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QUALITY PROFESSIONALISM SERVICE

CONSTRUCTION COMPLETION REPORT

FOR THE INTERIM MEASURE

AT

MINMILT REMEDIAL SITE

EAST FARMINGDALE, NEW YORK

NYSDEC SITE NO. 1-52-147

Prepared For: *Minmilt Realty Corp.*

Prepared By: *P.W. Grosser Consulting Engineer & Hydrogeologist, P.C.*

JULY 1997

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MINMILT REALTY
Construction Completion Report

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1.0 INTRODUCTION

This report was prepared by P.W. Grosser Consulting Engineer & Hydrogeologist, P.C. (PWGC) on behalf of Minmilt Realty Corp. The report documents the construction completion of the Interim Remedial Measure (IRM) designed to remediate the soil and groundwater at the Minmilt Realty site (NYSDEC Site No. 1-52-147). The construction completion report includes the following information:

- operation and maintenance manual (separate cover),
- record drawings including changes made to the remedial design (separate cover); and
- certification by a professional engineer that the remedial design was implemented and construction activities were completed in accordance with the NYSDEC approved remedial design.

The report addresses construction of the soil vapor extraction (SVE) and groundwater remedial systems. Construction activities included trenching, excavation, piping, mechanical, electrical, concrete work, air stripper installation, SVE and groundwater well installation. During the construction activities, certain performance standards were required, most of which is mentioned in this report, however, reference to PWGC's *"Specifications for Soil Vapor Extraction and Air Stripper System, March 1996"* should be made for specifications not mentioned in this report. The IRM construction was completed in accordance with PWGC's design specifications as approved by the NYSDEC.

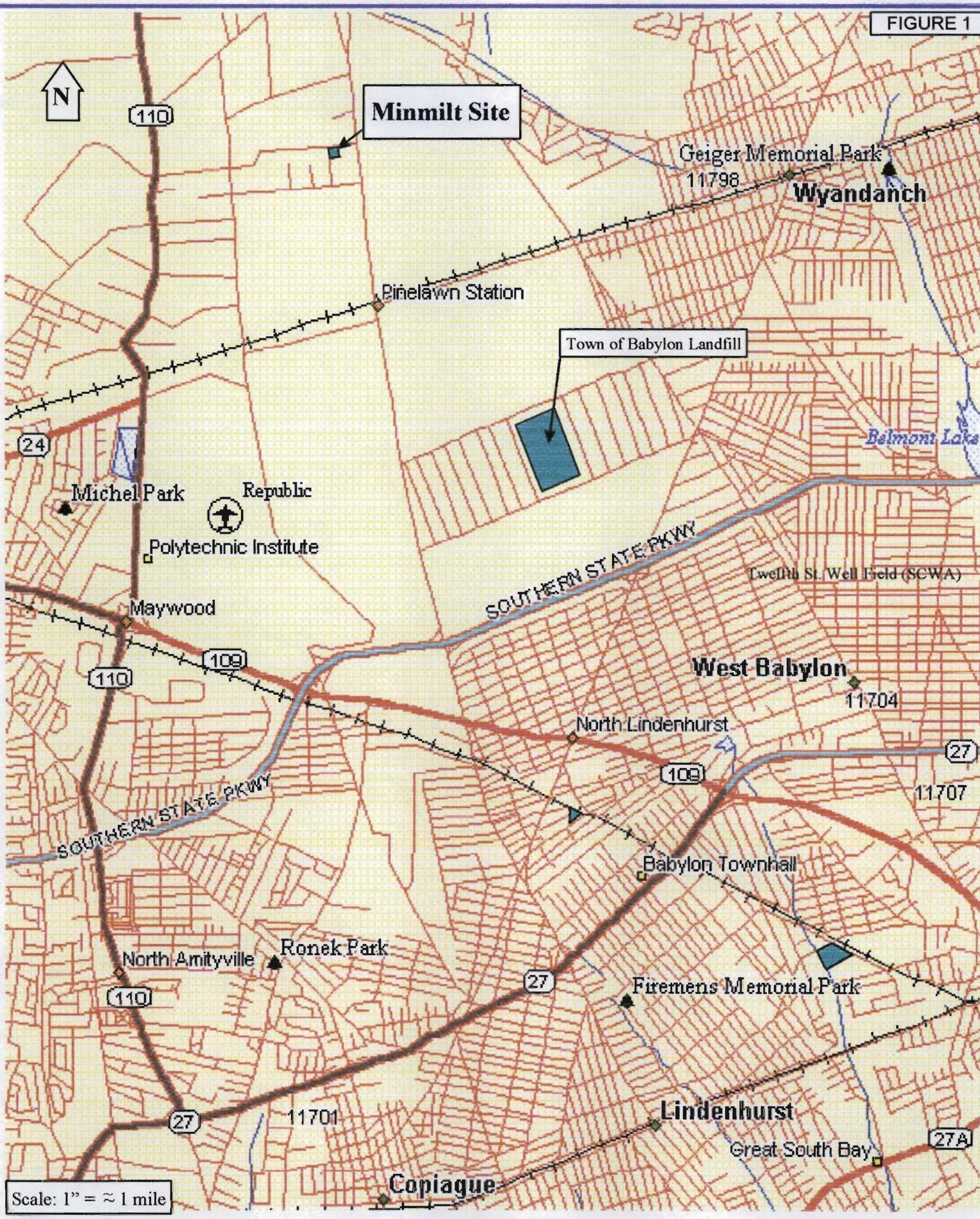
1.1 Site Description

The Minmilt Realty site is located at 540 Smith Street, East Farmingdale, New York. The property is owned by Minmilt Realty Corp. and the building was leased by Hygrade Metal Moulding and is currently vacant. The site lies on the south side of Smith Street, between New Highway and Wellwood Avenue. The location of the Hygrade site is illustrated in Figure 1. The site encompasses 2.28 acres with a single story building of 41,103.6 square feet.

The Minmilt Realty site is bordered on the east by Great Neck Saw, a manufacturer of metal tape measures and on the south by a property formerly occupied by Cantor Brothers, a chemical repacking and handling facility which is on the NYSDEC List of Inactive Hazardous Waste Disposal Sites (Site No. 1-52-021). A remedial investigation is currently being performed at the Cantor Brothers site. Bordering the site to the west is a building occupied by Liedel Corp. which fronts a Town of Babylon recharge basin.

This part of East Farmingdale and lower Melville are predominantly industrial/commercial. There are a number of additional Inactive Hazardous Waste sites, as well as sites under NYSDEC and Suffolk County Department of Health Services (SCDHS) consent orders for environmental clean-ups in the immediate area. Investigations in the immediate vicinity of the site are discussed in the *Investigation Report for Hygrade Metal Moulding Corp., 540 Smith Street Farmingdale, New York*

FIGURE 1



SITE VICINITY MAP
540 Smith Street
East Farmingdale, N.Y.

11735, March 1993, revised January 1994 (Investigation Report) prepared by PWGC.

Further east is Pinelawn National Cemetery and further south is Pinelawn Memorial Park Cemetery. Some of the property north and west of the site is still used for farming. The site's potable water is provided by the East Farmingdale Water District.

1.2 Site History

The Minmilt Realty building was constructed in 1965 for Hygrade Metal Moulding, who has been the only tenant. Prior to 1965, the property was vacant and used for agricultural purposes. Hygrade manufactures metal mouldings from strip metals for use in the construction of windows and other finished products. Prior to 1983, Hygrade used a vapor degreaser to clean metal parts with tetrachloroethylene (PCE). This procedure was terminated in 1983.

The SCDHS issued Minmilt Realty an Order on Consent (No. IW-91-0021) in January, 1992. The Consent Order alleged that Minmilt Realty caused or permitted the discharge of toxic or hazardous material to an on site leaching pool subsequently violating Section 760-1205 of Article 12 of the Suffolk County Sanitary Code. The referenced leaching pool is reported to have received periodic discharges from the vapor degreaser which contained PCE.

In response to the SCDHS Consent Order, a soil and groundwater investigation was conducted by PWGC under subcontract to Middleton, Kontokosta Associates (MKA). The objective of the investigation was to identify on-site contamination and associated source areas resulting from the alleged discharges. The results of the investigation are contained in the *Investigation Report* prepared by PWGC.

The soil and groundwater investigation identified significant soil contamination present in the subsurface on the east side of the building. The contamination is primarily PCE and was detected at concentrations high enough to classify some of the soil material as hazardous. PCE concentrations were found to increase with depth towards the water table. Preliminary calculations estimate approximately 5,500 cubic yards of soil have been impacted.

In addition, PCE was detected in the groundwater beneath the site in excess of acceptable NYSDEC standards. Contaminated soils are suspected to be the primary source of PCE in the groundwater. The PCE plume was determined to extend downgradient to at least the southern property line of Hygrade and vertically to at least 80 feet below grade (40 feet below the water table).

The soil and groundwater investigation also determined that background and upgradient groundwater quality in the vicinity of the Minmilt Realty site was also degraded indicating the presence of other upgradient sources of contamination.

In order to expedite the cleanup of the Minmilt Realty site and minimize further degradation of groundwater quality, an interim remedial measure (IRM) was proposed. The IRM consisted of a soil vapor extraction and groundwater pump and treat combination system to begin removal of the gross contamination. Details of the proposed IRM are contained in PWGC's report entitled *Interim Remedial Measure to be Conducted at the Hygrade Metal Moulding Facility East Farmingdale, New York - An Evaluation of Alternatives and Design, January 1994, revised December 1995 and April 1996 (IRM Report).*

Prior to the approval of the IRM, a remedial investigation was undertaken at the Minmilt Realty site to address the potential existence of other on-site sources; the potential migration of volatile organic vapors into the Minmilt Realty building and adjacent structures; the off-site migration of the dissolved groundwater plume; and the vertical depth of the dissolved groundwater plume. Complete results of this investigation are contained in the *Remedial Investigation Report For Hygrade Metal Moulding Manufacturing Corp., East Farmingdale, New York, October 1995, revised February 1996 (Remedial Investigation Report).*

There were no additional sources of PCE identified by the remedial investigation at the Minmilt Realty site. The vertical extent of the groundwater plume was determined to exist in the Magothy Aquifer to a depth of approximately 185 feet where it is contained by a clay layer. In addition, on-site monitoring well MW-3 was found to contain a mixture of fuel oil and PCE in a non-aqueous state. The findings of the remedial investigation resulted in the approval of the most recent revised (April 1996) *IRM Report* and the subsequent construction of the proposed treatment system which this O&M program addresses.

2.0 SELECTED INTERIM REMEDIAL DESIGN

The IRM consists of an SVE system and a groundwater pump and treat air stripper system to remove contaminants from the soil and groundwater, respectively. Two vapor phase granular activated carbon (GAC) vessels operating in series were installed to capture contaminated air streams resulting from the air stripper off gases and the SVE system. A liquid GAC vessel was installed as a polishing unit for the air stripper tower water effluent prior to discharge to the Town of Babylon recharge basin. This section provides a brief overview of each system. The IRM is described in greater detail in the *IRM Report.*

2.1 Soil Vapor Extraction (SVE) Remedial System

The SVE treatment system consists of two vapor extraction wells set in the source area located on the east side of the building (Figure 2). The contaminated air stream is extracted from the source area and passed through an air/water separator to remove moisture with a vacuum blower. The discharge from the SVE blower combines with the off gas from the air stripper prior to passing through a duct heater. The duct heater reduces the relative humidity of the air stream to less than 50% before it enters the first of two 3,000-pound vapor phase GAC vessels (in series) that remove contaminants prior to discharge to the atmosphere. A process flow diagram detailing the SVE treatment system is depicted in Figure 3.

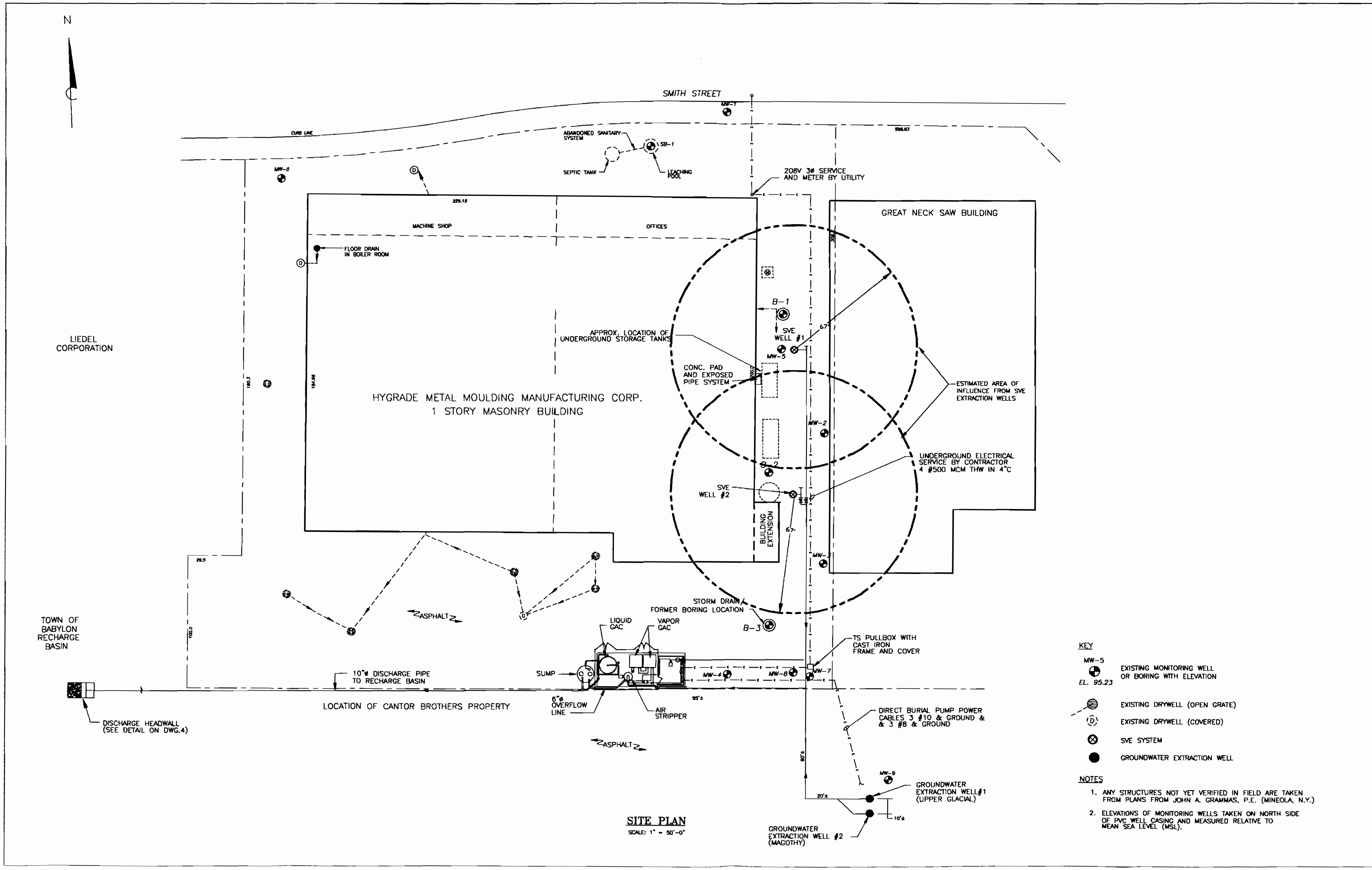


Figure No: 2

Site Plan / Source Area
540 Smith Street
East Farmingdale, N.Y.

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Project No: FIG1-2

Date: 5/9/97

2.2 Groundwater Remedial System

The groundwater remedial system includes two recovery wells. The shallow recovery well is screened in the Upper Glacial Aquifer and the deep recovery well is screened in the Magothy Aquifer. Groundwater extracted from these recovery wells is pumped to the top of a packed column air stripper tower (influent), allowing it to flow downward through the packing media while air is forced upward through the column. The treated water (effluent) then flows by gravity to a sump, and then pumped through a 14,000-pound liquid phase GAC polishing unit. The effluent is then discharged to the Town of Babylon recharge basin located adjacent to the site. A process flow diagram detailing the flow path of the groundwater recovery treatment system is depicted in Figure 3.

2.3 IRM Remedial System Operation

The IRM treatment system was designed for manual start-up and shut-down and for unattended operation once it is running. During normal operation, equipment will run continuously except for the SVE system transfer pump and sump pump which will start and stop based on the liquid level in the moisture separator and sump, respectively.

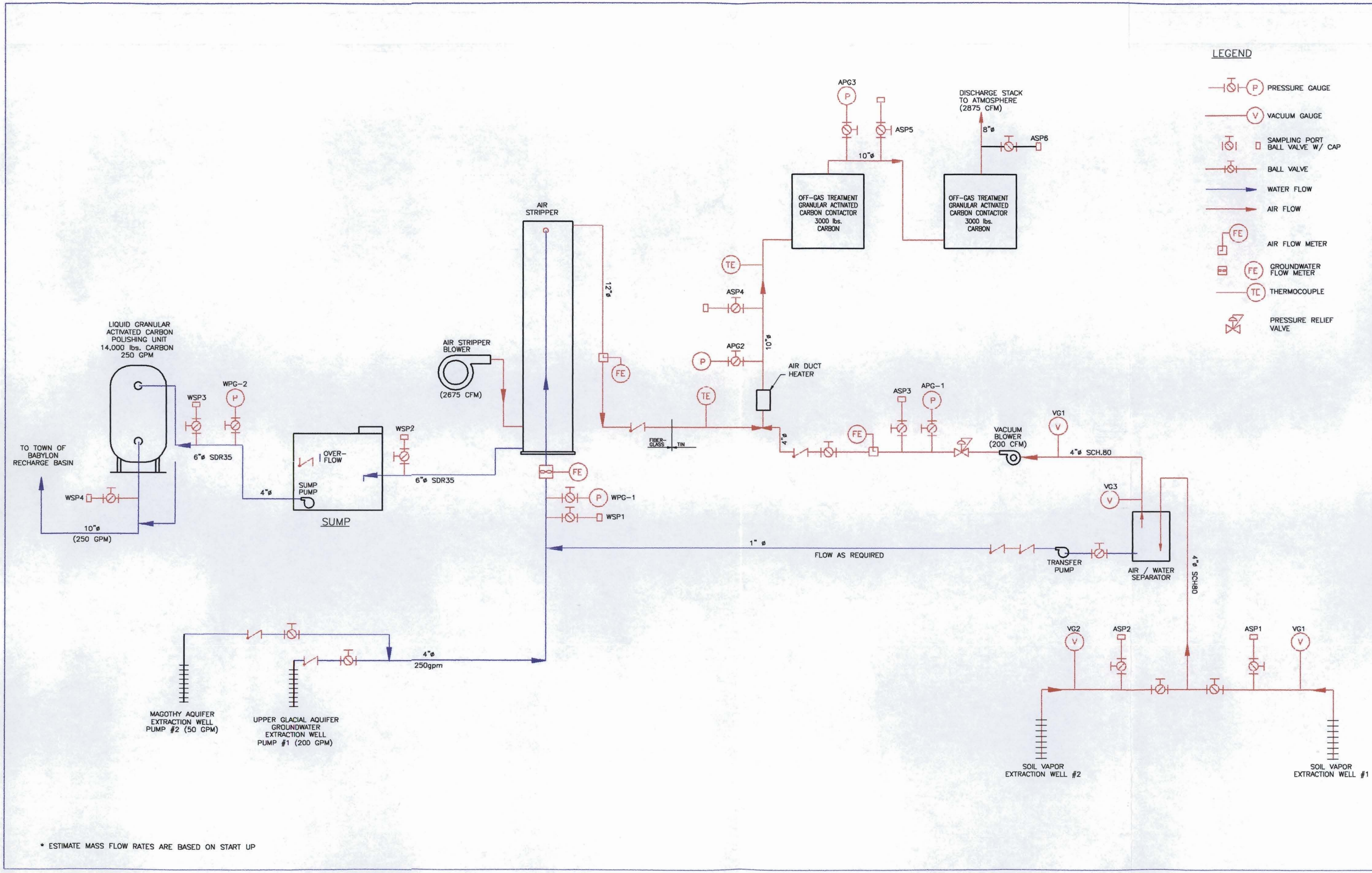
The controls for the system include alarms for motor overloads and high level in the moisture separator and sump. Various interlocks will cause some or all equipment to shut down due to an alarm condition occurring. If an alarm condition occurs, a dial-up telemetering system will call up to four telephone numbers and give a prerecorded alarm message.

Two methods of electrical surge protection were incorporated into the Minmilt IRM treatment system. A lightening rod was installed to ground the fence that encloses the remedial system. The 3/4-inch diameter copper lightening rod was attached to the far west gate post and extends ten feet below ground. The electrical system was also grounded with a 10-foot long, 3/4-inch diameter copper ground rod for surge protection. This ground rod is located to the south of the shed where the electrical service enters the shed.

3.0 CHRONOLOGY OF EVENTS

<u>1996</u>

Aug. 12	**SVE Well Installation**
Aug. 13 - 15	**Concrete Pad Preparation, Formwork & Pouring**
Aug. 13 - 28	**Asphalt Cutting, Trenching, Electrical/Telephone Conduit Installation, SVE/Groundwater Piping & Surveying**
Aug. 22/29	**SVE Well Head & Ball Valve Vaults/Concrete Pad Work**
Aug. 30	**Precast Sump and Electrical Pull Box Installation**
Sept. 3 - 4	**Sump Piping Connections (to air stripper & recharge basin)**
Sept. 5-6	**Excavated Soil Sampling & Disposal**



* ESTIMATE MASS FLOW RATES ARE BASED ON START UP

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Project No: FIG1-3 Date: 5/9/97

Process Flow Diagram

540 Smith Street
East Farmingdale, N.Y.

Figure No: 3

Sept. 6	Building System Installation (Shed)
Sept. 11 - 12	Trenching Inside the Town of Babylon Recharge Basin
Sept. 12	Discharge Headwall Formwork & Concrete Pouring
Sept. 20	Influent Drain Line Installation
Sept. 27 - Oct. 9	Fence Installation
Oct. 7	Air Stripper Installation & Soil Disposal
Oct. 8	Vapor Carbon Unit Installation
Oct. 9	Air Stripper Piping, Sample Port, Flow Meter, Pressure Gauge
Oct. 11	Ballard Installation
Oct. 15	Building System & Electrical Work
Oct. 23 - Nov. 13	Upper Glacial and Magothy Well Installation
Nov. 18	Recovery Well Vault & Pitless Adapter Installation
Nov. 19	Recovery Well Piping, Ball Valves & Check Valves
Nov. 20	Insulation for Piping Duct Work Fiberglass Piping (12" dia off gas)
Nov. 25 - Dec. 2	Upper Glacial Pump, Magothy Pump & Duct Heater Control Panel Installation
Dec. 3	Liquid Carbon Installation, Motor Rotation Checks & Magothy & Upper Glacial Well Development
Dec. 4	Well Development Continued
Dec. 10	Electrical Work with Control Panel & Duct Heater
Dec. 11 - 12	Paving, Site Restoration & Telephone Installation
Dec. 16 - 17	Baseline Groundwater Sampling & Electrical Work
1997	
Jan. 22	Backwash Liquid Carbon Unit and Program Duct Heater
Jan. 23	Pump Out of MW-3 & Electrical Work
Jan. 31	Electrical & Duct Work
Feb. 1	Electrical Work
Feb. 5	Backwash the Liquid Carbon Unit
Feb. 11	System Start Up - Baseline Recovery Well Groundwater Remedial System Sampling

4.0 CONSTRUCTION QUALITY CONTROL

4.1 Shop Drawings

Prior to shipping and installation of equipment, the Contractor was required to submit shop drawings from equipment manufacturers for approval in accordance with the project specifications. Shop drawings included fabrication and detailed installation drawings, equipment dimension drawings, and performance data. Shop drawings were revised for conformance with the contract documents.

Equipment or materials were not fabricated or shipped to the project site until shop drawings were approved.

4.2 Site Construction Observation

Throughout the construction phase, an engineer from PWGC provided on-site construction observation for most of the construction activities. The purpose of the on-site observation was to verify that delivered equipment matched approved shop drawing submittals, verify that construction was in conformance with contract documents including approved modifications, observe on-site testing, respond to Contractors questions and to assist in start-up and operation of the system.

4.3 Subsurface Installations

The SVE piping underwent air pressure tests that was performed in sections. The first section to be pressure tested was from SVE #1 to SVE #2. The contractor used an air compressor to raise the pressure in the pipe to 4.5 psi and it was bled off to 4 psi. The pressure test was run for one hour. At first, the pressure test mechanism leaked, however once the leak was repaired, the piping passed the test. Next, the piping from SVE #2 to the southeast corner of the property was pressure tested for half an hour and passed. Thrust blocks were placed at the 90 degree elbows and covered with concrete for added support.

The groundwater piping underwent a hydrostatic pressure test at 100 psi for two hours. The pressure remained within 3 psi of the original gauge reading and was therefore accepted. Once the groundwater piping passed the pressure test, the pipe was buried with sand and the SVE piping was laid in the sand above the groundwater piping, pressure tested, and passed. The groundwater piping that was run from the southeast corner to the well locations was pressure tested and passed on August 27, 1996.

The slope on the SVE and groundwater discharge piping was a minimum of one degree. The slope was verified with a level surveying instrument.

The precast sump and recovery well vaults were installed into level pits as verified with a level surveying instrument. The sump was checked for its ability to hold water, and showed no signs of leakage.

4.4 Concrete Work

Portland Cement was used throughout the project. An independent laboratory was used to perform the strength, slump and air content tests for the concrete pad. The concrete was designed for an fc of 3000 psi. Four cylinders were cast with the concrete supplied to form the concrete pad. Two cylinders were tested at 7 days and the other two cylinders were tested at 21 days. The strength tests were performed in accordance with "Method of Sampling Fresh Concrete" (ASTM C172). The cylinders were molded and laboratory cured in accordance with "Method of Making and Curing

Concrete Test Specimens in the Field" (ASTM C31) and tested in accordance with "Method of Test for Comprehensive Strength of Cylindrical Concrete Specimens" (ASTM C39). The air test result was 5.2% and the specifications called for 4.5 - 7.5% which was acceptable. The concrete passed the strength, air content and slump tests. The first slump test result was 2.5 inches which was within the design specifications of 2 to 3 inches. Universal labs performed a second slump test on site which resulted in a 5-1/4 inch slump which was only 1/4 inch higher than the design specifications of 3 - 5 inch slump, therefore, it was accepted.

4.5 Mechanical Work

The direction of rotation was checked on the air stripper blower, SVE blower, transfer pump, well pumps and sump pump. The pressure gauges were checked for failures upon system startup. The flow totalizer seized after a few weeks of operation, and was replaced.

4.6 Electrical Work

Some of the standards called out in the specifications included: National Electrical Code; Life Safety Code; New York State Energy Code; New York State Building Code; Applicable New York State Administrative Code (current editions).

The materials and equipment used on the site were specified to be new and have UL listing. The electrical work was performed by a licensed electrician. The pull box located at the southeast corner was rated for H20 loading. The electrical system was protected with a ten foot long lightening arrester located beneath the ground where the electrical supply enters the shed.

5.0 CONSTRUCTION ACTIVITIES

5.1 Trenching and Piping

The total length of trenches that were excavated for the remedial system was approximately 775 feet. The excavated soils were stockpiled next to the trenches to be used for backfill material later. The piping laid in the trenches was protected with a sand bedding material to avoid possible punctures with rocks or other debris. Since bedding material was used, the previously excavated soils were in excess after backfilling the trenches. The excess soils were stockpiled at the rear of the site until they were properly disposed of.

5.1.1 Electrical Supply Conduit

The 500 MCM electrical cable was run in sch 80 PVC conduit from the telephone pole where the electrical meter was mounted to the shed located at the south end of the site. The conduit was laid in a bed of sand above the SVE piping, in the same trench. This conduit was glued together since it was not carrying fluids or vapor for the remedial system. One inch diameter sch 80 telephone conduit was laid at the same depth and in the same trench as the electrical conduit, with sand separating the two.

5.1.2 Soil Vapor Extraction Piping

Four inch diameter sch 80 PVC piping was used for the SVE system. The pipe running from SVE #1 to SVE # 2 was sloped toward SVE #2 to allow condensation and water in the pipe to drain into SVE #2. Creating the pitch will avoid water entrapment and freezing in the winter months. The depths at SVE #1 and #2 were three feet and four feet respectively. At the southeast corner of the property, the piping was laid at 3.5 feet deep. The SVE piping underwent air pressure tests as described earlier. The SVE piping was laid in a bed of sand, and covered with sand prior to backfilling with the original soils extracted to form the trench.

5.1.3 Groundwater Piping

Four inch diameter sch 80 PVC piping was used for the groundwater remedial system. Harco brand push on fittings were used instead of threaded piping, however, the bends were required to be restrained with thrust blocks and concrete. The recovery well lines were manifolded together to a single line with a ductile iron "wye" connection. The connection was made after the well ball valves were installed. On August 25, 1996, the groundwater piping was laid from the southeast corner of the property to the concrete pad. Prior to backfilling the trenches, the piping underwent a hydrostatic pressure test at 100 psi as described earlier. Thrust blocks were placed at the 90 degree angles and concrete was poured on top of the elbows for added strength.

A drain was installed for the influent recovery well groundwater line that leads to the top of the air stripper tower to avoid pipe freezing in the winter months if shut-down is required. The drain line was installed four feet below grade and a "T" bar extension was provided to open and close the drain valve. Stones were placed beneath the drain spigot for seepage purposes. The drain valve can be accessed through a small plastic valve pit cover located within the fenced in remedial system area next to the shed.

The 10 inch diameter SDR35 sewer piping that was laid from the concrete pad to the recharge basin was not pressure tested for two reasons. First, the water in the piping would be treated water and secondly, the water flow was by gravity and not under pressure. The piping was sloped at 1/8 inch per foot of piping. Trenching of this stretch of piping began on August 28 and was completed on September 13, 1997 with the installation of the concrete head wall formation inside the Town of Babylon Recharge Basin.

5.1.4 Tin Duct Work

The air duct between the air stripper blower and the air stripper tower was constructed of tin. In addition, the 12 inch diameter fiberglass off-gas pipe from the air stripper was flanged to tin duct work at the check valve. The transition to tin enabled the duct heater to be housed in a square section of tin piping. The piping leading into and in between the vapor phase carbon vessels were made of duct. The stack exiting the secondary vapor phase carbon unit and the rain cap were also constructed of duct.

5.1.5 Trenching in the recharge basin

A "wye" connector located near the sump, was used to manifold the effluent lines from the sump overflow and liquid carbon vessel. The effluent side of the "wye" was ten inch diameter SDR35 pipe that led to the recharge basin. The Town of Babylon recharge basin located to the west of the site was enclosed with a fence. The southeast section of the fence was temporarily dismantled to provide access for the backhoe which excavated a trench to hold the ten inch diameter discharge line. A head wall was constructed around the discharge pipe and rip rap was placed at the outfall. The 3000 psi concrete head wall was three feet wide five feet tall and three feet deep.

5.2 Concrete Work

Portland Cement was used throughout the site. On August 13, 1996, a portion of the parking lot was cut away (41'-8" by 15'-8") and removed to allow for the concrete slab to be formed and poured. On the following day, the contractor laid out two layers of rebar six inches on center. The concrete slab was poured on August 15, 1996. The qualifications and tests performed on the concrete slab are detailed in section 4.2 "Concrete Work".

5.2.1 Precast Sump

The precast sump was delivered to the site in three pieces. The bottom portion was eight feet in diameter, six feet tall. The middle portion was 2 feet tall with the same diameter of eight feet. The sump top had two precut twenty-four inch diameter holes to allow for access. A rubber gasket was placed in between the top and bottom portions to form a seal. The bottom section of the sump had three precut holes for the overflow pipe, air stripper effluent pipe, and liquid carbon influent pipe. The pipe holes had rubber boots to seal the water and were made to order at specific locations. The sump was installed in the parking lot area to the west of the remedial system fence. Originally, the sump was to be placed to the north of the remedial system, however, because of the heavy truck traffic in the parking lot, it was moved to the east side. The sump relocation did not effect the system performance.

The six inch diameter SDR35 effluent line from the air stripper tower discharges into the sump. The sump effluent line leading to the liquid carbon polishing unit is four inch diameter sch 80 PVC. An overflow line exists towards the top of the sump and leads to the "wye" fitting that is connected to the ten inch diameter SDR35 PVC pipe that leads to the recharge basin. A three horsepower submersible pump was placed in the bottom of the sump to pump the water to the liquid carbon polishing unit.

5.2.2 Precast Recovery Well Vaults

Two six foot deep pits were excavated to hold the recovery well vaults. The bottom of the pits were leveled with a surveying instrument prior to placing the vaults down. Each vault came in two pieces which were sealed with silicon upon installation. Holes were prefabricated in the side and bottom of each vault for the groundwater recovery well piping.

5.2.3 Miscellaneous Concrete Work

Additional concrete work was performed around the SVE well and ball valve vaults and at the headwall for the discharge piping into the recharge basin. This concrete was delivered to the site premixed for a pressure load rating of 3000 psi. Tests such as cylinder, air content and slump were not performed on this concrete. The concrete that was used on the 90 degree elbows for the SVE and groundwater piping was hand mixed.

5.3 Soil Disposal

During the trenching activities, the piping was laid in a bed of sand for protection. As a result, when the trenches were backfilled, excess soils remained. These soils were stockpiled along with the excavated soils resulting from the precast recovery well vault and concrete sump installations. The stockpiled soils at the site were analyzed for disposal purposes. The analytical results indicated that the soil samples were non hazardous. Two tractor trailer loads of soils were removed from the site on September 6, 1996. Additional soils were loaded onto two tractor trailers and disposed of on October 7, 1997.

5.4 Soil Vapor Extraction System

The soil vapor extraction system consists of two extraction wells, a 5 Hp blower, a 0.5 Hp transfer pump, an air/water separator and an air filter. At the effluent side of the blower, a pressure relief valve, sampling port, u-meter and ball valve were installed in the four inch diameter piping. These parts were installed inside the shed for weather protection. The check valve was installed after the ball valve, outside the shed.

When the air filter was installed, two inch piping was used on the influent and effluent sides. It was noticed upon start-up, that the amount of vacuum designed (200 cfm) was not achievable due to the two inch piping. When the manufacturer of the blower/air water separator/air filter was contacted, they indicated that large losses were incurred because of the piping size. They recommended that the air filter be removed, and four inch piping be installed directly from the air/water separator to the blower. Once this change was made, the air flow rate increased from 135 cfm to 280 cfm.

5.4.1 Soil Vapor Extraction Wells

On August 12, 1996, the northern soil vapor extraction well was installed on the east side of the Hygrade Metal Moulding facility. The northern well was planned to be installed 83 feet south and 21 feet east of the northeast corner of the building, however upon drilling, refusal was encountered (concrete obstruction) and the northern well was installed one foot towards the north. Therefore, the northern SVE well was installed 82 feet south and 21 feet east of the northeast corner of the building. The wells were constructed according to the design specifications: 4 inch diameter schedule 40 PVC pipe; gravel: Morie CO. Filtration media #2 well gravel; grout consisted of 96 pounds of cement, 6 bags of bentonite and 6 gallons of water; 15 feet of #20 slotted screen, 20 feet of casing and 1 foot cap; 18 feet of gravel, 2 feet of bentonite pellets, 15 feet grout.

5.4.2 Soil Vapor Extraction Well Head and Ball Valve Vaults

The SVE well head vaults were constructed of 10 inch diameter PVC pipe and the ball valve vaults were constructed of 12 inch diameter SDR35 PVC pipe. The vaults were surrounded with six inch wide, 3000 psi concrete. Sand was placed in between the PVC vault pipe and the well heads. The concrete slab dimensions was six feet by five feet and was built with wire mesh for added strength.

A minor change to the original design was to increase the size of the SVE manhole covers and associated ball valve covers from 8 inches to 12 and 16 inches respectively. This change in design allowed easier access to the ball valves and SVE well heads and did not alter the performance of the remedial system.

5.5 Air Stripper System

The air stripper was delivered to the site and installed on October 7, 1997. It was prefabricated of fiberglass material. The tower was placed on a two inch concrete slurry so that the tower bottom flange bolts would not rest directly on the curred concrete pad area. The tower was delivered with 2/3 of the packing media already installed. The specification called out 3.5 inch diameter Jaegger Tri-packs, however, 2 inch diameter Lantec packing media was approved as an equal. The contractor submitted removal efficiency models using the Latec packing media which showed better removal efficiency rates than the Jaegger Tri-Packs. The air stripper tower was secured with eight guy wires which were attached to anchors in the concrete slab, gate posts, and line posts. The air stripper off gas piping was constructed of fiberglass instead of PVC piping due to the weight differences.

The air stripper was fastened to the fence gate posts and concrete pad anchor bolts with guy wire. A total of eight guy wires were used, however, two were removed to provide adequate room on the concrete pad for the vapor phase carbon vessels.

5.5.1 Recovery Well Installation

The recovery wells were installed at the design locations using cable tool method to minimize the amount of water use. The ten inch diameter Upper Glacial well installation began on October 23, 1996. The Upper Glacial well is 100 feet deep, with 60 feet of stainless steel no. 20 slot screen. The six inch diameter Magothy well installation began on October 28, 1996. The Magothy well is 175 feet deep with 60 feet of no. 10 slot stainless steel screen.

5.6 Mechanical Work and Miscellaneous Items

5.6.1 Air Stripper Blower

The 25 Hp air stripper blower was installed on a concrete pad that was formed on the concrete base slab. The blower was placed on the concrete pad so that it would line up with the opening to the air stripper tower. The air stripper blower requires periodic maintenance including lubrication with a grease gun.

5.6.2 Soil Vapor Extraction Blower and Transfer Pump

The five horsepower blower for the SVE system was installed along with the transfer pump and air/water separator. These items were installed inside the shed where they would be protected from weather elements. The blower and transfer pumps were installed with unions on either side for ease of repair and/or replacement if required.

The purpose of the centrifugal transfer pump is to pump the water from the air/water separator into the recovery well influent line and up to the top of the air stripper tower. Two check valves were installed in the one inch diameter transfer pump effluent line prior to connection with the four inch diameter recovery well influent line. Float switches were installed in the air/water separator to control the transfer pump and the SVE blower. The middle float switch was installed below the air influent line to signal the transfer pump to turn on. The bottom float switch was installed above the water effluent line to turn the transfer pump off. This float switch was located above the effluent line to keep the transfer pump primed and maintain a water seal in the air/water separator. The purpose of the top float switch is to turn the blower off to prevent water from entering the blower in the event that the air water separator fails to drain.

5.6.3 Recovery Well Pumps and Motors

The recovery well pumps installed were 2 Hp, 60 gpm and 7.5 Hp, 225 gpm Grundfos submersible pumps for the Magothy and Upper Glacial wells respectively. The motors selected were manufactured by Franklin. A six inch diameter MAASS pitless adapter was installed for the Magothy well as an approved equal to the Baker brand. Likewise, a ten inch diameter MAASS pitless adapter was installed for the Upper Glacial well. The specification called for an eight inch diameter pitless adapter for the Upper Glacial, however, a ten inch pitless was installed.

5.6.4 Pressure Gauges, Sampling Ports

Pressure gauges and sampling ports were installed at the design locations. Some of the sampling ports were changed from one inch diameter to 1/4 inch diameter to allow for more accurate flow control. The one sampling port that remained as one inch diameter was the tower effluent sampling port. The sampling ports at the influent and effluent side of the liquid carbon unit were provided by the carbon unit manufacturer. These sampling ports were made of poly-plastic tubing material with ball valves to control the flow.

5.6.5 Building Structure

The prefabricated shed was delivered to the site on September 6, 1996 and anchor bolted to the concrete slab. The shed was placed on the east end of the concrete slab with the double doors and windows facing the west. The shed dimensions were ten feet by fourteen feet long. The shed was installed to house the SVE blower, air/water separator, u-meters, electrical distribution panel, control panel and duct heater control panel. The building was insulated and provided with a fresh air vent, fan, receptacles, lights and telephone.

5.6.6 Fence Installation

The fence was installed to provide security protection for the equipment installed above grade and to control access to the system. The top of the fence perimeter was lined with three rows of barbed wire. The gate posts were placed in eighteen inch diameter footings and the line posts were placed in ten inch diameter footings. The footings for the corner posts were forty-two inches deep and the remaining posts were thirty-six inches deep. A ten foot lightening rod was attached to the northwest gate post and depressed into the ground.

5.6.7 Vapor Carbon Units

The two Calgon VF-3000 vapor carbon units were delivered to the site on October 8, 1996. The vessels were connected in series and pressure gauges were installed in line at the primary unit influent and the effluent. Initially during system start-up, the primary carbon influent pressure gauge which was a scale of 0 to 30 inches of water, was maxed out. However, after the first carbon change-out, the pressure gauge dropped back into range around 25 inches of water. Most likely, the cause for the initial high pressure gauge readings was due to the carbon settling during transportation to the site. After the second carbon change out, the pressure gauge still read around 25 inches of water.

5.6.8 Liquid Carbon Vessel

The liquid carbon polishing unit was delivered to the site by Calgon Corporation on December 3, 1997. The contractor placed the unit on line with the remedial system by attaching four inch diameter flexible hoses to the influent and effluent lines and securing them in place with kamlock connectors. On the system start-up day, a great deal of pressure losses were noticed at the influent side of the liquid carbon vessel, which were not typical according to the manufacturer performance curves. The manufacturer recommended to backwash the vessel to remove fine carbon particles that may be present and to fluidize the bed. An attempt was made to backwash the system by reversing the flexible hoses at the influent and effluent ends, but pressure problems were still encountered. It was finally determined that the effluent check valve supplied with the vessel was defective in that it could not be fully opened and therefore, required replacement. A Calgon Carbon representative replaced the defective check valve.

5.6.9 Insulation

Exterior air piping was insulated and the 1.5 inch thick insulation was protected with weatherproof PVC jacketing. Piping that was insulated included: from the twelve inch diameter air stripper discharge to the duct heater; the duct heater and transition duct; from the duct heater to the primary vapor phase carbon unit; and from the primary to the secondary vapor phase carbon unit. The insulation manufacturer was Knauf.

5.7 Electrical Installation

The electrical power was supplied to the property by LILCO. The electrical work was performed by a licensed electrician and included: electrical services; secondary wiring and distribution system; lighting and receptacles; wiring and control devices; electrical control systems and interlock wiring and coordination with the local utility company. The parts that were installed were checked by the inspector.

5.7.1 Control System

The control system was manufactured by a control systems manufacturer. A representative was on site during system start-up to make minor adjustments to the controls. The transformer that was provided with the control system was not correct and was promptly replaced. A series of system checks were performed to determine whether the specified interlocks were operating properly. Performance checks included; motor overload alarms for the blowers and pumps; system malfunctions including high level alarms, no air flow, etc.

5.7.2 Duct Heater Control Panel

When the duct heater first arrived on site, it had to be returned to the distributer because the power supply was not correct. Upon returning to the site, the duct heater was programed for the required change in temperature by the distributer representative who also checked the unit for failures. It was realized that the thermo couple wiring for the duct heater was reversed and was corrected. The duct heater control panel was installed by the electrician but programmed by the manufacturer. The electrician also installed the main control panel, but the manufacturer was on site for the system start-up to make some minor adjustments.

5.7.3 Telephone Auto-dialer

The original auto-dialer was ordered by the company that designed the control panel. Upon installation, an attempt was made to program the auto-dialer. The auto-dialer was not responding according to the specifications, and a different model auto-dialer was ordered and installed. The new auto-dialer was installed and system malfunctions were mimicked to check the auto-dialer's response. Two different responses were programmed into the auto-dialer (1) motor overload and (2) system malfunction. Upon implementing either of the two failures, the auto-dialer calls four different telephone numbers three times each and repeats the appropriate the message.

6.0 NYSDEC INSPECTION

The NYSDEC visited the site on several occasions during the remedial system construction. Mr. Steve Sharf, P.E. visited the site periodically during the initial few days because of concurrent work that was performed at the Cantor Brothers Site. Mr. Steve Sharf, P.E. visited on two occasions in November; on the 19th alone and on the 30th with Mr. John Grathwol.

The final inspection was performed by Mr. John Grathwol of the NYSDEC Bureau of Construction Services. The system was operating for a week when his inspection took place. Mr. Robert C. Knizek, P.E. reported some minor comments (based upon Mr. John Grathwol's inspection) in his April 9, 1997 system approval correspondence which were addressed. The comments did not prevent the issuance of 100% construction completion recognition by Mr. Steve Sharf, P.E. of the NYSDEC in his May 7, 1997 correspondence.

7.0 OPERATION AND MAINTENANCE

The operation and maintenance plan was approved by the NYSDEC in correspondence dated May 7, 1997 entitled "*Operations and Maintenance Program for the Interim Measure revised 1997*". The operation and maintenance manual provided by the contractor was submitted with the record drawings under separate cover.