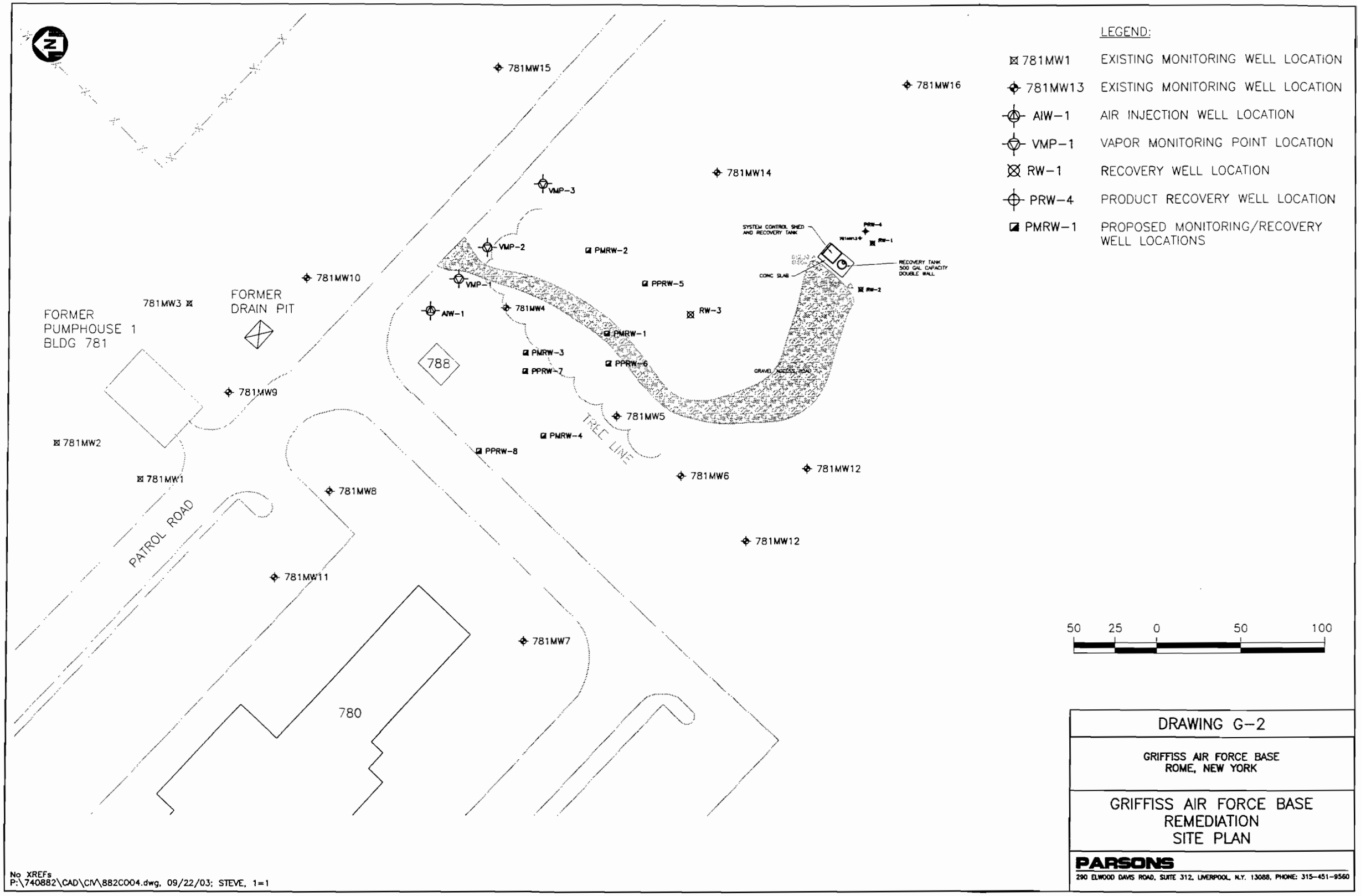
PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312
LIVERPOOL, N.Y. 13088
PHONE: (315) 451-9560
FAX: (315) 451-9570

GRIFFISS AFB
ROME, NEW YORK

TITLE SHEET AND DRAWING INDEX

DRAWING NO. G-1

REV. 0



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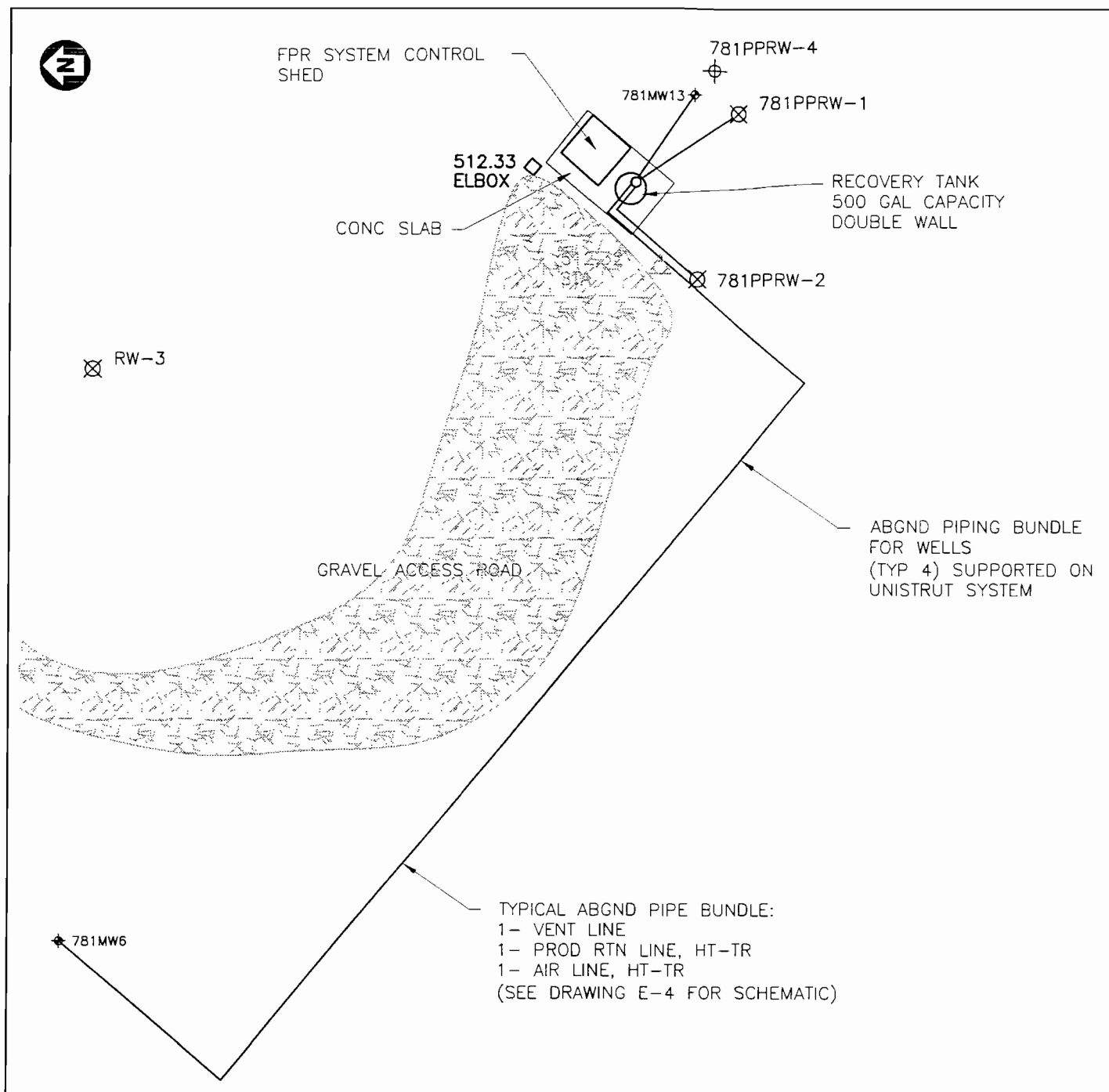
DRAWING G-2

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

GRIFFISS AIR FORCE BASE REMEDIATION SITE PLAN

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560



LEGEND:

⊠ 781MW1	EXISTING MONITORING WELL LOCATION
⌖ 781MW13	EXISTING MONITORING WELL LOCATION
⊠ 781PPRW-1	PARSONS PRODUCT RECOVERY WELL LOCATION
⌖ 781PPRW-4	PARSONS PRODUCT RECOVERY WELL LOCATION
FRP	FREE PRODUCT RECOVERY

ABBREVIATIONS:

ABGND	ABOVEGROUND
ELBOX	ELECTRICAL BOX
HT-TR	HEAT TRACE
PROD	PRODUCT
RTN	RETURN

20 10 0 20 40

DRAWING C-1

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

PUMP HOUSE No. 1 FPR SYSTEM
SITE PLAN

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

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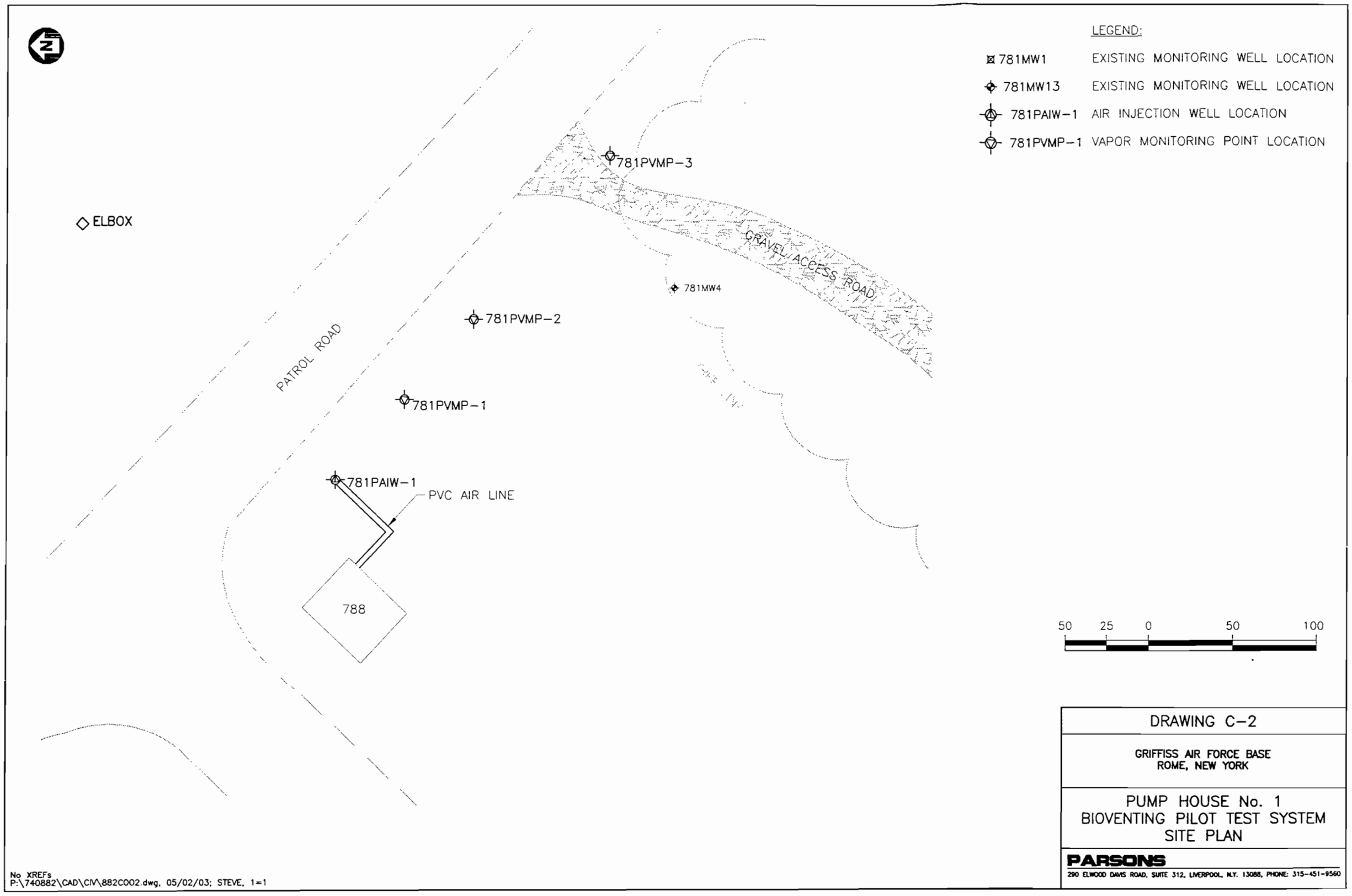

LEGEND:

781MW1	EXISTING MONITORING WELL LOCATION
781MW13	EXISTING MONITORING WELL LOCATION
781PAIW-1	AIR INJECTION WELL LOCATION
781PVMP-1	VAPOR MONITORING POINT LOCATION

50 25 0 50 100

DRAWING C-2

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

PUMP HOUSE No. 1
BIOVENTING PILOT TEST SYSTEM
SITE PLAN

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

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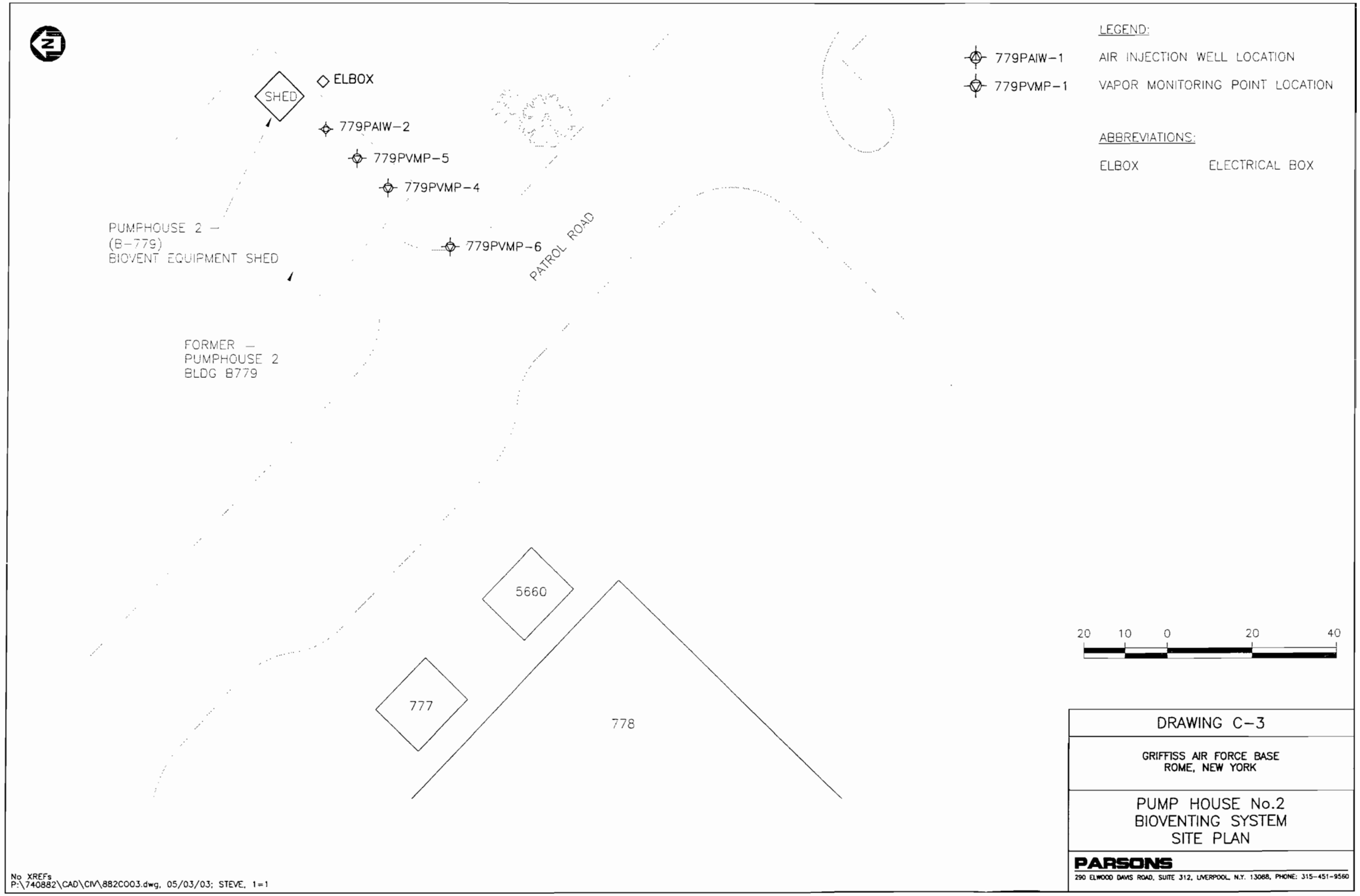

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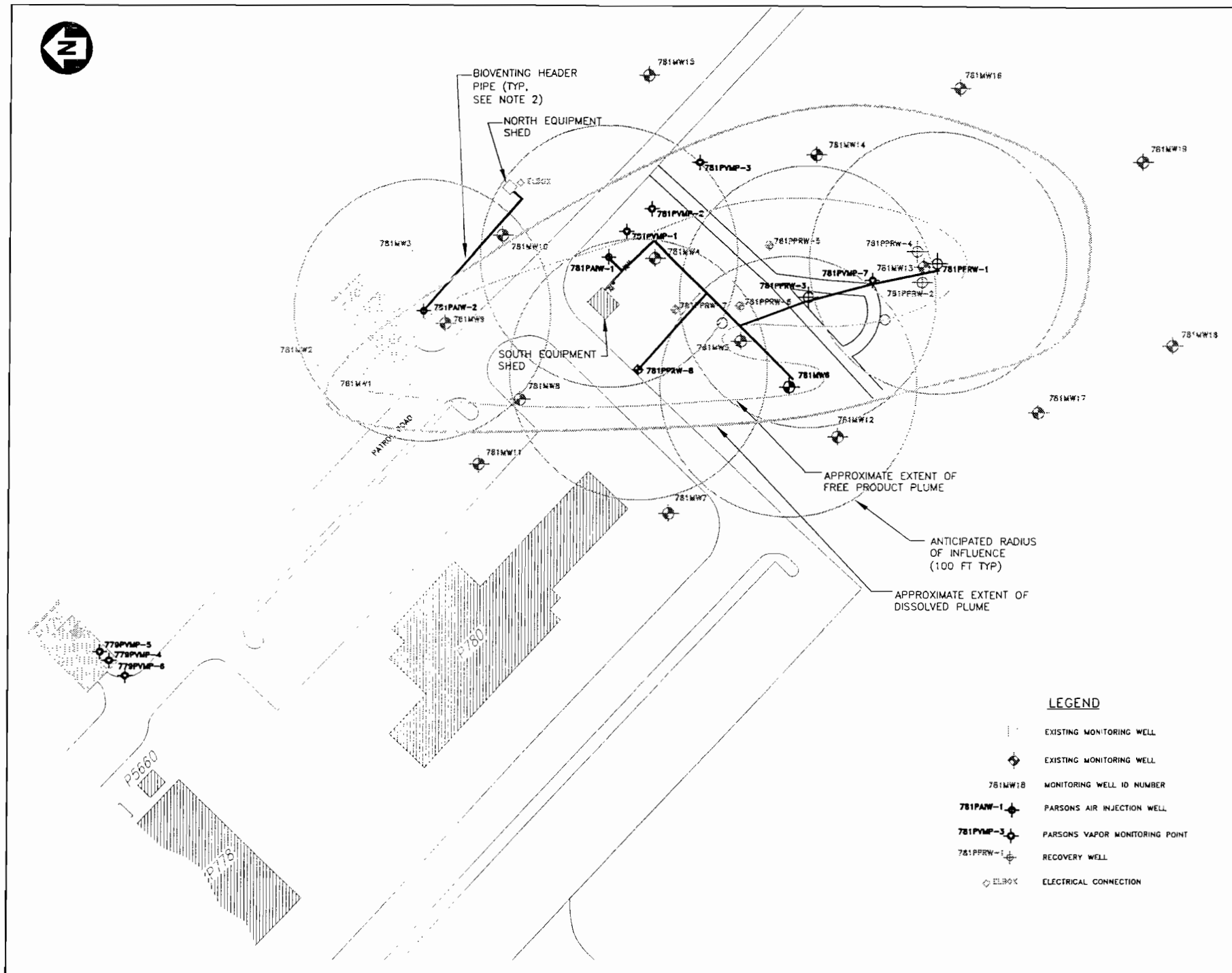
DRAWING C-3

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

PUMP HOUSE No.2
BIOVENTING SYSTEM
SITE PLAN

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560



NOTES:

1. THERMAL EXPANSION JOINTS BY JGB ENTERPRISES, INC. 2"ø BLACK DUCTING RFH, PART NO. 013-0322-0002 ARE INSTALLED EVERY 100 LF OF PVC HEADER PIPING. EXPANSION JOINTS ARE SECURED WITH TYPE 316 STAINLESS STEEL SMOOTH-BAND WORM-DRIVE HOSE CLAMPS, McMASTER-CARR, PART NO 45945K32.

2. 2-INCH DIAMETER SCHEDULE 40 PVC.

PUMPHOUSE 1 BIOVENTING SYSTEM
SUMMARY OF AIR INJECTION WELL CONVERSION

PHASE II PAIWS	PPRWS	INSTALLED
781PPRW-1	781PPRW-1	10/02
	781PPRW-2	10/02
781PPRW-3	781PPRW-3	10/02
	781PPRW-4	10/02
	781PPRW-5	7/03
	781PPRW-6	7/03
	781PPRW-7	7/03
781PPRW-8	781PPRW-8	7/03
	PAIWS	
781PAIW-1	781PAIW-1	10/02
781PAIW-2	781PAIW-2	12/03
	MW	
781MW-6	781MW-6	7/99
	PVMP	
	781PVMP-1	10/02
	781PVMP-2	10/02
	781PVMP-3	10/02
	*	
	781PVMP-7	12/03

- THE SIX WELLS LISTED IN THE LEFT COLUMN HAVE BEEN CONVERTED TO PAIWS UNDER THE PHASE II BIOVENTING SYSTEM WORK PLAN.

- MONITORING WELLS 781MW-1 THRU 781MW-19 WERE INSTALLED PREVIOUSLY BY OTHERS.

- * PVMP 4 THRU 6 ARE INSTALLED AT THE B-779 (PUMPHOUSE 2) SITE.

PPRW PARSONS PRODUCT RECOVERY WELL
PAIW PARSONS AIR INJECTION WELL
PVMP PARSONS VAPOR MONITORING POINTS
MW MONITORING WELL

LEGEND

- EXISTING MONITORING WELL
- EXISTING MONITORING WELL
- 781MW18 MONITORING WELL ID NUMBER
- 781PAIW-1 PARSONS AIR INJECTION WELL
- 781PVMP-3 PARSONS VAPOR MONITORING POINT
- 781PPRW-1 RECOVERY WELL
- ELBOX ELECTRICAL CONNECTION

80 40 0 80 160

DRAWING C-4

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

PUMPHOUSE 1 (PHASE II)
AS-BUILT SITE PLAN
FULL SCALE BIOVENTING SYSTEM

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

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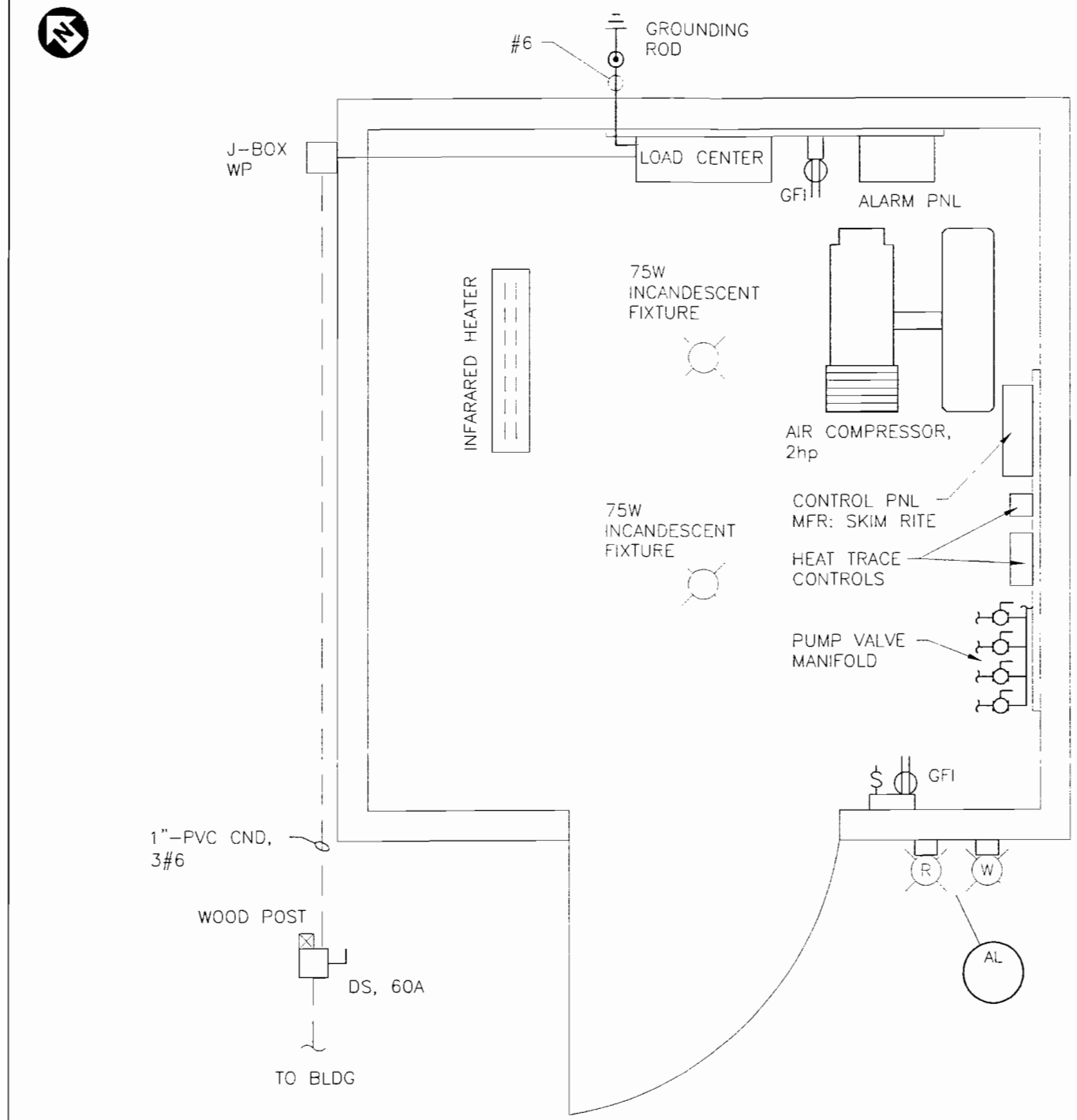

500 GAL TANK

ABBREVIATIONS:

CND	CONDUIT
DS	DISCONNECT SWITCH (non-fused)
PNL	PANEL
PVC	POLYVINYL CHLORIDE
PWR	POWER
RCPT	RECEPTACLE
S	SWITCH (SINGLE POLE)
XFMR	TRANSFORMER
WP	WEATHERPROOF (INSUL)

1 1/2 0 1 2

SCALE:

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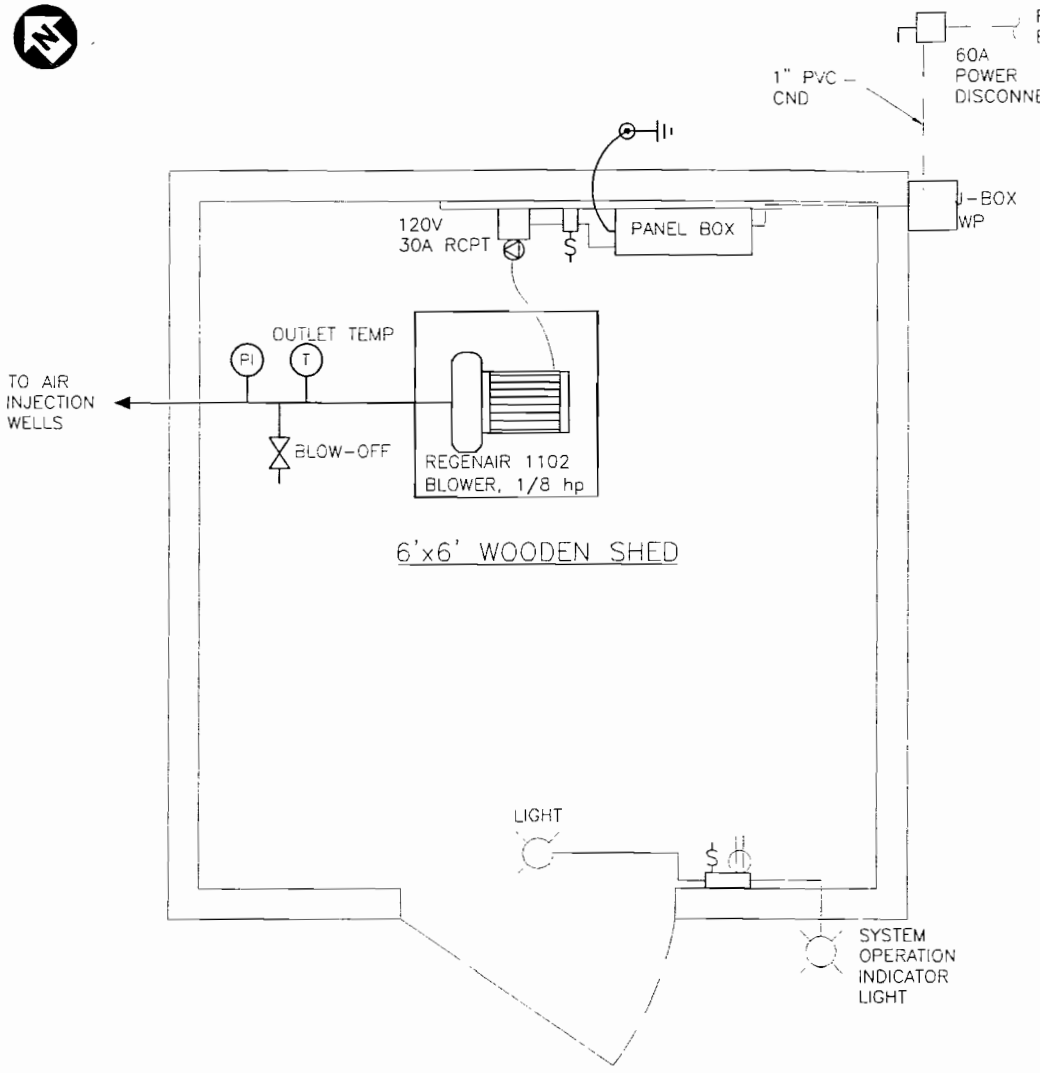
DRAWING E-1

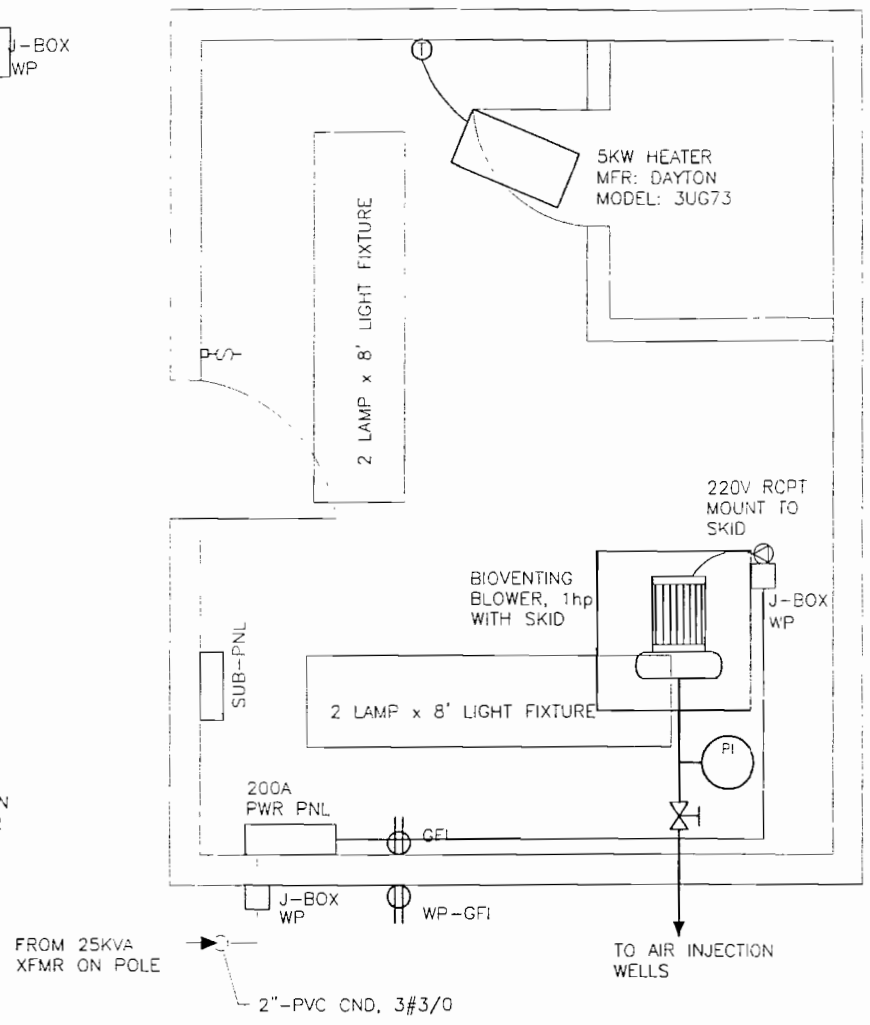
GRIFFISS AIR FORCE BASE
GROUNDWATER REMEDIATION
ROME, NEW YORK

PUMP HOUSE No. 1
FPR SYSTEM
ELECTRICAL PLAN AND DETAILS

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560



NORTH EQUIPMENT SHED



SOUTH EQUIPMENT SHED

ABBREVIATIONS:

CND	CONDUIT
PNL	PANEL
PVC	POLYVINYL CHLORIDE
PWR	POWER
RCPT	RECEPTACLE
$	SWITCH (SINGLE POLE)
XFMR	TRANSFORMER
WP	WEATHERPROOF (INSUL)
PI	PRESSURE INDICATOR
J-BOX	JUNCTION BOX
GFI	GROUND FAULT INTERRUPTER
	OUTLET
T	TEMPERATURE
	GROUND
	PLUG

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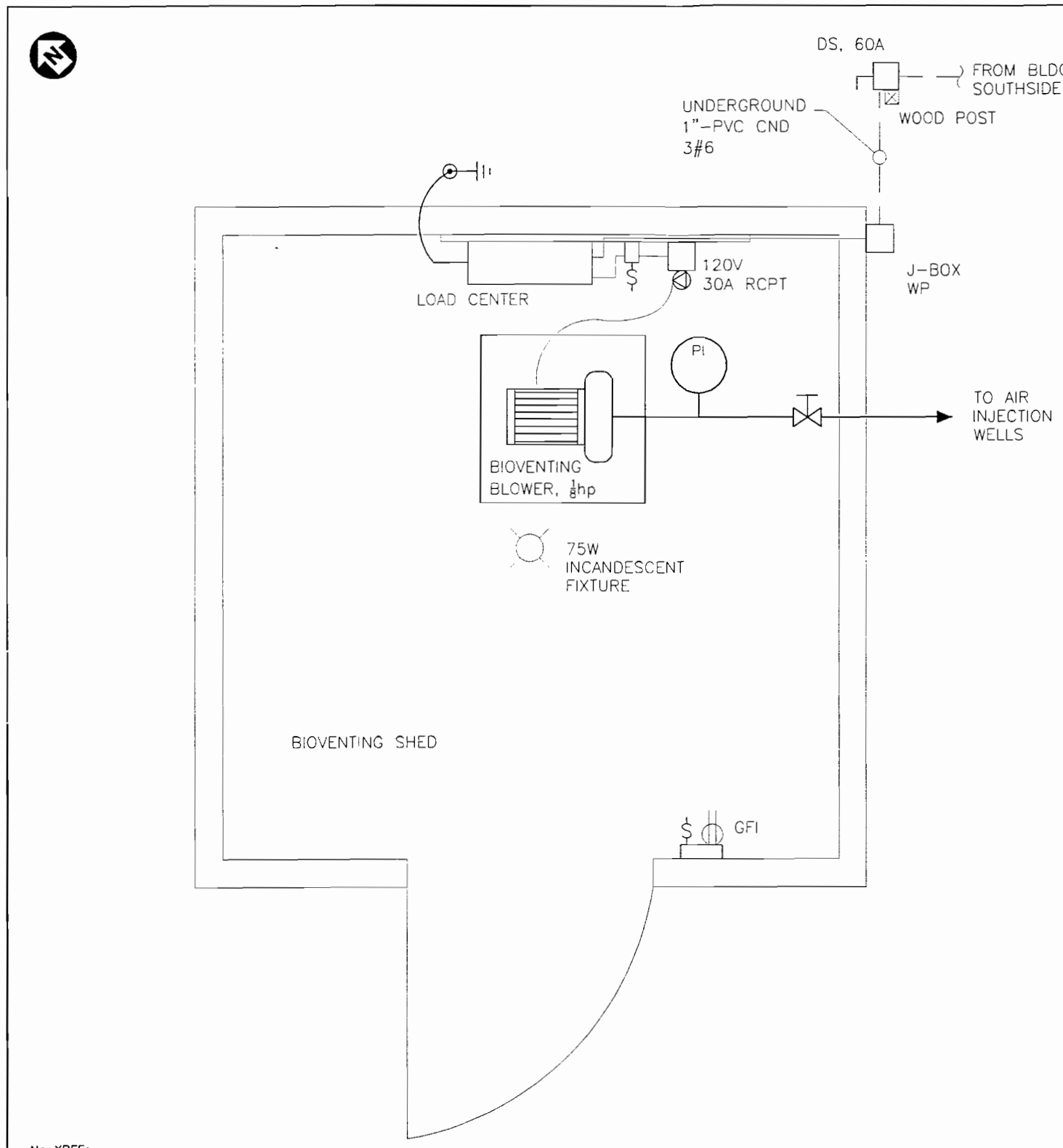
No XREFs

DRAWING E-2

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

PUMP HOUSE 1 (PHASE 2)
BIOVENTING SYSTEMS
ELECTRICAL PLAN AND DETAILS

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560



ABBREVIATIONS:

CND	CONDUIT
PWR	POWER
RCPT	RECEPTACLE
	SWITCH (SINGLE POLE)
WP	WEATHERPROOF (INSUL)
PI	PRESSURE INDICATOR
GFI	GROUND FAULT INDICATOR
	GROUND
	OUTLET
	PLUG

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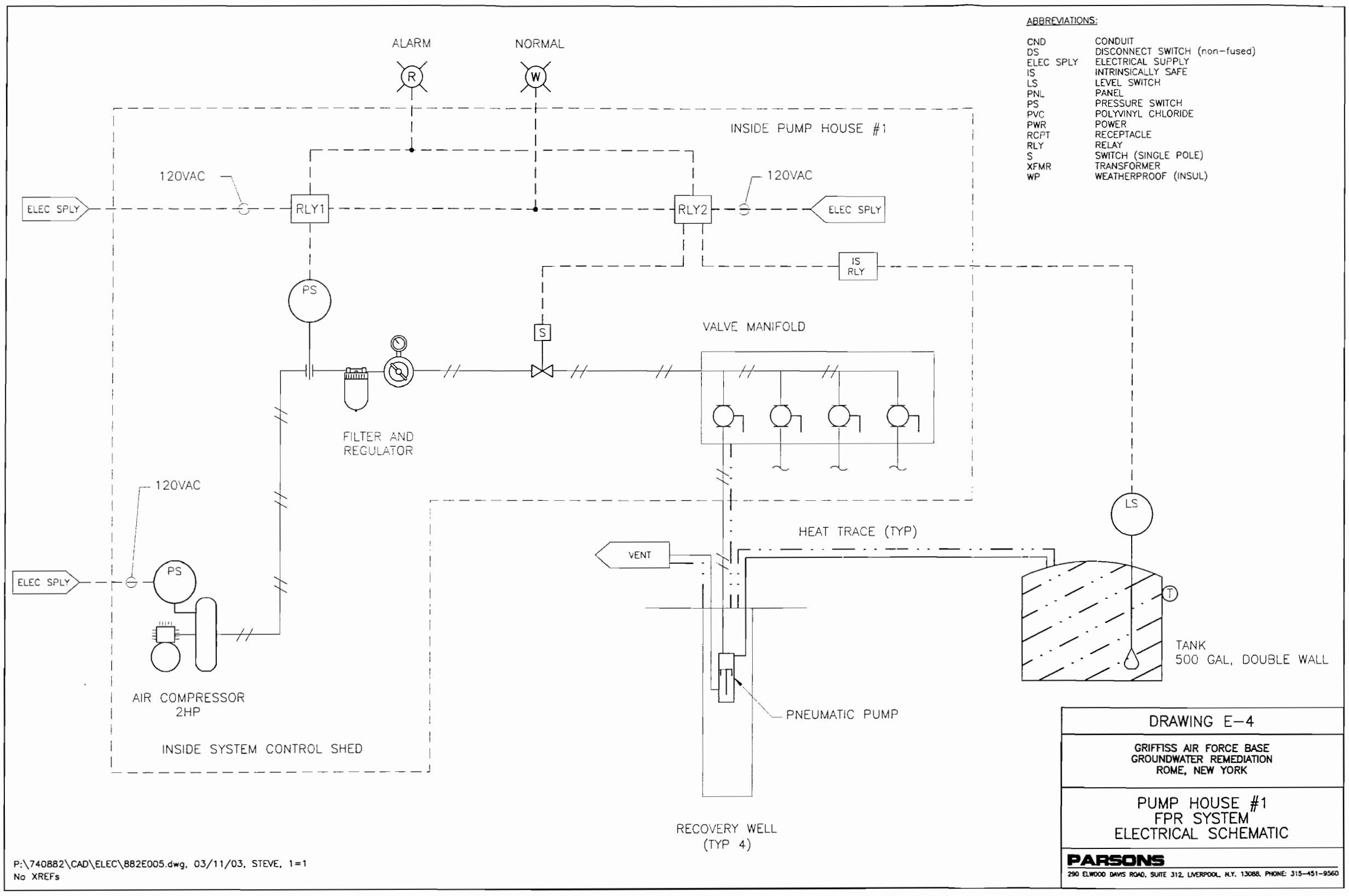
DRAWING E-3

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

PUMP HOUSE 2
BIOVENTING SYSTEM
ELECTRICAL PLAN AND DETAILS

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560



ABBREVIATIONS:

CND	CONDUIT
DS	DISCONNECT SWITCH (non-fused)
ELEC SPLY	ELECTRICAL SUPPLY
IS	INTRINSICALLY SAFE
LS	LEVEL SWITCH
PNL	PANEL
PS	PRESSURE SWITCH
PVC	POLYVINYL CHLORIDE
PWR	POWER
RCPT	RECEPTACLE
RLY	RELAY
S	SWITCH (SINGLE POLE)
XFMR	TRANSFORMER
WP	WEATHERPROOF (INSUL)

DRAWING E-4

GRIFFISS AIR FORCE BASE
GROUNDWATER REMEDIATION
ROME, NEW YORK

PUMP HOUSE #1
FPR SYSTEM
ELECTRICAL SCHEMATIC

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

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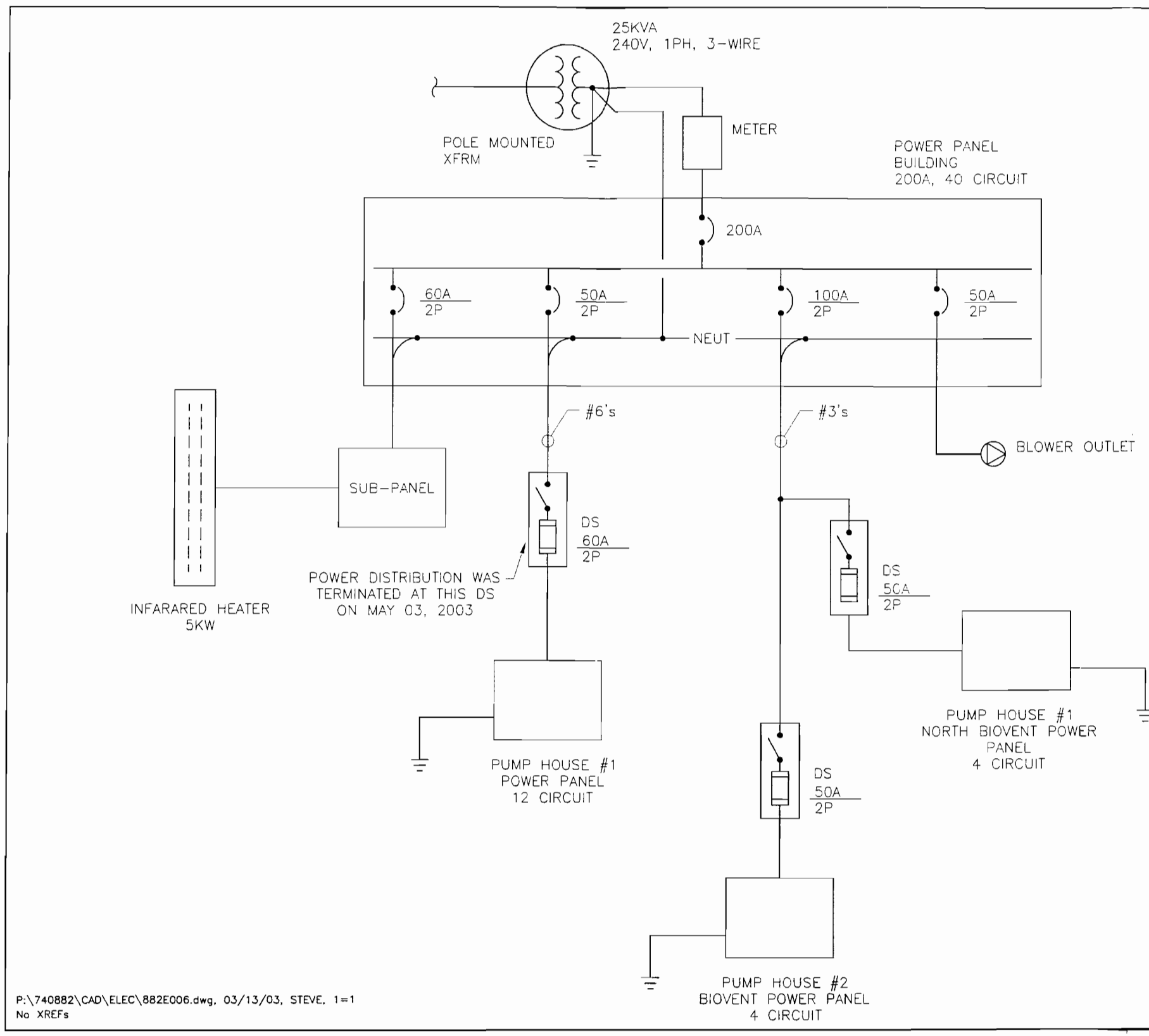

ABBREVIATIONS:

CND	CONDUIT
DS	DISCONNECT SWITCH (non-fused)
ELEC SPLY	ELECTRICAL SUPPLY
IS	INTRINSICALLY SAFE
LS	LEVEL SWITCH
NEUT	NEUTRAL
PNL	PANEL
PS	PRESSURE SWITCH
PVC	POLYVINYL CHLORIDE
PWR	POWER
RCPT	RECEPTACLE
RLY	RELAY
S	SWITCH (SINGLE POLE)
XFMR	TRANSFORMER
WP	WEATHERPROOF (INSUL)

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No XREFs

DRAWING E-5

GRIFFISS AIR FORCE BASE
GROUNDWATER REMEDIATION
ROME, NEW YORK

PUMP HOUSE #1 BIOVENTING SYSTEM ONE-LINE DIAGRAM

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

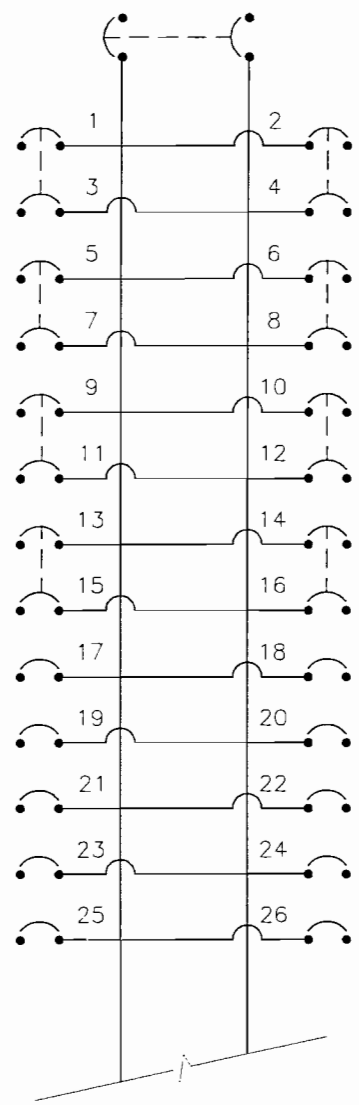
SUB PANEL	60A / 2P
(IN BUILDING)	
NORTH BIOVENT BLOWER	50A / 2P
–	

NORTH EQUIPMENT SHED SUBPANEL

FUEL WELLS	100A / 2P
(BIOVENT BLOWER No. 2)	
OUTLET IN HERE	50A / 2P
(BIOVENT BLOWER)	

PUMPHOUSE NO. 2 SUBPANEL

220V, SINGLE PHASE



NOTE:

SOUTH EQUIPMENT SHED PANEL HAS A CAPACITY FOR 40 SINGLE POLE CIRCUITS
MFR: GE POWER MARK

200A / 2P	MAIN (FEED FROM 25KVA XFMR)

100A / 2P	SUB PANEL (IN BUILDING)
50A / 2P	SOUTH BIOVENT BLOWER –

SOUTH EQUIPMENT SHED SUBPANEL

ABBREVIATIONS:

CND	CONDUIT
DS	DISCONNECT SWITCH (non-fused)
ELEC SPLY	ELECTRICAL SUPPLY
IS	INTRINSICALLY SAFE
LS	LEVEL SWITCH
PNL	PANEL
PS	PRESSURE SWITCH
PVC	POLYVINYL CHLORIDE
PWR	POWER
RCPT	RECEPTACLE
RLY	RELAY
S	SWITCH (SINGLE POLE)
XFMR	TRANSFORMER
WP	WEATHERPROOF (INSUL)

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DRAWING E-6

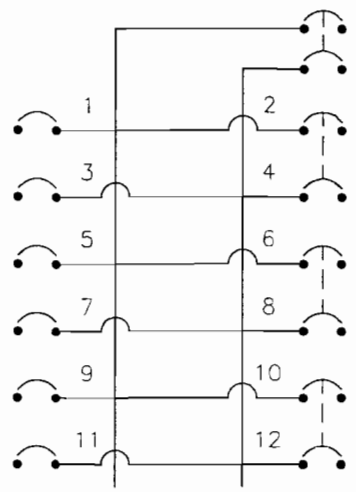
GRIFFISS AIR FORCE BASE
GROUNDWATER REMEDIATION
ROME, NEW YORK

PUMP HOUSE No. 1 & 2 BIOVENTING SYSTEM POWER PANEL SCHEDULE

PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

220V, SINGLE PHASE

LIGHTS AND GFI	20A
HEAT	20A
ALARM PANEL	20A
SKIM RITE PANEL	20A
GFI BELOW PANEL	20A
PUMP/COMPRESSOR FEED	20A



100A / 2P	MAIN
	(ONLY 50A FEED)

20A / 2P	SPARE
	SPARE
30A / 2P	30mA HEAT TRACE
	TANK
30A / 2P	30mA GFI HEAT
	TRACE LINES

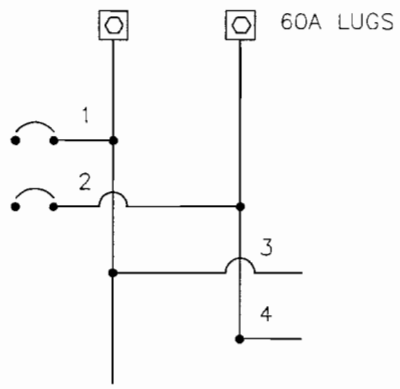
PUMP HOUSE No. 1, FREE PRODUCT RECOVERY SYSTEM
SUB-PANEL SCHEDULE
MFR: MURRAY
MODEL: LC112DC
12 CIRCUIT

ABBREVIATIONS:

CND	CONDUIT
DS	DISCONNECT SWITCH (non-fused)
ELEC SPLY	ELECTRICAL SUPPLY
IS	INTRINSICALLY SAFE
LS	LEVEL SWITCH
PNL	PANEL
PS	PRESSURE SWITCH
PVC	POLYVINYL CHLORIDE
PWR	POWER
RCPT	RECEPTACLE
RLY	RELAY
S	SWITCH (SINGLE POLE)
XFMR	TRANSFORMER
WP	WEATHERPROOF (INSUL)

220V, SINGLE PHASE

LIGHTS AND GFI	20A
BLOWER	30A



–	SPARE
–	SPARE

PUMP HOUSE No. 2, BIOVENTING SYSTEM
LOAD CENTER SCHEDULE

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DRAWING E-7

GRIFFISS AIR FORCE BASE
GROUNDWATER REMEDIATION
ROME, NEW YORK

PUMP HOUSE #1, FPR SYSTEM, AND
PUMP HOUSE #2, BIOVENTING SYSTEM
SUB-PANEL AND LOAD CENTER SCHEDULES

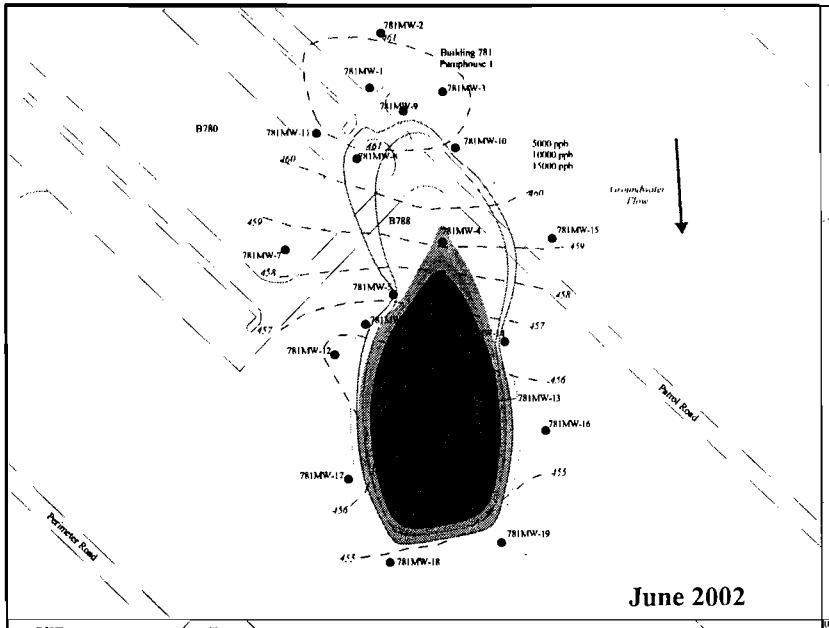
PARSONS
290 ELWOOD DAVIS ROAD, SUITE 312, LIVERPOOL, N.Y. 13088, PHONE: 315-451-9560

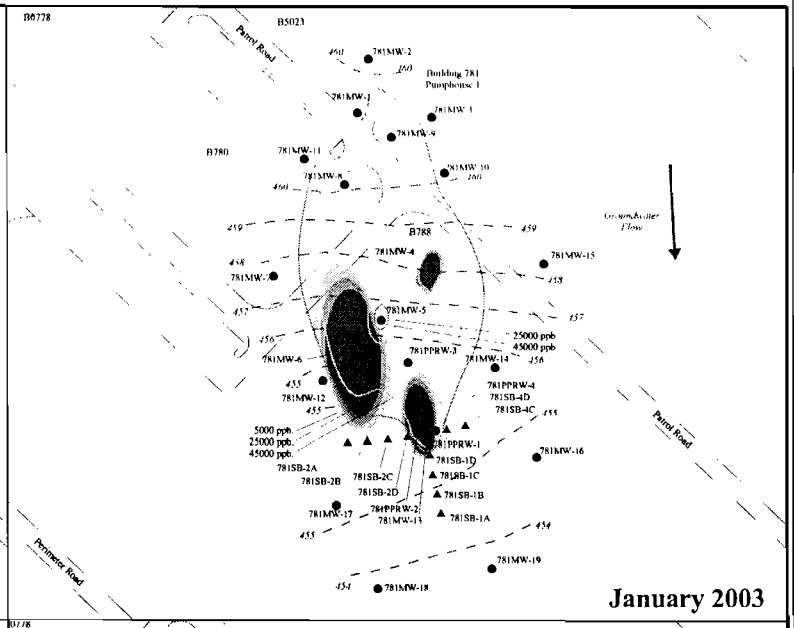
APPENDIX G

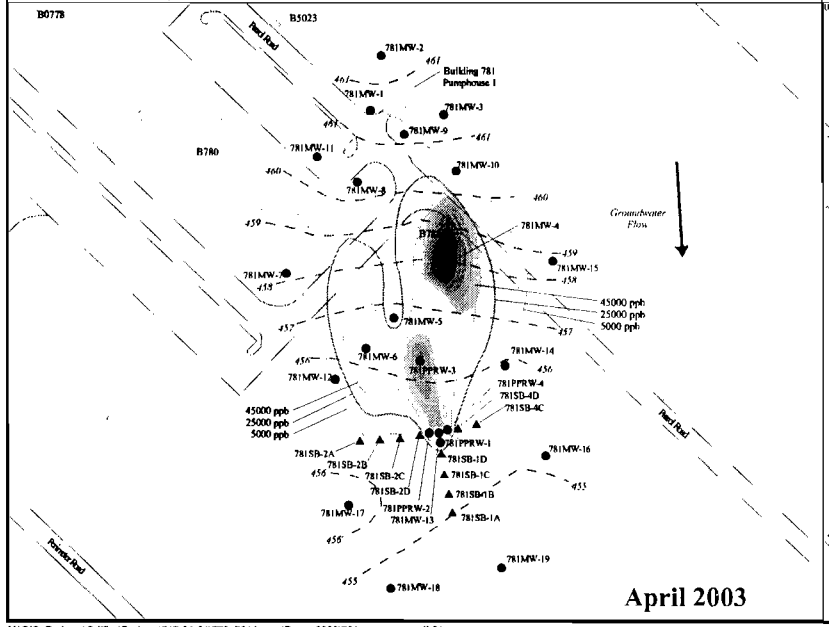
BORING LOGS

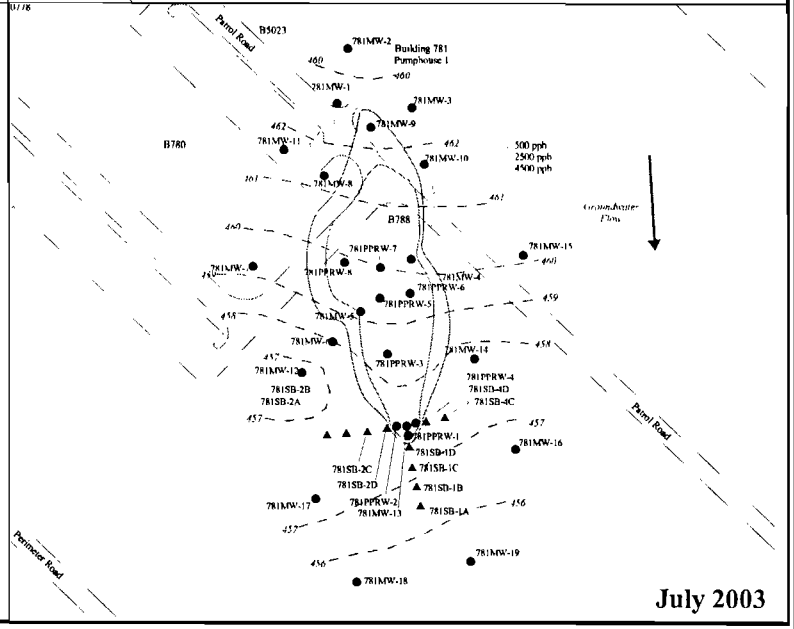
In October 2002 Parsons conducted an investigation to identify the parameters of the free product plume at Pumphouse 1 for the installation of the FRP system. Soil borings were installed in 25' increments starting at 100' south, east and west of existing monitoring well 781MW-13 which was selected base on field measurements 2.5' or more of free product. An alpha-numeric numbering system was used to identify the soil borings and other well installations during drilling events for the FPR and biovent systems. The following table lists the well number and corresponding field identifications as illustrated on Figure 1-3, Site Building 781 Contour Maps (FPM Draft Annual Groundwater Monitoring Report, Feb 2004) and on Drawing C-4 in Appendix F.

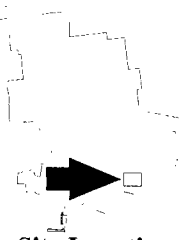
WELL NUMBER ON DRILL LOG	DRILLING DATE	CONTOUR MAP OR SITE PLAN IDENTIFICATION
PPRW-3A	10/17/02	781PPRW-3
PPRW-1E	10/15/02	781PPRW-1
PPRW-2E	10/15/02	781PPRW-2
PPRW-1A	10/07/02	781SB-1A
PPRW-1B	10/07/02	781SB-1B
PPRW-1C	10/08/02	781SB-1C
PPRW-1D	10/09/02	781SB-1D
PPRW-2A	10/09/02	781SB-2A
PPRW-2B	10/10/02	781SB-2B
PPRW-2C	10/11/02	781SB-2C
PPRW-2D	10/14/02	781SB-2D
PPRW-4D	10/17/02	781SB-4D
PPRW-4E	10/23/02	781PPRW-4
PAIW-1	10/24/02	781PAIW-1
PVMP-1	10/28/02	781PVMP-1
PVMP-2	10/29/02	781PVMP-2
PVMP-3	10/30/02	781PVMP-3
PAIW-2	11/01/02	779APIW-2
PVMP-6	11/07/02	779PVMP-6
PVMP-5	11/06/02	779PVMP-5
PVMP-4	11/05/02	779PVMP-4
WL-781PPRW-05	7/14/03	781PPRW-5
WL-781PPRW-06	7/15/03	781PPRW-6
WL-781PPRW-07	7/16/03	781PPRW-7
WL-781PPRW-08	7/18/03	781PPRW-8
781 PIW-2	12/15/03	781PAIW-2
781 VMP-7	12/17/03	781PVMP-7











Site Location

Key to Features

- MONITORING WELL
- SOIL BORING
- GROUNDWATER (feet)
- ROAD

FACILITY
- Existing
- Demolished

TOTAL VOC (ppb)
- 500
- 2500
- 4500
- 6500
- 8500
- 10500
- 12500
- 14500

TRUE FREE PRODUCT* (feet)
- 0 - 0.01
- 0.01 - 0.02
- 0.02 - 0.03
- 0.03 - 0.04
- 0.04 - 0.05
- 0.05 - 0.06
- 0.06 - 0.07
- 0.07 - 0.08
- 0.09 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6

*Method of Blake and Hall (1984)

60 0 60 120 180 Feet

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 1-3
Site Building 781 Contour Maps

FPM group

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FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

No. PPRW-3A SURFACE ELEV

R LEVEL INITIAL STABILIZED

LLING COMP. Parratt Wolff DRILLING METHOD HSA 6¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-17-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	0-2	1	Brown, fine to medium sand with silt, loose, moist.
2				2-4	1	Brown, fine sand, trace silt. Loose, moist.
3		0	SP	4-6	1	Same as above.
4				6-8	1	same as above.
5		0	SP	8-10	1	same as above.
6				10-12	1	6" Brown, fine sand with silt. 6" Brown, fine sand, trace silt. Moist, loose.
7		0	SP	12-14	1	6" same as above. 6" Brown, fine to medium sand, trace silt. Loose, moist.
8		0	SP			
10			SM	14-16	1	Same as above
11		0	SP	16-18	1	Same as above
12			SP	18-20	1	Brown, fine sand, trace silt. Moist, medium density.
13		0		20-22	1	6" same as above. 3" Brown, fine sand with silt, wet. 3" Brown, fine sand, trace silt. Moist, loose.
14						
15		0	SP			
16				22-24	1.5	6" Same as above. 6" Brown, fine sand and silt. Wet. 6" Brown, fine sand with silt. Wet.
17		0	SP			
18						
19		0	SP	24-26	1.5	3" Same as above. 3" Brown, fine to medium sand, trace silt. 12" Brown, fine sand with silt. All wet, medium density.
20			SP			
21		0	SM			
22			SP			
23		0	SP			
			SM			
		0	SM			
26			SP			
			SM			

WELL CONSTRUCTION

- TOP OF CASING AT +2.5 FT. AGS (RISER) OR BGS
- 12 IN. DIA. BOREHOLE
- 4 IN. DIA. SCHEDULE 40 PVC BLANK CASING 49 TO +2.5 FT.
- BENTONITE–CEMENT GROUT 45.5 TO 41 FT.
- BENTONITE PELLET SEAL 48 TO 45.5 FT.
- #0 (NAME) (#) SANDPACK 64 TO 48 FT.
- ___ IN. DIA. SLOTTED .010 SCREEN 64 TO 49 FT.
- ___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.
- BOTTOM WELL CAP 64 FT.
- BOTTOM OF BOREHOLE 64 FT.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-21-01 SITENAME AND SITEID Pumphouse 1

WELL No. PPRW-3A SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-12-02

WELL TYPE CODE

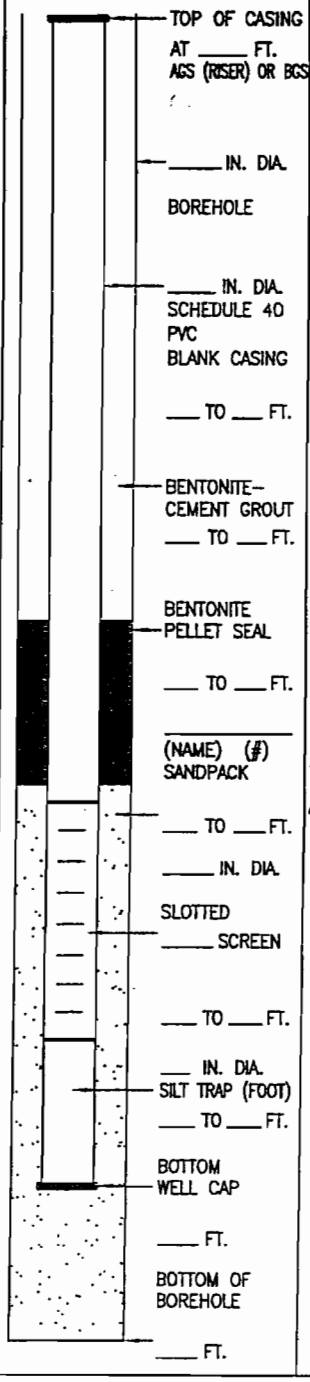
☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
27		0	SM
28			
29		4	SM
30			SM/SP
31		18	
32			SP
33		230	
34			
35		210	SP
36			SP
37		240	
38			
39		400	SP
40			
41		800	SP
42			
43		400	SP
44			
45		400	SP
46			
47		350	SP
48			
49		1000	SP
50			
51		1000+	SP
52			

WELL CONSTRUCTION



LATITUDE

LONGITUDE

DESCRIPTION/SOIL CLASSIFICATION

DEPTH	REC	(COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
26-28	1	6" Brown, fine sand with silt. 6" Brown, fine sand and silt. All wet, medium density.
28-30	1	6" Same as above. 6" Brown, fine to medium sand with silt and trace clay. Wet, medium density.
30-32	1	3" same as above. 3" Brown, Fine to medium sand, trace silt. 3" Brown, fine to coarse sand, trace silt. 3" Brown, fine sand, trace silt. Wet, medium density.
32-34	1	Same as above.
34-36	1	Same as above.
36-38	1	10" Same as above. 2" Brown, fine sand with gravel. Medium density, moist.
38-40	1	Brown, Fine sand, trace silt. Medium density, moist.
40-42	1	Same as above.
42-44	1	Same as above.
44-46	1	Same as above.
46-48	1	Same as above.
48-50	1	Same as above. Heavy odor
50-52	1	Same as above. Heavy odor

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

:L No. PPEW-3A SURFACE ELEV

:R LEVEL INITIAL STABILIZED

LING COMP. PARRATT WOLFF DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-17-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

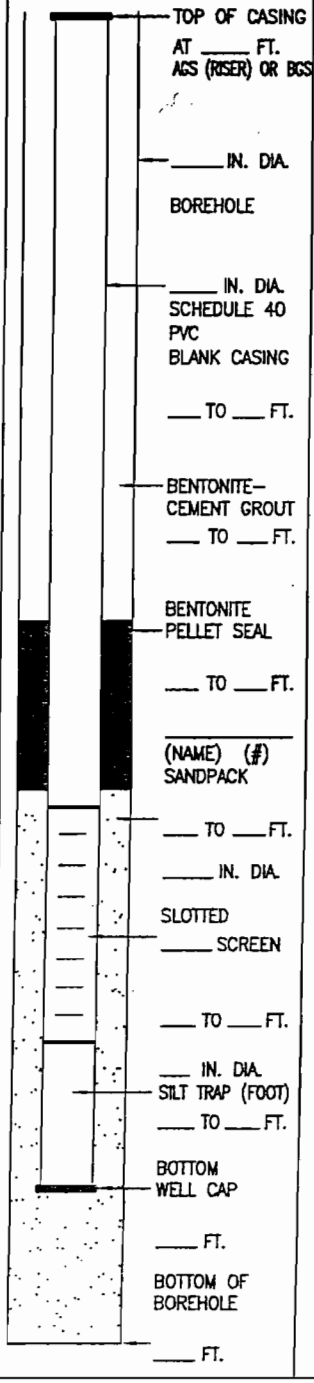
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
53		1000+	SP	53-54	1	Brown, fine sand, trace silt. Medium density, moist. Heavy odor
54				54-56	1	Same as above. Heavy odor.
55		1000+	SP	56-58	1	Same as above. wet. Heavy sheen when mixed with water.
56						
57		1000+	SP			Collect sample at 52-56'
58						781 SB3A 52AB at 1330

WELL CONSTRUCTION



FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 217-01-01 SITENAME AND SITEID Pumphouse 1

WELL No. PPRW-1E SURFACE ELEV _____

WATER LEVEL INITIAL _____ STABILIZED _____

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-15-02

WELL TYPE CODE _____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE _____

LONGITUDE _____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	WELL CONSTRUCTION	DESCRIPTION/SOIL CLASSIFICATION DEPTH REC (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
				TOP OF CASING AT 2 FT. (AGS) (RISER) OR BGS 12 IN. DIA. BOREHOLE 4 IN. DIA. SCHEDULE 40 PVC BLANK CASING +2 TO 48 FT. BENTONITE-CEMENT GROUT 44.5 TO 4 FT. BENTONITE PELLET SEAL 47 TO 44.5 FT. 0 (NAME) (#) SANDPACK 63 TO 47 FT. 4 IN. DIA. SLOTTED .20 SCREEN 63 TO 48 FT. 4 IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT. BOTTOM WELL CAP ___ FT. BOTTOM OF BOREHOLE 64 FT.	Auger to 60'. No samples collected.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID RUNYHOUSE 1

LL No. PPRW-2E SURFACE ELEV

ER LEVEL INITIAL STABILIZED

RILLING COMP. LAYNE WICFF DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-15-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	0-2	1	Brown, fine sand with silt. Loose, moist.
2				2-4	1	Same as above
3		0	SM	4-6	1	Same as above
4				6-8	1	Brown, fine sand, trace silt. Loose, moist.
5		0	SM	8-10	1	4 alternating 3" bands of fine sand and trace silt and fine sand with silt. Moist, medium density.
6						
7		0	SP			
			SP	10-12	1	Brown, fine sand with silt and trace clay. Moist, medium density.
10		0	SM			
11		0	SM	12-14	1.5	12" Same as above. 6" Brown, fine sand, trace silt. medium density, moist.
12						
13		0	SM SP			
14						

Auger to 60'.

WELL CONSTRUCTION

- TOP OF CASING AT 2.5 FT. AGS (RISER) OR BGS
- 12 IN. DIA. BOREHOLE
- 4 IN. DIA. SCHEDULE 40 PVC BLANK CASING 49 TO +2.5 FT.
- BENTONITE-CEMENT GROUT 45.5 TO 4 FT.
- BENTONITE PELLET SEAL 48 TO 45.5 FT.
- 0 (NAME) (#) SANDPACK 65 TO 48 FT.
- 4 IN. DIA. SLOTTED .20 SCREEN 64 TO 49 FT.
- 4 IN. DIA. SILT TRAP (FOOT) TO FT.
- BOTTOM WELL CAP 64.5 FT.
- BOTTOM OF BOREHOLE 65 FT.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

WELL No. PPRW-1A SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Pregatt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-7-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	WELL CONSTRUCTION (TEMPORARY LOCATION)	DESCRIPTION/SOIL CLASSIFICATION (BEGDEPTH, ENDDEPTH, COLOR, CLASS, MOISTURE CONTENT, STIFFNESS, RECOVERY)
					DEPTH REC
1		0	SM	TOP OF CASING AT ___ FT. AGS (RISER) OR BGS	0-2 1 Brown, fine to medium sand with silt, moist & loose.
2					2-4 1.5 Brown, fine sand with silt. Moist, loose.
3		0	SM	___ IN. DIA. BOREHOLE	4-6 1 Same as above
4					6-8 1 3" Same as above
5		0	SM		9" Brown, fine to medium sand with silt and clay, medium density, moist.
6				___ IN. DIA. SCHEDULE 40 PVC BLANK CASING	8-10 1.5 6" Same as above
7		0	SM		12" Light brown fine sand, trace medium sand and silt. All medium dense, moist.
8				___ TO ___ FT.	
9		0	SM		10-12 1.5 Same as above
10				BENTONITE-CEMENT GROUT	12-14 1.5 Same as above
11		0	SM	___ TO ___ FT.	14-16 1.5 Same as above
12					16-18 1.5 Same as above
13		0	SM	BENTONITE PELLET SEAL ___ TO ___ FT.	18-20 1.5 Brown, fine sand, trace medium sand and silt. Medium density, moist.
14					20-22 1 Same as above
15		0	SM	(NAME) (#) SANDPACK	22-24 1 Same as above
16					24-26 1.5 Same as above
17		0	SM	___ TO ___ FT. ___ IN. DIA. SLOTTED ___ SCREEN	26-28 1 Same as above, 0 PID
18					28-30 1 Same as above, 0 PID
19		0	SM		30-32 1.5 Same as above, 0 PID
20				___ TO ___ FT.	32-34 1.5 Same as above, 0 PID
21		0	SM	___ IN. DIA. SILT TRAP (FOOT)	34-36 1 Same as above, 0 PID
22				___ TO ___ FT.	36-38 1.5 Same as above, 0 PID
23		0	SM	BOTTOM WELL CAP	38-40 1 Same as above, 0 PID
24				___ FT.	40-42 .6 Same as above, 0 PID
25		0	SM	BOTTOM OF BOREHOLE	42-44 .6 Same as above, 0 PID
26				___ FT.	44-46 1.5 Same as above, 0 PID
					46-48 1.5 Same as above, 0 PID
					48-50 1.5 Same as above, 0 PID
					50-52 1.5 Same as above, no odor. PID reads 3.0 ppm.
					52-54 1.5 Same as above, wet, no odor. PID reads 4.0 ppm.

Collect sample 781SB1A50AB at 1430

Hole subsequently filled with cuttings to grade.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

No. PPRW-1B SURFACE ELEV

ER LEVEL INITIAL STABILIZED

RILLING COMP. PACATT WOLFF DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-7/8-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
1		0	SM
2			
3		0	SM
4			
5		0	SM
6			
7		0	SM
			SM
		0	SP
10			
11		0	SP
12			
13		0	SP
14			
15		0	SP
16			
17		0	SP
18			
19		0	SP
20			
21		0	SP
22			
2[illegible]		0	SP
2[illegible]			
2[illegible]		0	SP
26			

WELL CONSTRUCTION
TEMPORARY LOCATION

- TOP OF CASING AT ___ FT. AGS (RISER) OR BGS
- ___ IN. DIA. BOREHOLE
- ___ IN. DIA. SCHEDULE 40 PVC BLANK CASING
- ___ TO ___ FT.
- BENTONITE-CEMENT GROUT
- ___ TO ___ FT.
- BENTONITE PELLET SEAL
- ___ TO ___ FT.
- (NAME) (#) SANDPACK
- ___ TO ___ FT.
- ___ IN. DIA. SLOTTED ___ SCREEN
- ___ TO ___ FT.
- ___ IN. DIA. SILT TRAP (FOOT)
- ___ TO ___ FT.
- BOTTOM WELL CAP
- ___ FT.
- BOTTOM OF BOREHOLE
- ___ FT.

DESCRIPTION/SOIL CLASSIFICATION
BEGDEPTH, ENDDEPTH, COLOR, CLASS, MOISTURE CONTENT, STIFFNESS, RECOVERY)

DEPTH	REC	
0-2	1	Brown, fine to medium sand with silt. Loose, moist.
2-4	1.5	1'3" same as above 3" Light brown, fine sand with silt. Loose, moist.
4-6	1	2" Same as above 10" Brown, fine sand and silt, trace clay. Loose, moist.
6-8	1	Same as above
8-10	1	2" Same as above. 6" Brown, fine sand with silt. 4" Brown, fine to medium sand, trace silt. Moist, medium density.
10-12	1	Brown, fine sand, trace medium sand and silt. Loose, moist.
12-14	1	Brown, fine sand, trace medium sand and silt. Moist, medium density.
14-16	1	Same as above
16-18	1	Same as above
18-20	1	Same as above
20-22	1.5	Same as above
22-24	1.5	Same as above
24-26	1	Same as above
26-28	1	Same as above, @ PID
28-30	1.5	Same as above, @ PID
30-32	1.5	Same as above, @ PID
32-34	1	Same as above, @ PID
34-36	1	Same as above, @ PID
36-38	1	Same as above, @ PID
38-40	1	Same as above, @ PID
40-42	1	Same as above, Very dense, @ PID
42-44	1	Same as above, @ PID
44-46	1.5	Same as above, @ PID
46-48	1	Same as above, @ PID
48-50	1	Same as above, @ PID
50-52	1	Same as above, sample taken,
52-54	1.5	Same as above, ½ wet, no odor. PID reads 0.1 ppm
54-56	2	Same as above, all wet. Slight solvent odor. PID reads 1.5ppm.

Hole is backfilled with cuttings to grade.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

WELL No. PP RW - IC SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. PARRATT WOLFF DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-8-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

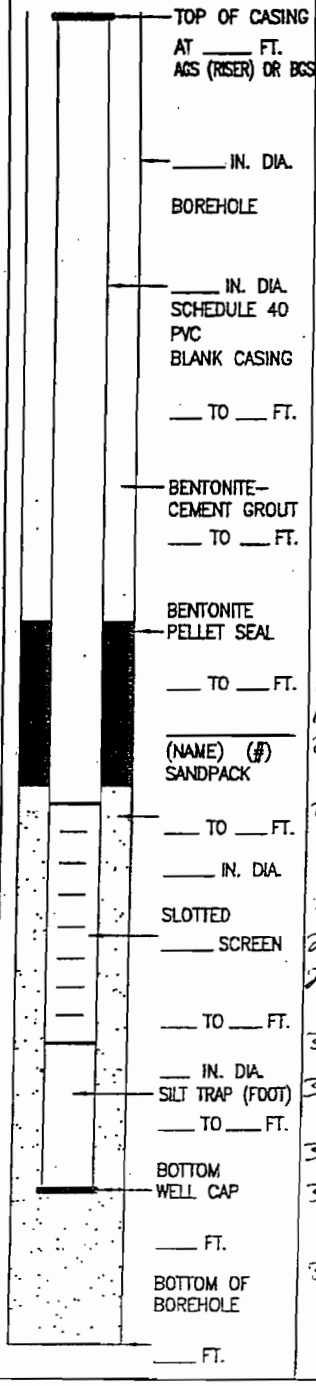
SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
1		0	SM
2			
3		0	SM
4			
5		0	SM
6			
7		0	SM
8			
9		0	SM
10			SM
11		0	SP
12			SP
13		0	
14			
15		0	SP
16			
17		0	SP
18			
19		0	SP
20			
21		0	SP
22			
23		0	SP
24			
25		0	SP
26			



WELL CONSTRUCTION
TEMPORARY LOCATION

DESCRIPTION/SOIL CLASSIFICATION
BEGDEPTH, ENDDEPTH, COLOR, CLASS, MOISTURE CONTENT, STIFFNESS, RECOVERY)

DEPTH	REC	
0-2	1	Brown, fine sand with silt. Moist, loose.
2-4	.5	Same as above, rock in shoe.
4-6	1.5	12" Same as above.
		3" Brown, fine sand with silt and gravel.
		3" Brown, fine sand with silt. All loose, moist.
6-8	1	4" same as above.
		6" Brown, fine sand with silt, trace clay.
		2" Brown, Fine sand with silt and clay. All moist, loose.
8-10	1	2" Same as above.
		10" Brown, fine sand with silt. Wet at 9", loose.
10-12	1.5	6" Same as above, moist.
		12" Brown, fine to medium sand, trace silt. Loose, moist.
12-14	1	3" Same as above
		9" Brown, fine sand, trace silt. Medium density, moist.
14-16	1	Same as above
16-18	1	same as above
18-20	1	Same as above
20-22	1	Brown, fine to medium sand, trace silt. Medium density, moist.
22-24	1	2" Same as above.
		10" Brown, fine sand, trace silt. Medium density, Moist.
24-26	1	same as above.
26-28	1	Same as above.
28-30	1.5	Same as above. 1" dark brown layer at 29'.
30-32	1	Same as above
32-34	1	Same as above. Very slight musty odor (not petro!).
34-36	1.5	Same as above
36-38	1	Same as above, Very dense, small rock fragments at 38'. PID reads 0.1 ppm.
38-40	1	Same as above. PID reads 0.1ppm

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

IL No. PDRW-1C SURFACE ELEV

TER LEVEL INITIAL STABILIZED

DRILLING COMP. PARRATT WOLFF DRILLING METHOD HSA 4½" ID

DRILLER D. THOMAS LOG BY DF DATE DRILLED 10-8-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

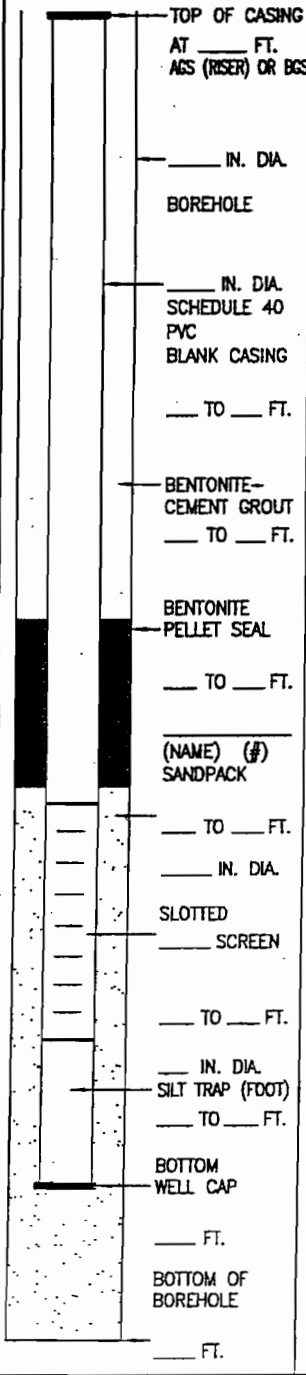
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
41		0-3	SP
42			
43		0	SP
44			
45		0	SP
46			
47		0	SP
		0	SP
50			
51		3	SP
52			
53		20	SP
54			
55		25	SP
56			
57		30	SP
58			
59			
60			
61			
62			
63			
66			

WELL CONSTRUCTION
TEMPORARY LOCATION



DESCRIPTION/SOIL CLASSIFICATION
BEGDEPTH, ENDDEPTH, COLOR, CLASS, MOISTURE CONTENT, STIFFNESS, RECOVERY)

DEPTH REC		
40-42	1	Brown, fine sand, trace silt, medium density, moist. Very slight odor (0-3 ppm), not steady reading. PID recalibrated.
42-44	1	Same as above
44-46	1	Same as above
46-48	1	Same as above
48-50	1	Same as above
50-52	1	Same as above
52-54	1	Same as above. Wet at bottom 4". Strange solvent-like odor.
54-56	1.5	Same as above, wet (same odor)
56-58	1.5	Same as above, wet (same odor)

collect sample at 50-52'
781SB1C50AB at 1630
collect sample at 56-58' "saturated"
781SB1C56AB at 1645

Hole is backfilled with cuttings to grade.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

WELL No. PPR-W1-D SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thomas LOG BY DF DATE DRILLED 10-9-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

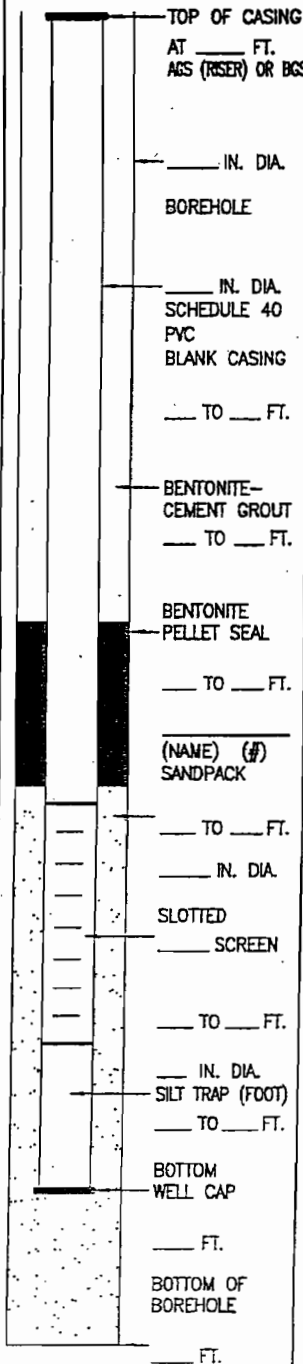
SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH REC	DESCRIPTION/SOIL CLASSIFICATION (BEGDEPTH, ENDDEPTH, COLOR, CLASS, MOISTURE CONTENT, STIFFNESS, RECOVERY)
1		0	SM	0-2 1.5	Brown, fine sand with silt, moist, loose.
2				2-4 1	Same as above
3		0	SM	4-6 1	Brown, fine sand, trace silt. Moist, loose.
4				6-8 1	6" Same as above
5		0	SP		6" Brown, fine to medium sand and gravel, with silt and trace clay. Loose, moist.
6				8-10 1.5	12" Brown, fine sand and silt.
7		0	SP		6" Brown, fine sand with silt and trace clay. All moist, loose.
8				10-12 1	Brown, fine sand with silt and trace gravel. Dense, moist.
9		0.2	SM	12-14 1.5	6" Brown, fine sand with silt.
10					12" Brown, fine to medium sand, trace silt. Medium density, moist.
11		0.1	SM	14-16 1	same as above, dense. No fuel odor
12			SM	16-18 1	same as above, no odor
13		0.1	SP	18-20 1	same as above, no odor
14				20-22 1	Brown, fine sand, trace silt. Dense, moist, no odor.
15		10	SP	22-24 1	Same as above. No fuel odor.
16				24-26 1	Same as above. No odor.
17		12	SP		
18					
19		12	SP		
20					
21		16	SP		
22					
23		14	SP		
24					
25		18	SP		
26					



FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Riverhouse 1

WELL No. PPRW1-D SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. ~~Beacon Wolff~~ DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY OF DATE DRILLED 10-9-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
27		16	SP	26-28	1	Brown, fine sand, trace silt, dense, moist. No fuel odor.
28				28-30	1	Same as above. No fuel odor.
29		19	SP	30-32	1	Same as above. No fuel odor.
30				32-34	1	Same as above. No fuel odor. Possible solvent odor.
31		14	SP	34-36	1	Same as above. No fuel odor. Possible solvent odor.
32				36-38	1	Same as above. No fuel odor.
33		118	SP	38-40	1	Same as above. Solvent odor.
				40-42	1	Same as above. Piece of gravel. solvent odor.
		75	SP	42-44	1	Same as above. solvent odor.
36				44-46	1	Same as above. solvent odor.
37		141	SP	46-48	1.5	Same as above. solvent odor.
38				48-50	1	Same as above. solvent odor.
39		270	SP	50-52	1	Same as above. Solvent odor.
40						
41		400	SP			
42						
43		180	SP			
44						
45		260	SP			
46						
47		450	SP			
48						
49		160	SP			
		580	SP			
52						

WELL CONSTRUCTION

- TOP OF CASING AT ___ FT. AGS (RISER) OR BGS
- ___ IN. DIA. BOREHOLE
- ___ IN. DIA. SCHEDULE 40 PVC BLANK CASING ___ TO ___ FT.
- BENTONITE-CEMENT GROUT ___ TO ___ FT.
- BENTONITE PELLET SEAL ___ TO ___ FT.
- ___ (NAME) (#) SANDPACK ___ TO ___ FT.
- ___ IN. DIA. SLOTTED ___ SCREEN ___ TO ___ FT.
- ___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.
- BOTTOM WELL CAP ___ FT.
- BOTTOM OF BOREHOLE ___ FT.

FPM Group Ltd. **Engineering and Environmental Science**

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

WELL No. PPRW1-D SURFACE ELEV _____

WATER LEVEL INITIAL _____ STABILIZED _____

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-9-02

WELL TYPE CODE _____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

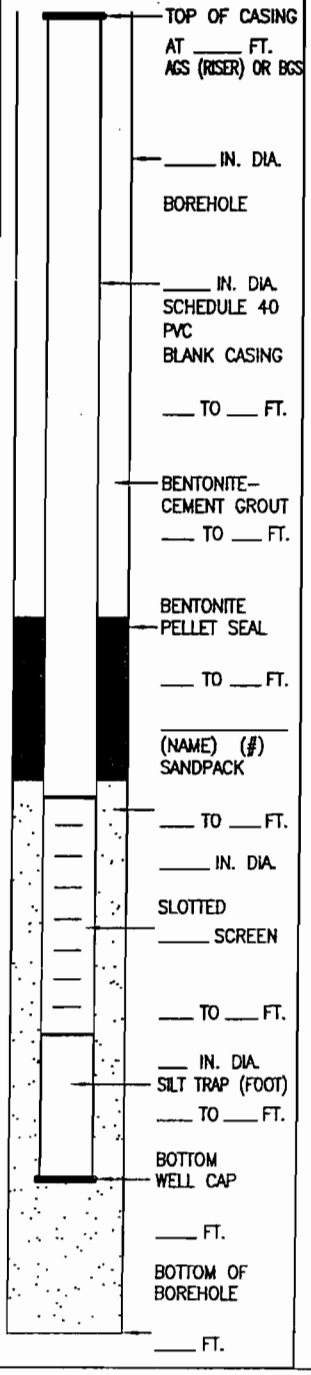
NOTES:

LATITUDE _____

LONGITUDE _____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
	DEPTH REC			
53	52-54 1	1000+	SP	Brown, fine sand, trace silt. Very heavy solvent odor. Moist, dense
54	54-56 1	—		Same as above. solvent odor. Wet.
55	56-58 1	1000+	SP	Same as above. Solvent odor. Wet.
56		—		
57		1000+	SP	E.O.B.
58		—		Collect sample at 52-54' interval. 781SB1D52AB at 1215.
				Set 1" well at 60' bgs.

WELL CONSTRUCTION



FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

WELL No. PPRW-2A SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. PRATT WOLFF DRILLING METHOD HSA 4¼"

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-9-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

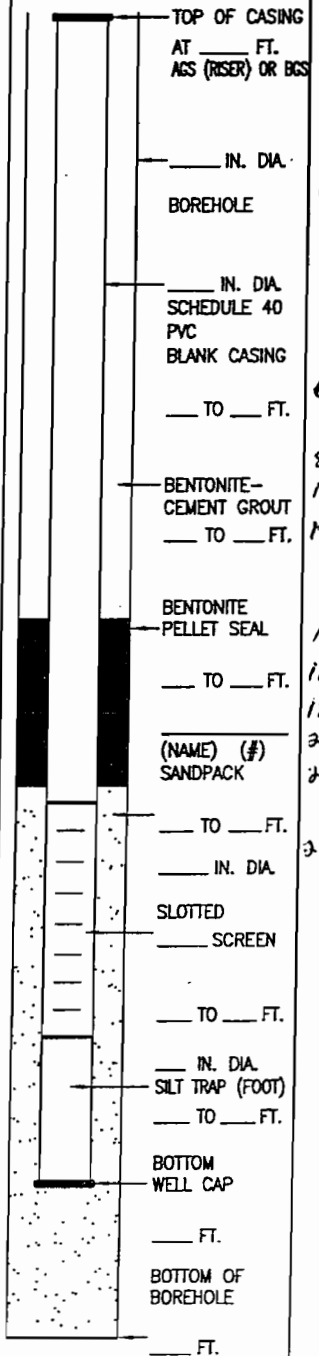
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
1		0	SM
2			
3		0	SM / SP
4			SP
5		0	SP / SM
6			
7		0	SM
10		0	SM
11		0	SM
12			SM
13		0	SP
14			
15		0	SP
16			
17		0	SP
18			
19		0	SP
20			
21		0	SP
22			
23		0	SP
26		1.5	SP

WELL CONSTRUCTION
TEMPORARY



DESCRIPTION/SOIL CLASSIFICATION

DEPTH	REC	(COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
0-2	1.5	Brown, fine sand with silt and gravel. Loose, moist.
2-4	1.5	12" same as above. 6" Brown, fine to coarse sand with gravel and silt. Medium density, moist.
4-6	1.5	6" same as above. 6" Brown, fine sand with silt and gravel. 6" Brown, fine to coarse sand with silt and gravel. All medium density, moist.
6-8	1	Brown, fine sand with silt. Moist, medium density.
8-10	.5	Same as above.
10-12	1	Same as above, dense.
12-14	1.5	6" Same as above. 12" Brown, fine sand, trace medium sand and silt. Dense, moist.
14-16	1	Same as above.
16-18	1	Same as above.
18-20	1	Same as above. Rock in shoe.
20-22	1	Same as above.
22-24	1	Brown, fine sand, trace silt. Dense, moist.
24-26	1.5	Same as above, no odor.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pinelawn 1

WELL No. PPRW-2A SURFACE ELEV _____

WATER LEVEL INITIAL _____ STABILIZED _____

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 6¼"

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-9-02

WELL TYPE CODE _____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

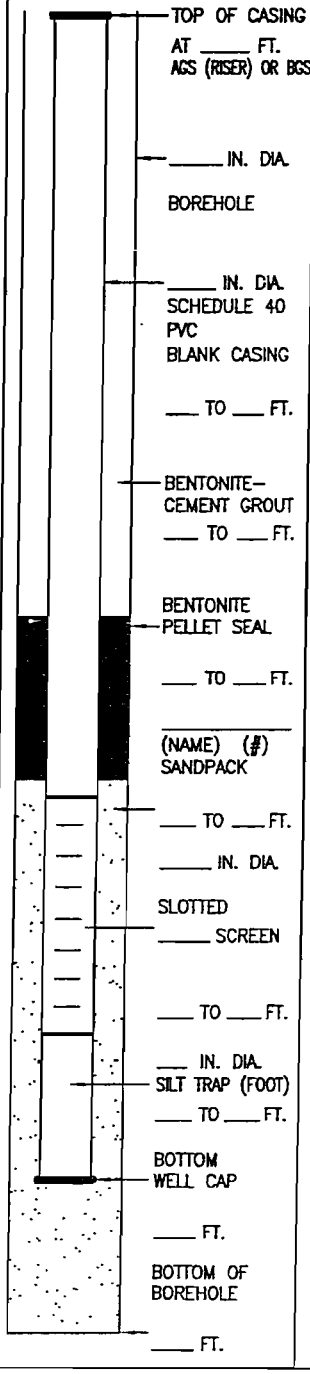
NOTES:

LATITUDE _____

LONGITUDE _____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
27		8	SP
28			
29		20	SP
30			
31		9	SP
32			
33		30	SP
34			
35		20	SP
36			
37		25	SP
38			
39		30	SP
40			
41		35	SP
42			
43		30	SP
44			
45		35	SP
46			
47		2	SP
48			
49		40	SP
50			
51		20	SP
52			

WELL CONSTRUCTION



DESCRIPTION/SOIL CLASSIFICATION

DEPTH	REC	(COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
26-28	1	Brown, fine sand, trace silt. Dense, moist. No odor.
28-30	1	Same as above, no odor.
30-32	1	Same as above, no odor.
32-34	1	Same as above, no odor.
34-36	1	Same as above, no odor.
36-38	1	Same as above, no odor.
38-40	1	Same as above, no odor.
40-42	1	Same as above, no odor.
42-44	1	Same as above, no odor.
44-46	1	Same as above, recalibrate PID.
46-48	1	Same as above.
48-50	1.5	Same as above.
50-52	1	Same as above.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-CIA SITENAME AND SITEID Pumphouse 1

WELL No. PPRW-2A SURFACE ELEV _____

WATER LEVEL INITIAL _____ STABILIZED _____

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-9-02

WELL TYPE CODE _____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

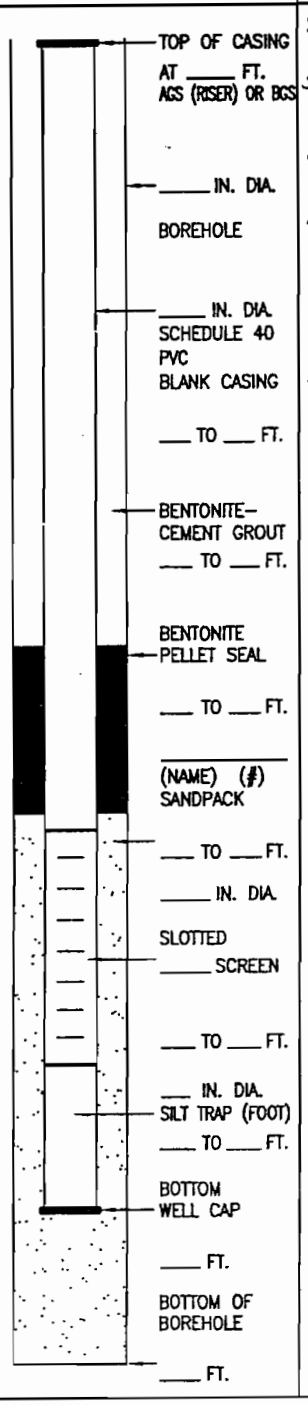
NOTES:

LATITUDE _____

LONGITUDE _____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
53		48	SP	52-54	1	Brown, fine sand, trace silt. Dense, moist, no odor. sample.
54				54-56	1	Same as above. Half of spoon is wet.
55		21	SP	56-58	1	Same as above. Half of spoon is wet. slough in spoon.
56				58-60	1	Same as above. All wet.
57		25	SP			
58						collect sample from 52-54' 781SB2A52AB at 1000
59		20	SP			Hole backfilled with cuttings.

WELL CONSTRUCTION



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PROJECT 717-01-01 SITENAME AND SITEID Purchase 1

WELL No. PPRW-3B SURFACE ELEV ____

WATER LEVEL INITIAL ____ STABILIZED ____

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼"

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-10-02

WELL TYPE CODE ____

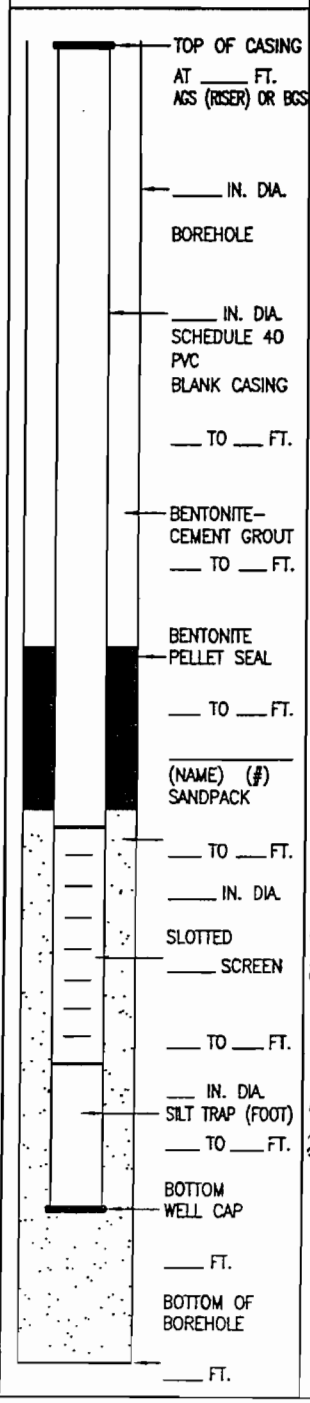
☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE ____

LONGITUDE ____



DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SP	0-2	1.5	6" Brown, fine sand, trace silt. Moist,
2			SM			12" Brown, fine sand with silt. loose.
3		0	SM	2-4	.5	Same as above, rock in shoe. Moist, loose.
4				4-6	1	Brown, fine to coarse sand with gravel, rock fragments. Moist, loose.
5		0	GP	6-8	.5	Same as above.
6				8-10	1	4" Same as above.
7		0	GP			4" Brown, fine sand and silt.
8						4" Brown, fine sand with silt.
9		0	GP			All medium density, ~~with~~ moist.
10			SM	10-12	1	6" Same as above.
11		0	SM			6" Brown, fine sand and silt. Moist, medium density.
12				12-14	1	10" Brown, fine sand with silt.
13		0	SM			2" Brown, fine sand and silt. Moist, dense.
14				14-16	1	6" Same as above.
15		0	SM SP			6" Brown, fine sand, trace silt. Medium density, moist.
16				16-18	1	6" Brown, fine to medium sand, trace silt.
17		0	SP			6" Brown, fine sand, trace silt. Moist, dense.
18				18-20	1	Same as above.
19		0	SP	20-22	1	6" Brown, fine sand and silt, with clay (wet).
20			SM			6" Brown, fine sand, trace silt. Moist, dense.
21		0	SP	22-24	1	Same as above.
22				24-26	1	Same as above.
23		0	SP			
24						
25		0	SP			
26						

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 707-01-01 SITENAME AND SITEID Powerhouse 1

L No. PRW-2B SURFACE ELEV

ER LEVEL INITIAL STABILIZED

RILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼"

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-10-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
26		0	SP
28			
29		15	SP
30			
31		48	SP
32			
33		150	SP
		160	SP
36			
37		140	SP
38			
39		180	SP
40			
41		20	SP
42			
43		25	SP
44			
45		66	SP
46			
47		70	SP
48			
49		85	SP
		180	SP
52			

WELL CONSTRUCTION

TOP OF CASING AT ___ FT. AGS (RISER) OR BGS

___ IN. DIA. BOREHOLE

___ IN. DIA. SCHEDULE 40 PVC BLANK CASING

___ TO ___ FT.

BENTONITE-CEMENT GROUT ___ TO ___ FT.

BENTONITE PELLET SEAL ___ TO ___ FT.

(NAME) (#) SANDPACK ___ TO ___ FT.

___ IN. DIA. SLOTTED ___ SCREEN ___ TO ___ FT.

___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.

BOTTOM WELL CAP ___ FT.

BOTTOM OF BOREHOLE ___ FT.

DESCRIPTION/SOIL CLASSIFICATION

DEPTH	REC	(COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
26-28	1	Brown, fine sand, trace silt, Moist, dense.
28-30	1.5	Same as above.
30-32	1	Same as above.
32-34	1	Same as above.
34-36	1	Same as above.
36-38	1	Same as above.
38-40	1	Same as above.
40-42	1	Same as above.
42-44	1	Same as above.
44-46	1	Same as above.
46-48	1	Same as above.
48-50	1	Same as above.
50-52	1	Same as above, slight odor.

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PROJECT 717-01-01 SITENAME AND SITEID Powerhouse 1

WELL No. PPRW-2B SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼"

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-10-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
53		250	SP	52-54	1	Brown, fine sand, trace silt. Moist, loose. Some odor. sample
54				54-56	1	Same as above. Some odor.
55		140	SP	56-58	1	Same as above. Heavy odor. Half wet.
56				58-60	1	Same as above. Heavy odor. Wet.
57		180	SP			
58						
59		200	SP			
60						

WELL CONSTRUCTION

- TOP OF CASING AT ___ FT. AGS (RISER) OR BGS
- ___ IN. DIA. BOREHOLE
- ___ IN. DIA. SCHEDULE 40 PVC BLANK CASING ___ TO ___ FT.
- BENTONITE–CEMENT GROUT ___ TO ___ FT.
- BENTONITE PELLET SEAL ___ TO ___ FT.
- ___ (NAME) (#) SANDPACK ___ TO ___ FT.
- ___ IN. DIA. SLOTTED ___ SCREEN ___ TO ___ FT.
- ___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.
- BOTTOM WELL CAP ___ FT.
- BOTTOM OF BOREHOLE ___ FT.

collect sample at 52-54'
7815B2B52AB at 1525

Hole backfilled to grade using cuttings.

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Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Rynhouse 1

TLL No. PPRW-2C SURFACE ELEV

TER LEVEL INITIAL STABILIZED

RILLING COMP. Parratt Wolff DRILLING METHOD HSA 4½"

DRILLER D. Thoma LOG BY OF DATE DRILLED 10-11-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
1		0	SM
2			
3		0	SM
4			
5		0	SP
6			SP
7		0	SM
-			
		0	SM
10			
11		0	SM
12			
13		0	SM
14			
15		0	SM
16			SP
17		15	SP
18			
19		18	SP
20			
21		8	SP
22			
23		5	SP
		9	SP
26			

WELL CONSTRUCTION

TOP OF CASING AT ___ FT. AGS (RISER) OR BGS

___ IN. DIA. BOREHOLE

___ IN. DIA. SCHEDULE 40 PVC BLANK CASING

___ TO ___ FT.

BENTONITE-CEMENT GROUT

___ TO ___ FT.

BENTONITE PELLET SEAL

___ TO ___ FT.

(NAME) (#) SANDPACK

___ TO ___ FT.

___ IN. DIA. SLOTTED ___ SCREEN

___ TO ___ FT.

___ IN. DIA. SILT TRAP (FOOT)

___ TO ___ FT.

BOTTOM WELL CAP

___ FT.

BOTTOM OF BOREHOLE

___ FT.

DESCRIPTION/SOIL CLASSIFICATION

DEPTH	REC	(COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
0-2	1	Brown, fine sand with silt, moist, loose.
2-4	1	Same as above.
4-6	1	Brown, fine to coarse sand with gravel, trace silt. Moist, loose.
6-8	1	6" Same as above. 6" Brown, fine sand with silt. Moist, loose.
8-10	1	Same as above.
10-12	1	Same as above.
12-14	1	Brown, fine sand with silt, trace gravel. Medium density, moist.
14-16	1	6" Same as above. 6" Brown, fine sand, trace silt. medium density, moist.
16-18	1	Same as above.
18-20	1	Same as above.
20-22	1	Same as above.
22-24	1.5	Same as above.
24-26	1	Same as above.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

WELL No. PPRW-2C SURFACE ELEV —

WATER LEVEL INITIAL — STABILIZED —

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼"

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-11-02

WELL TYPE CODE —

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

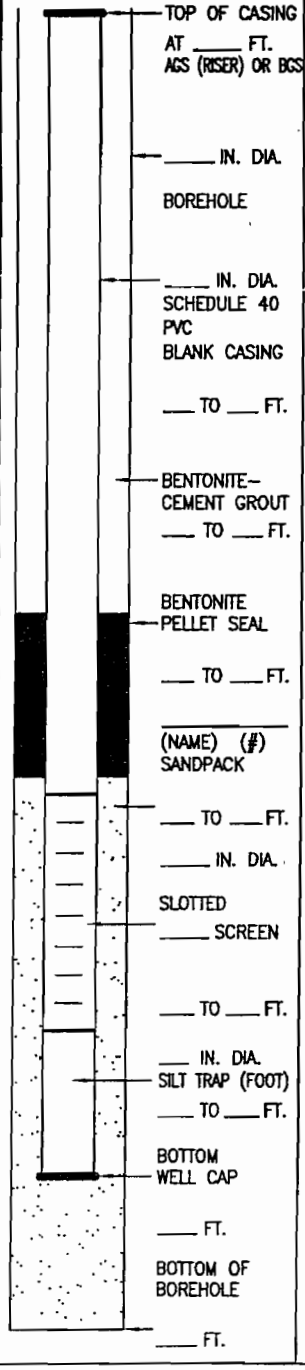
NOTES:

LATITUDE —

LONGITUDE —

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
27		9	SP	26-28	1	Brown, fine sand, trace silt. Medium density, Moist.
28				28-30	1	Same as above.
29		12	SP	30-32	1	6" Brown, fine sand with silt. 6" Brown, fine sand, trace silt. All dense, moist.
30			SM			
31		8	SP	32-34	1	Same as above.
32				34-36	1	Same as above.
33		6	SP	36-38	1	Same as above.
34				38-40	1	Same as above. slight odor.
35		15	SP	40-42	1	Same as above. Very dense. Solvent odor.
36				42-44	1	Same as above. Solvent odor.
37		28	SP	44-46	1	Same as above. Solvent odor.
38				46-48	1	Same as above. Solvent/Jet fuel odor.
39		33	SP	48-50	1	Same as above. Jet fuel odor.
40				50-52	1	Same as above. Jet fuel odor.
41		200	SP			
42						
43		300	SP			
44						
45		400	SP			
46						
47		430	SP			
48						
49		500	SP			
50						
51		600	SP			
52						

WELL CONSTRUCTION



FPM Group Ltd. **Engineering and Environmental Science**

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Powerhouse 1

WELL No. PPRW-2C SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼"

DRILLER D. Thomas LOG BY DF DATE DRILLED 10-11-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	WELL CONSTRUCTION	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
53		600	SP	TOP OF CASING AT ___ FT. AGS (RISER) OR BGS	DEPTH REC 52-54 1.5 Brown, fine sand, trace silt. Medium density, moist. Jet fuel odor.
54					54-56 1 Same as above. Jet fuel odor. Wet at bottom 4".
55		700	SP	___ IN. DIA. BOREHOLE	56-58 1 Same as above. No sheen, heavy odor. Half wet.
56					
57		500	SP		58-60 1 Same as above. No sheen, heavy odor. Wet.
58				___ IN. DIA. SCHEDULE 40 PVC BLANK CASING	
59		600	SP	___ TO ___ FT.	collect sample at 52-55'
				BENTONITE-CEMENT GROUT ___ TO ___ FT.	7815B2C52AB
				BENTONITE PELLET SEAL ___ TO ___ FT.	no sheen, no product. No PVC installed
				(NAME) (#) SANDPACK ___ TO ___ FT.	
				___ IN. DIA. SLOTTED ___ SCREEN ___ TO ___ FT.	
				___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.	
				BOTTOM WELL CAP ___ FT. BOTTOM OF BOREHOLE ___ FT.	

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pinelawn 1

WELL No. PPRW-2D SURFACE ELEV _____

WATER LEVEL INITIAL _____ STABILIZED _____

DRILLING COMP. Accent Water DRILLING METHOD HSA 4¼"

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-14-02

WELL TYPE CODE _____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

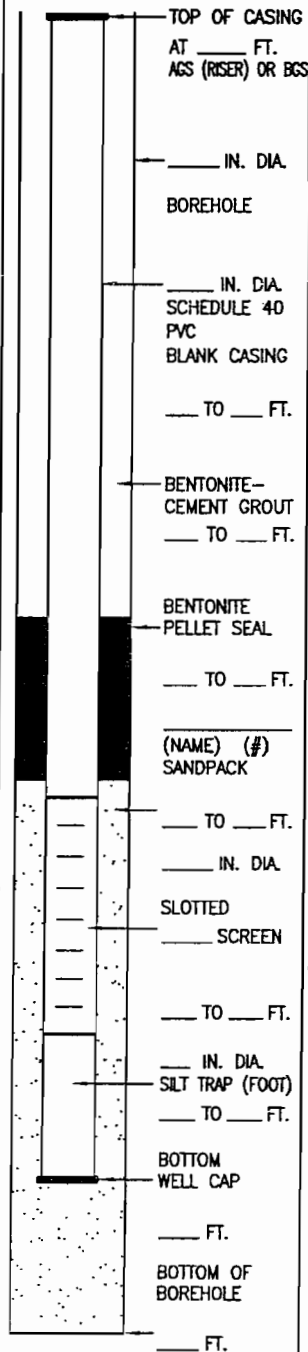
NOTES:

LATITUDE _____

LONGITUDE _____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	0-2	1.5	Brown, fine sand with silt. Moist, loose.
2				2-4	1	Same as above.
3		0	SM	4-6	1	6" Brown, fine sand with silt and gravel.
4						6" Brown, fine to medium sand, trace silt and gravel. All medium density, moist.
5		0	SM SP			
6			SM	6-8	1	6" Brown, fine sand with silt.
7		0	SP			3" Brown, fine sand, trace silt.
8			SM			3" Brown, fine sand with silt. Medium density, moist.
9		0	SM	8-10	1.5	12" Same as above.
10			SP			6" Brown, fine sand, trace silt. Medium density, moist.
11		0	SM	10-12	1	6" Brown, fine sand with silt.
12			SP			6" Brown, fine sand, trace silt. Medium density, moist.
13		0	SP			
14				12-14	1	12" Same as above, no odors
15		8	SP	14-16	1	Brown, fine to medium sand, trace silt, Moist, medium density.
16				16-18	1	Same as above. Recalibrate PID
17		10	SP	18-20	1	3" Brown, fine sand, trace silt.
18						9" Brown, fine to medium sand, trace silt. Medium density, moist.
19		7	SP	20-22	1	6" Same as above.
20						6" Brown, fine sand, trace silt. Moist, medium density.
21		3	SP	22-24	1	Same as above.
22				24-26	1	Same as above.
23		7	SP			
24						
25		9	SP			
26						

WELL CONSTRUCTION



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Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

TL No. PPRW-20 SURFACE ELEV

ER LEVEL INITIAL STABILIZED

ILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DE DATE DRILLED 10-14-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

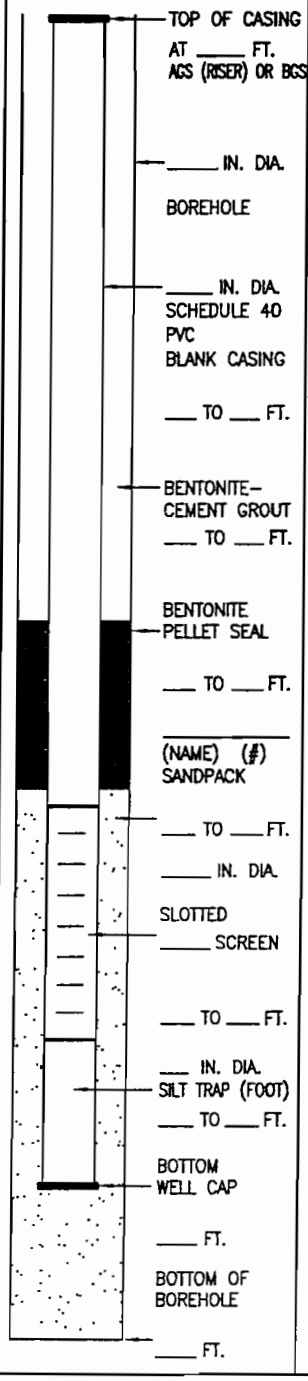
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
27		20	SP	26-28	1	Brown, fine sand, trace silt. Moist, medium density.
28				28-30	1	Same as above.
29		20	SP	30-32	1	Same as above.
30				32-34	1	Same as above.
31		18	SP	34-36	.5	Same as above.
32				36-38	1	Same as above. Solvent odor.
33		48	SP	38-40	1	Same as above. Solvent odor.
				40-42	1	Same as above, Very dense. Solvent odor.
		200	SP	42-44	1	Same as above, solvent odor.
36				44-46	1	Solvent odor, same as above.
37		230	SP	46-48	1	Same as above, solvent odor.
38				48-50	1	Same as above, solvent odor.
39		300	SP	50-52	1	Same as above, heavy odor.
40						
41		450	SP			
42						
43		400	SP			
44						
45		500	SP			
46						
47		600	SP			
48						
49		700	SP			
		775	SP			
52						

WELL CONSTRUCTION



FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Powerhouse 1

WELL No. PPRW-2D SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-14-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DESCRIPTION/SOIL CLASSIFICATION DEPTH REC (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
53		1000+	SP	52-54 1 Brown, fine sand, trace silt. Moist, very dense. Heavy odor.
54				54-56 1 Same as above, heavy odor.
55		1000+	SP	56-58 1 Same as above. Wet, no sheen, no free product.
56				
57		1000+	SP	
58				

WELL CONSTRUCTION

- TOP OF CASING AT ___ FT. AGS (RISER) OR BGS
- ___ IN. DIA. BOREHOLE
- ___ IN. DIA. SCHEDULE 40 PVC BLANK CASING
- ___ TO ___ FT.
- BENTONITE–CEMENT GROUT ___ TO ___ FT.
- BENTONITE PELLET SEAL ___ TO ___ FT.
- ___ (NAME) (#) SANDPACK ___ TO ___ FT.
- ___ IN. DIA. SLOTTED ___ SCREEN ___ TO ___ FT.
- ___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.
- BOTTOM WELL CAP ___ FT.
- BOTTOM OF BOREHOLE ___ FT.

Collect sample at 52-56'
781SB2D52AB/TC at 1530

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Powerhouse 1

LL No. PPRW-4D SURFACE ELEV

TER LEVEL INITIAL STABILIZED

ILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-17-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SP	0-2	1	Brown, fine sand, trace silt. Loose, moist.
2				2-4	1	Same as above.
3		0	SP	4-6	1	Brown, fine sand with silt, trace gravel. Loose, moist.
4				6-8	1	Brown, fine sand, trace silt, loose, moist.
5		0	SM	8-10	1	6" Brown, fine sand with silt.
6						6" Brown, fine sand, trace silt.
7		0	SP			All medium density, moist.
8				10-12	1	6" Same as above.
9		0	SM			6" Brown, fine sand with silt, trace gravel. Moist, medium density.
10			SP	12-14	1	6" Same as above.
11		0	SP			6" Brown, fine sand with silt. Moist, medium density.
12			SM	14-16	1	Brown, fine sand with silt, trace gravel. Moist, medium density.
13		0	SM			
14				16-18	1	6" Same as above.
15		0	SM			6" Brown, fine sand, trace silt, medium density, moist.
16				18-20	1	6" Brown, fine sand with silt.
17		0	SM			6" Brown, fine sand, trace silt. Moist, medium density.
18			SP	20-22	1	Same as above.
19		8	SM	22-24	1	6" Same as above.
20			SP			6" Brown, fine to medium sand, trace silt.
21		45	SP	24-26	1	Same as above.
22						
23		30	SP			
24		20	SP			
26						

WELL CONSTRUCTION

- TOP OF CASING AT ____ FT. AGS (RISER) OR BGS
- ____ IN. DIA. BOREHOLE
- ____ IN. DIA. SCHEDULE 40 PVC BLANK CASING
- ____ TO ____ FT.
- BENTONITE-CEMENT GROUT ____ TO ____ FT.
- BENTONITE PELLET SEAL ____ TO ____ FT.
- (NAME) (#) SANDPACK ____ TO ____ FT.
- ____ IN. DIA. SLOTTED ____ SCREEN ____ TO ____ FT.
- ____ IN. DIA. SILT TRAP (FOOT) ____ TO ____ FT.
- BOTTOM WELL CAP ____ FT.
- BOTTOM OF BOREHOLE ____ FT.

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

WELL No. PPRW-4D SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-17-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

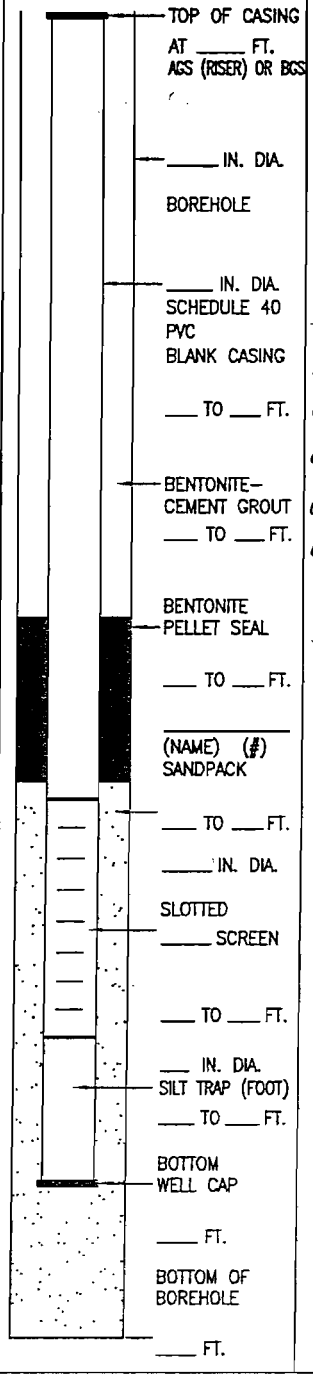
SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
27		28	SP
28			
29		40	SP
30			
31		45	SP
32			
33		120	SP
34			
35		200	SP
36			
37		230	SP
38			
39		200	SP
40			
41		200	SP
42			
43		350	SP
44			
45		190	SP
46			
47		200	SP
48			
49		350	SP
50			
51		—	—
52			



WELL CONSTRUCTION

DESCRIPTION/SOIL CLASSIFICATION

DEPTH	REC	(COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
26-28	1	6" Brown, fine to medium sand, trace silt. 6" Brown, fine sand, trace silt. Medium density, moist.
28-30	1	same as above.
30-32	1	Same as above.
32-34	1	same as above, slight odor.
34-36	1	Same as above.
36-38	1	same as above, medium odor.
38-40	1	same as above.
40-42	1	same as above.
42-44	1	same as above, heavy odor.
44-46	1	same as above, 0% LEL.
46-48	1	same as above.
48-50	1	same as above. Fuel-like heavy odor.
50-52	—	No recovery. Cuttings ~150 ppm.
52-54	1	Brown, fine sand, trace silt. Medium density, half wet. 0% LEL. PID reads 180 ppm.
54-56	1	same as above, wet. PID reads 60 ppm.

collect sample at 48-50'
781 SB 4D48AB at 1340.

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Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

WELL No. PPRW-4E SURFACE ELEV ____

WATER LEVEL INITIAL ____ STABILIZED ____

DRILLING COMP. Parratt Wolff DRILLING METHOD 6¼ HSA

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-23-02

WELL TYPE CODE ____

☐ FLUSH MOUNT ☒ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE ____

LONGITUDE ____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	WELL CONSTRUCTION	DESCRIPTION/SOIL CLASSIFICATION BEGDEPTH, ENDDEPTH, COLOR, CLASS, MOISTURE CONTENT, STIFFNESS, RECOVERY)
1–7				TOP OF CASING AT 2 FT. AGS (RISER) OR BGS 12 IN. DIA. BOREHOLE 4 IN. DIA. SCHEDULE 40 PVC BLANK CASING 48 TO +2 FT.	No samples auger to 68.5'
10–15				BENTONITE-CEMENT GROUT 44.5 TO 4 FT. BENTONITE PELLET SEAL 47 TO 44.5 FT. 0 (NAME) (#) SANDPACK	
16–22				63 TO 47 FT. 4 IN. DIA. SLOTTED .20 SCREEN 63 TO 48 FT. ___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.	
23–26				BOTTOM WELL CAP 63 FT. BOTTOM OF BOREHOLE 68.5 FT.	

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-02 SITENAME AND SITEID Annehouse 1

LL No. PA EIN +1 SURFACE ELEV

ER LEVEL INITIAL STABILIZED

RILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thomas LOG BY DF DATE DRILLED 10-24-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

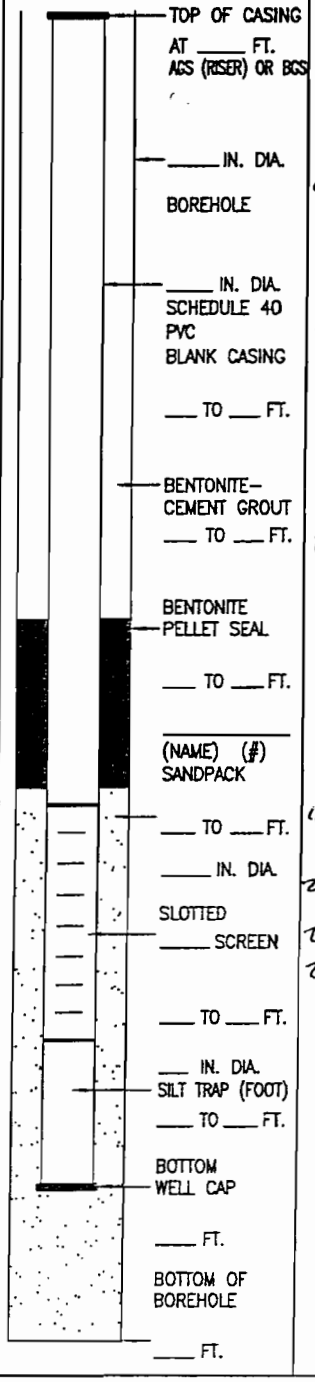
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	0-2	1	Brown, fine sand with silt and organics. Loose, moist.
2				2-4	1	Brown, fine sand with silt. Loose, moist.
3		0	SM	4-6	1	Same as above.
4				6-8	1	Same as above.
5		0	SM	8-10	1	Brown, fine sand with silt, trace medium sand and gravel, loose, moist.
6						
7		0	SM	10-12	1	Brown, fine to medium sand with silt and clay, trace gravel. Loose, moist.
8						
9		0	SM	12-14	1	Brown, fine to medium sand with silt, clay and gravel. Loose and wet.
10						
11		0	SM	14-16	1	6" Brown, fine sand and clay with silt. Wet, loose. 6" Brown, fine to medium sand with silt and clay. Moist, soft / loose.
12						
13		0	SM			
14			SC	16-18	1.2	8" same as above. 6" Brown, fine to medium sand, trace silt. Medium density, moist
15		0	SM			
16			SM	18-20	1.5	Brown, fine sand and silt, trace clay, gravel. Medium density, moist.
17		0	SP	20-22	1	Same as above.
18				22-24	1	same as above.
19		0	SM	24-26	1	Brown, fine sand, trace silt. Medium density, moist.
20						
21		0	SM			
22						
23		8	SM			
		30	SP			
26						

WELL CONSTRUCTION



DRILLING LOG

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

WELL No. PAIW-1 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-24-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

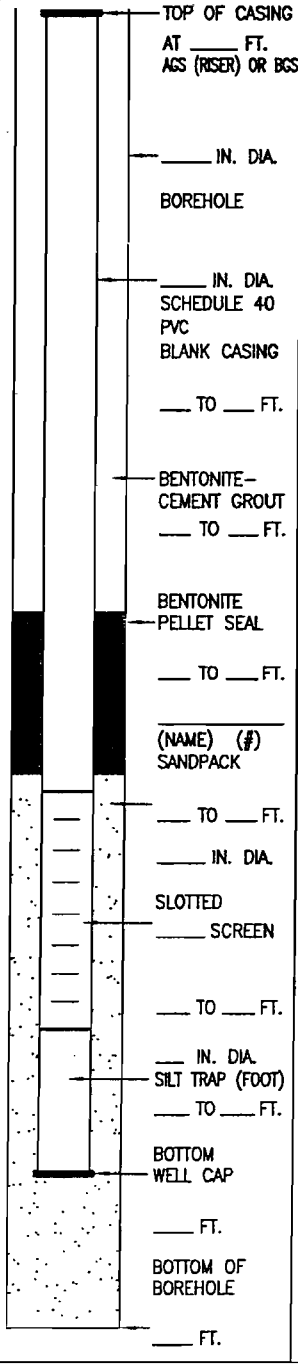
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
27		20	SP	26-28	1	Brown, fine sand, trace silt. Medium density, moist.
28				28-30	1	Same as above.
29		110	SP	30-32	1.2	12" Same as above. 2" Brown, fine sand with silt. Moist, medium density.
30			SP	32-34	1	Brown, fine sand, trace silt. Medium density, moist.
31		30	SM	34-36	1	Same as above. Odor.
32				36-38	1.5	Same as above.
33		80	SP	38-40	1	Same as above. Dense.
34				40-42	1.2	Same as above.
35		175	SP	42-44	1.5	Same as above.
36				44-46	1.5	Same as above.
37		280	SP	46-48	1.5	Brown, fine sand, trace silt and gravel. Moist, dense.
38				48-50	1	Same as above. Heavy odor.
39		350	SP	50-52	1	Brown, fine sand, trace silt. Dense, moist.
40						
41		300	SP			
42						
43		310	SP			
44						
45		280	SP			
46						
47		400	SP			
48						
49		500	SP			
50						
51		450	SP			
52						

WELL CONSTRUCTION



FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

L No. PAIW-1 SURFACE ELEV

ER LEVEL INITIAL STABILIZED

DRILLING COMP. PARRATT WOLFF DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-24-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
53		400	SP	52-54	1	Brown, fine sand, trace silt. Dense, moist.
54				54-56	1	Gray/Brown, fine sand, trace silt. Dense, wet. Heavy odor. Heavy to medium sheen visible.
55		1000+	SP	56-62	-	Auger sluough
56				62-63	-	Bottom of auger. Gray, fine to medium sand, silt, trace clay, with rounded pea to ¾" gravel (Till). Heavy odor.
57						
58						
59		-	-			
62			-			Collect sample at 1810 - 50 781SBI148AB at 1610.
63						

WELL CONSTRUCTION

- TOP OF CASING AT ___ FT. AGS (RISER) OR BGS
- ___ IN. DIA. BOREHOLE
- ___ IN. DIA. SCHEDULE 40 PVC BLANK CASING ___ TO ___ FT.
- BENTONITE-CEMENT GROUT ___ TO ___ FT.
- BENTONITE PELLET SEAL ___ TO ___ FT.
- (NAME) (#) SANDPACK ___ TO ___ FT.
- ___ IN. DIA. SLOTTED ___ SCREEN ___ TO ___ FT.
- ___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.
- BOTTOM WELL CAP ___ FT.
- BOTTOM OF BOREHOLE ___ FT.

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Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

WELL No. PUMP-1 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Layne Water DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-28-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

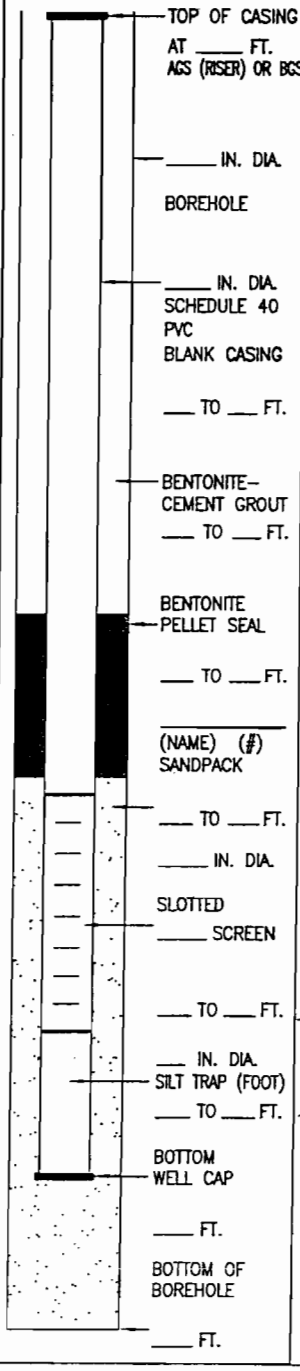
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	0-2	1	Brown, fine sand with silt and organics, loose, moist.
2				2-4	1	Brown, fine sand, trace silt. Loose, moist.
3		0	SP	4-6	1	Same as above.
4				6-8	1	Brown, fine to medium sand, trace silt and gravel. Loose, moist.
5		0	SP			
6				8-10	1	Same as above.
7		0	SP	10-12	1	6" Same as above. 3" Brown, fine sand, trace silt and gravel. 3" Brown, fine sand with silt. All loose, moist.
8						
9		0	SP			
10						
11		0	SP	12-14	1	Brown, fine sand, trace silt. Loose, moist.
12			SM			
13		0	SP	14-16	1	Same as above, medium density.
14				16-18	1.5	6" Same as above. 6" Brown, Fine sand with silt, trace clay and gravel. 6" Brown, fine sand trace silt.
15		0	SP			
16			SP	18-20	1	3" Same as above. 6" Brown, silt and fine sand, trace clay. 3" Brown, Fine sand and silt. All loose, moist.
17		0	SM			
18			SP			
19		1	SP SM			
20				20-22	1	Brown silt and fine sand, trace clay. Loose, moist.
21		1	SM			
22				22-24	1	6" Brown, fine sand and silt. 6" Brown, fine sand and silt, trace clay - All moist, loose.
23		2	SM			
24						
25						
26						

WELL CONSTRUCTION



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Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 1

L. No. Pump - 1 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 6¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 10-28-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
25		70	SM SP	24-26	1	3" Brown, fine sand and silt, trace clay. 6" Brown, fine to coarse sand, trace silt and gravel. 3" Brown, fine sand, trace silt. All moist, loose.
26				26-28	1	Same as above, very dense.
27		100	SP	28-30	1	Same as above.
28				30-32	1	Same as above.
29		40	SP	32-34	1	Same as above.
30				34-36	1	Same as above.
31		70	SP	36-38	1	Same as above.
				38-40	1	Same as above.
		80	SP	40-42	1	Same as above.
34				42-44	1	Same as above.
35		140	SP	44-46	1.5	Brown, fine sand, trace silt and gravel. Very dense, moist.
36						
37		180	SP	46-48	1.5	Brown, fine sand, trace silt. Very dense, moist.
38						
39		100	SP	48-50	1.5	Same as above.
40				50-52	1.8	Same as above. PID reads 800 ppm. (SP)
41		230	SP	52-54	1.8	Same as above. PID reads 1200+ ppm. (SP)
42						
43		210	SP			
44						
45		350	SP			
46						
47		410	SP			
		300	SP			
50						

WELL CONSTRUCTION

- TOP OF CASING AT ___ FT. AGS (RISER) OR BGS
- ___ IN. DIA. BOREHOLE
- ___ IN. DIA. SCHEDULE 40 PVC BLANK CASING ___ TO ___ FT.
- BENTONITE–CEMENT GROUT ___ TO ___ FT.
- BENTONITE PELLET SEAL ___ TO ___ FT.
- ___ (NAME) (#) SANDPACK ___ TO ___ FT.
- ___ IN. DIA. SLOTTED ___ SCREEN ___ TO ___ FT.
- ___ IN. DIA. SILT TRAP (FOOT) ___ TO ___ FT.
- BOTTOM WELL CAP ___ FT.
- BOTTOM OF BOREHOLE ___ FT.

6" Vapor Screen bottoms at:

Shallow 38' 9"

Internal 44' 9"

Deep 51' 6"

DRILLING LOG

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Rumpf House 1

WELL No. Dump-2 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thomas LOG BY DF DATE DRILLED 10-29-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

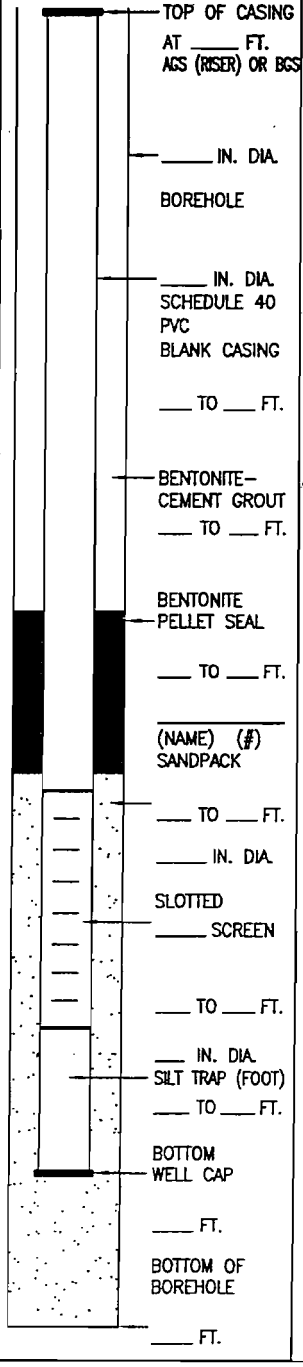
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SP	0-2	.7	Brown, fine to medium sand, trace silt and gravel. Loose, moist.
2				2-4	1	6" same as above. 6" Brown, fine sand with silt. Loose, moist.
3		0	SP SM			
4				4-6	2	Same as above.
5		0	SM	6-8	1.5	6" same as above. 12" Brown, fine to medium sand, trace silt. Loose, moist.
6						
7		0	SM SP	8-10	1	Same as above.
8				10-12	1	Same as above.
9		0	SP	12-14	1	Same as above.
10				14-16	1.5	Same as above.
11		0	SP	16-18	.5	Brown, fine to medium sand with gravel, trace silt. Loose, moist.
12				18-20	1.5	3" same as above. 15" Brown, fine sand with silt. Loose, wet at bottom.
13		0	SP			
14				20-22	1	Same as above, wet.
15		0	SP	22-24	-	No recovery - wet spoon and rock.
16				24-26	1.5	6" Brown, fine sand with silt. 12" Brown, fine sand & silt with clay. All wet, medium density.
17		0	SP			
18						
19		0	SP SM			
20						
21		0	SM			
22						
23		0	—			
24						
25		0	SM SC			
26						

WELL CONSTRUCTION



FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

WELL No. PUMP-2 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. PARRATT WOLFF DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 10-29-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
27		0	SC
28			SM
29		0-14	SM
30			SC
31		250	SM
32			SP
33		60	SP
36		320	SP
37		380	SP
38			
39		300	SP
40			
41		180	SP
42			
43		260	SP
44			
45		520	SP
46			
47		450	SP
48			
		590	SP
51		Root	SP
52			

WELL CONSTRUCTION

TOP OF CASING AT ___ FT. AGS (RISER) OR BGS

___ IN. DIA. BOREHOLE

___ IN. DIA. SCHEDULE 40 PVC BLANK CASING

___ TO ___ FT.

BENTONITE-CEMENT GROUT

___ TO ___ FT.

BENTONITE PELLET SEAL

___ TO ___ FT.

(NAME) (#) SANDPACK

___ TO ___ FT.

___ IN. DIA. SLOTTED ___ SCREEN

___ TO ___ FT.

___ IN. DIA. SILT TRAP (FOOT)

___ TO ___ FT.

BOTTOM WELL CAP

___ FT.

BOTTOM OF BOREHOLE

___ FT.

DESCRIPTION/SOIL CLASSIFICATION

DEPTH	REC	(COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
26-28	2	12" Brown, fine sand and silt with clay.
		12" Brown, fine sand and silt, trace clay. Medium density, wet.
28-30	1.5	6" Same as above.
		3" Brown, fine sand and silt and clay.
		9" Brown, fine sand with silt.
		All moist, dense.
30-32	1	Brown, fine sand, trace silt. Dense, moist.
32-34	1.5	6" Same as above.
		12" Brown, fine to medium sand, trace silt. All dense, moist.
34-36	1	Brown, fine sand, trace silt. Dense, moist.
36-38	1	Same as above.
38-40	1	Same as above.
40-42	1	Same as above.
42-44	1	Same as above.
44-46	1	Same as above.
46-48	1	Same as above.
48-50	1	Same as above.
50-52	1	Same as above. 1200+ ppm.
52-54	1	Same as above. ⅓ wet. 1500+ ppm. (SP)

Sample @ 50-52'

7815BV250AB at 0945

6" Vapor screens (Bottom at):

Deep: 51' 6"

Intermediate: 44' 9"

Shallow: 38' 9"

DRILLING LOG

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Amphouse 1

WELL No. Pump-3 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thuma LOG BY DF DATE DRILLED 10-30-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

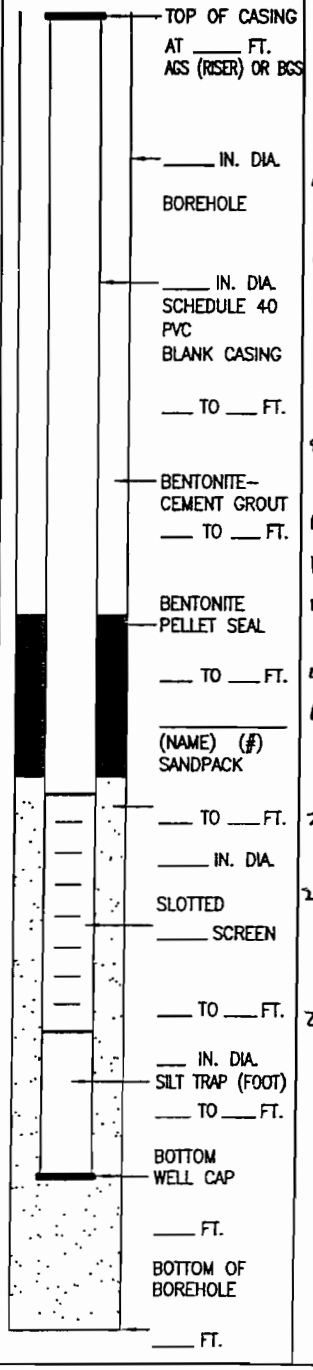
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	0-2	1.5	Brown, fine to medium sand with silt and organics.
2						6" Brown, fine sand with silt and trace gravel. Loose, moist.
3		0	SM	2-4	1	Same as above.
4				4-6	1.5	Brown, fine sand with silt. Loose, moist.
5		0	SM	6-8	1	3" Same as above.
6			SM			6" Brown, fine to medium sand, trace silt.
7		0	SP			3" Brown, fine sand with silt.
8			SM			All loose, moist.
9		0	SP	8-10	1	Brown, fine to medium sand, trace silt. Loose, moist.
10						
11		0	SP	10-12	1	Same as above.
12				12-14	1	Same as above.
13		0	SP	14-16	1	Brown, fine sand, trace silt. Loose, moist.
14				16-18	1	Same as above.
15		0	SP	18-20	1	10" Same as above.
16						2" Brown, fine sand with silt. Loose, moist.
17		0	SP	20-22	1	Same as above. Half wet, loose.
18			SP	22-24	1.5	6" Same as above.
19		0	SM			12" Brown silt and fine sand. All wet, loose/soft.
20				24-26	1.2	2" Same as above, wet.
21		0	SM			12" Brown, fine sand, trace silt. moist, medium density.
22						
23		0	SM			
24			SM			
25		0	SP			
26						

WELL CONSTRUCTION



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Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 1

L No. PUMP-3 SURFACE ELEV

ER LEVEL INITIAL STABILIZED

RILLING COMP. PARRATT WOLFF DRILLING METHOD HSA 4½" ID

DRILLER O. THOMA LOG BY DF DATE DRILLED 10-24-01

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

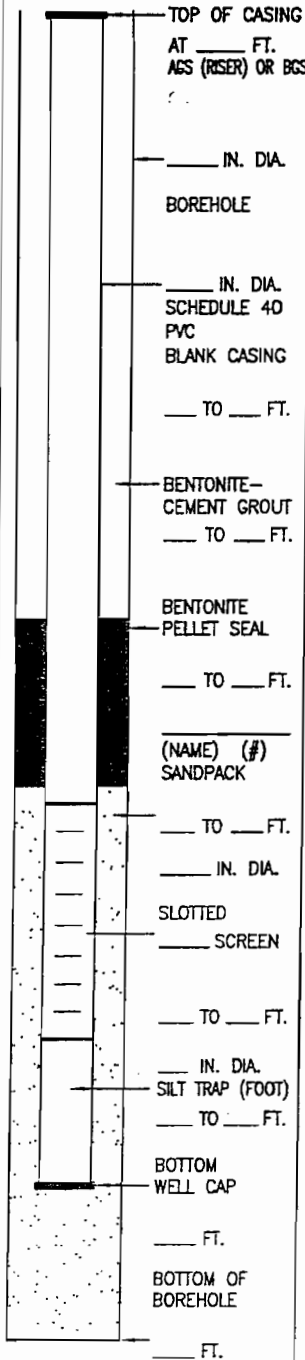
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY
27		0	SP
28			
29		0	SP
30			
31		0	SP
32			SP
33		0	
			SP
		0	
36			
37		0	SP
38			
39		0.1	SP
40			
41		8	SP
42			
43		10	SP
44			
45		8	SP
46			
47		8	SP
48			
49		4	SP
		3	SP
52			

WELL CONSTRUCTION



DESCRIPTION/SOIL CLASSIFICATION

DEPTH	REC	(COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
26-28	1	Brown, fine sand, trace silt. Moist, medium density.
28-30	1	same as above.
30-32	1	same as above.
32-34	1.5	12" same as above. 6" Brown, fine to medium sand, trace silt. moist, medium density.
34-36	1.5	6" same as above. 12" Brown, fine to coarse sand with gravel, trace silt. Moist, very dense.
36-38	1	3" same as above. 9" Brown, fine to medium sand, trace silt. Moist, very dense.
38-40	1	Brown, fine sand, trace silt. Moist, dense.
40-42	1	Same as above.
42-44	1	Same as above.
44-46	1	Same as above.
46-48	1	same as above.
48-50	1	Same as above.
50-52	1	Same as above.
52-54	1	Same as above. Half wet.

Sample at 42-44' interval

7815BV342-AB at 1115.

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Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 2

WELL No. PA/W-2 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 11/01/02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	WELL CONSTRUCTION	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	TOP OF CASING AT ___ FT. AGS (RISER) OR BGS	0-2	1	Brown, fine sand with silt, trace gravel, medium density, moist.
2					2-4	1	Same as above.
3		0	SM		4-6	1	Same as above.
4				___ IN. DIA. BOREHOLE	6-8	1	Same as above.
5		0	SM		8-10	1	Brown, fine sand, trace silt, medium density, moist.
6				___ IN. DIA. SCHEDULE 40 PVC BLANK CASING	10-12	.1	Same as above, concrete in shoe.
7		0	SM		12-14	.1	Same as above, concrete in shoe.
8				___ TO ___ FT.	14-16	–	Solid concrete. Refusal. Move 3' southeast.
9		0	SP				
10				BENTONITE-CEMENT GROUT			
11		0	SP	___ TO ___ FT.	0-2	1	Brown, fine sand with silt, trace gravel, medium density, moist.
12				BENTONITE PELLET SEAL	2-4	1	Same as above.
13		0	SP		4-6	1	Same as above.
14				___ TO ___ FT.	6-8	1	Brown, fine sand, trace silt, medium density, moist.
15		0	SP	(NAME) (#) SANDPACK	8-10	1	Same as above with brick fragments.
16				___ TO ___ FT.			
1		0	SM	___ IN. DIA. SLOTTED ___ SCREEN			
2							
3		0	SM	___ TO ___ FT.			
4				___ IN. DIA. SILT TRAP (FOOT)			
5		0	SM	___ TO ___ FT.			
6				BOTTOM WELL CAP			
7		0	SP	___ FT.			
8				BOTTOM OF BOREHOLE			
9		0	SP	___ FT.			

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PROJECT 717-01-01 SITENAME AND SITEID PUMPHOUSE 2

L No. PA1W-2 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. ~~PARRAM WEST~~ DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMAS LOG BY DF DATE DRILLED 4/01/02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

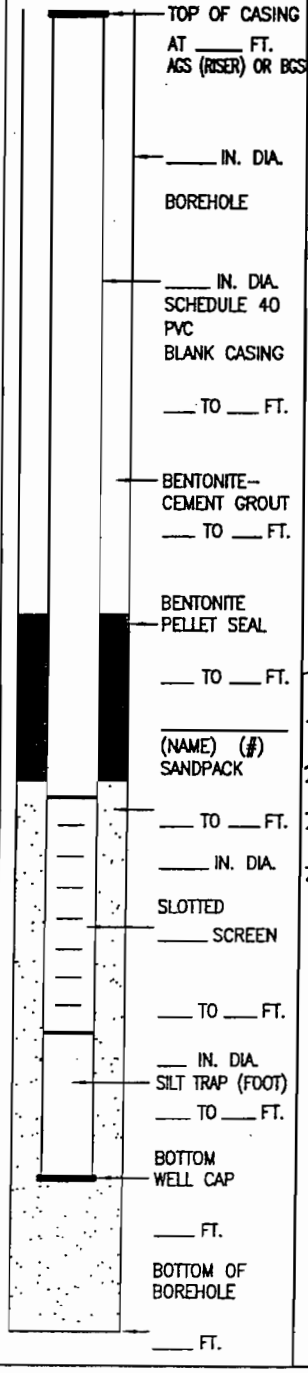
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
11		0	SP	10-12	.5	Brown, fine sand, trace silt, medium density, moist. Concrete and brick in shoe.
12						
13		0	SP	12-14	.5	Same as above, concrete in shoe. Hit concrete at 14' again. Move 5' north.
14				0-14	—	Auger to 14' bgs. No samples collected. Refusal at 14'. Auger through concrete (20").
7		—	—	16-18	1	Brown, fine sand, trace silt. Medium density, moist.
14			—	18-20	1	Same as above.
17		0	SP	20-22	1.5	12" Same as above. 6" Brown, fine to medium sand, trace silt. Loose, moist.
18						
19		0	SP	22-24	1	Brown, fine sand, trace silt. Loose, moist.
20			SP	24-26	1	Same as above.
21		0		26-28	1	Same as above.
22				28-30	1	Same as above.
23		0	SP	30-32	1.2	Same as above.
24				32-34	1	Same as above.
25		0	SP			
26						
27		0	SP			
28						
29		0	SP			
		0	SP			
33		0	SP			

WELL CONSTRUCTION



DRILLING LOG

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 2

WELL No. PAIW-2 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 11/01/02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

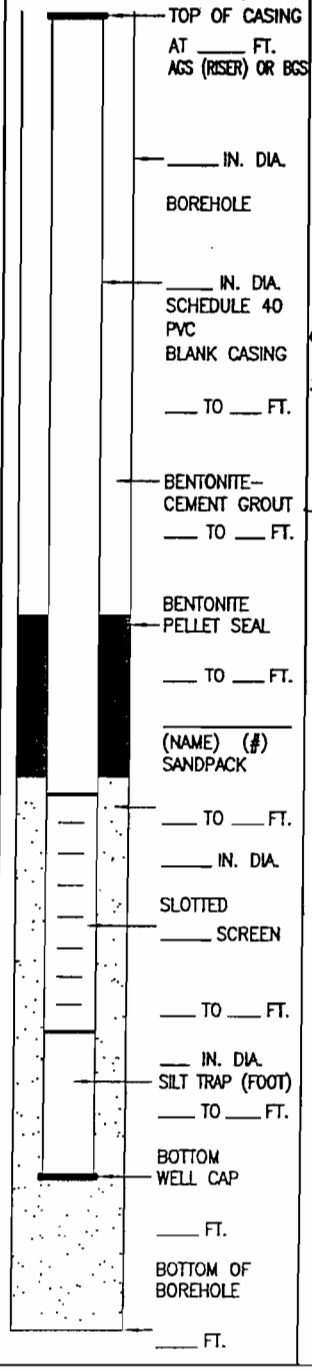
LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
35		0	SP	34-36	1.2	Brown, fine sand, trace silt. Loose, moist.
36				36-38	1.5	same as above.
37		0	SP	38-40	1	same as above.
38				40-42	1	same as above.
39		0	SP	42-44	1	same as above.
40				44-46	1	same as above.
41		0	SP	46-48	1	same as above.
42				48-50	1	same as above.
43		0	SP	50-52	1	6" same as above. 6" Brown, fine sand with silt, trace gravel, moist.
44				52-54	1	8" same as above. 4" Brown, fine to medium sand w/ silt, trace gravel. Wet, medium density.
45		0	SP			
46						
47		0	SP			
48						
49		0	SP			
50						
51		0	SM			
52						
53		0	SM			
54						

Collect sample at 50-52'
779 SBI-250 AB at 1700.

WELL CONSTRUCTION



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PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 2

WELL No. PMP-6 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4 1/4" ID

DRILLER D. Thoma LOG BY DE DATE DRILLED 11-7-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	WELL CONSTRUCTION	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	TOP OF CASING AT ___ FT. AGS (RISER) OR BGS	0-2	1.5	Brown, fine to medium sand with silt and gravel. Loose, moist.
2					2-4	1	Same as above.
3		0	SM	___ IN. DIA. BOREHOLE	4-6	1	Brown, fine sand with silt. Loose, moist.
4					6-8	1.5	8" Gray/Brown, fine sand with gravel and rock fragments. Loose, moist. 6" Dark brown, fine to medium sand with rock fragments. Heavy petroleum odor.
5		0	SM				
6			SP	___ IN. DIA. SCHEDULE 40 PVC BLANK CASING			
7		90		___ TO ___ FT.			
8		40	SP		8-10	1	Gray, fine to medium sand with rock fragments. some petroleum odor.
9				BENTONITE-CEMENT GROUT			
10			SP	___ TO ___ FT.			
11		1	SM		10-12	1	2" same as above. 10" Brown, fine sand with silt.
12				BENTONITE PELLET SEAL			
13		0	SP	___ TO ___ FT.	12-14	1	Brown, fine sand, trace silt, medium density, Moist.
14							
15		0	SP	(NAME) (#) SANDPACK	14-16	1	same as above.
16				___ TO ___ FT.	16-18	1	same as above.
17		0	SP	___ IN. DIA. SLOTTED ___ SCREEN	18-20	1.5	same as above.
18					20-22	1.	3" same as above. 2" Brown, fine sand with silt. 7" Brown, fine to medium sand, trace silt.
19		0	SP				
20				___ TO ___ FT.	22-24	1	same as above.
21		0	SM SP	___ IN. DIA. SILT TRAP (FOOT)	24-26	1	Brown, fine sand, trace silt, loose, moist.
22				___ TO ___ FT.			
23		0	SP	BOTTOM WELL CAP			
24				___ FT.			
25		0	SP	BOTTOM OF BOREHOLE			
26				___ FT.			

DRILLING LOG

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 2

WELL No. Pump-6 SURFACE ELEV _____

WATER LEVEL INITIAL _____ STABILIZED _____

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 11-7-02

WELL TYPE CODE _____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

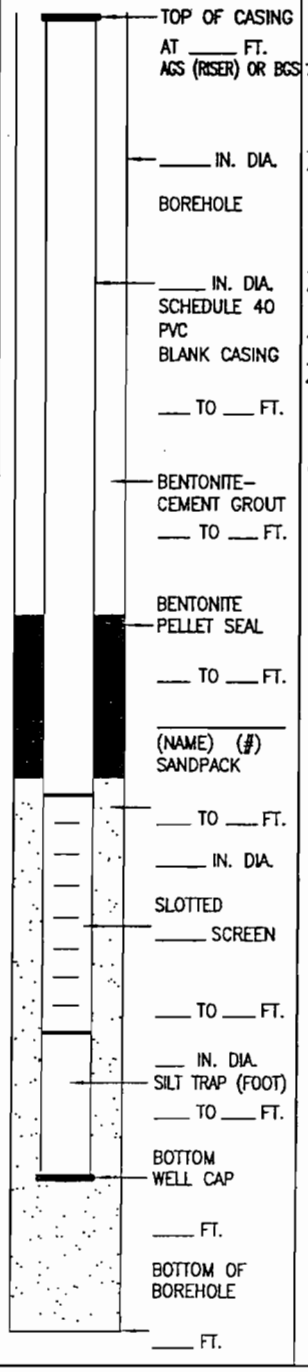
NOTES:

LATITUDE _____

LONGITUDE _____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
27		0	SP	26-28	1.7	Brown, fine sand, trace silt. Loose, moist.
28				28-30	1	same as above.
29		0	SP	30-32	1	Brown, fine sand with silt.
30				32-34	1.5	3" same as above. 15" Brown, fine sand, trace silt, medium density.
31		0	SM			
32				34-36	1	same as above.
33		0	SM SP	36-38	1	same as above.
34				38-40	1.5	same as above.
35		0	SP	40-42	.5	same as above.
36				42-44	1	same as above.
37		0	SP			
38						Sample at 6'-8'.
39		0	SP			779 SB VG06AB at 1400
40						
41		0	SP			
42						
43		0	SP			
44						

WELL CONSTRUCTION



FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 217-01-01 SITENAME AND SITEID Pumphouse 2

L No. PVMP-5 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4½" ID

DRILLER D. Thomas LOG BY DF DATE DRILLED 11-6-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

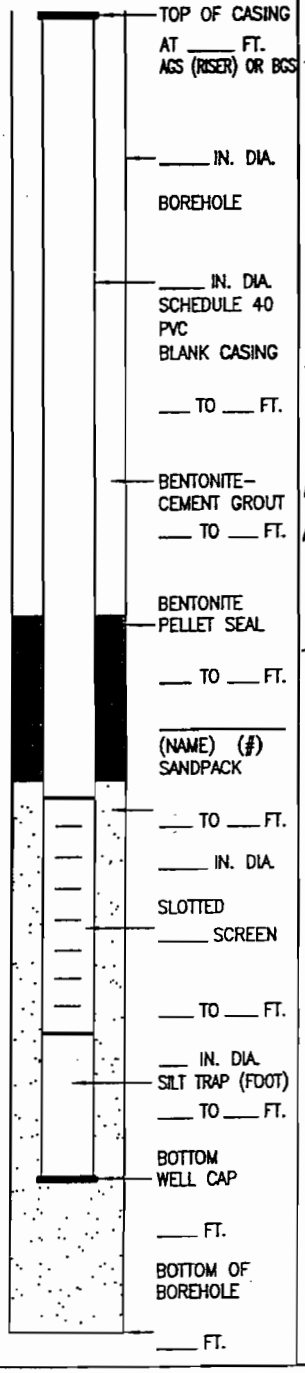
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	0-2	1	Brown, fine sand with silt, loose, moist.
2				2-4	1	Same as above.
3		0	SM	4-6	1.5	6" Same as above. 12" Brown, fine sand with silt and gravel, trace medium sand. Moist, loose.
4						
5		0	SM	6-8	1	Brown, Fine sand, trace silt. Loose, moist.
6				8-10	1	Same as above. Concrete in shoe.
7		0	SP	10-12	.7	Same as above. Rock and concrete fragments.
				12-14	1.5	Same as above.
		0	SP	14-16	1	Same as above.
10				16-18	1	Same as above.
11		0	SP	18-20	1	Same as above.
12				20-22	.5	Same as above.
13		0	SP	22-24	1	Brown, fine to medium sand, trace silt. Loose, moist.
14						
15		0	SP	24-26	1	Brown, fine sand, trace silt, trace medium sand and gravel. Loose, moist.
16						
17		0	SP			
18						
19		0	SP			
20						
21		0	SP			
22						
		0	SP			
		0	SP			
26						

WELL CONSTRUCTION



DRILLING LOG

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 2

WELL No. PVMP-5 SURFACE ELEV

WATER LEVEL INITIAL STABILIZED

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. THOMA LOG BY DF DATE DRILLED 11-6-02

WELL TYPE CODE

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

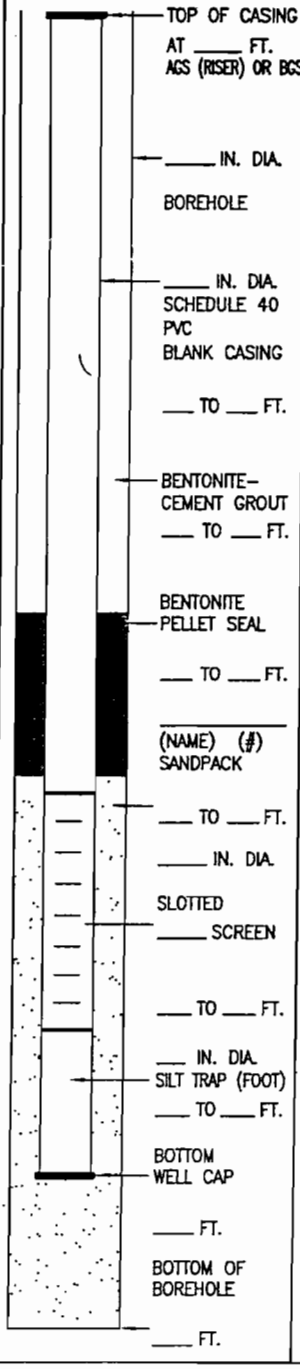
NOTES:

LATITUDE

LONGITUDE

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
27		0	SP	26-28	1.5	Brown, fine sand, trace silt, trace medium sand and gravel. Loose, moist.
28				28-30	1	Same as above.
29		0	SP	30-32	1	Brown, fine sand, trace medium sand and silt. Loose, moist.
30				32-34	1	same as above.
31		0	SP	34-36	1	Brown, fine sand, trace silt, dense, moist.
32						
33		0	SP	36-38	1	Same as above.
34				38-40	1	Same as above.
35		0	SP	40-42	1	Same as above.
36				42-44	.7	Same as above.
37		0	SP	44-46	1	Same as above.
38						
39		0	SP			
40						
41		0	SP			
42						
43		0	SP			
44						
45		0	SP			
46						
47						
48						
49						
50						
51						
52						

WELL CONSTRUCTION



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Ronkonkoma New York

PROJECT 717-01-01 SITENAME AND SITEID Pumphouse 2

BORING No. PUMP-4 SURFACE ELEV _____

WATER LEVEL INITIAL _____ STABILIZED _____

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thomas LOG BY DF DATE DRILLED 11-5-02

WELL TYPE CODE _____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

NOTES:

LATITUDE _____

LONGITUDE _____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
1		0	SM	0-2	1.5	12" Brown, fine sand with silt and organics. 6" Brown, fine sand with silt. Loose, moist.
2						
3		0	SM	2-4	1.5	same as above.
4				4-6	1	Brown, fine sand with silt, trace gravel.
5		0	SM	6-8	1.5	same as above.
6				8-10	1.5	Brown, fine sand with silt, loose, moist.
7		0	SM	10-12	1	Same as above, concrete fragments at 11'.
8				12-14	—	No recovery, rock fragments. Auger cuttings - gravel (1-3" rounded stones).
9		0	SM			
10						
11		0	SM	14-16	—	Auger through concrete.
12				16-18	1.5	Brown, fine sand with silt and rock fragments. Moist, loose.
13		—	—	18-20	1.5	14" same as above. 4" Brown, fine to medium sand, trace silt, all medium dense.
14						
15		0	—	20-22	1	Same as above.
16				22-24	1	Same as above.
17		0	SM	24-26	1	Brown, fine sand, trace silt, moist, medium density.
18			SM			
19		0	SP			
20						
21		0	SP			
22						
23		0	SP			
24						
25		0	SP			
26						

WELL CONSTRUCTION

- TOP OF CASING AT ____ FT. AGS (RISER) OR BGS
- ____ IN. DIA. BOREHOLE
- ____ IN. DIA. SCHEDULE 40 PVC BLANK CASING
- ____ TO ____ FT.
- BENTONITE-CEMENT GROUT ____ TO ____ FT.
- BENTONITE PELLET SEAL ____ TO ____ FT.
- (NAME) (#) SANDPACK ____ TO ____ FT.
- ____ IN. DIA. SLOTTED ____ SCREEN ____ TO ____ FT.
- ____ IN. DIA. SILT TRAP (FOOT) ____ TO ____ FT.
- BOTTOM WELL CAP ____ FT.
- BOTTOM OF BOREHOLE ____ FT.

DRILLING LOG

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT 217-01-01 SITENAME AND SITEID Pumphouse 2

WELL No. PUMP-4 SURFACE ELEV _____

WATER LEVEL INITIAL _____ STABILIZED _____

DRILLING COMP. Parratt Wolff DRILLING METHOD HSA 4¼" ID

DRILLER D. Thoma LOG BY DF DATE DRILLED 11-5-02

WELL TYPE CODE _____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

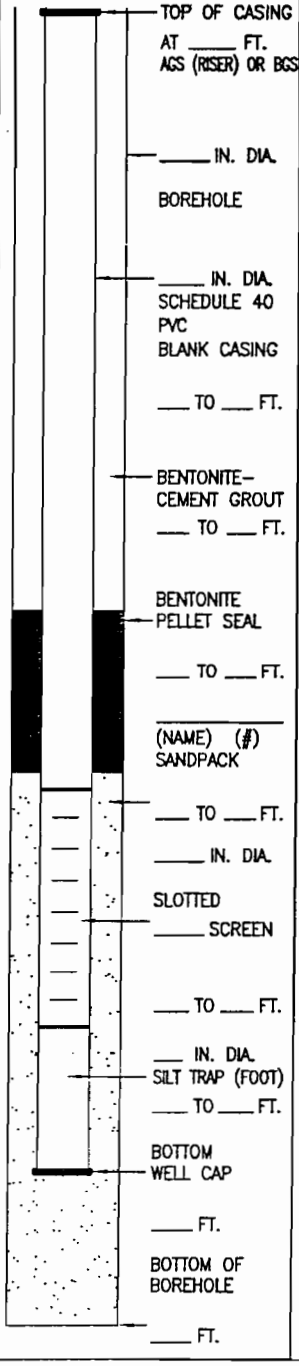
NOTES:

LATITUDE _____

LONGITUDE _____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
27		0	SP	26-28	1.5	Brown, fine sand, trace silt, moist, medium density.
28				28-30	1	same as above.
29		0	SP	30-32	1	same as above.
30				32-34	1	same as above.
31		0	SP	34-36	1	same as above.
32				36-38	1	same as above.
33		0	SP	38-40	1	same as above.
34				40-42	1	same as above.
35		0	SP	42-45	2	same as above. Spoon overdriven.
36						
37		0	SP			
38						
39		0	SP			
40						
41		0	SP			
42						
43		0	SP			
44						
45						
46						
47						
48						
49						
50						
51						
52						

WELL CONSTRUCTION



PARSONS
DRILLING RECORD

Contractor:	Parrat Wolf
Driller:	Glenn Lansig
Inspector:	E. Ashton
Rig Type:	CME-75

PROJECT NAME: GAFB Pumphouse 1
PROJECT NUMBER: 740882

BORING/ WELL NO. Sheet 1 of 1 — WL-781PPRW-05
Location Description: SEE SITE PLAN

Location Plan

SEE SITE PLAN

Weather: Sunny: 80° F
Date/Time Start: 7/14/03-1240
Date/Time Finish: 7/15/03-1445

GROUNDWATER OBSERVATIONS

Water Level	53.6'			
Date	7/16/03			
Time	1037			
Meas. From	TOC			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
0-10		NA	NA	0	(0'-20'): Brown to light brown, fine to medium sand, trace silt, dry to moist, loose, no petroleum odor, no stains (SP/SM)
		NA			
10-20					
20-30					(20'-40'): Brown, fine to medium sand, trace silt, moist to wet, no petroleum odor, no stains (SP/SM)
30-40					Note: Wet at 30' bgs-shallow water table. Not true water table based on DTW in preexisting wells in surrounding area.
40-46					(40'-46'): Brown, fine to medium sand, trace silt, trace fine gravel, wet, no petroleum odor, no stains (SP/SM)
46-48		11/18	80	720	(46'-48'):Light brown, fine to medium sand, trace silt, fine gravel, dry, very dense. petroleum odor, no stains (SP/SM)
		26/31			
48-50		21/24	NA	NA	(48'-50'): No recovery
		31/44			
50-52		9/13	50	1,144	(50'-52'): Light brown, fine to medium sand, trace silt, dry, medium density, petroleum odor, no stains (SP/SM)
		13/25			
52-54		16/18	50	2,084	(52'-54'): Brown, fine to medium sand, trace silt, moist, dense, petroleum odor, no stains (SP/SM)
		19/23			
54-56		9/20	80	1,714	(54'-56'): Fine to medium sand, trace silt, moist to wet, petroleum odor, no stains (SP/SM)
		17/23			
56-58		7/9	50	1,192	(56'-58'): Brown to light gray, fine sand, some silt, wet, medium density, petroleum odor, no stains (SM)
		18/25			
58-60		23/38	60	503	(58'-60'): Brown, fine sand and silt, some fine gravel, moist to wet, very dense, petroleum odor, no stains (SP/SM)
		43/47			
60-62		30/41	60	NA	(60'-61.3'): Brown to gray silt, some fine sand and fine gravel, moist, very dense, no petroleum odor, no stains (Till)
		50/3			
62-64		36/61	50	NA	(62'-63'): Gray silt, some fine sand, fine gravel, moist to wet, very dense, no petroleum odor, no stains, (Till)
		-/-			
64-66		NA	NA	NA	
		NA			(64'-65'): Same as above (Till)
					Note: Drilled with HSAs to 65' bgs
					Terminated soil boring at 65' bgs.

SCHEMATIC

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Collected soil sample 781S0553BA (52'-54'), 781S0553BS (MS), 781S0553BD (MSD) for chemical analysis. Soil sample analyzed by EPA. Method 8260, 8270, TKN, and pH. Also performed sieve analysis (60'-64') and micro plate count (50'-52')
4-inch well installed; 6-inch PVC sump installed at bottom of well screen.

PARSONS
DRILLING RECORD

Contractor:	Parrat Wolf
Driller:	Glenn Lansig
Inspector:	E. Ashton
Rig Type:	CME-75

PROJECT NAME: GAFB Pumphouse 1
PROJECT NUMBER: 740882

BORING/WELL NO. WL-781PPRW-06 Sheet 1 of 2
Location Description: SEE SITE PLAN

Weather: Sunny: 82° F
Date/Time Start: 7/15/03-1605
Date/Time Finish: 7/16/03-1459

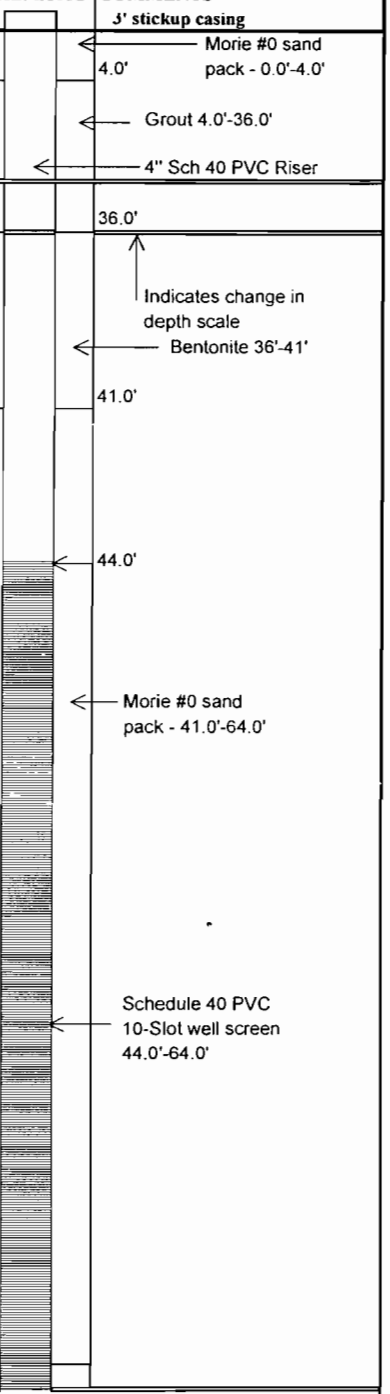
Location Plan: SEE SITE PLAN

GROUNDWATER OBSERVATIONS

Water Level	55.2'			
Date	7/17/03			
Time	0808			
Meas. From	TOC			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
0-10		NA	NA	0	(0'-20'): Brown to dark brown, fine to medium sand, trace silt, trace roots (top foot), dry, no petroleum odor, no stains (SP)
		NA			
10-20					
20-30					(20'-38'): Brown, fine to medium sand, trace silt, fine gravel, dry to moist, no petroleum odor, no stains (SP)
30-38					Note: Encountered petroleum odor at 38' in soil cuttings from HSAs
38-40		4/12	100	215	(38'-40'): Brown to light brown, fine to medium sand, trace silt, dry to moist, medium density, petroleum odor, no stains (SP)
		18/18			
40-42		5/13	100	189	(40'-42"):Brown to light brown, fine to medium sand, trace silt, dry to moist, medium density, petroleum odor, no stains (SP/SM)
		20/26			
42-44		18/25	100	340	(42'-44"): Brown to light brown, fine to medium sand, trace silt, dry to moist, very dense, petroleum odor, no stains (SP)
		31/34			
44-46		8/33	80	278	(44-46'): Same as 42'-44' above (SP)
		33/35			
46-48		24/26	80	641	(46'-48'): Same as 44'-46' above (SP)
		29/35			
48-50		13/17	80	789	(48'-50'): Light brown, fine to medium sand, trace silt, fine gravel, dry to moist, dense, petroleum odor, no stains (SP)
		19/22			
50-52		4/10	80	713	(50'-52'): Brown to light brown, fine to medium sand, trace silt, fine gravel, dry to moist, medium density, petroleum odor, no stains (SP)
		16/24			
52-54		16/20	80	2,146	(52'-54'): Brown to light brown, fine to medium sand, trace silt, dry to moist, dense, petroleum odor, no stains (SP)
		24/29			
54-56		7/16	80	1,845	(54'-56'): Brown to gray fine to medium sand, trace silt, fine to medium gravel, wet, dense, petroleum odor, no stains (SP)
		19/22			
56-58		17/23	80	1,114	(56'-58'): Brown to gray, fine to medium sand, trace silt, fine gravel, wet, very dense, no petroleum odor, no stains, (SP)
		31/38			
58-60		30/80	50	1,845	(58'-60"): Brown, fine to medium sand, some silt, fine to medium gravel, wet, very dense, petroleum odor, no stains (SP/SM)
		-/-			Refusal at 60' bgs
					Terminated soil boring at 65' bgs.

SCHEMATIC



COMMENTS:
Collected soil sample 781S0653BA (52'-54'), 781S0653BC (DUP) for chemical analysis. Soil sample analyzed by EPA. Method 8260, 8270, TKN, and pH. Also performed sieve analysis (56'-60') and micro plate count (48'-50')
4-inch well installed: 6-inch PVC sump installed at bottom of well screen.

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

PARSONS
DRILLING RECORD

Contractor:	Parrat Wolf
Driller:	Glenn Lansig
Inspector:	E. Ashton
Rig Type:	CME-75

PROJECT NAME: GAFB Pumphouse 1
PROJECT NUMBER: 740882

BORING/ WELL NO. Sheet 2 of 2 — WL-781PPRW-06
Location Description: SEE SITE PLAN

Weather: Sunny: 82° F
Date/Time Start: 7/15/03-1605
Date/Time Finish: 7/16/03-1459

Location Plan

SEE SITE PLAN

GROUNDWATER OBSERVATIONS				
Water Level	55.2'			
Date	7/17/03			
Time	0808			
Meas. From	TOC			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
60-62		28/54	50	35	(60'-62'): Gray to brown, fine sand, some silt, fine to medium gravel, wet, very dense, no petroleum odor, sheen present (Till)		Morie #0 sand pack - 41.0'-64.0'
		59/-			Refusal at 61.5' bgs		
62-64		15/28	50	15	(62'-64'): Same as above except gray in color and no sheen present (Till)		Schedule 40 10-Slot well screen 44.0'-64.0'
		44/45					
64-66		NA	NA	NA			64.0' Sch. 40 PVC Sump
		NA					64.5' 64.0'-64.5'
							65.0'
					Note: Drilled to 65' bgs with HSAs		
					Terminated soil boring at 65' bgs.		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Collected soil sample 781S0653BA (52'-54'), 781S0653BC (DUP) for chemical analysis. Soil sample analyzed by EPA Method 8260, 8270, TKN, and pH. Also performed sieve analysis (56'-60') and micro plate count (48'-50')
4-inch well installed; 6-inch PVC sump installed at bottom of well screen.

PARSONS
DRILLING RECORD

BORING/ WELL NO. Sheet 1 of 2 — WL-781PPRW-07

Contractor:	Parrat Wolf
Driller:	Glenn Lansig
Inspector:	E. Ashton
Rig Type:	CME-75

PROJECT NAME: GAFB Pumphouse 1
PROJECT NUMBER: 740882

Location Description: SEE SITE PLAN

Weather: Sunny: 82° F
Date/Time Start: 7/16/03-1615
Date/Time Finish: 7/17/03-1438

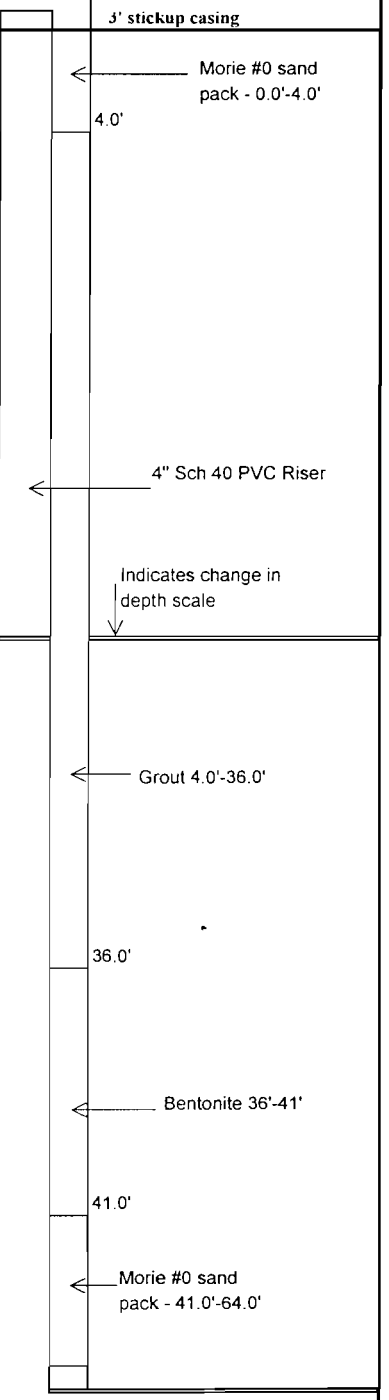
Location Plan: SEE SITE PLAN

GROUNDWATER OBSERVATIONS

Water Level	NA			
Date	NA			
Time	NA			
Meas. From	NA			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
0-5		NA	NA	NA	(0'-5"): Brown, fine to medium sand, trace silt, dry, no petroleum odor, no stains (SP)
		NA			
5-10		NA	NA	NA	(5'-13"): Brown, fine to medium sand, some fine to medium gravel, trace silt, dry, no petroleum odor, no stains (SP)
		NA			
10-15					
		NA	NA	NA	(13'-17'): Brown, fine sand, some silt, fine gravel, dry to moist, no petroleum odor, no stains (SP/SM)
15-20		NA			
		NA	NA	NA	(17'-30'): Brown fine to medium sand, trace silt, fine gravel, dry to moist, no petroleum odor, no stains (SP)
		NA			
20-25					Note: Encountered petroleum odor at 30' bgs
25-30					
30-32		6/12	100	39.1	(30'-32'): Brown to light brown, fine to medium sand, trace silt, dry to moist, medium density, petroleum odor, no stains (SP)
		16/20			
32-34		16/19	100	130	(32'-34): Brown to light brown, fine to medium sand, trace silt, dry to moist. dense, petroleum odor, no stains (SP)
		22/23			
34-36		6/15	100	145	(34'-36'): Same as 30'-32' above (SP)
		19/19			
36-38		15/21	100	201	(36'-38'): Brown to light brown, fine to medium sand, trace silt, fine gravel, dry to moist, dense, petroleum odor, no stains (SP)
		23/25			
38-40		5/13	100	200	(38'-40"): Brown to light brown, fine to medium sand, trace silt, dry to moist, medium density, petroleum odor, no stains (SP)
		16/16			
40-42		10/12	100	246	(40'-42'): Same as 38'-40' above (SP)
		16/18			
42-44		14/19	100	316	(42'-44'): Brown to light brown, fine to medium sand, trace silt, fine gravel, dry to moist, dense, petroleum odor, no stains (SP/SM) Refusal at 60' bgs
		30/31			
					Terminated soil boring at 65' bgs.

SCHEMATIC



SAMPLING METHOD
SS - SPLIT SPOON
A - AUGER CUTTINGS
C - CORED

COMMENTS:
Collected soil sample 781S0753BA (52'-54') for chemical analysis. Soil sample analyzed by EPA Method 8260, 8270, TKN, and pH. Also performed sieve analysis (46'-50') and micro plate count (50'-52')
4-inch well installed; 6-inch PVC sump installed at bottom of well screen.

PARSONS
DRILLING RECORD

BORING/ WELL NO. Sheet 2 of 2 — WL-781PPRW-07

Contractor: Parrat Wolf
Driller: Glenn Lansig
Inspector: E. Ashton
Rig Type: CME-75

PROJECT NAME: GAFB Pumphouse 1
PROJECT NUMBER: 740882

Location Description: SEE SITE PLAN

Weather: Sunny: 82° F
Date/Time Start: 7/16/03-1615
Date/Time Finish: 7/17/03-1438

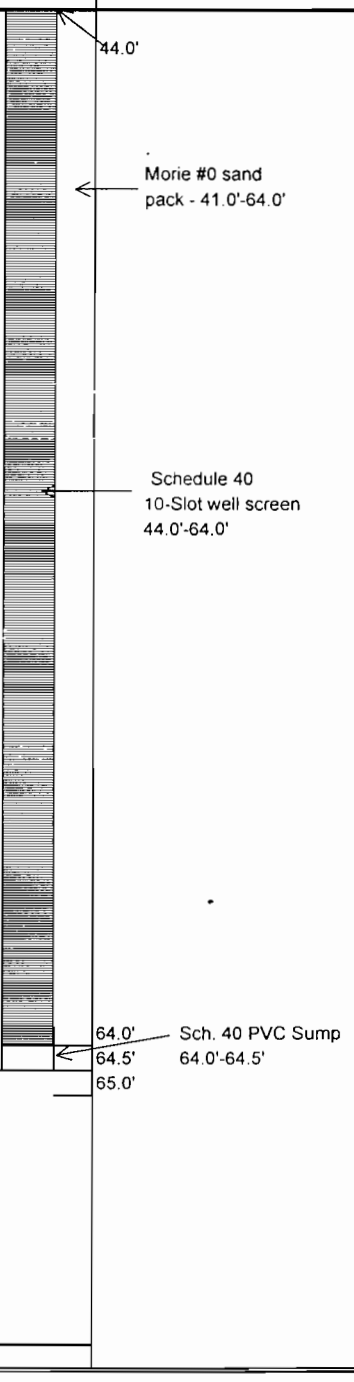
Location Plan: SEE SITE PLAN

GROUNDWATER OBSERVATIONS

Water Level	NA			
Date	NA			
Time	NA			
Meas. From	NA			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
44-46					(44'-46'): Same as 42'-44' above (SP)
46-48		17/27 29/42	100	420	(46'-48'): Brown to light brown, fine to medium sand, trace silt, fine gravel, dry to moist, dense, petroleum odor, no stains (SP)
48-50		14/17 23/23	60	447	(48'-50'): Brown to light brown, fine to medium sand, trace silt, dry to moist, dense, petroleum odor, no stains (SP)
50-52		11/18 20/20	100	712	(50'-52'): Sme as 48'-50' above (SP)
52-54		19/28 33/30	100	1,895	(52'-54'): Brown, fine to medium sand, trace silt, dry to moist, very dense, petroleum odor, no stains (SP)
54-56		7/13 18/19	80	1,920	(54'-56'): Brown to gray, fine to medium sand, trace silt, moist to wet (55.5'), dense, petroleum odor, no stains (SP)
56-58		14/18 69/-	80	2,232	(56'-57'): Gray to brown, fine sand, trace silt, wet, dense, petroleum odor, no stains (SP) (57'-57.5'): Greenish to gray, fine sand, some silt, moist to wet, very dense, petroleum odor, no stains (SM). Refusal at 57.5'
58-60		23/50 4/-	50	2,196	(58'-60'): Gray to greenish gray, fine to medium sand. some silt, fine to medium gravel, moist to wet, very dense, petroleum odor, no stains (SP/SM: Weathered Till). Refusal at 58.4'
60-62		50/5 -/-	30	30	(60'-62'): Brown to greenish gray to reddish orange, silt, some fine sand, some fine to medium gravel, wet, very dense, no petroleum odor, no stains (Weathered Till). Refusal at 60.5'
62-64		52/5 -/-	50	25.7	(62'-62.5'): Same as 60'-62' above (Weathered Till). Refusal at 62.5'
					Note: Drilled to 65' bgs with HSAs
					Terminated soil boring at 65' bgs.

SCHEMATIC



COMMENTS

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

Collected soil sample 781S0753BA (52'-54') for chemical analysis. Soil sample analyzed by EPA Method 8260, 8270, TKN, and pH. Also performed sieve analysis (46'-50') and micro plate count (50'-52')
4-inch well installed; 6-inch PVC sump installed at bottom of well screen.

PARSONS
DRILLING RECORD

Contractor:	Parrat Wolf
Driller:	Glenn Lansig
Inspector:	E. Ashton
Rig Type:	CME-75

PROJECT NAME: GAFB Pumphouse 1
PROJECT NUMBER: 740882

BORING/ WELL NO. Sheet 1 of 2 — WL-781PPRW-08
Location Description: SEE SITE PLAN

Location Plan

SEE SITE PLAN

Weather: Partly Cloudy: 75° F
Date/Time Start: 7/18/03-0650
Date/Time Finish: 7/18/03-1423

GROUNDWATER OBSERVATIONS

Water Level	NA			
Date	NA			
Time	NA			
Meas. From	NA			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
0-10		NA	NA	NA	(0'-10'): Brown, fine sand, some silt, trace fine to medium gravel, dry to moist, no petroleum odor, no stains (SM: Fill)
		NA			
10-20		NA	NA	NA	(10'-38'): Brown, fine to medium sand, trace silt, dry to moist, no petroleum odor, no stains (SP)
		NA			
20-30					
30-38					Note: Encountered petroleum odor at 38' in soil cuttings from HSAs
38-40		9/11	80	107	(38'-40'): Brown to light brown, fine to medium sand, trace silt, dry to moist, medium density, petroleum odor, no stains (SP)
		15/22			
40-42		6/12	100	143	(40'-42"):Same as 38'-40' above(SP)
		13/16			
42-44		11/18	100	201	(42'-44"): Brown to light brown, fine to medium sand, trace silt, dry to moist, dense, petroleum odor, no stains (SP)
		24/28			
44-46		8/11	80	269	(44-46'): Brown to light brown, fine to medium sand, trace silt, dry to moist, medium density, petroleum odor, stains, (SP)
		16/19			
46-48		16/24	80	273	(46'-48'): Brown to light brown, fine to medium sand, trace silt, dry to moist, very dense, petroleum odor, no stains(SP)
		27/27			
48-50		10/25	80	263	(48'-50'): Brown to light brown, fine to medium sand, trace silt, trace fine gravel, dry to moist, dense, petroleum odor, no stains (SP)
		23/25			
50-52		9/13	80	210	(50'-52'): Same as 48'-50' above (SP)
		21/20			
52-54		10/16	80	491	(52'-54'): Same as 48'-50' above except some fine gravel present and moist (SP)
		22/23			
54-56		7/10	80	1,903	(54'-56'): Gray to brown, fine to medium sand, trace silt, moist to wet, medium density, petroleum odor, black stains (streaks) (SP)
		18/23			
56-58		12/21	80	1,964	(56'-58'): Gray, fine to medium sand, trace silt, wet, dense, petroleum odor, black stains (streaks) (SP)
		22/26			
58-60		37946	50	2,147	(58'-60"): Gray to brown to greenish gray, fine sand, some silt, trace fine to medium gravel, wet, dense, petroleum odor, black stains (streaks) in upper portion of sample (SM)
		24/27			
					Terminated soil boring at 65' bgs.

SCHEMATIC

COMMENTS

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Collected soil sample 781S0853BA (54'-56') for chemical analysis. Soil sample analyzed by EPA Method 8260, 8270, TKN, and pH. Also performed sieve analysis (48'-52') and micro plate count (52'-54')
4-inch well installed; 6-inch PVC sump installed at bottom of well screen.

PARSONS
DRILLING RECORD

BORING/ WELL NO. Sheet 2 of 2 — WL-781PPRW-08

Contractor: Parrat Wolf
Driller: Glenn Lansig
Inspector: E. Ashton
Rig Type: CME-75

PROJECT NAME: GAFB Pumphouse 1
PROJECT NUMBER: 740882

Location Description: SEE SITE PLAN

Location Plan

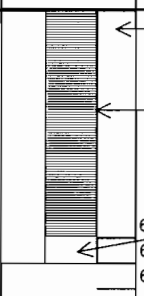
SEE SITE PLAN

Weather: Partly Cloudy: 75° F
Date/Time Start: 7/18/03-0650
Date/Time Finish: 7/18/03-1423

GROUNDWATER OBSERVATIONS				
Water Level	NA			
Date	NA			
Time	NA			
Meas. From	NA			

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
60-62		18/25	50	50	(60'-62'): Brown, fine to medium sand, some silt, some fine to medium gravel, wet, very dense, no petroleum odor, no stains (Weathered Till)
		50/-			Refusal at 61.4' bgs
62-64		21/51	50	150	(62'-64'): Same as above (Weathered Till). Refusal at 63.0'
		-/-			
64-66		NA	NA	NA	
		NA			
					Note: Drilled to 65' bgs with HSAs
					Terminated soil boring at 65' bgs.

SCHEMATIC



COMMENTS

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Collected soil sample 781S0853BA (54'-56') for chemical analysis. Soil sample analyzed by EPA Method 8260, 8270, TKN, and pH. Also performed sieve analysis (48'-52') and micro plate count (52'-54')
4-inch well installed; 6-inch PVC sump installed at bottom of well screen.

DRILLING LOG

PAGE ___ OF ___

FPM Group Ltd. Engineering and Environmental Science

Wonkonkoma New York

PROJECT Pumphouse 1 SITENAME AND SITEID Pumphouse 1

WELL No. 781 PIW-2 SURFACE ELEV ___

WATER LEVEL INITIAL ___ STABILIZED ___

DRILLING COMP. NORTHSTAR DRILLING METHOD HSA

DRILLER S. Laramie LOG BY D. FORSE DATE DRILLED 12-15-2003

WELL TYPE CODE ___

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

781 PIW-2

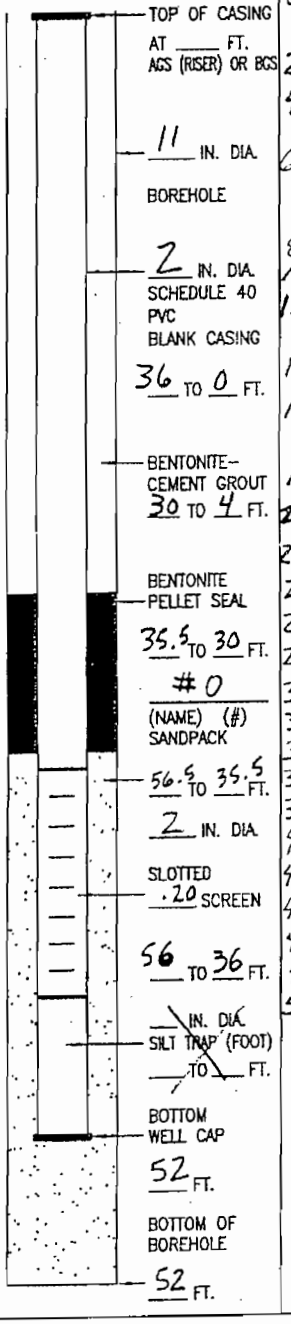
N

NOTES:

LATITUDE ___

LONGITUDE ___

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
		0	SM	0-2	1.5	Brown Fine to Medium Sand trace silt, moist loose
				2-4	1	Same as above
		0		4-6	1.5	16" Same as above 2" Brown Fine to Medium Sand with S.H, very dense, moist
			SM	6-8	1.5	1' Brown F-M sand w/silt + Gravel 6" Brown F-M sand w/silt moist, loose
		0		8-10	1.5	Same as above
				10-12	1	Same as above
		0	SM	12-14	.5	Brick + CRUSHED concrete with F-M sand and silt.
		0		14-16	X	Refusal - Concrete
				16-18	2	2" concrete + gravel, 20" Brown F-M sand trace silt, moist, loose.
		0	SM	18-20	2	Same as above
				20-22	1.5	Same as above
		0		22-24	1	Same as above
				24-26	.4	Same as above
				26-28	\	No Recovery - rock in shoe
				28-30	.2	Same as above
				30-32	.5	Same as above
				32-34	1	Same as above
				34-36	1	Same as above
				36-38	1	Same as above
				38-40	1	Same as above
				40-42	1	Same as above
				42-44	1.5	Same as above
				44-46	1	Same as above
				46-48	1	Same as above
				48-50	1.5	Same as above
				50-52	1.5	Same as above



DRILLING LOG

PAGE ____ OF ____

CPM Group Ltd. Engineering and Environmental Science

Onkonkoma New York

PROJECT Pumphouse 1 SITENAME AND SITEID Pumphouse 1

WELL No. 781 PIW-2 SURFACE ELEV ____

WATER LEVEL INITIAL ____ STABILIZED ____

DRILLING COMP. NORTHSTAR DRILLING METHOD HSA

DRILLER S. Laramie LOG BY D. FORSE DATE DRILLED 12-15-2003

WELL TYPE CODE ____

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

SKETCH MAP

781 PIW-2

N

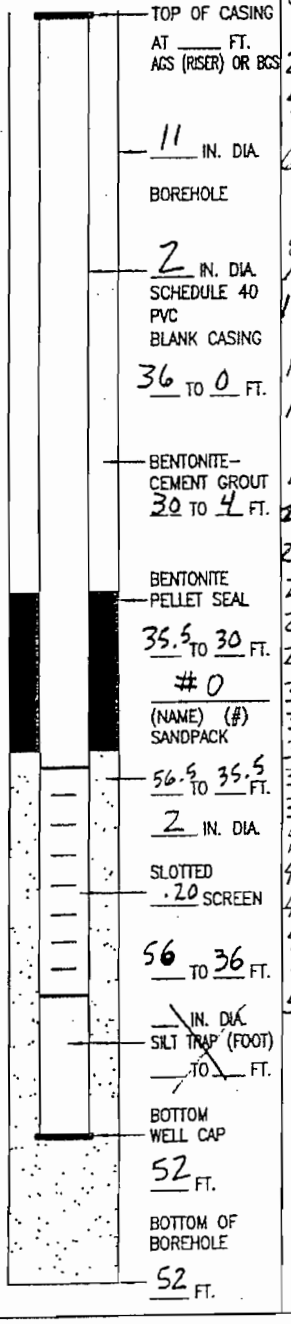
NOTES:

LATITUDE ____

LONGITUDE ____

DEPTH (FT.)	SOIL SAMPLE INTERVAL	ORGANIC VAPORS (ppm)	LITHOLOGY	DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
5		0	SM	0-2	1.5	Brown Fine to Medium Sand trace silt, moist loose
				2-4	1	Same as above
10		0		4-6	1.5	16" Same as above 2" Brown Fine to Medium Sand with silt, very dense, moist
15			SM	6-8	1.5	1' Brown F-M sand w/silt + Gravel
20		0				6" Brown F-M sand w/silt moist, loose
25				8-10	1.5	Same as above
30		0		10-12	1	Same as above
			SM	12-14	.5	Brick + CRUSHED concrete with F-M SAND AND silt.
40		0		14-16	X	Refusal - Concrete
				16-18	2	2" Concrete + gravel, 20" Brown F-M sand trace silt, moist, loose.
45		0				
50			SM	18-20	2	Same as above
		0		20-22	1.5	Same as above
55				22-24	1	Same as above
				24-26	.4	Same as above
				26-28	\	No Recovery - rock in shoe
				28-30	.2	Same as above
				30-32	.5	Same as above
				32-34	1	Same as above
				34-36	1	Same as above
				36-38	1	Same as above
				38-40	1	Same as above
				40-42	1	Same as above
				42-44	1.5	Same as above
				44-46	1	Same as above
				46-48	1	Same as above
				48-50	1.5	Same as above
				50-52	1.5	Same as above

WELL CONSTRUCTION



DRILLING LOG

PAGE ___ OF ___

FPM Group Ltd. Engineering and Environmental Science

Ronkonkoma New York

PROJECT Pumphouse 1 SITENAME AND SITEID Pumphouse 1 , 781

WELL No. 781 VMP-7 SURFACE ELEV ___

WATER LEVEL INITIAL ___ STABILIZED ___

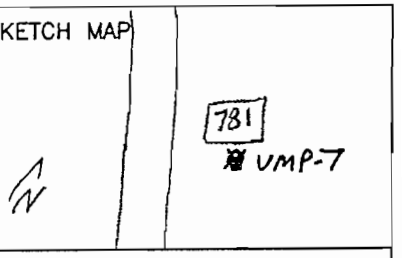
DRILLING COMP. NORTHSTAR DRILLING METHOD HSA

DRILLER S LARAMIE LOG BY D FORSE DATE DRILLED 12-17-2003

WELL TYPE CODE ___

☐ FLUSH MOUNT ☐ STEEL STANDPIPE (DETAILS LISTED BELOW)

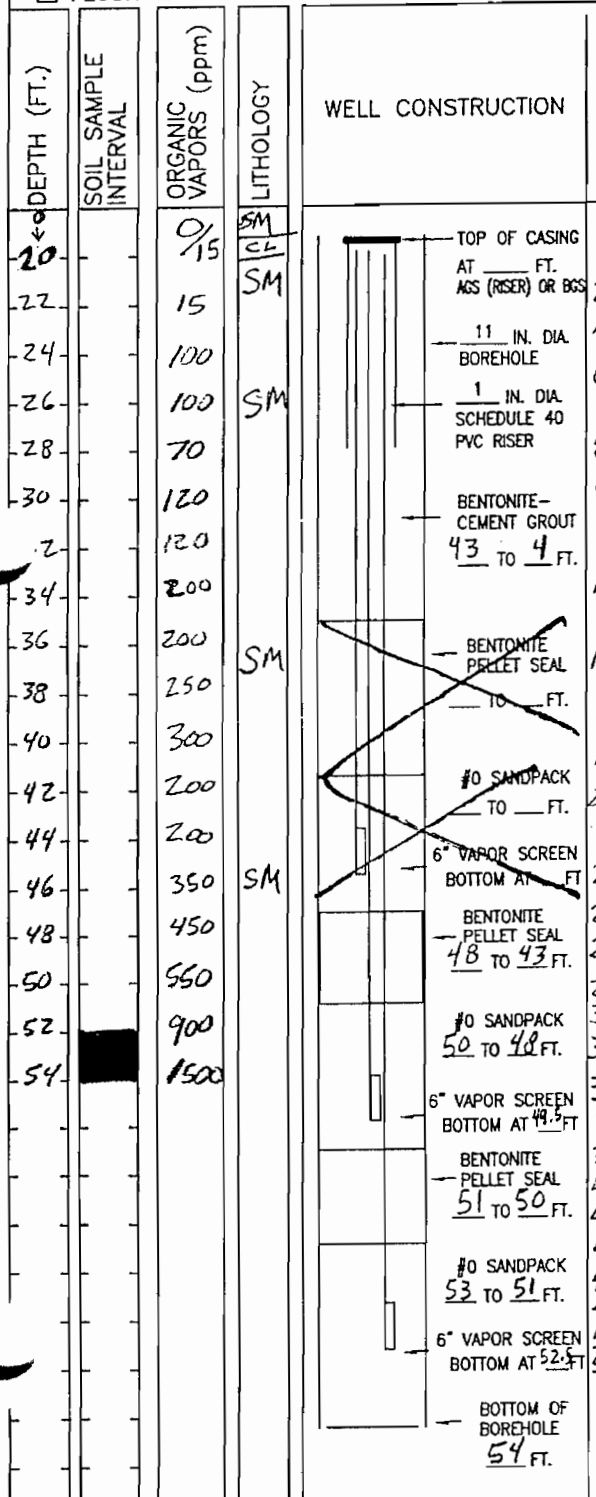
SKETCH MAP



NOTES:

LATITUDE ___

LONGITUDE ___



DEPTH	REC	DESCRIPTION/SOIL CLASSIFICATION (COLOR, CLASS, MOISTURE CONTENT, STIFFNESS)
0-2	1	6" Brown Fine to Coarse sand + Gravel. 6" Brown Fine to Medium sand with silt.
2-4	1.5	Brown F-M sand with silt, moist, loose
4-6	2	Same as above.
6-8	1	6" Same as above, 2" Silt and F-M sand with gravel, 4" Brown F-M sand w/silt.
8-10	2	Same as above.
10-12	2	6" Same as above, 6" Brown F-M sand w/ silt, 6" BROWN F-M sand w/silt.
12-14	1	6" Brown Silt + F-M sand trace Clay 6" Same as above, 6" Brown F-M SAND w/silt
14-16	1	Brown, Silt+Clay w/ F-M sand, moist
16-18	1.5	Brown F-M sand trace silt, moist.
18-20	1.5	Same as above.
20-22	1.5	6" Brown Silt + F-M sand, moist, loose 1' Brown F-M sand trace silt.
22-24	1	Same as above.
24-26	1	Same as above
26-28	1.5	Same as above
28-30	1	Same as above
30-32	1	Same as above
32-34	1	Same as above
34-36	1.5	Same as above
36-38	1	Same as above
38-40	1	Same as above
40-42	1	Same as above
42-44	1	Same as above
44-46	1	Same as above
46-48	1.5	Same as above
48-50	1.5	Same as above
50-52	1.5	Same as above
52-54	1.5	Same as above

APPENDIX H

LOCKOUT/TAGOUT PROCEDURES

Lockout/Tagout Procedures

Whenever maintenance is being performed on one of the bioventing blowers, all power sources must be disconnected and locked out and the appropriate tags must be attached. Keys for the lock affixed to the power sources shall be maintained by the technician performing the maintenance activities. At no time may a lock be removed by another individual without the consent of the maintenance technician who locked out the equipment. In addition, any individual other then the maintenance technician who locked out the equipment wishing to remove a lock must obtain the consent of the project manager.

Tags must display statements such as, "Danger – Do Not Operate" or "Danger – Do Not Turn Switch On". If one of these tags is present, obey its warning. Operating equipment contrary to a tag warning may result in death, or serious bodily harm to yourself or a co-worker.

APPENDIX I

QUARTERLY SYSTEM MONITORING RESULTS TABLES AND FREE PRODUCT RECOVERY TABLE

I.1 QUARTERLY SYSTEM MONITORING RESULTS TABLES

I.2 FREE PRODUCT RECOVERY TABLE

I.1 QUARTERLY SYSTEM MONITORING RESULTS TABLES

PUMPHOUSE 1 (B-781) BIOVENT PILOT TEST SAMPLING RESULTS

781 PAIW-1

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	**(ppb)**	781 PAIW-1	781 PAIW-1	781 PAIW-1	781 PAIW-1	781 PAIW-1	781 PAIW-1	781 PAIW-1
Sample type		Baseline soil	Field measure					
Sample date		Oct-02	Apr-04					
VOCs:								
1,2,4-trimethylbenzene	**10,000**	U						
1,3,5-trimethylbenzene	**3,300**	U						
benzene	**60**	U						
ethylbenzene	**5,500**	U						
isopropylbenzene	**2,300**	U						
m,p-xylene (mixed)	**1,200**	U						
naphthalene	**13,000**	U						
n-butylbenzene	**10,000**	U						
n-propylbenzene	**3,700**	U						
p-isopropyltoluene	**10,000**	U						
sec-butylbenzene	**10,000**	U						
t-butylbenzene	**10,000**	U						
toluene	**1,500**	U						
SVOCs:								
acenaphthene	**50,000**	U						
acenaphthylene	**50,000**	U						
anthracene	**50,000**	U						
benz(a)anthracene	**224**	U						
benzo(a)pyrene	**61**	U						
benzo(b)fluoranthene	**220**	U						
benzo(g,h,i)perylene	**50,000**	110 R						
benzo(k)fluoranthene	**220**	U						
chrysene	**400**	U						
dibenz(a,h)anthracene	**14**	U						
fluorene	**50,000**	U						
fluoranthene	**50,000**	U						
indeno(1,2,3-cd)pyrene	**3,200**	U						
phenanthrene	**50,000**	U						
pyrene	**50,000**	U						
TVH (ppm) (field screen)	**N/A**		20 ppm					

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

R= Data are unusable due to deficiencies in the ability to analyze the sample and meet the AFCEE QC criteria.

PUMPHOUSE 1 (B-781) BIOVENT PILOT TEST SAMPLING RESULTS

781 PVMP-1

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PVMP-1	781 PVMP-1	781 PVMP-1	781 PVMP-1	781 PVMP-1	781 PVMP-1	781 PVMP-1
Sample type		Baseline soil	Field measure	Field measure				
Sample date		Oct-02	Dec-02	Apr-04				
VOCs:								
1,2,4-trimethylbenzene	10,000	39,000						
1,3,5-trimethylbenzene	3,300	U						
benzene	60	U						
ethylbenzene	5,500	7,400						
isopropylbenzene	2,300	2,100						
m,p-xylene (mixed)	1,200	32,000						
naphthalene	13,000	8,800						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	6,000						
p-isopropyltoluene	10,000	2,700						
sec-butylbenzene	10,000	3,400						
t-butylbenzene	10,000	U						
toluene	1,500	10,000						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	610 R						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	360 F						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	160 F						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A		9,950 ppm	>11,000 ppm				

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

PVMP=Parsons vapor monitoring point

N/A=Not applicable/or no analysis was performed on corresponding compound.

Soil samples were collected at 50' and 52' bgsat this location, the highest values are reported here.

R= Data are unusable due to deficiencies in the ability to analyze the sample and meet the AFCEE QC criteria.

This PVMP was originally under the pilot test program, therefore, field soil gas readings were not collected regularly.

PUMPHOUSE 1 (B-781) BIOVENT PILOT TEST SAMPLING RESULTS

781 PVMP-2

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PVMP-2	781 PVMP-2	781 PVMP-2	781 PVMP-2	781 PVMP-2	781 PVMP-2	781 PVMP-2
Sample type		Baseline soil	Field measure	Field measure				
Sample date		Oct-02	Dec-02	Apr-04				
VOCs:								
1,2,4-trimethylbenzene	10,000	5,700						
1,3,5-trimethylbenzene	3,300	U						
benzene	60	U						
ethylbenzene	5,500	400						
isopropylbenzene	2,300	230						
m,p-xylene (mixed)	1,200	2,000						
naphthalene	13,000	720						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	790						
p-isopropyltoluene	10,000	470						
sec-butylbenzene	10,000	660						
t-butylbenzene	10,000	U						
toluene	1,500	U						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	120 R						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A		>11,000 ppm	750 ppm				

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

PVMP=Parsons vapor monitoring point

N/A=Not applicable/or no analysis was performed on corresponding compound.

Soil samples were collected at 50' and 52' bgsat this location, the highest values are reported here.

R= Data are unusable due to deficiencies in the ability to analyze the sample and meet the AFCEE QC criteria.

This PVMP was originally under the pilot test program, therefore, field soil gas readings were not collected regularly.

PUMPHOUSE 1 (B-781) BIOVENT PILOT TEST SAMPLING RESULTS

781 PVMP-3

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PVMP-3	781 PVMP-3	781 PVMP-3	781 PVMP-3	781 PVMP-3	781 PVMP-3	781 PVMP-3
Sample type		Baseline soil	Field measure	Field measure				
Sample date		Nov-02	Dec-02	Apr-04				
VOCs:								
1,2,4-trimethylbenzene	10,000	U						
1,3,5-trimethylbenzene	3,300	U						
benzene	60	U						
ethylbenzene	5,500	U						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	U						
naphthalene	13,000	U						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	U						
p-isopropyltoluene	10,000	U						
sec-butylbenzene	10,000	U						
t-butylbenzene	10,000	U						
toluene	1,500	U						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000							
TVH (ppm) (field screen)	N/A		2,700 ppm	25 ppm				

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

PVMP=Parsons vapor monitoring point

N/A=Not applicable/or no analysis was performed on corresponding compound.

Soil samples were collected at 50' and 52' bgsat this location, the highest values are reported here.

This PVMP was originally under the pilot test program, therefore, field soil gas readings were not collected regularly.

PUMPHOUSE 1 (B-781) BIOVENT SYSTEM SAMPLING RESULTS

781 PAIW-2

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	**(ppb)**	781 PAIW-2	781 PAIW-2	781 PAIW-2	781 PAIW-2	781 PAIW-2	781 PAIW-2	781 PAIW-2
Sample type		Baseline soil	Field measure					
Sample date		Dec-03	Apr-04					
VOCs:								
1,2,4-trimethylbenzene	10,000	U						
1,3,5-trimethylbenzene	3,300	U						
benzene	60	U						
ethylbenzene	5,500	U						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	U						
naphthalene	13,000	U						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	U						
p-isopropyltoluene	10,000	N/A						
sec-butylbenzene	10,000	U						
t-butylbenzene	10,000	U						
toluene	1,500	6.83						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A	N/A	50 ppm					

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS
Note: VMPs 4,5 6 are listed with PH 2 (B/779) data

781 PVMP-7

Soil Sampling Results (ppb)	TAGM Criteria						
Location ID	**(ppb)**	781 PVMP-7	781 PVMP-7	781 PVMP-7	781 PVMP-7	781 PVMP-7	781 PVMP-7
Sample type		Baseline soil	Field measure				
Sample date		Dec-03	Apr-04				
VOCs:							
1,2,4-trimethylbenzene	**10,000**	2,440					
1,3,5-trimethylbenzene	**3,300**	835					
benzene	**60**	12.1 F					
ethylbenzene	**5,500**	201					
isopropylbenzene	**2,300**	115					
m,p-xylene (mixed)	**1,200**	1,220					
naphthalene	**13,000**	885					
n-butylbenzene	**10,000**	455					
n-propylbenzene	**3,700**	362					
p-isopropyltoluene	**10,000**	N/A					
sec-butylbenzene	**10,000**	270					
t-butylbenzene	**10,000**	27.9 F					
toluene	**1,500**	81.6 F					
SVOCs:							
acenaphthene	**50,000**	U					
acenaphthylene	**50,000**	U					
anthracene	**50,000**	U					
benz(a)anthracene	**224**	U					
benzo(a)pyrene	**61**	U					
benzo(b)fluoranthene	**220**	U					
benzo(g,h,i)perylene	**50,000**	U					
benzo(k)fluoranthene	**220**	U					
chrysene	**400**	U					
dibenz(a,h)anthracene	**14**	U					
fluorene	**50,000**	U					
fluoranthene	**50,000**	U					
indeno(1,2,3-cd)pyrene	**3,200**	U					
phenanthrene	**50,000**	100 F					
pyrene	**50,000**	U					
TVH (ppm) (field screen)	**N/A**		>11,000 ppm				

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

Note: This sample ID is WL-781PVMP-5D The boring was subsequently renamed 781PVMP-7 as part of the PH 1&2 alpha numerical sequence.

PUMPHOUSE 2 (B-779) BIOVENT SYSTEM SAMPLING RESULTS

779 PAIW-2

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	779 PAIW-2	779 PAIW-2	779 PAIW-2	779 PAIW-2	779 PAIW-2	779 PAIW-2	779 PAIW-2
Sample type		Baseline soil	Field soil gas					
Sample date		Nov-02						
VOCs:								
1,2,4-trimethylbenzene	10,000	U						
1,3,5-trimethylbenzene	3,300	U						
benzene	60	U						
ethylbenzene	5,500	U						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	U						
naphthalene	13,000	U						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	U						
p-isopropyltoluene	10,000	U						
sec-butylbenzene	10,000	U						
t-butylbenzene	10,000	U						
toluene	1,500	U						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	140 J						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A	N/A						

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quantitation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

PUMPHOUSE 2 (B-779) BIOVENT SYSTEM SAMPLING RESULTS

779 PVMP-4

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	779 PVMP-4	779 PVMP-4	779 PVMP-4	779 PVMP-4	779 PVMP-4	779 PVMP-4	779 PVMP-4
Sample type		Baseline soil	Field soil gas	Field soil gas	Field soil gas	Field soil gas	Field soil gas	Field soil gas
Sample date		Oct-02	Dec-02	Jan-03	Apr-03	Jul-03	Nov-03	Apr-04
VOCs:								
1,2,4-trimethylbenzene	10,000	U						
1,3,5-trimethylbenzene	3,300	U						
benzene	60	U						
ethylbenzene	5,500	U						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	U						
naphthalene	13,000	U						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	U						
p-isopropyltoluene	10,000	U						
sec-butylbenzene	10,000	U						
t-butylbenzene	10,000	U						
toluene	1,500	U						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	110 R						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A		30 ppm	200 ppm	0 ppm	0 ppm	35 ppm	5 ppm

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here measured in ppm.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

R= Data are unusable due to deficiencies in the ability to analyze the sample and meet the AFCEE QC criteria.

PUMPHOUSE 2 (B-779) BIOVENT SYSTEM SAMPLING RESULTS

779 PVMP-5

Soil Sampling Results (ppb)	TAGM Criteria								
Location ID	(ppb)	779 PVMP-5	779 PVMP-5	779 PVMP-5	779 PVMP-5	779 PVMP-5	779 PVMP-5	779 PVMP-5	779 PVMP-5
Sample type		Baseline soil	Field screen	Field soil gas	Summa	Field soil gas	Summa	Summa	Summa
Sample date		Oct-02	Dec-02	Jan-03	Feb-03	Apr-03	Jul-03	Nov-03	Apr-04
VOCs:									
1,2,4-trimethylbenzene	10,000	U			U				
1,3,5-trimethylbenzene	3,300	U			U				
benzene	60	U			U				
ethylbenzene	5,500	U			U				
isopropylbenzene	2,300	U			N/A		N/A	N/A	
m,p-xylene (mixed)	1,200	U			U		0.028		
naphthalene	13,000	U			N/A				
n-butylbenzene	10,000	U			N/A				
n-propylbenzene	3,700	U			N/A				
p-isopropyltoluene	10,000	U			N/A				
sec-butylbenzene	10,000	U			N/A				
t-butylbenzene	10,000	U			N/A				
toluene	1,500	U			N/A				
SVOCs:									
acenaphthene	50,000	U							
acenaphthylene	50,000	U							
anthracene	50,000	U							
benz(a)anthracene	224	U							
benzo(a)pyrene	61	U							
benzo(b)fluoranthene	220	U							
benzo(g,h,i)perylene	50,000	110 R							
benzo(k)fluoranthene	220	U							
chrysene	400	U							
dibenz(a,h)anthracene	14	U							
fluorene	50,000	U							
fluoranthene	50,000	140 F							
indeno(1,2,3-cd)pyrene	3,200	U							
phenanthrene	50,000	120 F							
pyrene	50,000	120 F							
TVH (ppm) (field screen)	N/A		30 ppm	270 ppm		10 vppm	45 ppm	10 ppm	5 ppm

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

R= Data are unusable due to deficiencies in the ability to analyze the sample and meet the AFCEE QC criteria.

PUMPHOUSE 2 (B-779) BIOVENT SYSTEM SAMPLING RESULTS

779 PVMP-6

Soil Sampling Results (ppb) Location ID	TAGM Criteria (ppb)	779 PVMP-6	779 PVMP-6	779 PVMP-6	779 PVMP-6	779 PVMP-6	779 PVMP-6	779 PVMP-6
Sample type		Baseline soil	Field soil gas	Field soil gas	Field soil gas	Field soil gas	Field soil gas	Field soil gas
Sample date		Oct-02	Dec-02	Jan-03	Apr-03	Jul-03	Nov-03	Apr-04
VOCs:								
1,2,4-trimethylbenzene	10,000	88						
1,3,5-trimethylbenzene	3,300	25						
benzene	60	U						
ethylbenzene	5,500	U						
isopropylbenzene	2,300	1.3 F						
m,p-xylene (mixed)	1,200	2.7 F						
naphthalene	13,000	30						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	3.7 F						
p-isopropyltoluene	10,000	20						
sec-butylbenzene	10,000	12						
t-butylbenzene	10,000	U						
toluene	1,500	U						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	560 J						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	500 R						
benzo(k)fluoranthene	220	U						
chrysene	400	470 J						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A		25 ppm	250 ppm	15 ppm	45 ppm	10 ppm	5 ppm

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

R= Data are unusable due to deficiencies in the ability to analyze the sample and meet the AFCEE QC criteria.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 PPRW-1

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PPRW-1	781 PPRW-1	781 PPRW-1	781 PPRW-1	781 PPRW-1	781 PPRW-1	781 PPRW-1
Sample type		Baseline soil	Field measure	Field measure				
Sample date		Oct-02	Apr-04					
VOCs:								
1,2,4-trimethylbenzene	10,000	19,000						
1,3,5-trimethylbenzene	3,300	6,500						
benzene	60	U						
ethylbenzene	5,500	3,000						
isopropylbenzene	2,300	1,200						
m,p-xylene (mixed)	1,200	13,000						
naphthalene	13,000	2,900						
n-butylbenzene	10,000	3,000						
n-propylbenzene	3,700	3,300						
p-isopropyltoluene	10,000	1,500						
sec-butylbenzene	10,000	1,900						
t-butylbenzene	10,000	1,500						
toluene	1,500	2,900 B						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A		400 ppm					

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 PPRW-2

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PPRW-2	781 PPRW-2	781 PPRW-2	781 PPRW-2	781 PPRW-2	781 PPRW-2	781 PPRW-2
Sample type		Baseline soil	Field measure					
Sample date		Oct-02						
VOCs:								
1,2,4-trimethylbenzene	10,000	170,000						
1,3,5-trimethylbenzene	3,300	57,000						
benzene	60	6,500						
ethylbenzene	5,500	40,000						
isopropylbenzene	2,300	11,000						
m,p-xylene (mixed)	1,200	160,000						
naphthalene	13,000	24,000						
n-butylbenzene	10,000	24,000						
n-propylbenzene	3,700	30,000						
p-isopropyltoluene	10,000	12,000						
sec-butylbenzene	10,000	16,000						
t-butylbenzene	10,000	12,000						
toluene	1,500	90,000 B						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Totel volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 PPRW-3

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PPRW-3	781 PPRW-3	781 PPRW-3	781 PPRW-3	781 PPRW-3	781 PPRW-3	781 PPRW-3
Sample type		Baseline soil	Field measure					
Sample date		Oct-02	Apr-04					
VOCs:								
1,2,4-trimethylbenzene	10,000	65,000						
1,3,5-trimethylbenzene	3,300	18,000						
benzene	60	380						
ethylbenzene	5,500	10,000						
isopropylbenzene	2,300	2,800						
m,p-xylene (mixed)	1,200	49,000						
naphthalene	13,000	13,000						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	8,100						
p-isopropyltoluene	10,000	3,100						
sec-butylbenzene	10,000	4,000						
t-butylbenzene	10,000	370						
toluene	1,500	15,000						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A		110 ppm					

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanitilation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 PPRW-4

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PPRW-4	781 PPRW-4	781 PPRW-4	781 PPRW-4	781 PPRW-4	781 PPRW-4	781 PPRW-4
Sample type		Baseline soil	Field measure					
Sample date		Oct-02						
VOCs:								
1,2,4-trimethylbenzene	10,000	U						
1,3,5-trimethylbenzene	3,300	U						
benzene	60	U						
ethylbenzene	5,500	U						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	U						
naphthalene	13,000	U						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	U						
p-isopropyltoluene	10,000	U						
sec-butylbenzene	10,000	U						
t-butylbenzene	10,000	U						
toluene	1,500	U						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	U						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 PPRW-5

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PPRW-5	781 PPRW-5	781 PPRW-5	781 PPRW-5	781 PPRW-5	781 PPRW-5	781 PPRW-5
Sample type		Baseline soil	Field measure					
Sample date		Jul-03						
VOCs:								
1,2,4-trimethylbenzene	10,000	299						
1,3,5-trimethylbenzene	3,300	166						
benzene	60	44.0 F						
ethylbenzene	5,500	11.4 F						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	90.4 F						
naphthalene	13,000	22.3 F						
n-butylbenzene	10,000	28.9 F						
n-propylbenzene	3,700	U						
p-isopropyltoluene	10,000	N/A						
sec-butylbenzene	10,000	U						
t-butylbenzene	10,000	13.2 F						
toluene	1,500	33.7 F						
SVOCs:								
acenaphthene	50,000	5.24 M						
acenaphthylene	50,000	N/A						
anthracene	50,000	7.10 M						
benz(a)anthracene	224	92.3 M						
benzo(a)pyrene	61	99.2 M						
benzo(b)fluoranthene	220	162 M						
benzo(g,h,i)perylene	50,000	42.7 M						
benzo(k)fluoranthene	220	16.0 M						
chrysene	400	23						
dibenz(a,h)anthracene	14	130 M						
fluorene	50,000	24.3 M						
fluoranthene	50,000	75.1 M						
indeno(1,2,3-cd)pyrene	3,200	113 M						
phenanthrene	50,000	49.2 M						
pyrene	50,000	63.7 M						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Excedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

M = A matrix effect was present.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 PPRW-6

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PPRW-6	781 PPRW-6	781 PPRW-6	781 PPRW-6	781 PPRW-6	781 PPRW-6	781 PPRW-6
Sample type		Baseline soil	Field measure					
Sample date		Jul-03						
VOCs:								
1,2,4-trimethylbenzene	10,000	1,120						
1,3,5-trimethylbenzene	3,300	422						
benzene	60	U						
ethylbenzene	5,500	32.2 F						
isopropylbenzene	2,300	30.6 F						
m,p-xylene (mixed)	1,200	107 F						
naphthalene	13,000	92.6						
n-butylbenzene	10,000	51.2 F						
n-propylbenzene	3,700	93.5						
p-isopropyltoluene	10,000	N/A						
sec-butylbenzene	10,000	222						
t-butylbenzene	10,000	24.2 F						
toluene	1,500	54.8 F						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	N/A						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	11.2 F						
fluoranthene	50,000	4.46 F						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	24.1 F						
pyrene	50,000	4.46 F						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

M = A matrix effect was present.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 PPRW-7

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PPRW-7	781 PPRW-7	781 PPRW-7	781 PPRW-7	781 PPRW-7	781 PPRW-7	781 PPRW-7
Sample type		Baseline soil	Field measure					
Sample date		Jul-03						
VOCs:								
1,2,4-trimethylbenzene	10,000	334						
1,3,5-trimethylbenzene	3,300	130						
benzene	60	U						
ethylbenzene	5,500	U						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	U						
naphthalene	13,000	271						
n-butylbenzene	10,000	142						
n-propylbenzene	3,700	27.0 F						
p-isopropyltoluene	10,000	N/A						
sec-butylbenzene	10,000	60.5 F						
t-butylbenzene	10,000	U						
toluene	1,500	7.42 F						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	N/A						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	5.32 F						
fluoranthene	50,000	3.70 F						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	12.5 F						
pyrene	50,000	3.50 F						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanitation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 PPRW-8

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 PPRW-8	781 PPRW-8	781 PPRW-8	781 PPRW-8	781 PPRW-8	781 PPRW-8	781 PPRW-8
Sample type		Baseline soil	Field measure					
Sample date		Jul-03	Apr-04					
VOCs:								
1,2,4-trimethylbenzene	10,000	150,000						
1,3,5-trimethylbenzene	3,300	58,900						
benzene	60	2,970						
ethylbenzene	5,500	35,700						
isopropylbenzene	2,300	11,200						
m,p-xylene (mixed)	1,200	140,000						
naphthalene	13,000	22,700						
n-butylbenzene	10,000	28,500						
n-propylbenzene	3,700	27,200						
p-isopropyltoluene	10,000	N/A						
sec-butylbenzene	10,000	16,300						
t-butylbenzene	10,000	1,110 F						
toluene	1,500	57,900						
SVOCs:								
acenaphthene	50,000	265 F						
acenaphthylene	50,000	N/A						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	829 F						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	369 F						
pyrene	50,000	152 F						
TVH (ppm) (field screen)	N/A		45 ppm					

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 MW-4

Soil Sampling Results (ppb) Location ID	TAGM Criteria (ppb)	781 MW-4	781 MW-4	781 MW-4	781 MW-4	781 MW-4	781 MW-4	781 MW-4
Sample type		Baseline soil	Field measure					
Sample date		Apr-99						
VOCs:		(by PEER)						
1,2,4-trimethylbenzene	10,000	160,000 M						
1,3,5-trimethylbenzene	3,300	54,000 M						
benzene	60	29,000 J						
ethylbenzene	5,500	46,000 J						
isopropylbenzene	2,300	12,000 M						
m,p-xylene (mixed)	1,200	220,000						
naphthalene	13,000	33,000 M *						
n-butylbenzene	10,000	40,000 M						
n-propylbenzene	3,700	25,000 M						
p-isopropyltoluene	10,000	13,000 M						
sec-butylbenzene	10,000	28,000 M						
t-butylbenzene	10,000	5,1000 M						
toluene	1,500	90,000 J						
SVOCs:								
acenaphthene	50,000	U M						
acenaphthylene	50,000	N/A						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	1,400						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	530 F						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

The baseline data is from the "Preliminary Draft Site Characterization Report Former PH 1 Soil and Groundwater Sampling & Analysis" report by PEER Consultants Jan 2000

M = A matrix effect was present

* = This value is from sample analysis method 8270 (SVOC)

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 MW-8

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 MW-8	781 PPRW-8	781 PPRW-8	781 PPRW-8	781 PPRW-8	781 PPRW-8	781 PPRW-8
Sample type		Baseline soil	Field measure					
Sample date		Apr-99						
VOCs:		(by PEER)						
1,2,4-trimethylbenzene	10,000	14,000						
1,3,5-trimethylbenzene	3,300	7,000						
benzene	60	420						
ethylbenzene	5,500	2,500						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	15,000 B						
naphthalene	13,000	U *						
n-butylbenzene	10,000	12,000						
n-propylbenzene	3,700	1,900						
p-isopropyltoluene	10,000	1,400						
sec-butylbenzene	10,000	2,800						
t-butylbenzene	10,000	U						
toluene	1,500	4,000 B						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	N/A						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U M						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

The baseline data is from the "Preliminary Draft Site Characterization Report Former PH 1 Soil and Groundwater Sampling & Analysis" report by PEER Consultants Jan 2000

M = A matrix effect was present

* = This value is from sample analysis method 8270 (SVOC)

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 MW-9

Soil Sampling Results (ppb) Location ID	TAGM Criteria (ppb)	781 MW-9	781 MW-9	781 MW-9	781 MW-9	781 MW-9	781 MW-9	781 MW-9
Sample type		Baseline soil	Field measure					
Sample date		Apr-99						
VOCs:		(by PEER)						
1,2,4-trimethylbenzene	10,000	150,000						
1,3,5-trimethylbenzene	3,300	78,000						
benzene	60	10,000						
ethylbenzene	5,500	24,000						
isopropylbenzene	2,300	6,600						
m,p-xylene (mixed)	1,200	170,000 B						
naphthalene	13,000	21,000 *						
n-butylbenzene	10,000	120,000						
n-propylbenzene	3,700	20,000						
p-isopropyltoluene	10,000	17,000						
sec-butylbenzene	10,000	18,000						
t-butylbenzene	10,000	12,000						
toluene	1,500	32,000 B						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	N/A						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U M						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

The baseline data is from the "Preliminary Draft Site Characterization Report Former PH 1 Soil and Groundwater Sampling & Analysis" report by PEER Consultants Jan 2000

M = A matrix effect was present

* = This value is from sample analysis method 8270 (SVOC)

PUMPHOUSE 1 (B-781) PRODUCT RECOVERY WELL SAMPLING RESULTS

781 MW-13

Soil Sampling Results (ppb)	TAGM Criteria							
Location ID	(ppb)	781 MW-13	781 MW-13	781 MW-13	781 MW-13	781 MW-13	781 MW-13	781 MW-13
Sample type		Baseline soil	Field measure					
Sample date		Jun-99						
VOCs:		(by PEER)						
1,2,4-trimethylbenzene	10,000	230						
1,3,5-trimethylbenzene	3,300	U						
benzene	60	310						
ethylbenzene	5,500	U						
isopropylbenzene	2,300	U						
m,p-xylene (mixed)	1,200	860						
naphthalene	13,000	U *						
n-butylbenzene	10,000	U						
n-propylbenzene	3,700	U						
p-isopropyltoluene	10,000	U						
sec-butylbenzene	10,000	U						
t-butylbenzene	10,000	U						
toluene	1,500	1,500						
SVOCs:								
acenaphthene	50,000	U						
acenaphthylene	50,000	N/A						
anthracene	50,000	U						
benz(a)anthracene	224	U						
benzo(a)pyrene	61	U						
benzo(b)fluoranthene	220	U						
benzo(g,h,i)perylene	50,000	U						
benzo(k)fluoranthene	220	U						
chrysene	400	U						
dibenz(a,h)anthracene	14	U						
fluorene	50,000	U						
fluoranthene	50,000	U						
indeno(1,2,3-cd)pyrene	3,200	U						
phenanthrene	50,000	U						
pyrene	50,000	U						
TVH (ppm) (field screen)	N/A							

Notes:

B = Analyte is present in the associated blank.

U = Analyte was not detected above the MDL

J = Estimated value.

F = Analyte was postively identified but the associated numerical value is below the Practical Quanititation Limit.

Exceedance of TAGM criteria

TVH=Total volatile hydrocarbons, only the highest field measurement of soil gas from three depth intervals is reported here.

PIW=Pressure Injection Well

N/A=Not applicable/or no analysis was performed on corresponding compound.

The baseline data is from the "Preliminary Draft Site Characterization Report Former PH 1 Soil and Groundwater Sampling & Analysis" report by PEER Consultants Jan 2000

* = This detection result is from sample analysis method 8270 (SVOC)

I.2 FREE PRODUCT RECOVERY TABLE

2003													2004												Start BV	Restart BV	
2-Sep	8-Sep	16-Sep	22-Sep	29-Sep	6-Oct	13-Oct	20-Oct	27-Oct	3-Nov	10-Nov	17-Nov	24-Nov	1-Dec	8-Dec	15-Dec	22-Dec	29-Dec	5-Jan	12-Jan	19-Jan	26-Jan	2-Feb	9-Feb	16-Feb	23-Feb	1-Mar	8-Mar	15-Mar	23-Mar	22-Apr	WELL
																														PRW #1
1.2	0.00	0.5	0	0.375	0	0	0	0.25	0	0	0	0	0	0	0	0	0	0	0.8	0	1.7	1.7	1.2	0.9	0.45	0.4	0	0.575	0	0	Product Recovered - Liters
57.81	57.85	57.98	58.00	58.13	58.22	58.26	58.22	58.28	58.38	58.28	58.34	58.24	58.27	58.24	58.18	58.11	58.10	58.02	57.92	57.88	57.93	57.93	57.84	57.95	57.95	57.95	57.98	57.98	57.87	57.67	Depth to Product- Ft
57.86	58.02	58.04	58.11	58.15	58.27	58.34	58.32	58.30	58.43	58.33	58.39	58.28	58.30	58.27	58.21	58.15	58.17	58.17	57.97	58.14	58.02	58.02	57.97	58.06	58.08	58.00	58.12	58.03	58.02	57.81	Depth to Water - Ft
0.62	2.13	0.75	1.37	0.25	0.63	1.00	1.25	0.25	0.62	0.62	0.62	0.50	0.37	0.38	0.38	0.50	0.88	1.87	0.62	3.25	1.13	1.13	1.62	1.37	1.62	0.62	1.75	0.63	1.88	1.75	Product Thickness - inches
																														PRW #2
N/A	0.6	0.15	0	0.225	0	0.4	0	0.35	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.375	0	0	0	0	Product Recovered - Liters
58.90	58.98	59.08	59.11	59.23	59.32	59.38	59.33	59.40	59.48	59.40	59.46	59.36	59.39	59.35	59.30	59.23	59.23	59.16	59.05	59.04	59.06	59.06	58.98	59.08	59.08	58.20	58.22	58.21	58.12	57.88	Depth to Product - Ft
59.08	59.06	59.14	59.23	59.30	59.43	59.45	59.44	59.44	59.58	59.44	59.51	59.39	59.43	59.38	59.32	59.25	59.26	59.20	59.08	59.07	59.09	59.09	59.03	59.16	59.20	58.28	58.31	58.29	58.18	57.94	Depth to Water - Ft
2.25	1.00	0.75	1.50	0.88	1.37	0.88	1.37	0.50	1.25	0.50	0.62	0.38	0.50	0.38	0.25	0.25	0.38	0.50	0.38	0.38	0.38	0.38	0.63	1.00	1.50	1.00	1.13	1.00	0.75	0.75	Product Thickness - inches
																														PRW #3
N/A	0.625	0.125	0	0.6	0	0	0.6	0	0	0	0	0	0.3	0	0	0	0	0.55	0	0	0	0	0	0	0	0	0	0.375	0	0	Product Recovered - Liters
58.20	58.29	58.37	58.41	58.53	58.62	58.68	58.72	58.75	58.84	58.78	58.84	58.75	58.79	58.76	58.72	58.65	58.63	58.59	58.50	58.45	58.46	58.46	58.35	58.43	58.42	59.26	59.31	59.32	59.24	59.06	Depth to Product - Ft
58.40	58.36	58.47	58.58	58.57	58.70	58.80	58.73	58.80	58.90	58.84	58.89	58.85	58.82	58.81	58.79	58.73	58.74	58.61	58.53	58.54	58.58	58.58	58.38	58.50	58.50	59.35	59.42	59.33	59.26	59.12	Depth to Water - Ft
2.50	0.88	1.25	2.13	0.50	1.00	1.50	0.12	0.62	0.75	0.75	0.62	1.25	0.38	0.63	0.88	1.00	1.37	0.25	0.38	1.12	1.50	1.50	0.38	0.88	1.00	1.13	1.37	0.12	0.25	0.75	Product Thickness - inches
																														PRW #4
N/A	0.25	0.2	0	0.125	0.4	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	Product Recovered - Liters
57.72	57.80	57.86	57.91	58.02	58.13	58.17	58.12	58.18	58.30	58.19	58.27	58.16	58.20	58.17	58.12	58.04	58.04	57.99	57.86	57.86	57.88	57.88	57.80	57.89	57.90	57.01	57.05	57.03	56.96	56.71	Depth to Product - Ft
57.82	57.88	57.96	58.04	58.13	58.17	58.26	58.23	58.29	58.35	58.26	58.32	58.20	58.22	58.19	58.13	58.05	58.05	58.00	57.86	57.87	57.90	57.90	57.82	57.97	57.98	57.12	57.11	57.08	57.02	56.78	Depth to Water - Ft
1.25	1.00	1.25	1.63	1.37	0.50	1.12	1.37	1.37	0.63	0.88	0.62	0.50	0.25	0.25	0.13	0.12	0.12	0.12	0.00	0.12	0.25	0.25	0.25	1.00	1.00	1.37	0.75	0.62	0.75	0.88	Product Thickness - inches
																														PRW #5
N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Product Recovered - Liters
56.25	56.28	56.35	56.41	56.50	56.60	56.68	56.71	56.78	56.89	56.88	56.97	56.87	56.85	56.85	56.81	56.75	56.75	56.68	56.61	56.54	56.55	56.55	56.39	56.47	56.45	56.43	56.48	56.48	56.44	56.24	Depth to Product- Ft
56.25	56.28	56.35	56.41	56.50	56.60	56.68	56.71	56.78	56.89	56.88	56.97	56.87	56.85	56.85	56.81	56.75	56.75	56.68	56.61	56.54	56.55	56.55	56.39	56.47	56.45	56.43	56.48	56.48	56.44	56.24	Depth to Water - Ft
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Product Thickness - inches
																														PRW #6
N/A	N/A	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Product Recovered - Liters
58.06	58.1	58.17	58.24	58.30	58.40	58.47	58.53	58.58	58.70	58.70	58.75	58.71	58.89	58.69	58.64	58.62	58.61	58.54	58.48	58.40	58.40	58.40	58.24	58.28	58.26	58.25	58.28	58.28	58.25	58.08	Depth to Product - Ft
58.06	58.14	58.19	58.26	58.34	58.45	58.54	58.62	58.67	58.71	58.71	58.76	58.72	58.71	58.71	58.66	58.64	58.63	58.57	58.50	58.42	58.42	58.42	58.26	58.31	58.30	58.29	58.32	58.33	58.29	58.11	Depth to Water - Ft
0.00	0.50	0.25	0.25	0.50	0.63	0.88	1.12	1.13	0.12	0.12	0.12	0.12	0.25	0.25	0.25	0.25	0.25	0.38	0.25	0.25	0.25	0.25	0.25	0.38	0.50	0.50	0.50	0.62	0.50	0.38	Product Thickness - inches
																														PRW #7
N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Product Recovered - Liters
57.94	57.96	57.99	58.04	58.09	58.19	58.25	58.33	58.39	58.49	58.51	58.57	58.55	58.54	58.55	58.48	58.47	58.46	58.39	58.33	58.25	58.25	58.25	58.08	58.12	58.09	58.08	58.09	58.08	58.09	57.96	Depth to Product- Ft
57.94	57.96	57.99	58.04	58.09	58.19	58.25	58.33	58.39	58.49	58.51	58.57	58.55	58.54	58.55	58.48	58.47	58.46	58.39	58.33	58.25	58.25	58.25	58.08	58.12	58.09	58.08	58.09	58.08	58.09	57.96	Depth to Water - Ft
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Product Thickness - inches
																														PRW #8
N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Product Recovered - Liters
57.47	57.49	57.53	57.55	57.62	57.70	57.77	57.72	57.90	58.02	58.05	58.11	58.07	58.09	58.10	58.04	58.01	58.00	57.93	57.88	57.80	57.80	57.80	57.61	57.64	58.45	58.41	58.44	58.45	58.45	58.39	Depth to Product - Ft
57.47	57.49	57.53	57.55	57.62	57.70	57.77	57.72	57.90	58.02	58.05	58.11	58.07	58.09	58.10	58.04	58.01	58.00	57.93	57.88	57.80	57.80	57.80	57.61	57.64	58.45	58.41	58.44	58.45	58.45	58.39	Depth to Water - Ft
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Product Thickness - inches
																														781MW #4
N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Product Recovered - Liters
56.09	56.11	56.40	56.18	56.27	56.37	56.43	56.73	56.53	56.68	56.63	56.96	56.65	56.72	56.70	56.66	56.56	56.56	56.48	56.39	56.37	56.38	56.38	56.18	56.28	56.25	56.21	56.26	56.05	56.24	56.11	Depth to Product - Ft
56.09	56.11	56.40	56.18	56.27	56.37	56.43	56.73	56.53	56.68	56.63	56.96	56.65	56.72	56.70	56.66	56.56	56.56	56.48	56.39	56.37	56.38	56.38	56.18	56.28	56.25	56.21	56.26	56.05	56.24	56.11	Depth to Water - Ft
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Product Thickness - inches
																														781MW #6
0.3	0.1	0	0	0	0	0	0.05	0	0.05	0	0	0	0	0.05	0	0.2	0.15	0.5	0.2	0	0	0	0	0	0.5	0.25	0.2	0.325	0	0	Product Recovered - Liters
61.00	61.09	61.21	61.25	61.35	61.44	61.48	61.50	61.51	61.65	61.62	61.61	61.53	61.55	61.52	61.46	61.38	61.35	61.29	61.23	61.17	61.20	61.20	61.07	61.16	61.15	61.15	61.19	61.20	61.12	60.90	Depth to Product - Ft
61.14	61.11	61.23	61.32	61.42	61.53	61.58	61.55	61.52	61.72	61.67	61.71	61.60	61.70	61.60	61.68	61.50	61.57	61.40	61.26	61.29	61.30	61.30	61.16	61.35	61.29	61.28	61.36	61.28	61.21	60.95	Depth to Water - Ft
1.75	0.25	0.25	0.88	0.88	1.13	1.25	0.62	0.13	0.88	0.63	1.25	0.88	1.88	1.00	2.75	1.50	2.75	1.37	0.38	1.50	1.25	1.25	1.12	2.38	1.75	1.63	2.13	1.00	1.13	0.63	Product Thickness - inches
																														781MW #8
0.1	N/A	0	0	0	0	0	0.1	0	0	0	0	0	0	0.075	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Product Recovered - Liters
55.06	55.19	55.57	55.26	55.34	55.43	55.49	55.92	55.62	55.76	55.80	56.20	55.79	55.81	55.84	55.78	55.72	55.71	55.61	55.55	55.47	55.48	55.48	55.26	55.31	55.25	55.22	55.23	55.62	55.25	55.15	Depth to Product -Ft
55.08	55.21	55.58	55.28	55.36	55.51	55.63	55.92	55.63	55.77	55.81	56.21	55.80	55.94	55.84	55.78	55.72	55.71	55.62	55.57	55.49	55.50	55.50	55.29	55.36	55.33	55.30	55.32	55.70	55.34	55.27	Depth to Water - Ft
0.25	0.25	0.12	0.25	0.25	1.00	1.75	0.00	0.13	0.13	0.13	0.12	0.12	1.62	0.00	0.00	0.00	0.00	0.12	0.25	0.25	0.25	0.25	0.38	0.82	1.00	1.00	1.13	1.00	1.13	1.50	Product Thickness - inches
																														781MW #9
N/A	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Product Recovered - Liters
54.64	54.65	54.98	54.73	54.81	54.92	54.99	54.96	55.10	55.25	55.26	55.63	55.30	55.34	55.34	55.25	55.20	55.15	55.05	54.95	54.82	54.80	54.80	54.51	54.60	54.57	54.55	54.61	54.93	54.65	54.55	Depth to Product - Ft
54.64	54.65	54.98	54.73	54.81	54.92	54.99	54.96	55.10	55.25	55.26	55.63	55.30	55.34	55.34	55.25	55.20	55.15	55.05	54.95	54.82	54.80	54.80	54.51	54.60	54.57	54.55	54.61	54.93	54.65	54.55	Depth to Water - Ft
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Product Thickness - inches
																														781MW #13
N/A	N/A	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Product Recovered - Liters
56.16	56.22	57.71	56.37	56.47	56.58	56.62	56.92	56.63	56.74	56.64	57.06	56.60	56.64	56.59	56.55	56.47	56.47	56.40	56.29	56.29	56.31	56.31	56.23	56.33	56.35	56.30	56.35	56.70	56.25	56.06	Depth to Product -Ft
56.28	56.34	57.78	56.42	56.53	56.62	56.67	56.98	56.68	56.80	56.69	57.11	56.64	56.69	56.64	56.59	56.52	56.52	56.46	56.34	56.34	56.36	56.36	56.27	56.38	56.39	56.36	56.42	56.75	56.29	56.10	Depth to Water - Ft
1.50	1.50	0.88	0.63	0.75	0.50	0.63	0.75	0.62	0.75	0.62	0.62	0.50	0.62	0.62	0.50	0.63	0.63	0.75	0.63	0.63	0.62	0.62	0.50	0.63	0.50	0.75	0.88	0.62	0.50	0.50	Product Thickness - inches
1.60	1.58	0.00	0.00	1.33	0.40	0.40	0.75	0.60	0.55	0.30	0.00	0.00	0.00	0.30	0.13	0.00	0.20	0.15	1.05	1.00	0.00	1.70	1.70	1.20	0.90	0.95	1.03	0.50	1.28	0.00	0.00	Product Recovered During Week - Liters
462.29	463.87	463.87	463.87	465.19	465.59	465.99	466.74	467.34	467.89	468.19	468.19	468.19	468.49	468.62	468.62	468.82	468.97	470.02	471.02	471.02	472.72	474.42	475.62	476.52	477.47	478.49	478.99	480.27	480.27	480.27	Total Product Recovered - LITERS

	2002	2003	System Startup																			
WELL	19-Dec	8-Jan	10-Feb	4-Mar	14-Apr	21-Apr	28-Apr	5-May	12-May	19-May	27-May	3-Jun	10-Jun	16-Jun	23-Jun	30-Jun	7-Jul	14-Jul	20-Jul	28-Jul	5-Aug	11-Aug	18-Aug
PRW #1																							
Product Recovered - Liters					1.50*	1.00*	0.25*	0.40*	0.50*	1.0	N/A	N/A	5.3	0.25	N/A	N/A	2.5	N/A	N/A	N/A	N/A	1.5	0.9
Depth to Product- Ft			59.00	59.88			58.85	58.65	58.46	58.43	58.21	58.05	57.95	58.01	57.84	57.79	57.70	57.82	57.76	57.74	56.68	57.68	57.72
Depth to Water - Ft			61.25	59.80			58.93	58.80	58.57	58.50	58.48	58.40	58.55	58.08	58.11	58.11	58.04	57.83	57.90	58.00	56.85	57.98	57.91
Product Thickness -Ft	2.36	2.64	28.13	-1.00			1.00	1.87	1.37	0.88	3.37	4.38	7.50	0.88	3.37	4.00	4.25	0.12	1.75	3.25	2.13	3.75	2.37
PRW #2																							
Product Recovered - Liters					2.75*	1.00*	0.50*	0.50*	1.0*	0.35*	N/A	N/A	2.0	0.10	N/A	N/A	N/A	0.7	N/A	0.7	N/A	0.6	N/A
Depth to Product - Ft			60.20	60.68	60.28		59.90	59.32	59.55	59.52	59.34	59.20	59.11	59.13	59.00	58.96	58.88	58.88	58.89	58.87	58.82	58.85	58.88
Depth to Water - Ft			62.50	61.41	60.67		60.10	59.49	59.75	59.63	59.45	59.32	59.35	59.15	59.04	59.03	58.95	59.02	58.90	58.97	58.93	58.99	58.95
Product Thickness -Ft	2.16	2.37	28.75	9.12	4.88	0.00	2.50	2.13	2.50	1.37	1.37	1.50	3.00	0.25	0.50	0.88	0.88	1.75	0.12	1.25	1.37	1.75	0.88
PRW #3																							
Product Recovered - Liters										1.25	N/A	N/A	N/A	0.35	N/A	N/A	1.25	0.125	N/A	N/A	N/A	0.75	N/A
Depth to Product - Ft							59.48	59.32	59.15	59.03	58.84	58.67	58.58	58.55	58.40	58.34	58.21	58.25	58.21	58.16	58.15	58.14	58.19
Depth to Water - Ft							59.78	59.49	59.26	59.16	58.89	58.75	58.68	58.64	58.45	58.45	58.39	58.26	58.27	58.32	58.21	58.29	58.22
Product Thickness -Ft	0.00	0.02					3.75	2.13	1.37	1.62	0.62	1.00	1.25	1.13	0.63	1.37	2.25	0.12	0.75	2.00	0.75	1.87	0.38
PRW #4																							
Product Recovered - Liters							0.25*	0.30*	0.0*	0.0*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.45
Depth to Product - Ft						57.83	58.81	58.65	58.48	58.44	58.25	58.10	58.04	57.99	57.85	57.82	57.73	57.73	57.70	57.70	57.64	57.66	57.66
Depth to Water - Ft						59.08	59.03	58.82	58.49	58.45	58.26	58.14	58.07	58.02	57.88	57.84	57.75	57.78	57.75	57.76	57.69	57.73	57.79
Product Thickness -Ft	0.00	0.02				15.63	2.75	2.13	0.13	0.13	0.12	0.50	0.38	0.38	0.38	0.25	0.25	0.63	0.62	0.75	0.62	0.88	1.63
PRW #5																							
Product Recovered - Liters																				N/A	N/A	N/A	N/A
Depth to Product- Ft																				56.25	56.2	56.22	56.23
Depth to Water - Ft																				56.25	56.2	56.22	56.23
Product Thickness -Ft																				0.00	0.00	0.00	0.00
PRW #6																							
Product Recovered - Liters																				N/A	N/A	N/A	N/A
Depth to Product - Ft																				58.01	58.01	58.01	58.02
Depth to Water - Ft																				58.01	58.01	58.02	58.03
Product Thickness -Ft																				0.00	0.00	0.13	0.12
PRW #7																							
Product Recovered - Liters																				N/A	N/A	N/A	N/A
Depth to Product- Ft																				57.95	57.93	57.93	57.95
Depth to Water - Ft																				57.95	57.93	57.93	57.95
Product Thickness -Ft																				0.00	0.00	0.00	0.00
PRW #8																							
Product Recovered - Liters																				N/A	N/A	N/A	N/A
Depth to Product - Ft																				57.48	57.47	57.47	57.48
Depth to Water - Ft																				57.48	57.47	57.47	57.48
Product Thickness -Ft																				0.00	0.00	0.00	0.00
781MW #4																							
Product Recovered - Liters							N/A	N/A	N/A	0.05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Depth to Product - Ft							59.27	56.08	56.66	56.95	56.75	56.60	56.54	56.47	56.63	56.33	56.24	56.21	56.17	56.16	56.11	56.13	56.13
Depth to Water - Ft							59.90	56.68	57.51	56.98	56.76	56.61	56.55	56.48	56.63	56.33	56.24	56.21	56.17	56.16	56.11	56.13	56.13
Product Thickness -Ft	1.10	0.94					0.63	0.60	0.85	0.03	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
781MW #6																							
Product Recovered - Liters			N/A		0.00*	0.00*	0.00*	0.00*	NR	0.00*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Depth to Product - Ft			62.62		61.70	61.41		61.04	NR	60.78	61.43	61.29	61.25	61.17	61.07	61.04	NR	60.93	60.92	60.92	60.89	60.91	60.94
Depth to Water - Ft			64.32		61.81	61.43		61.05	NR	60.78	61.43	61.30	61.25	61.17	61.07	61.04	NR	60.93	60.92	60.92	60.89	60.92	60.96
Product Thickness -Ft	1.30	1.56	21.25	0.00	1.37	0.25	0.00	0.12	#VALUE!	0.00	0.00	0.12	0.00	0.00	0.00	0.00	NR	0.00	0.00	0.00	0.00	0.13	0.25
781MW #8																							
Product Recovered - Liters							N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.075	N/A	N/A	N/A	N/A	0.05	N/A
Depth to Product -Ft							55.98	55.82	55.61	55.60	55.47	55.40	55.36	55.40	55.61	55.25	55.18	55.27	55.17	55.16	55.13	55.11	55.15
Depth to Water - Ft							55.98	55.82	55.63	55.63	55.54	55.47	55.46	55.42	55.62	55.27	55.28	55.27	55.17	55.19	55.13	55.34	55.31
Product Thickness -Ft	0.08	0.10					0.00	0.00	0.25	0.38	0.88	0.88	1.25	0.25	0.12	0.25	1.25	0.00	0.00	0.38	0.00	2.88	2.00
781MW #9																							
Product Recovered - Liters							N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Depth to Product - Ft							55.33	55.11	54.88	54.82	54.70	54.65	54.64	54.62	54.88	54.59	54.55	54.60	54.57	54.60	54.57	54.61	54.63
Depth to Water - Ft							55.33	55.11	54.88	54.82	54.70	54.65	54.64	54.62	54.88	54.59	54.55	54.60	54.57	54.60	54.57	54.61	54.63
Product Thickness -Ft	0.02	0.02					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
781MW #13																							
Product Recovered - Liters					0.60*	0.00*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Depth to Product -Ft			58.15	58.41			57.20	57.04	56.84	56.80	56.62	56.50	56.43	56.36	56.59	56.22	56.13	56.13	56.11	56.11	56.05	56.08	56.10
Depth to Water - Ft			60.80	58.75			57.26	57.11	56.91	56.87	56.70	56.56	56.50	56.43	56.65	56.29	56.23	56.24	56.22	56.21	56.15	56.19	56.21
Product Thickness -Ft	2.72	2.59	33.13	4.25	0.00	0.00	0.75	0.88	0.87	0.88	1.00	0.75	0.88	0.88	0.75	0.88	1.25	1.37	1.37	1.25	1.25	1.37	1.37
Product Recovered During Week - Liters	0.00	0.00	0.00							2.65			7.25	0.70			3.825	8.825		0.70	0.00	2.90	1.35
Total Product Recovered - LITERS	0.00	0.00	0.00						440.49	443.14	443.14	443.14	450.39	451.09	451.09	451.09	454.915	455.74	455.74	456.44	456.44	459.34	460.69

Note: Water level measurements for this table are taken relative to top of piping installed for the product recovery and/or biovent systems. These measurements are not taken from the surveyed top of casing.

Note: Product Recovered is for week indicated only

Note: * indicates that recovery skimmer is installed at this well location

** indicates that manual (passive) recovery system has been installed at this well location

NR = No reading taken