NATIONAL HEATSET PRINTING SITE
EAST FARMINGDALE, SUFFOLK COUNTY, NY

Revised Remedial Action Work Plan

Work Assignment Number:
Contract No. D005539
NYSDEC Site #1-52-140
In-Well Stripping System Installation

Prepared For:

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A tyco INTERNATIONAL LTD. COMPANY

LIST OF ACRONYMS

µg/Kg ..... microgram per kilogram
µg/L ..... microgram per liter
µg/m^3 ..... micrograms per cubic meter
ACI ..... American Concrete Institute
ACFM .....Actual Cubic Feet per Minute
ASTM .....American Society for Testing and Materials
AST .....Aboveground Storage Tank
AT .....Acceptance Testing
bgs .....Below ground surface
BETX .....Benzene, toluene, ethylbenzene, and xylenes
CAMP .....Community Air Monitoring Plan
CERCLA .....Comprehensive Environmental Response, Compensation and Liability Act
CFR .....Code of Federal Regulations
COCs .....Contaminants of Concern
CQC .....Contractor Quality Control
CFR .....Code of Federal Regulations
CWA .....Clean Water Act
DDC .....Density Driven Convection
DOT .....Department of Transportation
EPA.....Environmental Protection Agency
FS .....Feasibility Study
FRP.....Fiberglass Reinforced Plastic
FSP.....Field Sampling Plan
gpm.....gallons per minute
GTS .....Groundwater Treatment System
HDPE.....High Density Polyethylene
HASP .....Health & Safety Plan
ICFM .....Inlet Cubic Feet per Minute
NFPA .....National Fire Protection Association
NCP .....National Contingency Plan
NPDES .....National Pollutant Discharge Elimination System
NYSDEC.....New York State Department of Environmental Conservation

NYSDOH .....New York State Department of Health
OSHA.....Occupational Safety and Health Act
PCE .....Tetrachloroethylene
PE.....Professional Engineer
P&ID .....Piping and Instrumentation Diagram
ppm.....parts per million
PM .....Program Manager
PPE.....Personal Protective Equipment
QA/QC .....Quality Assurance/Quality Control
QAPP.....Quality Assurance Project Plan
RCRA.....Resource Conservation and Recovery Act
RD.....Remedial Design
RI/FS.....Remedial Investigation/Feasibility Study
ROD.....Record of Decision
SAP.....Sampling & Analysis Plan
SARA .....Superfund Amendments and Reauthorization Act
SCDHS .....Suffolk County Department of Health Services
SCFM.....Standard Cubic Feet per Minute
SCWA .....Suffolk County Water Authority
SOP .....Standard Operating Procedure
SOW .....Statement of Work
SPDES.....State Pollution Discharge Elimination System
TCA.....1,1,1-trichloroethane
TCE.....Trichloroethylene
UFPO.....Underground Facilities Protection Organization
USEPA.....United States Environmental Protection Agency
UL .....Underwriters Laboratories
VOCs .....Volatile Organic Compounds

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1.0 INTRODUCTION

This Project Work Plan (PWP) represents the proposed approach to construct an in-well stripping groundwater treatment system on-site and off-site using Density-Driven Convection (DDC) at the National Heatset Printing Site located at One Adams Boulevard in the Hamlet of East Farmingdale, Town of Babylon, Suffolk County. This work will be performed in accordance with the Bid Specification Contract No. D005539.

The following plans have been developed for this work plan and are considered complimentary components to this Work Plan:

- Health & Safety Plan, Dated March 2006;
- Sampling & Analysis Plan;
- Quality Control/ Quality Assurance Plan;
- Waste Management Plan;
- Stormwater Management Plan;
- Excavation Plan;
- Soil Erosion and Sediment Control Plan; and,
- Dust Control Plan.

1.1 Summary of Work

The work consists of furnishing all labor, materials, supervision, equipment, and services necessary to complete the scope of work detailed in the Specifications, Contract Drawings and documents. The work for the In-Well Stripping System includes, but is not limited to:

- Conduct Pilot Test and report results and recommendations;
- Install air purifying equipment to meet air discharge standards, if necessary, during pilot test;
- Supply, fabricate and install 16 in-well stripping wells; 4 on-site and 12 off-site;
- Supply, fabricate and install the necessary above ground treatment equipment;
- Furnish above ground equipment in enclosures or containers that shall be portable;
- Test and startup in well stripping systems on-site and off-site locations;
- O&M the on-site and off-site in-well stripping systems for a period of 360 days following start-up.

1.2 Pilot Test Results

Earth Tech along with Wasatch Environmental, the patent holder on the Density Driven Convection (DDC) in-well stripping technology, completed a DDC pilot test at the site in 2006. The purpose of the pilot test was to demonstrate the effectiveness of the in-well stripping as a viable remedial technology at this property. During the pilot study, Earth Tech/Wasatch installed and operated one DDC well (DDC-1) to demonstrate that the well system will meet the site performance standards and criteria as supported by the collection and laboratory analysis of groundwater samples and the measurement of field operational parameters. Figure 1 shows the location of the pilot test well DDC-1.

The final Pilot Study Report prepared by Earth Tech and Wasatch was submitted to NYSDEC on May 15, 2007. The report concluded that the results of the pilot test demonstrated achievement of the testing performance requirements as follows:

- **Horizontal Radius of Influence:** The pilot test demonstrated the DDC test well has a cross gradient horizontal radius of capture of at least 65 feet based on the tracer study and likely more than 80 feet based on the transducer study;
- **Vertical Recirculation:** The DDC test well recirculates groundwater from the top to the bottom of the aquifer, based on bromide tracer results;
- **In-Well Stripping:** In-well stripping of VOCs entering the DDC well can be achieved based on calculations using site operational parameters and Henry's Law constant, as the presence of permanganate precluded measurement of this criteria with pilot test groundwater monitoring data;
- **Vapor Treatment:** GAC treatment of off-gas from the DDC well meets emission criteria;
- **Groundwater Treatment:** The ability to remove VOCs through the combination of the capture radius, vertical recirculation, and in-well stripping criteria described above, demonstrate that the DDC system will effectively reduce chlorinated VOC concentrations in the recirculation cell with time. Given the presence of permanganate it was not possible to make this demonstration directly with groundwater analytical data during the course of the pilot test.
- **Well Fouling:** Potential well fouling can be controlled; and,
- **Aquifer Impacts:** The DDC system does not cause impacts to surrounding facilities, structures, or hydrogeologic units nor cause transmission of vapors through the vadose zone.

1.3 Project Work Plan Organization

This Project Work Plan (PWP) identifies the functional and technical requirements of the project, and includes; procedures for specific remedial action work items, figures, additional plans, contact information, and disposal facility and transporter information. The information regarding the National Heatset Printing Site PWP is organized as follows:

- Section 1.0: Introduction, summary of work, pilot test results, and project organization;
- Section 2.0: Site Background and Description (site location, site description, and site history);
- Section 3.0: Project Work Plan (Mobilization, Facilities, Site Preparation, Specific Work Items, Excavation, Backfill, Restoration)
- Section 4.0: Transportation and Disposal Plan
- Section 5.0: Dust Control Plan
- Section 6.0 Air Monitoring Plan
- Section 7.0: System Operation and Maintenance
- Section 8.0: Project Schedule
- Figures
- Appendices (Supplemental Information)

1.4 Project Organization

The Remedial Action for the National Heatset Printing Site will be completed by a team comprised of several organizations and agencies including; NYSDEC, Engineer, Earth Tech and Wasatch Environmental. Earth Tech and Wasatch will be responsible for the execution of the remedial action including; all design, drilling, equipment installation, excavation, transportation, disposal, restoration activities, and operation and maintenance at the Site. Earth Tech has selected a project team to efficiently complete the Remedial Action. Key personnel and their assigned responsibilities for implementation of the remedial action include:

- Earth Tech Project Manager - Mr. Keith Decker will act as the Project Manager and has over 16 years of hands-on construction management experience involving public and private sector projects. As an Earth Tech Project Director, he is responsible for the overall project, including personnel and subcontractor staffing and/or procurement, health and safety requirements, materials and equipment procurement, cost and schedule control, client liaison, summary of work, pilot test requirements, and project organization;
- Earth Tech Hydrogeologist – Mr. Walter Howard will serve as the site hydrogeologist and task manager for the drilling and pilot study operations. Mr. Howard has over 20 years experience in the environmental field. Mr. Howard will work with Wasatch Environmental and the driller(s) during the installation of the DDC, monitoring wells and the piezometers associated with the treatment system.
- Earth Tech Site Superintendent – The site superintendent will be on-site and will manage the site personnel and will be responsible for executing the construction activities on-site. The site superintendent will maintain communications with the Project Manager to insure enough resources are available to complete the project in the required time frame.
- Health and Safety Officer – The HSO will be on-site every day executing the site safety and air monitoring program. The Health and Safety Officer will report to Mr. Robert Poll, CIH and will consult with him on field activities and documentation.
- Wasatch Project Manager / Engineer – Les Pennington will be the project manager and be the primary individual providing all of the technical documentation and engineering support for the system design, construction and performance.

2.0 SITE BACKGROUND AND DESCRIPTION

The site contains one multi-tenant industrial building approximately 4.5 acres in size. The National Heatset Printing Company occupied a portion of this building from July 1983 until April 1989. Their operations consisted of lithographic tri-color printing of newspaper and periodical advertisements and the manufacturing of lithographic printing plates. National Heatset had been using organic solvents at the site since 1983. Inspections by the Suffolk County Department of Health Services (SCDHS) in 1983 and 1986 reported improper storage and discharge of waste materials.

The National Heatset Printing Company filed for bankruptcy in 1987. The SCDHS discovered that after filing for bankruptcy, National Heatset disposed of its chemicals inventory by dumping the materials onto the soils and into a leaching pool located off the rear of the building on the northeast side of the property.

Investigations conducted on the SCDHS and the property owner's consultant reported the presence of on-site subsurface soil contamination and on-site and downgradient groundwater contamination. The contaminants identified consisted of volatile organic compounds, principally Tetrachloroethylene (PCE). The site was listed in the Registry as a Class 2 in 1993.

A RI was performed by Holzmacher, McLendon & Murrell, P.C. for the NYSDEC from August 1997 to January 1999. The RI reported the presence of a groundwater plume containing VOCs, which extends approximately 7,100 feet downgradient of the site. The highest concentrations of PCE in groundwater were detected at approximately 80 feet bgs on top of a clay layer. Concentrations of VOCs greater than 1,000 ppb (maximum 12,021 ppb) in the groundwater were present in the 75 to 85-foot sampling interval to approximately 4,100 feet downgradient (south-southeast) of the site. Contaminated soils were detected in the saturated zone, below the water table, and were located directly below the leaching pool in the rear of the property.

The Suffolk County Water Authority (SCWA) Albany Avenue well field is located 6,500 feet downgradient from the site. The wells are screened at depths of 419 to 509 feet bgs, below the contaminated plume. Monthly monitoring of these wells has not detected the presence of any contamination. Data collected during the RI indicates that the groundwater contaminant plume migrating from the National Heatset site is sinking, and therefore may eventually contaminate the public drinking water well field. However, exposure to contaminants that may reach the Albany Avenue well field is not expected since these wells are monitored on a monthly basis and must meet NYSDOH standards. Additional sampling performed in 2007 by OBG indicated that the plume was actually wider at the down gradient treatment area.

Potential remedial alternatives for the National Heatset Printing site were identified, screened and evaluated in a FS. Based on the RI and FS, the Department issued a ROD document dated June 17, 1999 which identified the selected remedy for the site. The major elements of the National Heatset Printing site remedy, as presented in the ROD, are as follows:

- A remedial design program which includes a pilot test to verify the components of the conceptual design and provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. Additional investigation needed for the pilot test or the remedial design will be conducted.
- Based on the pilot test data, the effectiveness of the in-well stripping system at the source area will be evaluated. Since the high VOC concentrations at the source area indicate the presence

of undissolved product mixed with groundwater, and alternative remedy such as extraction and treatment or sparging with air or ozone may be chosen to recover and/or treat the undissolved product. The two down gradient in-well stripping systems would be retained to prevent the migration of the contaminant plume.

- Construction and implementation of the in-well stripping systems or an alternative remedy supported by pilot test date, which includes:
- One system at the source area, consisting of two groundwater circulation wells. This system will remediate the area with the highest VOC concentrations;
- One system at the south end of the site consisting of three groundwater circulation wells. This system will prevent additional VOC contamination from leaving the site; and
- One system down gradient of the southern edge of the one (1) ppm groundwater contamination contour. This system will consist of seven wells and will halt further migration of VOCs down gradient of the site.

3.0 PROJECT WORK PLAN

The following PWP is provided to detail the work activities associated with implementing the DDC technology on a full-scale basis at the National Heatset Printing site. This section describes details associated with implementing the on-site and off-site DDC treatment systems. The DDC in-well stripping technology described in this Work Plan was developed by Wasatch Environmental Inc. (Wasatch), the U.S. Patent holder. In the DDC system, groundwater is pumped from a screen at the bottom of the well by air-lift pumping. Air from a blower is conveyed into the well, below the water table, through an air line. As the air rises through the water column in the well, contaminants are stripped out of the groundwater. By action of the same air, the groundwater is lifted above the upper screen, through which it is then released back into the aquifer. Volatile organic compounds (VOCs), such as PCE, are absorbed (stripped) into the co-current air stream as the air passes through the water. The air stream transports the volatile contaminants for subsequent treatment. Groundwater that re-enters the aquifer through the top screen flows both horizontally away from the well and vertically to the lower screen, where it re-enters the well. The water can thus be re-circulated through the well, where additional air stripping occurs.

The main advantage of recirculating or DDC technology is that it induces both vertical flow components and higher groundwater velocities through the stratified sediments of the subsurface. The higher velocities increase the dissolution rate of non-aqueous phase liquids (NAPLs), and NAPLs liberated from the sediments are transported to the intake screen of the well. Once in the well, the contaminants can be removed by the air stripping action in the well.

3.1 Full-Scale DDC System Installation

3.1.1 On-Site DDC System

The on-site DDC system will consist of four (4) DDC treatment wells and two treatment systems. The layout of the on-site DDC system is shown on Figure 2. One of the on-site wells (DDC-1) was installed in 2006, and used to conduct the DDC pilot study. The planned locations for the 3 additional wells (DDC-2, DDC-3 and DDC-4) are shown on Figure 2. These locations were selected based on the results of the pilot study and project requirements. Figure 2 shows the minimum capture radius of 65 feet that is expected for each of the four on-site DDC wells, based on the pilot study results. The DDC wells will be placed in two lines with wells DDC-1 and DDC-2 in the first line and wells DDC-3 and DDC-4 in the second line. The wells in each set will be spaced 100 feet apart in an orientation perpendicular to the direction of groundwater flow. The second line of wells (DDC-3 and DDC-4) will be located a distance of approximately 140 feet downgradient of the first line of wells (DDC-1 and DDC-2).

Figure 3 shows the typical DDC well construction details for the on-site wells. The methods for drilling and installing the DDC wells are described in Section 3.3.

Each of the two treatment systems will be capable of operating two DDC wells, and will consist of a rotary-lobe type blower unit, vapor phase GAC vessels and associated operational controls and equipment. One of the treatment systems was installed on-site in 2006 and used to operate treatment well DDC-1. An as-built schematic showing details of the first blower system installed to operate well DDC-1 is included as Figure 4. This treatment system enclosure is located to the west of DDC-1, as shown on Figures 1 and 2. For the full-scale system, this system will be expanded to also operate well DDC-2. The second treatment system, constructed to operate wells DDC-3 and DDC-4, will be constructed to essentially the same specification of

the first system, except it will not be equipped with an acid injection system and the blower system will be sized to the meet the parameters defined during the Pilot Test. The reason for this change is that it was concluded from the pilot study that the potential for well fouling is low and therefore there is not a need for continual introduction of well screen treatment chemicals to the wells. Further details of the treatment system are discussed in Section 3.4.

3.1.2 Off-Site DDC System

The off-site DDC system will consist of twelve (12) DDC treatment wells and one integrated treatment system. The layout of the off-site DDC system is shown on Figure 5. The planned locations for the 12 wells (DDC-5 through DDC-16) are shown on Figure 5. These locations were selected based on the results of the OBG post-pilot study sampling results along with the original treatment requirements. Figure 5 shows the minimum capture radius of 60 feet that is expected for each of the twelve off-site DDC wells, based on the pilot study results. The DDC wells will be placed in a line along Benjoe Drive and a second perpendicular line along the border of the SCWA property. The wells in each set will be spaced approximately 120 feet apart in an orientation perpendicular to the direction of groundwater flow.

Figure 3 shows the typical DDC well construction details for the off-site wells. The methods for drilling and installing the off-site DDC wells are described in Section 3.3.

The down gradient treatment systems will be constructed to be an integrated system for ease of monitoring and construction. Each blower will consist of a rotary-lobe type blower unit, vapor phase GAC vessel and associated operational controls and equipment. Each blower is designed to supply air to three DDC wells. The down gradient treatment system(s) are being constructed and installed as a modular system and will consist of one container housing all the blowers, one container housing the knock-out tanks, one container housing the heat exchangers and the vapor phase carbon will be a separate container. All containers will be constructed with a common control system. The containers will be placed on a constructed concrete pad for stability and fenced for security. The Piping and Instrumentation Diagram (P&ID) are provided in Appendix A. Further details of the treatment system are discussed in Section 3.4.

3.2 Mobilization Activities

As part of the mobilization activities Earth Tech will work with the various utility companies to identify the active and inactive utilities that occupy the work areas.

Mobilization onto the site will begin with the set-up of an office trailer located near the off-site work site, site security zones and temporary facilities. During site preparation, it is not anticipated that any clearing and grubbing of trees or brush is required at the on-site location, a number of trees may have to be removed at the off-site location to facilitate the installation of the wells on the Suffolk County Water Authority well field property. A site survey will be conducted prior to construction to tie in the building location, current surface elevations, locations of piping systems and electrical transformer locations. The trailers will be delivered, blocked and secured. Temporary electric services will be provided as needed. Material staging and storage areas will be defined and the necessary temporary fencing will be established to define the work areas.

3.2.1 Site Facilities

In compliance with the Bid Specifications, two project trailers will be located adjacent to the site, one each for NYSDEC/Engineer and one for Earth Tech/Wasatch. The NYSDEC/Engineers trailer will contain one (1) telephone line and all the equipment listed in Specification Section 01590. Earth Tech will utilize its trailer

as a communication center for the Project Team. All key on-site Project Team Members will have cell phones so that they can be contacted at any time during the project. Site communication will be via two-way site radios. Earth Tech will maintain enough two-way radios for the entire project team, however on-site communications shall follow proper chain of command. Location of office trailers will be provided on a site layout drawing. Earth Tech will make arrangements with Long Island Lighting Company electrical engineering to provide power to a pole placed on the property by our electrical subcontractor. The electrical contractor will pull power from the pole into a meter and local panel. The power will then be pulled from the electrical panel to each individual trailer.

Site security will be obtained through the existing chain link perimeter fence. A visitor log will be maintained by Earth Tech.

3.2.2 Site Preparation

Several general site preparation activities will be performed by Earth Tech prior to any intrusive soil excavation or grading activities, including utility clearances and identification, conduct survey of pre-excavation cut-lines, installation of erosion controls, clearing and removal of any vegetation, preparation of a "clean" access area, and implementation of a traffic control strategy.

- **Utility Clearance and Identification** – The Dig safe ticket number for this site is (To Be Provided prior to start of activities). Underground and above ground utilities that could affect or be affected by construction activities will be identified prior to the initiation of any intrusive activities. Locations of all utilities will be marked out by an independent company (UFPO / DIGSAFE). When all utility locations have been identified Earth Tech will review the locations and determine if any utilities will be in conflict with the proposed construction plans. If any utility conflicts are identified, Earth Tech and the appropriate utility company will discuss what actions will need to be taken.

- **Erosion and Sedimentation Controls –** Site-disturbing activities will be carefully conducted to minimize the exposure of unprotected soils, which are more easily eroded than undisturbed soils. Erosion and sediment controls are an integral part of the construction sequence and will be in place prior to commencing any intrusive soil activities. Earth Tech will conduct all site activities to minimize the extent of unprotected soil and to protect as much of the natural vegetation as possible. In addition, Earth Tech will minimize the time that soil is left unprotected. Erosion control and soil excavation activities will follow the construction sequencing to maximize the effectiveness of the erosion control strategy. The selection of specific erosion and sedimentation control measures during construction activities will depend on a number of parameters, including the type of construction activities, site topography, type of ground covers, and maintenance considerations. Earth Tech will install silt fence, hay bales, geotextile material, and / or other erosion control devices as specified in the contract plans. The sediment and erosion controls will be inspected on a daily basis during construction activities and repaired immediately if damage is observed until a final vegetated surface cover has been established in all areas.

- **Work Area Security –** The type of work area security will depend on the type of construction activities being performed and the location of these activities. Security measures will be implemented by Earth Tech and will consist of temporary fencing or

barriers, locked gates, warning tape, maintenance of sign in / sign out sheets, and practicing safe work procedures. During DDC well installation the active work areas will have full-time security during off-work hours. This is needed to secure the equipment and protect the public from open drilling or excavation areas that are outside the security fence locations.

- **Survey of Pre-Excavation Cut Lines –** As part of the pre-installation activities Earth Tech will have a surveyor work with a geophysical company to identify the location and depth of utilities throughout the work area. An independent New York State registered professional surveyor will complete a pre-work survey to verify and stake out wells, trench lines of individual areas and to perform general site layout. The surveyor will collect existing elevations, establish two monuments and identify site features located on the Contract Drawings. The pre-work survey will be provided to the Engineer.

- **Clearing and Removing of Vegetation and Structures –** To facilitate construction activities, existing vegetation, any surface structures, and other obstructions will be removed from the site during site preparation activities. Earth Tech will clear trees and other vegetation as required for site access and the execution of work. Earth Tech will minimize disturbance of vegetation and minimize clearing activities outside of construction areas. Earth Tech will also minimize the removal of structures prior to the actual construction taking place in those areas. This will limit the site disturbance and minimize erosion issues. When the structures are removed they will be removed with a combination of backhoe and an excavator if needed. The clean debris will be shipped for recycling or disposal.

- **Dust and Vapor Control -** During construction activities, dust and vapor control measures will be implemented. Fugitive dust and vapor created as a result of any construction/excavation will be mitigated in accordance with the Health and Safety Plan (HASP). Implementation of dust and vapor suppression will be determined by Earth Tech's onsite Health and Safety Officer in compliance with the HASP. Earth Tech will utilize a combination of dust, vapor and odor suppression measures. Section 6.0 of this PWP further explains the dust control methodology.

- **"Clean" Access Area –** Due to contamination being expected in the subsurface soils and groundwater during construction activities, a "clean" transition area will be established at various locations for access / egress to specific work areas. The "clean" area will be used for equipment / material deliveries, and loading of any contaminated material for on-site treatment, staging or off-site disposal. Earth Tech has evaluated the specific work required and will consider the limits of excavation to be in the exclusion zone with the "clean" area being outside the limit(s) of work. Orange construction fence will be utilized to demarcate the exclusion and clean zones at specific locations of the site.

- **Transportation Plan –** Earth Tech will also implement a transportation plan strategy for access to and exit from the site for transport trucks hauling contaminated soil and for clean fill being delivered to the site. Earth Tech does not anticipate a large number of trucks entering or leaving the site. However, it is important to have a transportation plan based on the scope of work and the ability to efficiently and safely move the transport vehicles in and out of the site. Earth Tech will try to eliminate the trucks coming in contact

with the soil to minimize the amount of decontamination required prior to leaving the site. Trucks delivering or transporting material off-site will follow the established truck routes through the City. Transporters will be provided with a map depicting the truck route. Truck drivers found not adhering to the established truck route will be removed from the project.

- **Site Maintenance –** The Site will be maintained in a professional manner at all times during construction. Water spray will prevent dust emissions at the site. The site will be neat, kept clean, and appear organized during construction operations. During off work hours, the site will be secured through a locked perimeter fence with all stockpiles properly covered and clean fill stockpiles neatly graded to prevent dust emissions. A trash dumpster will be placed on-site for collection of trash. Areas outside the fenced locations will be secured with temporary fencing and a full-time security person during non-working hours.

- **Permits -** Earth Tech anticipates that no permits would be required from the New York State Department of Environmental Conservation (NYSDEC), but will have to meet the substantive requirements of any permits. Earth Tech has confirmed that there are no permits required to install the in-well stripping wells or monitoring wells. Earth Tech will secure all local permits for accessing streets, street openings, street closures and any other local permits required to undertake the work.

3.3 Selected Remedial Action Implementation Items

The following sections describe the Remedial Action work that will be completed at the National Heatset Printing site.

3.3.1 Site Work

3.3.1.1 Drilling of DCC Wells

The general details of the DDC well design are presented in Figure 3. Each well will consist of a 10-inch diameter well with a 1-foot sump (blank casing) set into the clay aquitard. The lower screen will be 12 feet long, with its bottom slot set as near as possible at the surface of the aquitard. The upper screen will be 15 feet long, extending from the approximate seasonal high water table (about 20 to 29 feet bgs). The DDC well will be constructed of 10-inch diameter PVC well casing with Johnson HQ 0.020 slot wire-wrapped stainless steel screens for both the upper and lower screen intervals. Centralizers will be used to position the well in the bore hole. Final design of each DDC well will be based on observations of the subsurface conditions encountered during drilling.

The DDC pilot study well (DDC-1) was constructed with three piezometers installed within the bore hole annulus of the DDC well. Two of the piezometers (DDC1-PDa and DDC1-PDb) were screened over the same interval as the lower DDC well screen and the third piezometer (DDC1-PS) was screened over the same interval as the shallow DDC well screen. These piezometers were used during the pilot study to monitor groundwater flow through the well and detect possible fouling of the well (indicated by decreasing draw downs in the lower piezometers over periods of days to weeks), and to collect groundwater samples for analysis of bromide tracer and contaminant concentrations. Piezometers will not be included in the installation of the additional on-site DDC wells as they are not necessary for system operations.

The well bore annulus outside the screens will be filled with sand appropriate to the aquifer and 20-slot screen. Between the screens, the annulus will be filled with 30-40 or finer sand, and three to four feet long bentonite seals will be placed approximately at 30, 45, and 60 feet bgs. The bentonite seals are installed to prevent water from short-circuiting within the sand pack.

The two well screen sections will be developed using a surge block and pump. The screened intervals will be individually surged and pumped until the turbidity stabilizes. The well will be packed off using an inflatable packer or other means to isolate the two screen sections during development of the upper screen. Well development water will be pumped into a temporary storage tank. After settlement, the development water will be returned to the well and will thus be the first water treated by the well at start up.

The DDC well internal components include a six-inch and eight-inch diameter eductor pipe (connected by a reducer coupling), with two packers and a 125-slot screened section at the top (see Figure 3), and a 4-inch air supply pipe that will be centered in the well and the eductor. The eductor will sit on the bottom of the well (sump) and will extend to the surface with the top of the eductor screen set at approximately 8 feet above the water table. The two packers will be installed below the upper screen in between the well casing and the six-inch section of the eductor. The 4" air supply pipe will be placed inside the eductor pipe, extending to approximately 12 feet below the water table.

The DDC wells will be installed using a dual rotary drilling procedure. The DDC wells will be installed using a cased hole and large diameter drill equipment. This method of installation was selected due to the reduction in drill cuttings as well as the minimization of drilling fluid generation. The approach to the well installation

will also minimize the amount of ancillary equipment, which is critical because more of the DDC wells are located within active city streets.

An ABI Mobilram with a VDW drill will be utilized to advance the borehole for the DDC wells. The VDW drill is a dual rotary drill capable of turning both the outer casing as well as the inner auger to create large diameter well holes to the depths required for this project. The dual rotary VDW drill consists of two vertically arranged auger drives. The upper auger drive propels the inner auger (~ 16" OD), while the lower auger drive turns the casing in the opposite direction (~18" OD / 17" ID). The casing and auger drives can be adjusted in relationship to each other depending on ground conditions as experienced while drilling with either the casing or the auger being the leading tool. Drill cutting and spoils are ejected by openings at the upper end of the casing. Through the rotation in opposite direction, the ejection of the discharge is accelerated.

The following will be the procedure followed during the well installation process.

1. The location of the well will be surveyed and located.

2. The first section of auger / casing (~ 42') will be installed and connected to the VDW drill. Using a 90 Deg pickup and laydown device, the ABI Mobilram can pickup the drill tooling without the use of additional support equipment. In order to minimize ground disturbance a standard construction loader will be used on the opposite end of the drill tooling to prevent un-necessary damage to the surrounding area.

3. The first sections of auger / casing will then be vertically aligned and advanced into the ground to the desired depth. Once the first section of auger / casing has advanced to the desired depth, additional sections of auger / casing will be added until the bottom of the drill tooling has contacted and advanced at least one foot into the Gardners Clay confining layer (estimated to be ~ 80 – 85' bgs – to be confirmed).

4. The auger will then be rotated at a high speed to eject as much of the drill spoils from the casing as possible. The inside auger is then extracted from the casing in sections, leaving a clean cased hole for well construction. The spoils will be spun off into a roll-off container.

5. The DDC well will then be constructed as detailed in Figure 3 using the required drill construction materials.

6. Upon completion of the well construction, the DDC well will be flooded to 2' bgs using potable water. This water will prevent any differential hydraulic pressures from damaging the well while the casing is removed from the hole as well as minimizing friction between the inside of the casing and the well construction materials.

7. The casing is then rotated in the opposite direction from how it was installed while simultaneously extracting the casing from the borehole.

8. Drill tooling is then lowered to a horizontal position using the 90 deg pickup and laydown device with support of a loader.

3.3.1.2 Contingency

Using the above DDC well installation procedures, several contingency measures can be utilized. The contingency measures include the use of a variable moment vibratory pile system to help with extraction. Due to the diameter and depth of the DDC wells, it may be necessary to begin to extract the casing from the borehole using some vibration. This vibratory unit can be turned to a very low setting to introduce vibrations into the casing and minimize the vibrations being introduced laterally into the surrounding subsurface soils. If the casing is not able to be extracted using the rotary drive, the casing can be vibrated to start the extraction and then removed the remainder of the way with the rotary drill.

3.3.1.3 DDC Well Manhole Construction

Upon completion of the well construction, the protective DDC Well Manhole and cover will be installed. The manhole will be constructed from a 48" Diameter steel casing (3/8" wall thickness). The casing will either be vibrated in or drilled to a depth of ~10' bgs. The interior material between the casing and the DDC will be vacuum excavated or drilled out to a depth of ~5-6' bgs. This will create sufficient room inside the casing to install the custom DDC well head and connect the air supply and return lines to the well. A NYSDOT standard manhole concrete cover will secured to the casing and a cast iron H-20 load rated NYSDOT manhole frame and cover will be mortared to the concrete manhole cover or a Bilco door. See Figure 6 for additional details of the DDC Well Manhole.

3.3.1.4 Contingency

As an alternate to the above approach for the DDC Well Manhole Construction, the steel casing may be installed prior to the installation of the DDC Well. This will enable the internal contents of the steel casing to be removed by drilling out the contents to a depth of 6' bgs using the dual rotary drill as apposed to vacuum excavation.

3.3.1.2 On-Site Treatment Systems

A blower will be installed in the treatment system enclosure(s). Electrical service will be extended to and connected to the system to operate the blower and its associated electrical controls. The blower will be a 40-45-hp rotary lobe-type blower capable of supplying up to 700 standard cubic feet per minute (scfm) of air at a continuous pressure of up to 9 pounds per square inch-gauge (psig).

The DDC well will be connected to the blower system by underground piping. The well and all its appurtenances, except for the treatment system enclosure, will be installed below grade. At the well, only a manhole cover will be visible.

All DDC wells and treatment systems will be constructed and operated in a closed-loop manner. The return air from the well (bearing the stripped contaminants) will be piped to the mechanical system for treatment and reuse in the pumping/stripping process. On return to the mechanical system, the return air will be heated to reduce its relative humidity, passed through carbon adsorption unit(s), and returned to the inlet to the blower to be pressurized and piped back to the DDC well. The same air is thus used in a continuous loop, with no release to the atmosphere. A schematic drawing showing details of the closed-loop system is included as Figure 7.

3.3.1.3 Off-Site Treatment Systems

As described in Section 3.1.2 the off-site treatment system will be constructed in multiple containers, with all blowers be housed in one unit. The blowers for the down gradient treatment zone will of four (4) 75-hp rotary lobe-type blower capable of providing 1178 ICFM, as shown in Figure 5. The P&ID's in Appendix A provide details of the construction.

3.3.1.4 Utility and Pipe Trench Excavation Plan

The primary utility trenches will be excavated from the DDC wells to the treatment system enclosure(s). The typical utility trench will include a 6" PVC pipe or equivalent, for air to be introduced to the well and a 6" PVC or equivalent, return air line for gas treatment in the treatment system. Figure 8 shows typical trench details. At the down gradient plume area, Earth Tech is planning on trenching all the piping except for the piping under Albany Avenue which would be installed with horizontal boring equipment.

Each trench will be located so as to not interfere with existing site structures or compromise the integrity of site structures. Each electric utility trench will be marked with warning tape for locating purposes. Earth Tech will install all the piping from the treatment system to the DCC wells. All piping will installed in the field and pressure tested. Piping will be backfilled with 3/8" crushed stone around the piping with the remainder of the trench filled with soil taken from the excavation as long as the soil meets the specifications. If soil does not meet the specifications imported material will be used.

Earth Tech will utilize a tracked excavator or rubber tired backhoe to dig the trench, grades will be determined in the field to promote gravity flow of moisture back to the well from the air discharge line. The trench, above the piping, shall be backfilled with the native soil placed and compacted in 12-inch lifts. The trench will be sloped or shielded to allow for access in accordance with OSHA Trenching requirements, when more than four and half feet below grade. Trenches that encounter water will be backfilled with stone.

3.3.1.5 Piping Installation

The installation of all buried pipe will be per Specification Section 02605. The trench width will vary with its depth and the type of soil present. The bed width should allow for adequate compaction around the pipe. The excavated material, if it is rock free and well broken up by the excavator, may provide a suitable backfill material. Maximum particle size of 1" will be used for bedding, haunching, or initial backfill. The trench bottom should be relatively smooth and free of rock. Objects that may cause point loading on the pipe should be removed and the trench bottom.

All pipes should be carefully examined before installation and damaged pipe removed. Cuts and gouges that reduce the wall thickness by more than 10% may impair long-term service life these areas should be cutout and discarded. Minor scuffing or scratching will have no adverse effect on the serviceability of products.

Damaged pipe may be repaired by any of the joining methods previously discussed. Heat fusion is preferable for all applications where conditions permit. The use of chains, end hooks, or cable slings is not recommended.

Piping systems should be pressure tested before being put into service. Air will be used as the test medium. Raise the pressure at a steady rate to the required pressure. The pressure in the section shall be measured as close as possible to the lowest point of the test section.

The pressure test can be conducted before or after the line is backfilled. The pipe should be covered at intervals, particularly at curves to hold it in place during pressure tests. Flanged connections may be left exposed for visual leak inspection.

Test pressure should not exceed 1.5 times the rated operating pressure of the pipe or the lowest rated component in the system. Initially, the pipe should be raised to test pressure and allowed to stand without makeup pressure for a sufficient time to allow for expansion of the pipe. This usually occurs within 2-3hours. After equilibrium is established, the test section is pressurized to 1.5 times operating pressure, the pump is turned off, and the final test pressure is held for another hour for a total of 4 hours.

Polyethylene pipe holds pressure by developing stress in its walls. This process continues throughout the test period and the pipe increases slightly in diameter. Pressure drop will occur due to continued expansion of the pipe during the second phase of the test. A drop in pressure during the test phase is common and does not prove with absolute certainty that a leak or failure is present in the system. Polyethylene pipe is tested by measuring the "make up" water required to return the section to test pressure. Allowable amounts of makeup water for expansion during the pressure test are used to maintain the pressure. If the test pressure is not returned within the allowable volume of water, the test fails. If there are no visual leaks or significant pressure drops during the final test period, the pipeline passes the test.

3.3.1.6 Backfill Material

General backfill material will consist of excavated site soils from the trench excavation and/or imported clean soil that meets the environmental requirements of Specification Section 02220.

3.3.2 Water Management Plan

3.3.2.1 Drilling Makeup Water

Water used in the process of drilling will be pumped to a frac tank for collection, settling and return as makeup water to the well. Water is used in the course of drilling to maintain the open borehole until the well can be constructed and installed.

3.3.2.2 Excavation Water

Water which collects in the excavations as a result of groundwater intrusion shall be pumped from excavations as necessary when they impede excavation, construction, or affect the ability to achieve compaction of backfill soils.

3.3.2.3 Stormwater Control

The following systems shall be constructed to ensure contaminated water is controlled from entering excavations from surface run on or off site from surface runoff.

a. soil berms immediately outside limits of excavation
b. silt fence at limits of disturbance to control stormwater from carrying sediments off-site
c. stormwater diversion and control swales

3.3.2.4 Decontamination Water

Water utilized for decontamination of equipment shall be supplied by potable water from an offsite source.

All water utilized in equipment decontamination shall be treated pumped to the on-site tank. Portable decontamination stations to decontaminate heavy equipment or parts of heavy equipment (e.g., excavator bucket) will be established at specific work areas during the project. A temporary decontamination station will be set up at the exit of the site to decontaminate haul vehicles that are transporting contaminated soils from the various locations or at the well locations. Water resulting from equipment decontamination activities shall be collected, analyzed, and shipped off-site for proper disposal.

Water shall be potable water supplied from onsite or offsite sources. Potable water may be stored onsite in small poly tanks or 55-gallon drums and be readily available in designated areas where personnel decontamination will occur. Each local personnel decontamination area will have drums for storing used personnel protective equipment (PPE), tubs for washing and rinsing boots, boot racks for storage of boots, and fresh PPE.

Water resulting from personnel decontamination activities shall be collected, stored, and properly disposed of offsite.

3.4 Treatment System Construction

Earth Tech will provide a pre-fabricated building for the installation of the treatment system. The exterior shell of the pre-fabricated building will be 40' feet long by 8' feet wide shipping container.

After the building has been delivered, interior work will commence. Interior work will consist of the following:

- Installation of all piping and conduit systems that will be contained within or beneath the temporary trailers.
- Installation of electrical control system.
- Installation of plumbing system.
- Installation of blower and carbon system components.

Building pipe penetrations will be field located off building drawings. All drawings are drawn to scale and all pipe penetrations will be measured in the field and confirmed by field supervision.

The system will include (but may not be limited to) the following major components:

- Rotary Lobe Blower
- Vapor Phase Activated Carbon
- Moisture Separators, and
- Heat Exchangers

The design air flow for the in-well stripping system is 350 icfm per recirculation well.

The remedial system equipment will be mounted directly to the shipping container structure. All electrical equipment, wiring and controls will be installed in accordance with the National Electric Code (NEC). All remedial equipment and process piping shall be installed with adequate clearances for maintenance and safe operation of the equipment and in conformance with all applicable codes and standards. System logic controls and the system motor controls will be designed and installed by the Control System vendor. The required supply of chemicals used in the treatment of the well will be ordered and staged appropriately prior to use in the processing equipment.

34.1 Rotary-Lobe Blower

A rotary-lobe positive displacement blower capable of supplying 350 icfm of air at 9 psi to each well will be installed in each treatment trailer. The blower will be installed in a sound proof enclosure capable of reducing noise levels by 20 dB(A). The blower will be fitted with a particulate filter on the inlet filter-silencer. The blower will be driven by a 75 HP motor off-site and 45 HP on-site. Pressure relief valves will be located downstream of the blower unit.

3.4.2 Vapor Phase Carbon

The system will included two sets of two vapor phase carbon vessels units in parallel. The vapor phase carbon selection is based on manufacturer's prediction modeling and is sized to handle 350 icfm per set. A 20 kW duct heater is located in the duct upstream of the carbon vessels to reduce relative humidity below 50%. The heater is sized to operate constant without variable controls. The duct heater is interlocked to the ID fan to insure gas flow and includes an over temperature switch to prevent overheating. The duct heater is

approximately 24 inches by 18 inches and is 6 inches long and weighs 70 lbs. The down gradient system will consist of a large vapor phase carbon unit that will be constructed with a common header pipe to treat all the return air from the 12 wells. The unit will contain approximately 10,000 lbs of vapor phase carbon.

3.5 Decontamination Plan

Earth Tech will be establishing a main decontamination station for large equipment and smaller portable stations for personal decontamination. The main decontamination station will be constructed by removing the existing soil and compacting the subgrade soil. A geotextile cushion layer will be placed on the compacted subgrade, with a 20 mil liner being placed on top of the geotextile cushion layer. An additional geotextile cushion layer will be installed over the 20 mil liner with 12" of crushed stone being placed above the geotextile. Alternatively, a portable pre-manufactured decontamination pad will be provided that is capable of being moved from the site to the off-site location. A sump will be established in the corner of the decontamination station to collect water and pump it to a holding tank or drum(s).

Upon completion of all construction activities, all heavy equipment exiting the Contaminant Reduction Zone will be properly decontaminated on the main decontamination pad. Additional decontamination procedures are discussed in the HASP. All equipment will be inspected prior to being demobilized from the project site.

3.5.1 Exclusion Zone

This zone, commonly known as the Hot Zone, is where there will be direct contact with the potentially contaminated material. The level of PPE required shall be based on hazard, site condition and air monitoring performed. The outer boundary of the Exclusion Zone, called the Hotline, shall be delineated with caution tape or safety fence. Modification to the size and boundary of the exclusion zone will be made in the field based on operation and wind directions. The primary Exclusion Zone location will be along the inside perimeter of the excavation during intrusive activities. The exclusion zone shall also include inside shipping containers. The drivers of the transport vehicle will be instructed to take the appropriate precautions when tarping and untarping the transport vehicle(s).

3.5.2 Contaminant Reduction Zone

This zone, commonly known as the Warm Zone, is where workers and equipment shall be decontaminated. This shall minimize the spread of contaminants from the Exclusion Zone into clean areas. The contamination reduction zone will be located in front of or next to the Exclusion Zone so that personnel exiting the exclusion can conveniently stop at the Contaminant Reduction Zone for decontamination.

Decontamination (Decon) is the process of removing or neutralizing potentially harmful contaminants that have accumulated on personnel and equipment in order to reduce the spread of contamination outside the work area. Decontamination is critical to the health and safety of site workers and it protects the community by minimizing the off-site migration of contaminants. One of the most important aspects of controlling contaminated material migration is the prevention of the spread of contamination. Good contamination prevention will minimize employee and public exposure. Earth Tech will prevent the spread of contamination through the use of engineering controls.

All personnel leaving the Exclusion Zone must be decontaminated in the Contamination Reduction Zone prior to entering the Support Zone. The decontamination process is composed of a series of steps performed in a specific sequence. The basic concept is that more heavily contaminated items will be

decontaminated and removed first, followed by decontamination and removal of inner, less contaminated items.

3.5.3 Equipment Contamination Reduction Zone

Nearly all contractor hardware (not consumable) is considered to be recoverable. As such, they will be decontaminated using the proper equipment, (i.e. brushes, sprayers, detergent). Should equipment become heavily soiled, then the use of a water sprayer and/or scrapers and brushes shall be used before being decontaminated. In general, the high pressure sprayer will be used for cleaning equipment: every effort will be made to remove adhering material with brushes and the sprayer.

3.5.4 Personnel Contamination Reduction Zone

As workers leave the Exclusion Zone they approach the first station where they will place their equipment and tools. After the workers place their equipment and tools down, they will proceed to the second station where all outside protective clothing is washed off and rinsed. This area shall consist of tubs, long handle brushes and garden sprayers/hoses. At the next area, workers are required to remove their outer boots and then outer gloves and place them in plastic garbage bag-lined drums. Once outer gloves are removed, workers proceed to the next station where they remove all outer garments and place them in plastic garbage bag-lined drums. Once workers are fully decontaminated and all garments are removed, they remove their respirators. Used cartridges and inner gloves are placed into plastic garbage bags.

4.0 TRANSPORTATION AND DISPOSAL PLAN

This section describes waste disposal procedures that will be implemented at the Site, including manifest package and tracking of waste shipments. Earth Tech will be maintaining and tracking disposal facility weight slips, and any other transportation and disposal forms.

It is estimated that approximately 100 tons of material will be generated. This waste material will be disposed of at permitted hazardous waste or a solid waste landfill facility. The quantity of material being potentially removed from the site does not pose any major traffic control problems and no impacts to the sites activities should be noticeable for shipping material off-site.

Waste materials will be staged, sampled, profiled, and after approval loaded into offsite transportation vehicles. Each transportation vehicle will have a transporters permit pursuant to the provisions set forth in 6NYCRR Part 364 and all other applicable out of state regulations. Manifesting and transportation of all hazardous waste will be in accordance with 6 NYCRR Part 372 and 40 CFR Part 263. Earth Tech will be responsible for providing complete and accurate manifests for the signature of the NYSDEC or their authorized representative. The completed manifest will accompany all shipments of hazardous waste while in transit at all times. Transportation of non-hazardous regulated waste will be in accordance with Federal Department of Transportation (DOT) regulations 49 CFR 172 and will be transported under a standard non-hazardous manifest. Analytical results will be used to characterize the waste prior to excavation and loading. All transport vehicles (non-hazardous and hazardous) will be weighed at an off-site location and at the disposal facility to track the quantity / mass of soil removed from the site. The certified disposal facility weight tickets will be collected and tracked by NYSDEC.

- **Offsite Transportation Vehicles -** All trucks will be totally covered with solid tarps prior to leaving the site. Trucks will have sealed tailgates with no visible light observed in the gasket of the tailgates. All trucks will be required to display appropriate placards and possess NYSDEC hauler permits prior to loading. Containers will be inspected prior to loading and prior to leaving the site. All offsite transportation vehicles will travel on clean access areas or roads located on-site to minimize the vehicle contacting potentially impacted material. All transport vehicles will be properly inspected and decontaminated, if required, before leaving the site for transport to the disposal facility. In the event of a spill or discharge of waste during offsite transportation, the transporter will take immediate action to protect human health and the environment. The appropriate action will include but not be limited to the following: notify local and state authorities, dike the spill area if necessary, and barricade spill area to prevent human contact.

- **Waste Classification –** Impacted material will be handled as three separate waste disposal types; non-hazardous, non-hazardous debris, hazardous waste exhibiting toxicity characteristics for chlorinated solvents.

- **Disposal Facilities –** Earth Tech shall submit the names, addresses, telephone numbers and contact names for all off-site disposal facilities (hazardous and non-hazardous) to NYSDEC for approval prior to transportation and disposal of waste from the site. Non-hazardous soil and debris will be transported and disposed of at an approved landfill facility. The disposal facilities will supply a weekly accounting of the loads of waste received, including Manifest numbers, bill of lading numbers, load weights as received,

truck identification information, and receipt date. Earth Tech will be responsible for resolving any discrepancies between loads shipped and received.

4.1 Disposal Protocol

Remediation samples will be collected when appropriate to properly characterize material prior to material being staged on-site. Based on the analytical results, waste will be handed according to the following criteria:

- **RCRA Non-hazardous Waste:** If the analytical results of samples indicate that the analytes listed in Table 4-1 and 4-2 are within their specified limits then its respective soil will be sent to a landfill facility permitted to accept it.

- **RCRA Hazardous Waste:** If the analytical results of samples indicate that the analytes listed in Table 4-1 and 4-2 are above the specified limits and if during excavation, this soil will be sent to a Hazardous waste landfill facility permitted to accept it.

TABLE 4-1
SAMPLE TCLP ANALYTE AND LIMIT

TCLP ANALYTE	REGULATORY LIMIT (mg/L)
1,1-Dichloroethene	0.7
1,2-Dichloroethene	NA
1,2-Dichloroethane	0.5
1,1,1-Trichloroethane	NA
Vinyl Chloride	0.2
Trichloroethene	0.5
Tetrachloroethene	0.7

TABLE 4-2
SAMPLE ANALYTES AND ACTION LIMITS
OTHER RCRA CHARACTERISTICS, LANDFILL REQUIREMENTS

ANALYTE	LIMIT
VOCs	
SVOCs	
PCB(total)	50 mg/kg
Corrosivity (pH)	Non-Corrosive (pH must be >2 or <12.5)
Ignitability	Must be non-ignitable
Percent Sulfur	Must be <3.5%

5.0 DUST CONTROL PLAN

5.1 Purpose

This Dust Control Plan describes the proposed method of dust suppression for the **National Heatset Printing** Site. The proposed method consists of sprinkling water when work activities may be expected to generate fugitive dust. Other dust suppression techniques may also be employed (see Section 5.5).

5.2 Dust Monitoring

The environmental action level for fugitive dust will be a 24-hour average of 150 ug/m3 based on the average concentration measured by the dust monitoring equipment, with a maximum average time of 15 minutes.

Source Material	Location Sampled	Method Detection Limit	Environmental	Occupational
Fugitive Dust	Work Area	1ug/M3	Action Level 150ug/m3 or 100 ug/m3 over the background level, which ever is higher	Action Level 5mg/m3 (Respirable Dust)

5.3 Monitoring Frequency

Environmental and Occupational samples will be collected before the initiation of excavation and demolition tasks. The results of these samples will establish a background level for fugitive dust.

Monitoring will be performed as specified in Sections 5.5 and 6 to ensure fugitive dust concentrations are below the action levels identified in Section 5.2.

5.4 Water and Dust Suppression Applications

The application (sprinkling) of water as a dust suppressant shall be in accordance with this Dust Control Plan and shall be continued through the completion of the project. The water will be obtained from local sources or water recycled from treatment.

5.5 Dust Suppression

Real-time monitoring of dust will be performed during soil excavation and handling activities in accordance with Section 5.2. In the event that the environmental action level is reached (150 ug/m3 total with 100 ug/m3 over the background level), or if there is visible dust leaving the site, dust suppression techniques will be immediately employed.

One or more of the following dust suppression techniques will be employed as appropriate:

- Applying water on haul roads;
- Wetting equipment and excavation faces;
- Spraying water on buckets during excavation and dumping;
- Hauling materials in properly tarped containers;
- Restricting vehicle speeds to 5 mph;
- Covering piles after excavation activity ceases;
- Closing excavations as soon as practicable; and
- Construction vehicle wash down.

Atomizing water sprays may be used to prevent overly wet conditions. Given the size of the site and the resulting ease of keeping excavated areas moist, it is expected that these dust suppression measures will prevent fugitive dust from exceeding the environmental action level.

If the dust suppression techniques do not lower particulates to an acceptable level, or if extreme wind conditions occur, work will be suspended until additional corrective measures are implemented or the extreme wind conditions subside.

5.6 Execution

Water shall be applied (sprinkled) as needed by pumping devices, sprinkling systems, or water trucks to control dust during the active portions of the project. Water shall be applied as required based on dust monitoring levels and visible dust. All dust suppressant dispensing equipment shall meet applicable safety and licensing regulations. Weather conditions will also be considered in selecting and implementing dust control measures.

5.7 Dust Emergency Response Plan

If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (that is, below 150 ug/m3 and no visible dust), work will be suspended until additional measures are implemented to remedy the situation. It is unlikely that emergency procedures will be encountered based on the type of work being performed at the Site. However, discussions with the local regulatory officials will be conducted prior to the start of work on the Site and appropriate community response plans, including notification procedures, response actions and community action levels will be prepared and reviewed. Worker contingency plans will include, among other components, the use of full-face respirators with high-efficiency particulate filters, when dust levels are above occupational action levels

5.8 Site Specific Construction Activities and Dust Control Measures

There are three construction activities that may increase the potential for fugitive dust generation. These are:

- Excavation
- truck traffic, and
- site grading

5.9 Excavation and Hauling Activities

All excavated materials stockpiled on site will be maintained to minimize dust generation. Soil pile surfaces shall be moistened if dust is being generated from the pile(s). Adequately secured tarps, plastic or other material shall be used if required to further reduce dust emissions. Any material requiring off-site disposal will be handled in accordance with applicable regulation in a timely manor.

Prior to land clearing/earth moving activities, water shall be applied by means of truck(s), hoses and/or sprinklers as appropriate to minimize dust emissions. Haul vehicles transporting soil into or out of the site shall be covered. In situations where soil is encountered that contain concentrations of contaminants that make the material potentially hazardous a combination of measures could be implemented to reduce the risk of odor and dust suppression. Dust suppression can be mitigated by having a technician applying a mist in the work area to eliminate dusting problems.

When extreme wind conditions make dust control ineffective, as a last resort, excavation may need to be suspended.

5.10 Site Grading

During grading with on-site soils or off-site backfill materials, water will be applied as needed by misting and water spraying to control dust. Vehicles entering or exiting the construction area shall travel at a speed that minimizes dust emissions.

All visibly dry, disturbed, soil surface areas of operation and roadways shall be watered to as necessary to control dust emissions during site operations. Paved roads shall be cleaned if the amount of dirt tracked-out of the operation area has the potential to cause dust emissions. Unpaved driveways may be graveled to reduce dust emissions.

6.0 AIR MONITORING PLAN

6.1 Introduction

The National Heatset Printing Site, located in the East Farmingdale, Town of Babylon, Suffolk County, New York is the subject of the Remedial Action project. Construction activities will be completed for the remedial action by Earth Tech, for the New York State Department of Environmental Conservation. This Air Monitoring Program has been prepared in accordance with the following documents:

- Bid Specifications Section 01060 and 01200 (1.08);
- NYSDOH Community Air Monitoring Plan

A perimeter and work area air monitoring program will be established prior to performing any soil excavating or drilling activities that would result in soil or groundwater disturbance. The air monitoring program will be coordinated with the Health and Safety Plan (HASP). The HASP will provide a proactive plan to monitor the effectiveness of, and upgrade, as necessary, the fugitive dust control measures used during the construction. Periodic air monitoring will be performed during excavation, drilling, transportation and stockpiling of soils on the Site.

Due to the location of the site and dust suppression measures that will be employed, it is expected the potential to impact the surrounding community will be minimal. Nevertheless, monitoring of particulate emissions as described below will further minimize this potential.

6.2 Objective

The objective of this Air-Quality Monitoring Program (AQMP) is to provide direct measurement of total suspended particulate (0.1 to 10 microns) and chemical compounds which could potentially be released during excavation, handling, and transportation of VOC impacted soils at the site. The air-quality monitoring program consists of (1) work area (exclusion zone) air monitoring for evaluating construction worker health and safety; and (2) community air monitoring to determine the levels of volatile compounds and particulate at the perimeter of the site. The community air monitoring program will consist of one upwind and one downwind location. To determine wind direction a wind sock will be established on site.

6.3 WORK ZONE AIR MONITORING PROGRAM

The air quality within the work area will be monitored to ensure worker health and safety in accordance with requirements specified in 29 CFR 1910.120, as described in Section 6.8 and 7.7 in the Health and Safety Plan for activities at the Site.

6.4 COMMUNITY AIR MONITORING PLAN

Earth Tech will undertake a community air-monitoring program during the remedial project to provide direct measurement of volatile organic compounds and total suspended particulate (0.1 to 10 microns) which may

be released during excavation and drilling activities associated with the remediation. This air-monitoring program is directed toward evaluating and documenting the migration of potential emissions to the site perimeter. Results will be used to confirm the maintenance of safe air quality surrounding the site during the handling of contaminated soils and drill cuttings. If contaminant levels in the air exceed the air-quality action levels detailed in Section 6.4.1, the project manager will be promptly alerted to the results of the monitoring and the need for the implementation of additional measures (as described in Section 6.4.1.1) to further control emissions from the site.

Real-time air quality monitoring for volatile organic compounds and total suspended particulate air monitoring will provide the project manager with immediate data concerning air quality at the site during the project. The procedures for monitoring and the short-term air quality action levels are subsequently described in this section. Real-time air quality data will be collected throughout the duration of soil excavation activities. Background data will be collected over a one-day period prior to soil excavation when no soil handling work is being performed.

6.4.1 Real-Time Air Monitoring -Volatile Organic Compounds

Real-time air quality data will be collected from one downwind perimeter and one upwind location of the work area and the site perimeter using portable instrumentation in accordance with a periodic monitoring protocol described below. One upwind and one downwind perimeter monitoring stations will be established. Each station will be located along the perimeter of the site.

Real-time monitoring will commence at the start of each workday or new task and will continue until daily soil handling activities have ceased. The real-time data generated will allow the project manager to determine if air quality at the work area perimeter and site perimeter are being impacted by site activities and whether the implementation of emission control measures, as delineated in Section 6.4.1.1, is necessary.

Real-time monitoring will be accomplished using a total volatile organic analyzer equipped with a photo ionization detector (PID) and a 10.2-eV lamp, which will be calibrated daily to benzene with a 100 ppm isobutylene air standard. Monitoring will be undertaken at each monitoring station and work area on a continuous basis during the course of daily operations. If Action Levels are exceeded, work shall stop until measurements are below Action Levels. In addition, monitoring locations and frequencies may be revised, depending on the location of exposed contaminated soil, wind direction, and data collected. Additional real-time air monitoring will be done at the request of either the project manager or NYSDEC or NYSDOH personnel. Equivalent backup, real-time air-monitoring equipment will be available on-site, should a piece of equipment malfunction.

Sampling at each station will be accomplished by pointing the intake tube of the PID toward the likely emission source, generally at the height of the breathing zone (4 to 5 feet). The instrument will be monitored during the course of the day and data downloaded at the end of each work day, when intrusive activities are occurring. Sampling location, wind direction, weather conditions and site activity will also be recorded. Real-time air monitoring data will be kept in on-site files. These data will be available at the site.

Based on data published by OSHA (Occupational Safety and Health Administration), ACGIH (American Congress of Government Industrial Hygienists), and NIOSH (National Institute for Occupational Safety and Health), short-term air quality action levels have been established for air emissions control at the site perimeter. An action level of total volatiles at the work area and site perimeter has been established at 5.0 ppm above background (see below). If this action level is exceeded the following actions will be taken:

(1) Work activities will be halted and actions specified under the Vapor Emission Response Plan (Section 6.4.1.1) will be undertaken.

(2) A Vinyl Chloride-specific DragerTM tube will be used to measure the concentration of Vinyl Chloride migrating from the site perimeter.

The 5.0 ppm action level at the site perimeter is based on an estimated concentration of vinyl chloride in the PID reading from total chlorinated compounds measured during monitoring. Since the PID detects volatile compounds other than chlorinated compounds, the 5.0 ppm action level is considered conservative. If odors are detected in the nearby community, despite the fact that total VOC levels are below the 5.0 ppm action level, engineering controls as described in Section 6.4.1.1 will be implemented.

An action level of 1 ppm sustained for 5 minutes above background will be used at the work zone, in accordance with OSHA short-term exposure limits (STEL) for vinyl chloride to ensure construction worker health and safety (29 CFR 1910.1028). If the total VOC concentration exceeds 10 ppm, worker personal protective equipment will be upgraded from Modified Level D to Level C.

6.4.1.1 Vapor Emission Response Plan

The Site Vapor Emission Response Plan will be triggered by either an exceedance of total VOC action levels at either the work area or site perimeter or a vinyl chloride measurement of 0.5 ppm at the site perimeter. If a five-minute sustained measurement of 5.0 ppm above background for the work area or the site perimeter or a vinyl chloride level of 0.5 ppm at the site perimeter is measured, excavation activities will be stopped and the following actions will be undertaken:

Continue total VOC monitoring at the work area perimeter. If the total VOC level decreases below 5 ppm over background, then excavation activities can resume. If the total VOC levels persist above 5.0 ppm, then the project manager will implement engineering controls and immediately notify the site project manager and the Site Safety Officer (SSO).

Following the implementation of engineering controls, excavation activity may resume after the total VOC levels at the work area perimeter and site perimeter are below 5.0 ppm above background.

If the total VOC levels are greater than 5.0 ppm but less than 25 ppm over background at the perimeter of the work area, excavation activity may resume provided that the total VOC level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure (whichever is less) is below 5.0 ppm above background.

If the total VOC level is above 25 ppm at the perimeter of the work area, excavation activities must be shut down. When work shutdown occurs, downwind air monitoring as directed by the SSO will be implemented to ensure that the emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan (Section 6.4.1.2)

Primary engineering controls that may be implemented to reduce emission levels include:

- Cover piles of contaminated soils with polyethylene sheeting.
- Limiting excavation size and the surface area of exposed contaminated soil.
- Backfilling excavation with clean soil.

Adding surfactant such as BioSolve® to impacted media (application in excavated areas will be a sight mist

as to avoid increasing solubility of wastes leading to increased groundwater contamination).

6.4.1.2 Major Vapor Emission Response Plan

If after the cessation of the work activities and implementation of engineering controls, persistent total VOC levels (1) greater than 25 ppm above background at the work perimeter; or (2) greater than 5.0 ppm above background 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure (whichever is less) are measured, then the following action will be taken within 30 minutes:

- Cover the excavated area with polyethylene sheeting or clean soil.
- Limiting excavation size and the surface area of exposed contaminated soil.
- Cover the excavated area with polyethylene sheeting or clean soil.
- Notify the NYSDOH, County Health Department, NYSDEC and the local police.

Total VOC levels will be monitored within 20 feet of the nearest downwind residential or commercial structure. (20 Foot Zone).

Continue air monitoring 15-minute intervals in the 20-Foot Zone. If two successive readings below action levels are measured, air-monitoring intervals may be halted or modified by the SSO, with approval of the NYSDEC and NYSDOH.

If total VOC levels persist above the 5.0 ppm within the 20 foot zone, the project manager, SSO and the Engineers project manager will consult with each other and the Emergency Response agencies to determine appropriate actions to be implemented. The Engineers project management personnel have ultimate authority during major vapor emission emergencies. The NYSDEC must approve any actions to continue work following such a shut down period.

6.4.2 Real-Time Air Monitoring - Total Suspended Particulate

In conjunction with the real-time volatile emission monitoring, direct-reading monitoring equipment for particulate matter will be used to collect real-time airborne particulate data. The instrument to be used for this sampling is a MIE DataRam PDR 1000 Dust/Aerosol, which operates on the principle of light scattering. The DataRamTM responds to particles in the size range of 0.1 to 10 micrometers and in the concentration range of 0.01 to 400 mg/rn^3. Real-time particulate measurements will be based on a 15-minute, time-weighted average. The DataRamTM will be calibrated daily with a filtered air sample. The technician will log recorded measurements at each sample point. Equivalent backup real-time air monitoring equipment will be available on-site in the event of an equipment malfunction.

A New York State action level of 100 ug/m^3 for particulate matter above background will be used to determine whether modifications to given processes are required. If the action level is exceeded, real-time monitoring of the upwind background level will commence immediately using the same portable monitor. If the site particulate measurement is greater than 100 ug/m^3 above the upwind background level, or if dust is observed leaving the work site, dust suppression techniques (i.e., misting surfaces with water or covering open piles) will be implemented to reduce the generation of fugitive dust. If the action level of 100 ug/m^3 above background is exceeded, the Engineers project manager and NYSDEC on-site representative will be notified. The Engineers project manager will notify the Division of Air Resources in writing within five working days. All work will be in accordance with the NYSDEC 4030 TAGM: Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites, October 1989.

6.4.3 Documentation for Air Quality Monitoring

An essential part of any sampling/analytical scheme is ensuring the integrity of the sample from collection to data reporting. Sample integrity includes the possession and handling of a sample that is traceable from the time of collection, through analysis and final disposition.

Sample Labels: Unique sample identification codes will be assigned at the time of collection to prevent misidentification of samples. The identification codes will include the following information:

- Project/Name/Number;
- sample location;
- date of collection;
- time of collection;
- initials of sampler;
- analytical method.

Field Logbook: All information pertinent to sampling will be recorded in a logbook. It is imperative that sufficient information be recorded so that the sampling event can be reconstructed without reliance on the collector's memory. Information will be entered into a bound notebook and, as a minimum, entries will include the following:

- Location of sampling point;
- Sample identification code;
- Sample collection date and time;
- Sample methodology;
- Sample analysis;
- Collector's initials;
- Field observations, if any;
- Field measurements, if any, and
- DEC Review.

Dedicated field logbooks will be maintained on site to document the daily calibration of the real-time and speciated real-time air monitoring equipment.

6.5 Equipment

The following equipment will be used for real-time air quality monitoring:

TABLE 6-1
Real-Time Air Monitoring Instruments

INSTRUMENT	MANUFACTURER/MODEL*	SUBSTANCES DETECTED
Photo Ionization Detector (PID)	RAE Systems mini-RAE 2000 MultiRAE Plus, AreaRAE (min. 10.2 eV bulb)	Petroleum hydrocarbons Organic Solvents
Combustible Gas Indicator (CGI) May be combined with individual or multi-gas detectors.	MutiRAE Plus	Explosivity
Individual Gas Detectors	MultiRAE Plus	Oxygen (O_2) Carbon Monoxide (CO) Hydrogen Sulfide (H_2S) Cyanide Gases (CN^-)
Particulate Monitor	MIE Model PDR-1000 DataRAM	Aerosols, mist, dust, and fumes
Colorimetric Detector Tubes	Draeger	Vinyl Chloride

7.0 SYSTEM OPERATION AND MAINTENANCE

System Operation and Maintenance will be thoroughly documented in a System Operation and Maintenance Manual (SOMM). A SOMM will be prepared for the DDC System according to the project specifications. Responsibility for the SOMM will be in the hands of the Project Manager. The SOMM shall address all the appropriate systems throughout the treatment systems and will include all required manufacturer's O&M manuals. The SOMM will include system, subsystem and component descriptions, locations, start-up procedures, normal operation, effectiveness monitoring, emergency procedures, and shutdown procedures. Support documents will include a Master Equipment list, a complete set of updated submittal information, a record drawing listing, and an equipment manufacturer's warranty listing.

7.1 Acceptance Testing and Startup Plan

The system start-up will consist of three (3) phases: non-process, process testing and acceptance testing. Non-process testing includes dry testing of parts that do not require the fluid to operate. Clean water testing is an example of process testing. Clean water is used for operation to ensure pipe seals and proper performance of all mechanical components. Acceptance testing utilizes contaminated groundwater and the operation of all equipment. Flow rate, compliance, and overall system performance are evaluated during this phase.

Per project specification, an Acceptance Testing (AT) will be implemented to start up and demonstrate the full operational and specified performance range of the equipment and system. The AT will be used to verify system compliance with the technical specifications under process conditions. The AT will be initiated after the mechanical equipment has been installed. The AT will be developed based on normal start-up and acceptance criteria.

The Project Manager and Project Superintendent will arrange and coordinate the AT with the NYSDEC's representative. The AT will include, but not be limited to following items:

1. Equipment Checkout under the direction of the Contractor will perform the following:
    a) Inspect, Adjust or Modify Equipment
    b) Start-Up Systems
    c) Prepare Written Approval of Installation
    d) Prepare Written Equipment Test Procedure for Acceptance Test
    e) Prepare Written Verification of Satisfactory Completion of Acceptance Test
2. Non-process Test - Mechanical Start-Up & System Shakedown the Contractor will perform the following:
    a) Verify and Demonstrate that Equipment Functions Under Non-process Conditions and is Properly Installed.
    b) Test Materials, Mechanical, Piping, and Electrical Systems.
    c) Obtain Owner Approval of Successful Completion of Non-process Test
3. Contractor will Perform the Following After Successful Completion of Non-process Test:
    a) Tag Acceptable Equipment According to Specifications
4. Acceptance Test: the Contractor will Perform the Following After Successful Completion of

non-process Test

a) Process Flow Acceptance Test According to Specifications Using Water from DDC Wells

b) Sample System Influent and Effluent of Every Process Unit According to Specifications (by others)

c) Perform Analysis at New York State Certified Laboratory (by others)

5. Acceptance Test Failure

a) Contractor will Modify or Replace any Equipment Failing Acceptance Test

b) Contractor will Obtain Written Permission from Owner to Make Modifications or Replacements

c) Contractor will Repeat Acceptance Test if Failure Occurs

6. Final Acceptance

a) Contractor Provides Written Certification that Plant meets Effluent Criteria

b) Owner's Representative Provides Certificate of Substantial Completion

7.2 Estimate of Treatment System Results

The treatment system configurations on the down-gradient portions of the site are configured to treat the groundwater to the estimated concentrations as described in the following table.

Table 7 – Estimated Down-Gradient Concentration

Contaminant	Recorded Concentration Ug/l	Concentration after 1 pass Ug/l	Concentration after 2 passes Ug/l	Concentration after 3 passes Ug/l
PCE	1,400.0	126.0	11.3	1
TCE	340.0	51.0	7.65	1.1
DCE	870.0	261.0	78.3	23.5

The following calculations were used to develop the removal concentrations presented in Table 7. The removal efficiencies are based on Henry's Constant for each individual contaminant and based on the air to water ratio.

PCE Concentration of 1,400 ppb

- First pass would remove 90% of the PCE or reduce the remaining concentration to 126 ppb.
- Second pass would again reduce the PCE by 90% from 126 ppb to 11.3 ppb.
- Third pass would further reduce PCE from 11.3 ppb to 1.0 ppb.

TCE Concentration of 340 ppb

- First pass would remove 85% of the TCE or reduce the remaining concentration to 51 ppb.
- Second pass would again reduce the TCE by 85% from 51 ppb to 7.7 ppb.
- Third pass would further reduce TCE from 7.65 ppb to 1.1 ppb.

DCE Concentration of 340 ppb

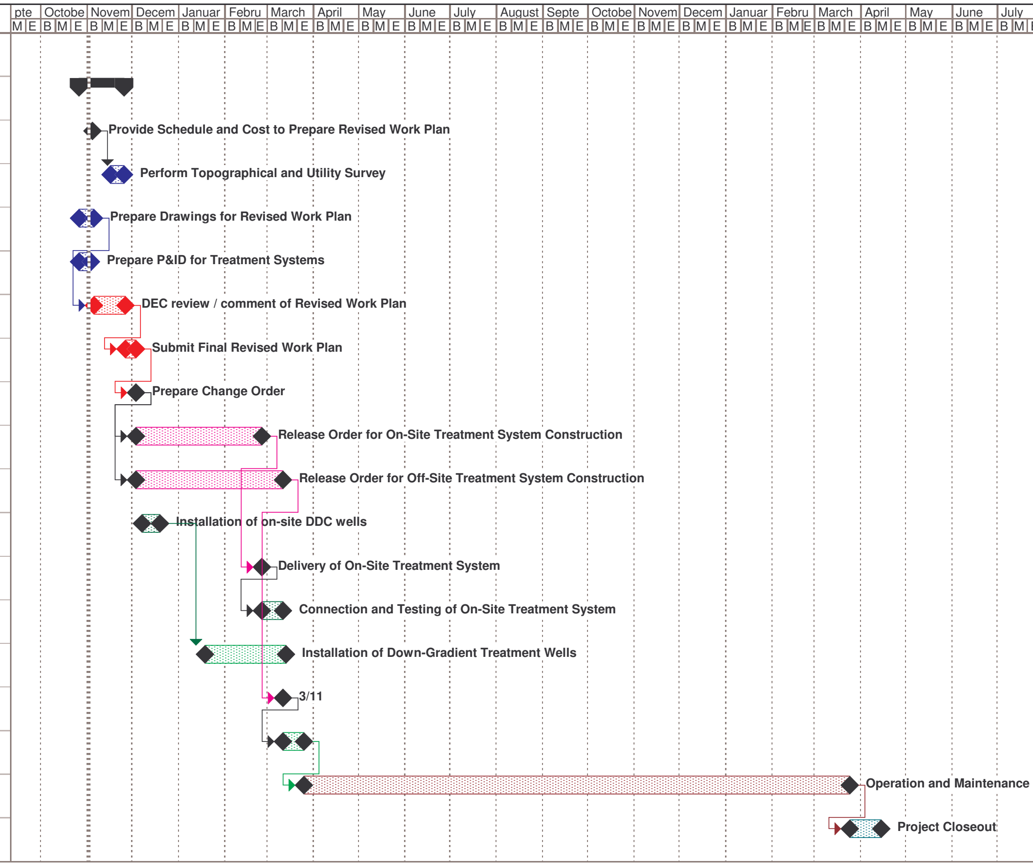
- First pass would remove 70% of the DCE or reduce the remaining concentration to 261 ppb.
- Second pass would again reduce the DCE by 70% from 261 ppb to 78.3 ppb.
- Third pass would further reduce DCE from 78.3 ppb to 23.5 ppb.

The same scenario could be used to develop an estimated concentration at the up-gradient portion of the site. The difference in the up-gradient portion varies from the down-gradient portion in having two rows of wells. This configuration would likely further reduce the concentration and minimize any further down-gradient contribution of contamination.

8.0 PROJECT SCHEDULE

NATIONAL HEATSET PRINTING
EARTH TECH PROJECT SCHEDULE
DESIGN/CONSTRUCTION

ID	Task Name	Duration	Start	Finish	Predecessors
1					
2	**Revised Work Plan Preparation**	**22 days**	**Mon 10/27/08**	**Tue 11/25/08**	
3	Provide Schedule and Cost to Prepare Revised Work Plan	0 days	Wed 11/5/08	Wed 11/5/08	
4	Perform Topographical and Utility Survey	7 days	Mon 11/17/08	Tue 11/25/08	3
5	Prepare Drawings for Revised Work Plan	8 days	Mon 10/27/08	Wed 11/5/08	
6	Prepare P&ID for Treatment Systems	6 days	Mon 10/27/08	Mon 11/3/08	
7	DEC review / comment of Revised Work Plan	15 days	Thu 11/6/08	Wed 11/26/08	5
8	Submit Final Revised Work Plan	5 days	Thu 11/27/08	Wed 12/3/08	7
9	Prepare Change Order	0 days	Wed 12/3/08	Wed 12/3/08	8
10	Release Order for On-Site Treatment System Construction	60 days	Thu 12/4/08	Wed 2/25/09	9
11	Release Order for Off-Site Treatment System Construction	70 days	Thu 12/4/08	Wed 3/11/09	9
12	Installation of on-site DDC wells	10 days	Mon 12/8/08	Fri 12/19/08	
13	Delivery of On-Site Treatment System	0 days	Wed 2/25/09	Wed 2/25/09	10
14	Connection and Testing of On-Site Treatment System	10 days	Thu 2/26/09	Wed 3/11/09	13
15	Installation of Down-Gradient Treatment Wells	40 days	Mon 1/19/09	Fri 3/13/09	12
16	Delivery of Off-Site Treatment System	0 days	Wed 3/11/09	Wed 3/11/09	11
17	Connection and Testing of Off-Site Treatment System	10 days	Thu 3/12/09	Wed 3/25/09	16
18	Operation and Maintenance	260 days	Thu 3/26/09	Wed 3/24/10	17
19	Project Closeout	15 days	Thu 3/25/10	Wed 4/14/10	18

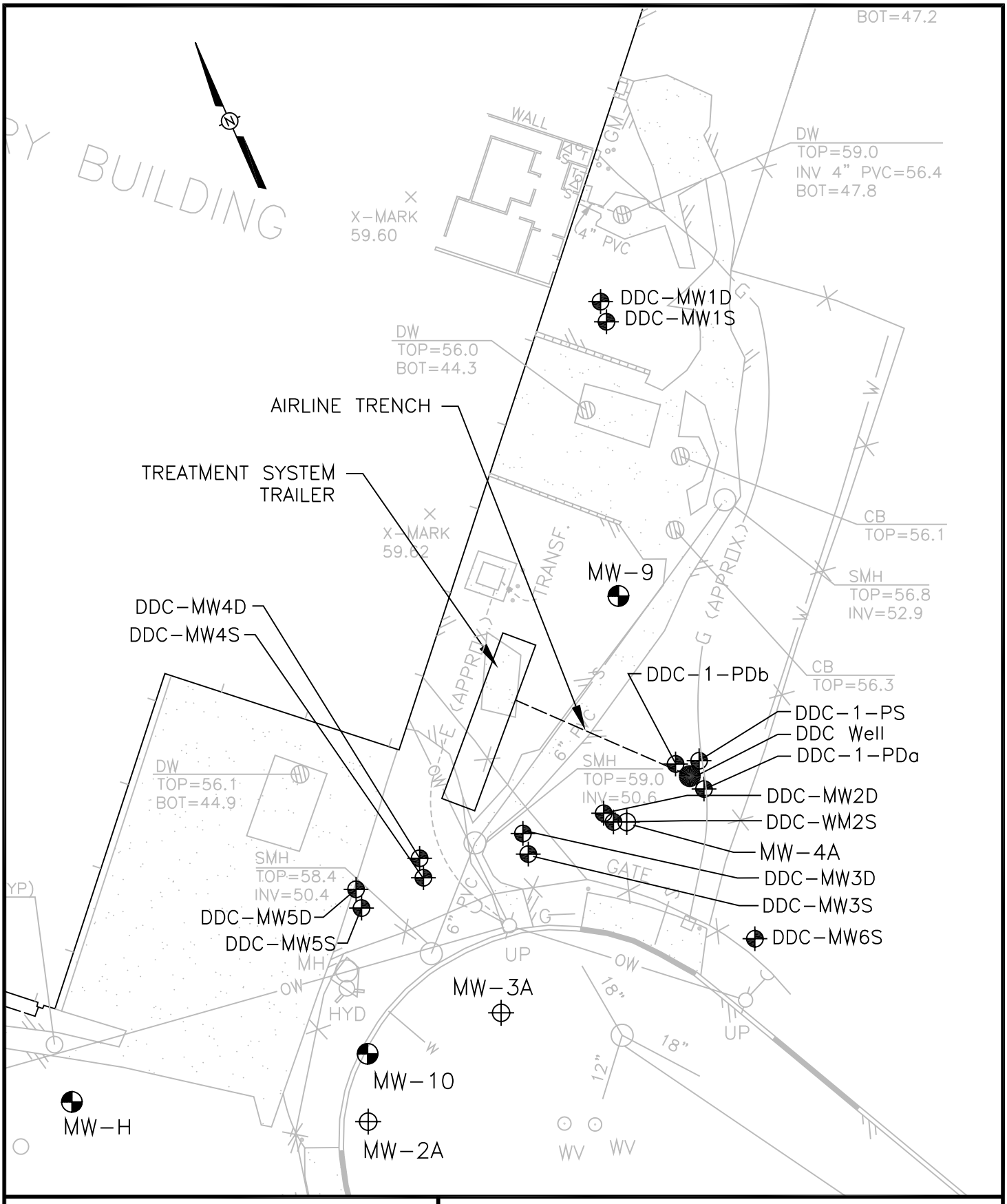


Project: revised work plan schedule
Date: Sun 11/2/08

Task		Progress		Summary		External Tasks	
Split		Milestone		Project Summary		External Milestone	

Deadline

FIGURES



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A tyco International Ltd. Company

0' 15' 30' 60'

SCALE

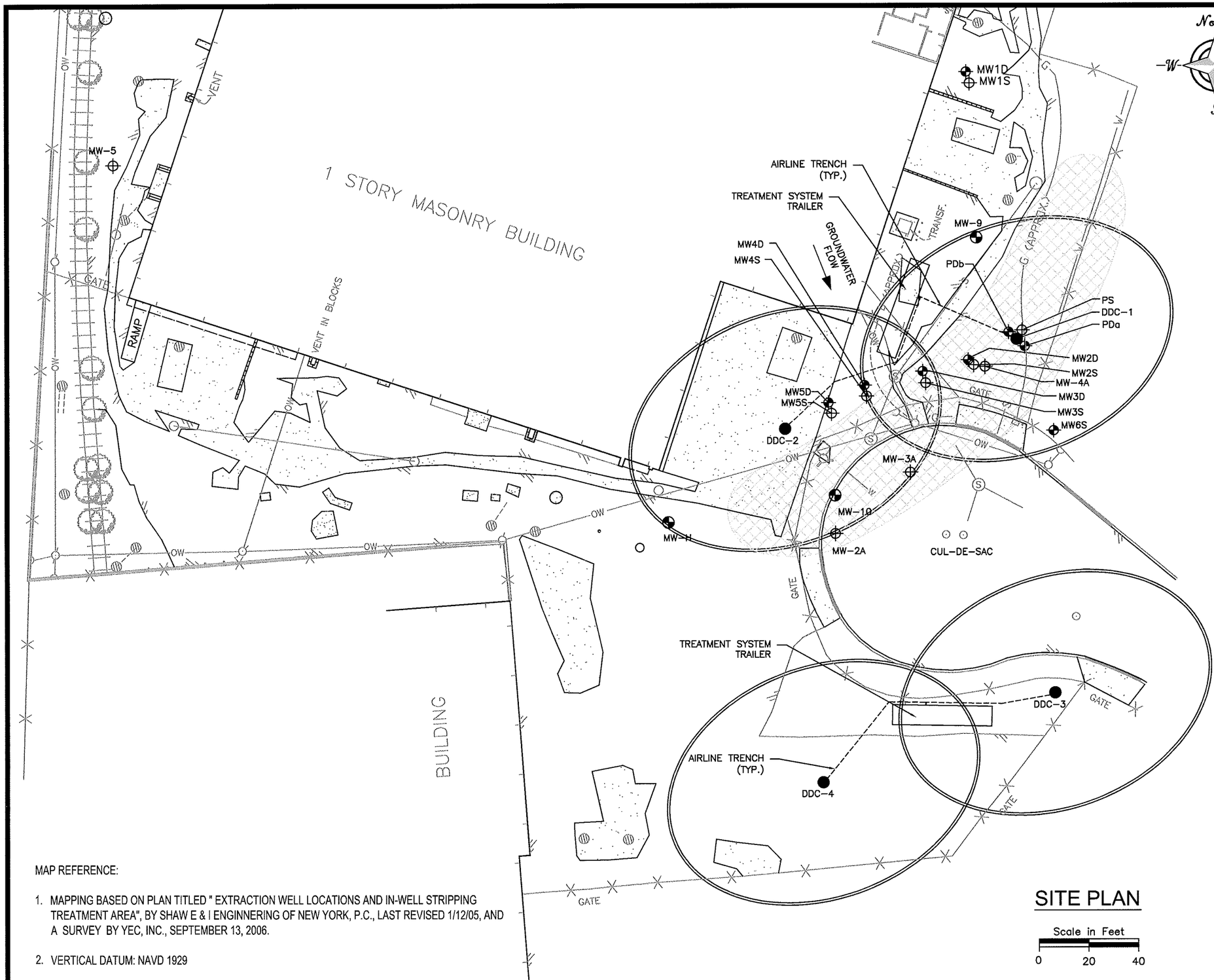
FIGURE 1
SITE PLAN
DDC PILOT TEST

NATIONAL HEATSET PRINTING

BABYLON, NEW YORK

OCTOBER 2006

92701



LEGEND

- DDC-2 — DDC TREATMENT WELL LOCATION
- MINIMUM TREATMENT WELL CAPTURE ZONE (R=65 FT.)
- REQUIRED IN-WELL STRIPPING TREATMENT AREA
- DEEP MONITORING WELL
- SHALLOW MONITORING WELL
- SD — SEDIMENT SAMPLE
- GP — GEOPROBE POINT
- EDGE OF PAVEMENT
- CONCRETE
- CURB
- DROP CURB
- BOLLARD
- WALL
- RAILROAD
- CHAIN LINK FENCE
- UTILITY POLE
- ANCHOR
- OW — OVERHEAD WIRES
- STANDPIPE
- CATCH BASIN FIELD INLET (DW=DRY WELL)
- MANHOLE
- S — SEWER MANHOLE
- S — UNDERGROUND SEWER (PAINT MARK)
- GAS METER
- G — UNDERGROUND GAS LINE (PAINT MARK)
- HYDRANT
- WATER VALVE
- W — UNDERGROUND WATER LINE (PAINT MARK)
- E — UNDERGROUND ELECTRIC LINE (PAINT MARK)

MAP REFERENCE:

1. MAPPING BASED ON PLAN TITLED " EXTRACTION WELL LOCATIONS AND IN-WELL STRIPPING TREATMENT AREA", BY SHAW E & I ENGINNERING OF NEW YORK, P.C., LAST REVISED 1/12/05, AND A SURVEY BY YEC, INC., SEPTEMBER 13, 2006.
2. VERTICAL DATUM: NAVD 1929
3. HORIZONTAL DATUM: NY STATE PLANE COORDINATE SYSTEM, NAD 83, LONG ISLAND ZONE

SITE PLAN

Scale in Feet

0 20 40

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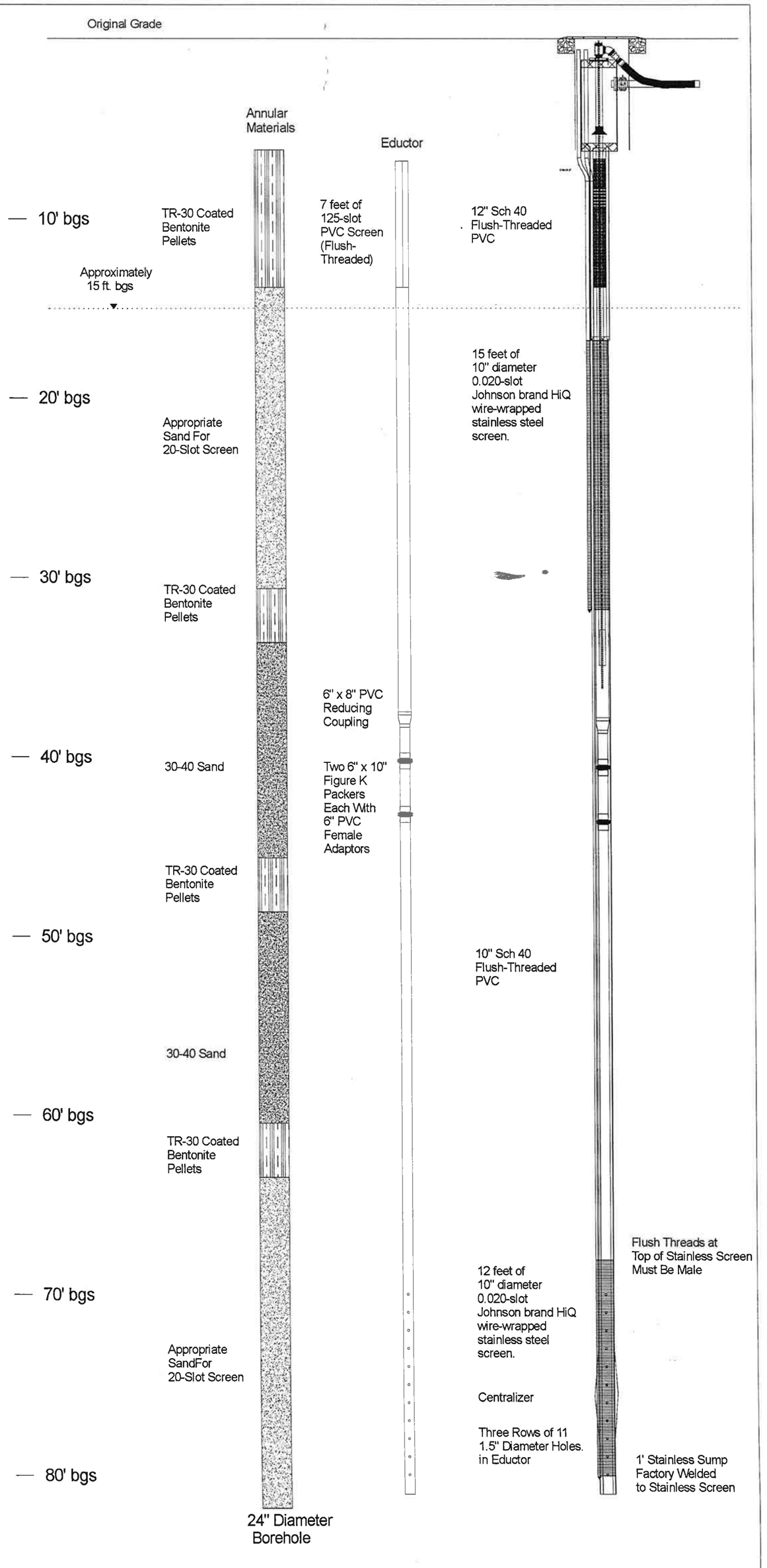
40 British American Blvd.
Latham, New York 12110

NATIONAL HEATSET PRINTING SITE
NYSDEC Site ID 1*52-140
IN-WELL STRIPPING SYSTEM INSTALLATION
ON-SITE DDC SYSTEM PLAN

HAMLET OF EAST FARMINGDALE	Suffolk County, New York
DATE: MAY, 2007	SCALE: AS NOTED
PROJECT NO.: 92701	Figure 2



WASATCH ENVIRONMENTAL
2410 West California Avenue
Salt Lake City, UT 84104
801-972-8400
www.wasatch-environmental.com

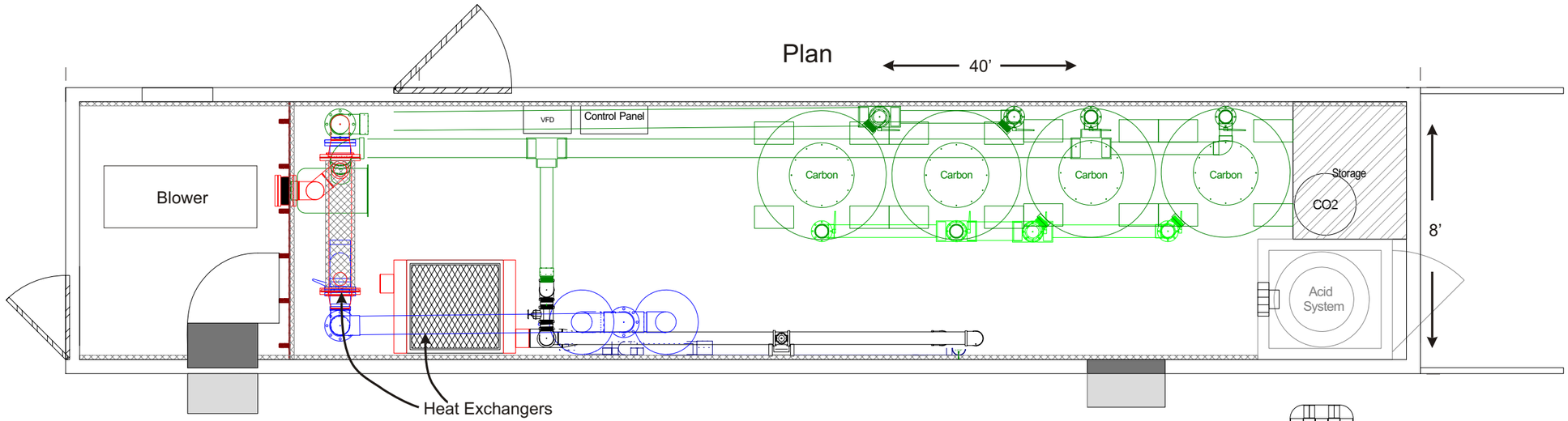
PROJECT NO.

DATE
March 10, 2006

National Heatset Printing Site
Babylon , New York

Figure 3 - Pilot DDC Well - As-Built

Plan



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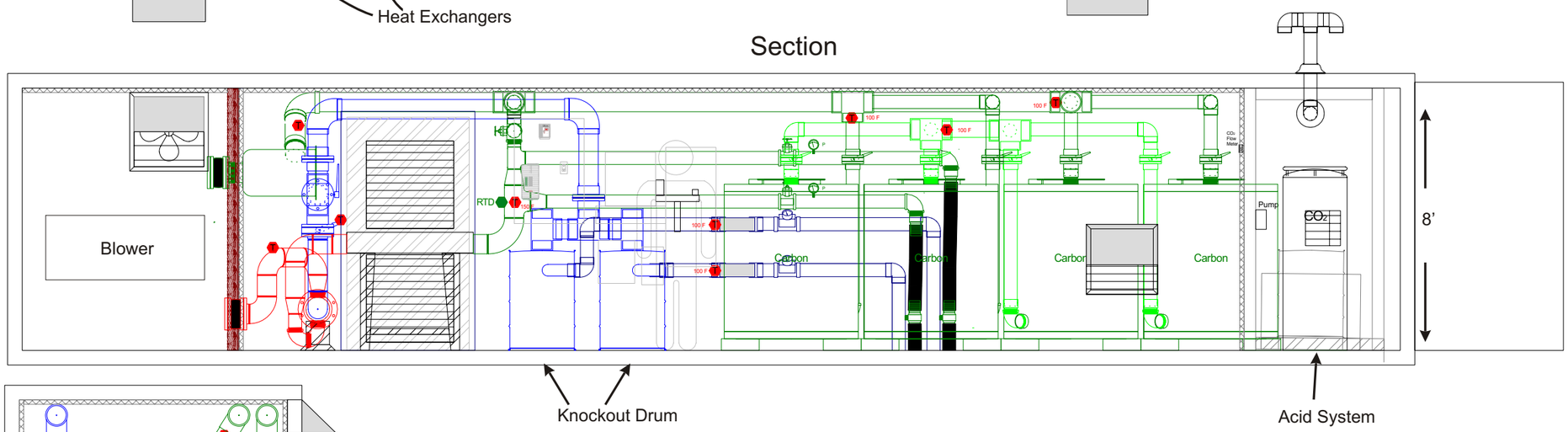

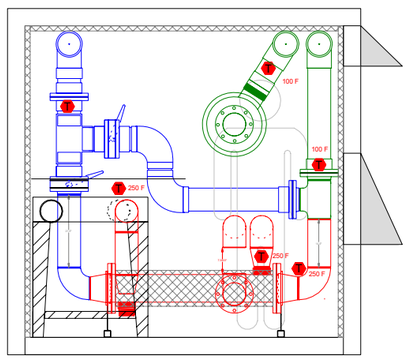

End

WASATCH ENVIRONMENTAL
2410 West California Avenue
Salt Lake City, UT 84104
801-972-8400
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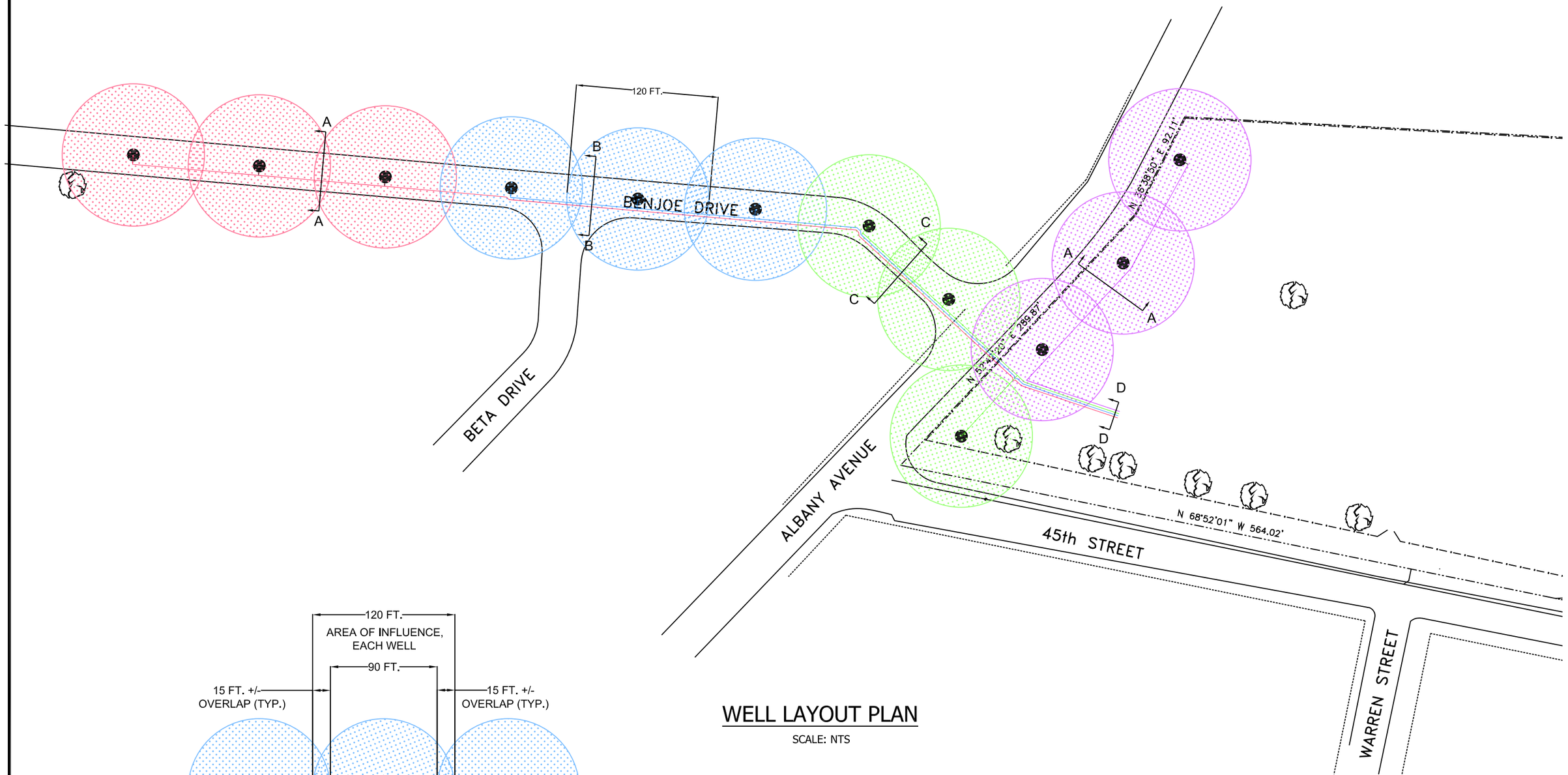
Blower System - As-Built

National Heatset Printing Site
Babylon , New York

PROJECT NO.	DATE
1325-002	November 14, 2006

Figure 4



WELL LAYOUT PLAN

SCALE: NTS

WELL LAYOUT DETAIL

SCALE: NTS

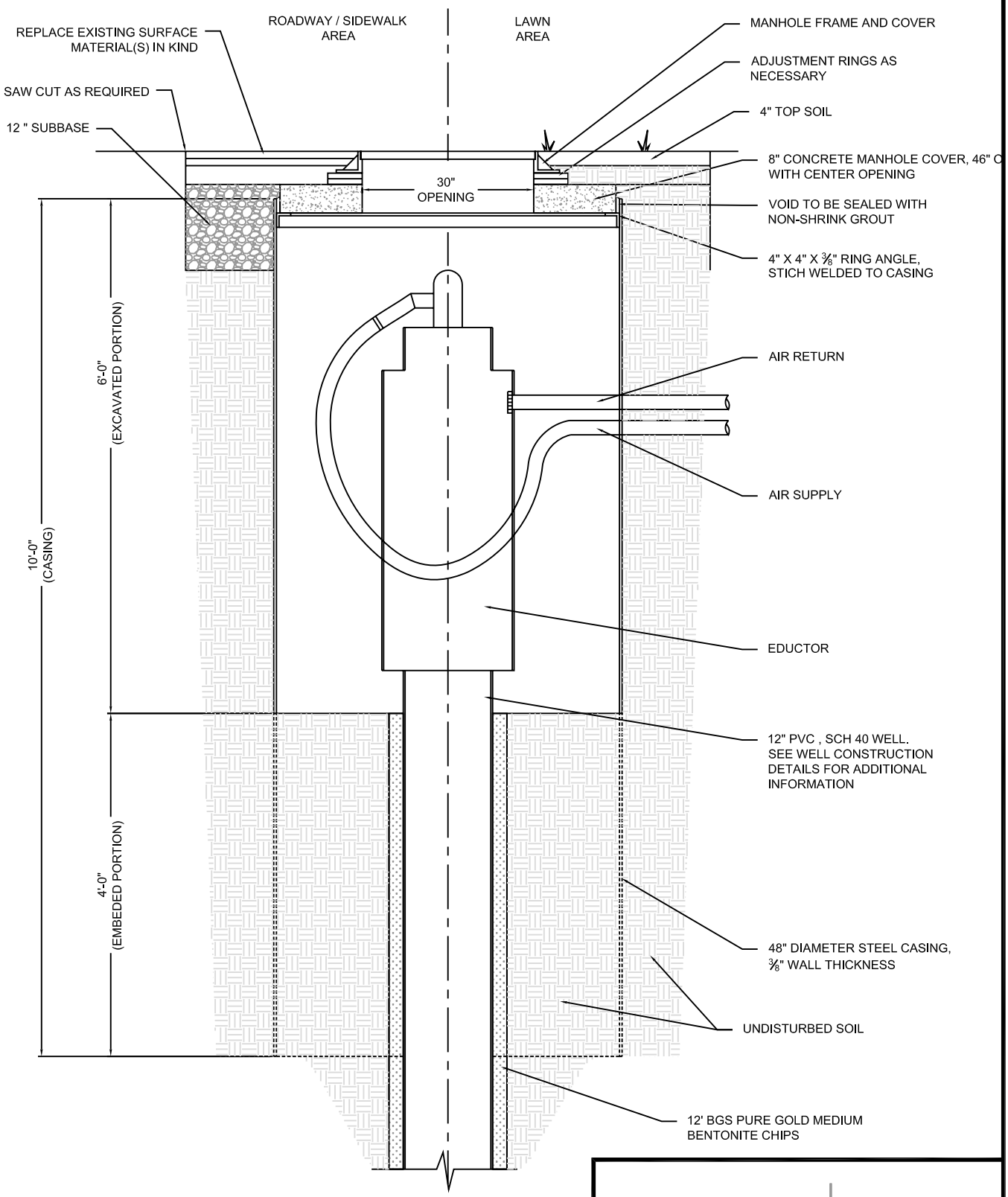
EARTH TECH | AECOM

OFF SITE SYSTEM DETAILS

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
	—		10/2008	5

Plotted By: keith.meister
Layout-Sheet Name: PLAN
Plot File Date Created: Oct/29/2008 3:45 PM

Filename: L:\WORK\92701\CADD\WELLS\802901-D101-A.DWG



NOTES:

ALL MATERIALS COMPACTED IN 12" LIFTS TO 95% OF A STANDARD PROCTOR.

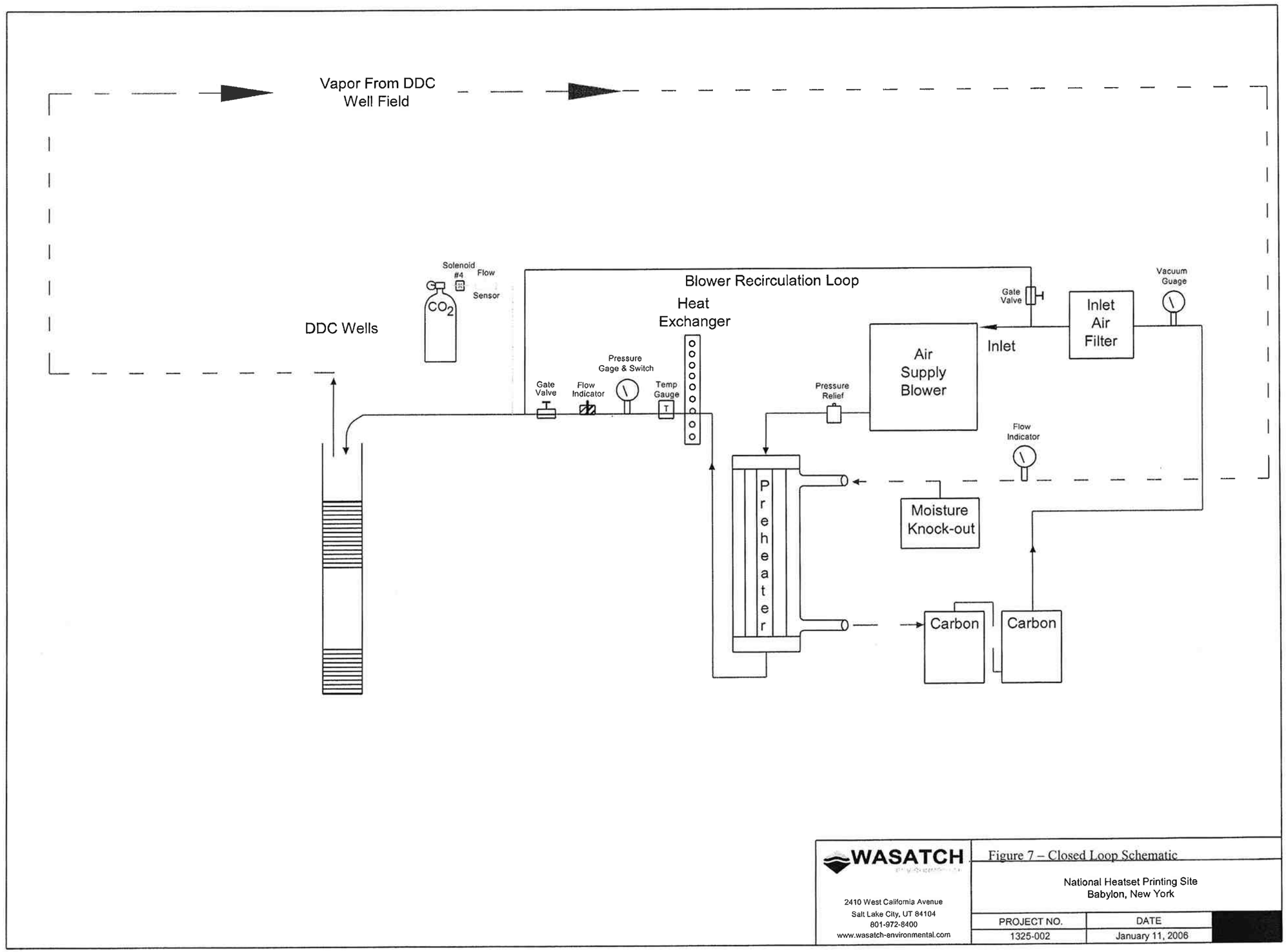
ALL LAWN AREAS TO BE RESTORED WITH TOP SOIL, SEED, FERTILIZER AND MULCH.

ROADWAYS, DRIVEWAYS, CURBS AND SIDEWALKS TO BE RESTORED WITH MATERIALS IN KIND OR AS PER LOCAL REQUIREMENTS.

EARTH TECH | AECOM

TYPICAL DDC MANHOLE INSTALLATION DETAIL

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
	—		10/2008	6



WASATCH

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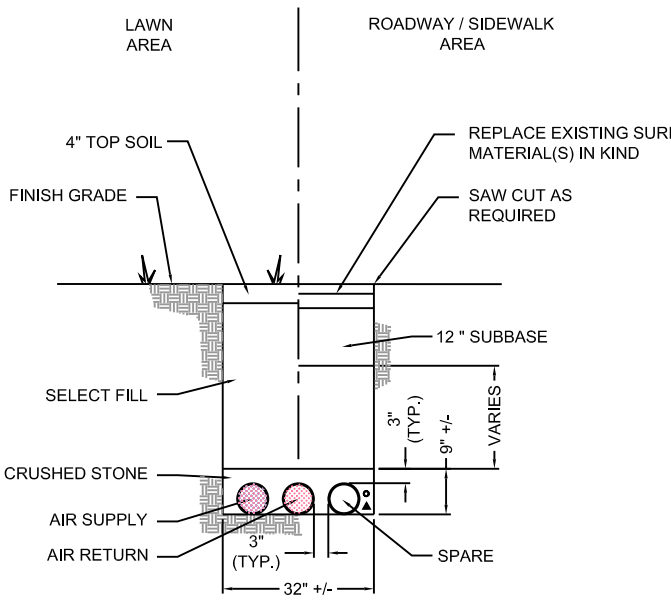
Figure 7 – Closed Loop Schematic

National Heatset Printing Site
Babylon, New York

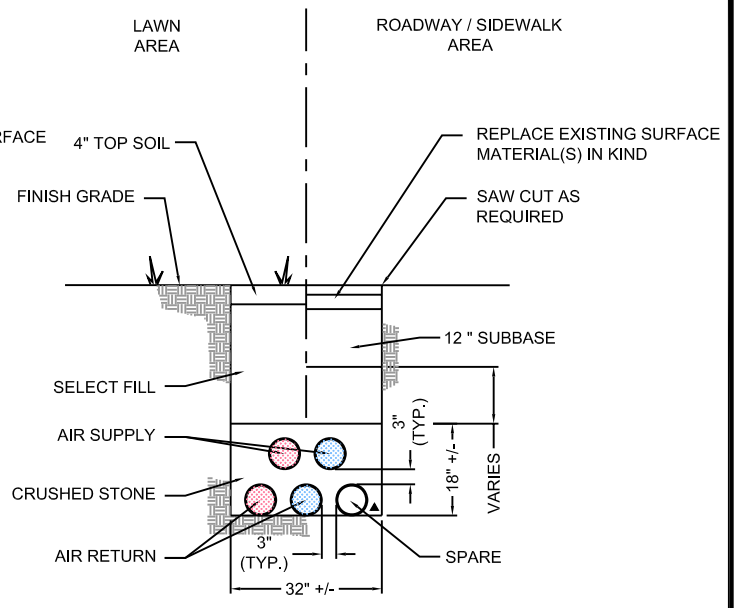
PROJECT NO.	DATE
1325-002	January 11, 2006



SECTION A-A

TYPICAL 1 WELL SET TRENCH DETAIL

SCALE: NTS



SECTION B-B

TYPICAL 2 WELL SET TRENCH DETAIL

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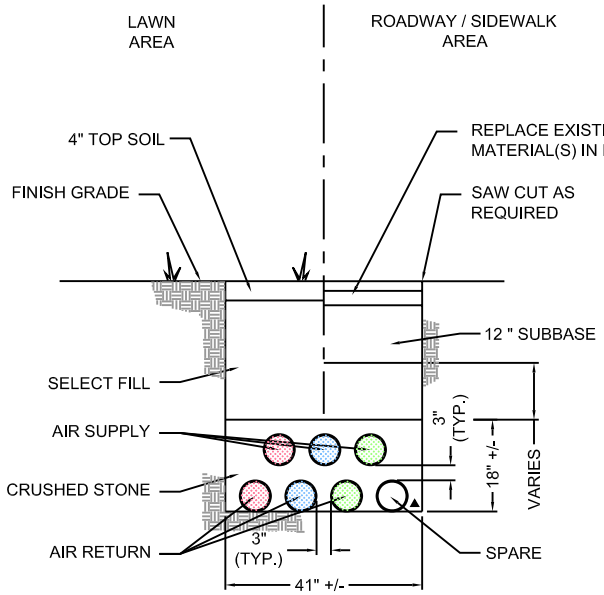

SECTION C-C

TYPICAL 3 WELL SET TRENCH DETAIL

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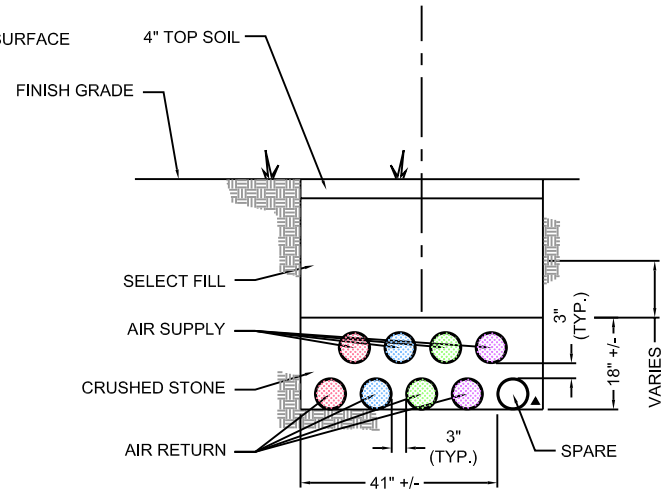

SECTION D-D

TYPICAL 4 WELL SET TRENCH DETAIL

SCALE: NTS

LEGEND

- ○ SIX INCH HDPE (2 PER WELL SET - ONE SPARE)
- ▼ TRACER WIRE
- ∘ ONE INCH DISCHARGE LINE

NOTES:

ALL MATERIALS COMPACTED IN 12" LIFTS TO 95% OF A STANDARD PROCTOR.

ALL LAWN AREAS TO BE RESTORED WITH TOP SOIL, SEED, FERTILIZER AND MULCH.

ROADWAYS, DRIVEWAYS, CURBS AND SIDEWALKS TO BE RESTORED WITH MATERIALS IN KIND OR AS PER LOCAL REQUIREMENTS.

EARTH TECH | AECOM

TYPICAL TRENCH DETAILS

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
	—		10/2008	8

Plotted By: keith.meister
Layout--Sheet Name: TRENCH
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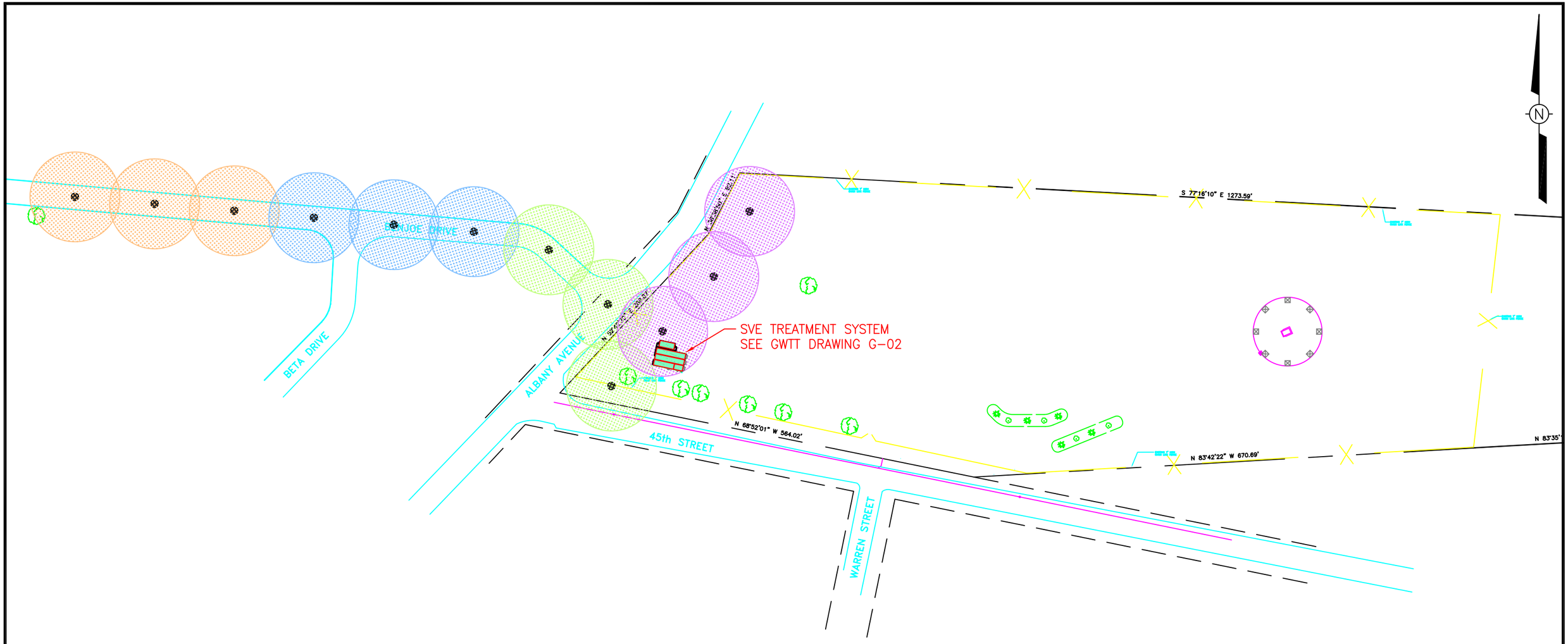
Filename: L:\WORK\92701\CADD\WELLS\802901-D101-A.DWG

Appendix A
Piping and Instrumentation Diagram



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GROUND/WATER TREATMENT AND TECHNOLOGY, INC.

NO.	REVISIONS	DATE
A	FOR REVIEW	10/30/08

EARTH TECH INC.
LONG ISLAND, NY

HOT AIR ASSISTED SVE TREATMENT SYSTEM
SITE PLAN

SCALE: 1"=128'-0"	APPROVED: –	DRAWN BY: TLo
DATE: 10/28/08		

GROUNDWATER TREATMENT & TECHNOLOGY
P.O. BOX 1174
DENVILLE, NJ 07834

DWG SIZE: 11" x 17"	PROJECT: EARTH-TECH	DRAWING NUMBER: G-01

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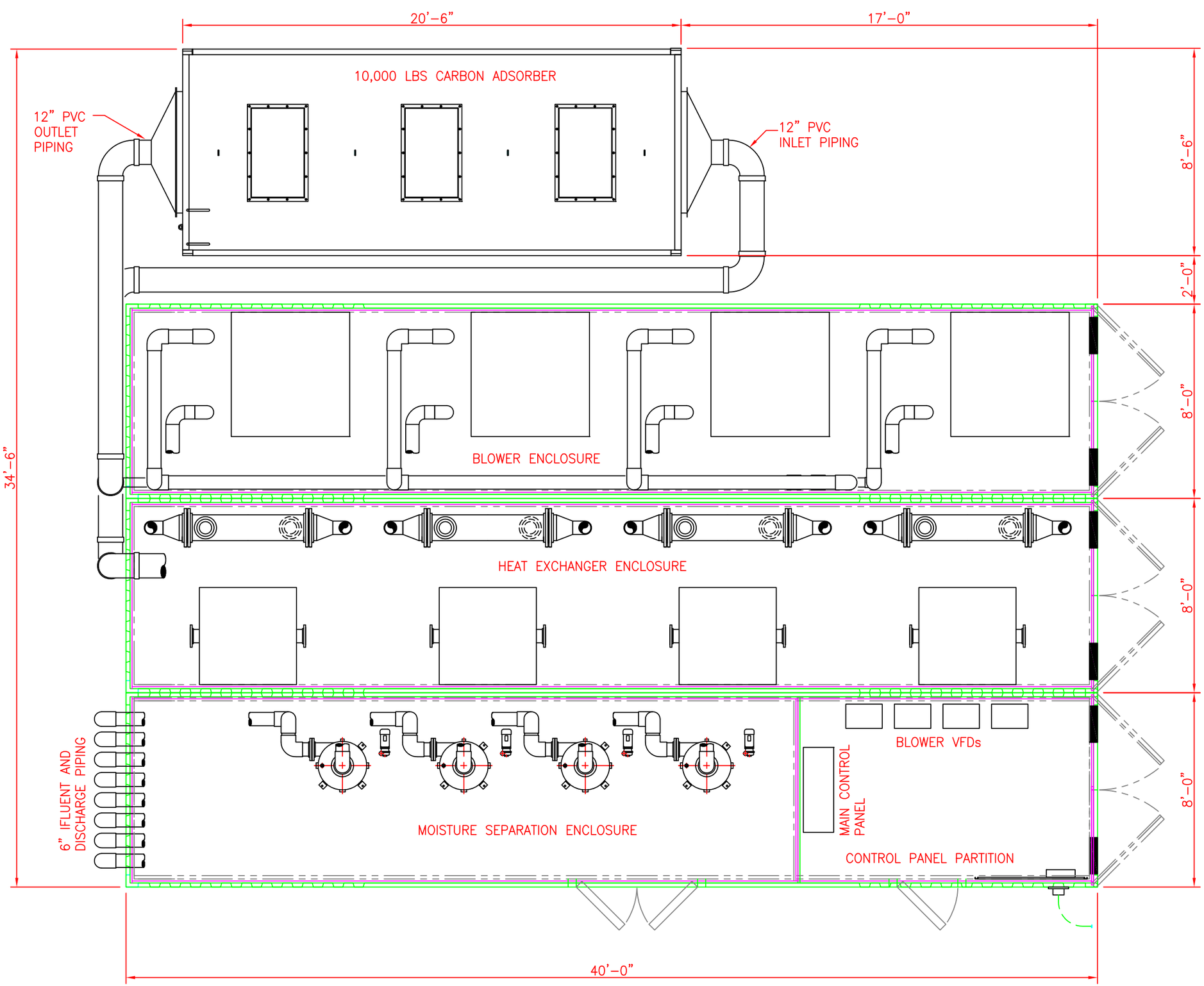

N

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NO.	REVISIONS	DATE
A	FOR REVIEW	10/30/08

EARTH TECH INC.
LONG ISLAND, NY

HOT AIR ASSISTED SVE TREATMENT SYSTEM
GENERAL ARRANGEMENT

SCALE: 1"=128'-0"	APPROVED: –	DRAWN BY: TLo
DATE: 10/28/08		

GROUNDWATER TREATMENT & TECHNOLOGY
P.O. BOX 1174
DENVILLE, NJ 07834

DWG SIZE: 11" x 17"	PROJECT: EARTH-TECH	DRAWING NUMBER: G-02

PIPE LINE LEGEND

- PROCESS PIPING
- EXISTING PIPING
- FUTURE PIPING
- INSTRUMENTATION
- INSULATION
- HEAT TRACED W/ INSULATION
- FLOW DIRECTION
- PIPE CROSS OVER

MISC. FITTINGS LEGEND

- FLANGE CONNECTION
- REDUCER

MISC. SYMBOL

- TIE IN LOCATION
- MATERIAL CHANGE

VALVE LEGEND

- GATE VALVE (OPEN)
- GATE VALVE (CLOSE)
- BALL VALVE (OPEN)
- BALL VALVE (CLOSE)
- BUTTERFLY VALVE (OPEN)
- BUTTERFLY VALVE (CLOSE)
- CHECK VALVE
- A.R.V. AIR RELEASE VALVE
- V.R.V. VACUUM RELIEF VALVE
- PRESSURE RELIEF VALVE
- FLOW METER
- PI PRESSURE GAGE
- VI VACUUM GAGE
- PS PRESSURE SWITCH

GENERAL CONTROL SYMBOL

- HS LOCAL MOUNT
- LSH PANEL MOUNT
- CAHN DISTRIBUTED CONTROL
- I ELECTRICAL INTERLOCK
- M MOTOR

ABBREVIATION

LSP = LIQUID SAMPLE PORT

VSP = VAPOR SAMPLE PORT

INSTRUMENT TAG No. SYSTEM

EACH INSTRUMENT IS IDENTIFIED BY A COMBINATION OF LETTERS AND NUMBERS. THE LETTERS ARE SELECTED FROM TABLE 1 TO CLASSIFY THE INSTRUMENT FUNCTION. THE LETTERS ARE FOLLOWED BY LOOP NUMBERS WHICH WILL NUMERICALLY IDENTIFY IT.

EXAMPLE

CONTROL SYMBOL

LIC 200A

L	IC	200	A
FIRST LETTER	SUCCEEDING LETTERS	NUMBER	SUFFIX
FUNCTIONAL IDENTIFICATION		EQUIPMENT NUMBER	
INSTRUMENT TAG NUMBER			

IN THIS EXAMPLE,

- THE FIRST LETTER "L" MEANS LEVEL;
- THE SUCCEEDING LETTERS "IC" MEANS INDICATOR AND CONTROLLER;
- NUMBER "200" MEANS EQUIPMENT INSTRUMENT IS ASSOCIATED TO; AND
- SUFFIX "A" MEANS THE FIRST INSTRUMENT IN SEQUENTIAL ORDER THAT IS ASSOCIATED TO THE EQUIPMENT, THE NEXT INSTRUMENT SIMPLY WILL CARRY THE "B" SUFFIX.

TABLE 1

LETTER IDENTIFICATION

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER FLAME				
C				CONTROL	CLOSED
D	DENSITY OR SPECIFIC GRAVITY	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT		
F	FLOW	RATIO			
G	GAUGING				
H	HAND OPERATED				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K				CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE				MIDDLE OR INTERMEDIATE
N					
O	TORQUE		ORIFICE (RESTRICT)		OPEN
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY	INTEGRATE OR TOTALIZE			
R	RADIOACTIVITY		RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
Tm	TIME				
U	MULTIVARIABLE		MULTIFUNCTION		
V	VISCOSITY OR VIBRATION			VALVE OR DAMPER	
W	WEIGHT OR FORCE		WELL		
X	SEQUENCE		UNCLASSIFIED		
Y				RELAY OR COMPUTE	
Z	POSITION			DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

NOTES:

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NO.	REVISIONS	DATE
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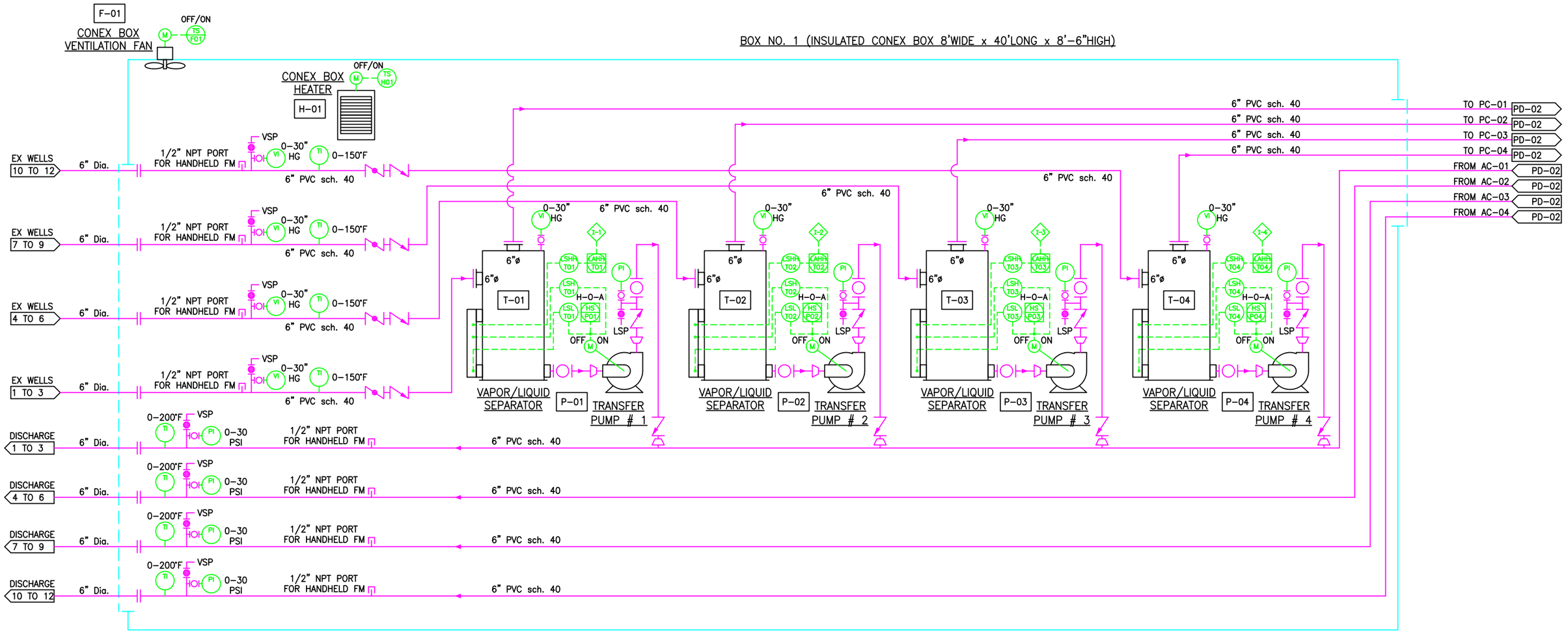
EARTH TECH INC.
LONG ISLAND, NY

HOT AIR ASSISTED SVE TREATMENT SYSTEM
PROCESS & INSTRUMENT DIAGRAM
LEGEND

SCALE: NONE	APPROVED: –	DRAWN BY: TLo
DATE: 10/20/08		

GROUNDWATER TREATMENT & TECHNOLOGY
P.O. BOX 1174
DENVILLE, NJ 07834

DWG SIZE: 11" x 17" | PROJECT # : Earth Tech | DRAWING NUMBER: PD-00



DESIGN DATA:

INFLUENT FLOW RATE
- (12) WELLS AT 350 ICFM EACH MERGED INTO (4) 6" HEADER
- (4) 6" HEADER AT 1050 ICFM EACH

INFLUENT TEMPERATURE
- APPROXIMATELY FROM 50°F TO 70°F

EFFLUENT FLOW RATE
- (4) 6" HEADER AT 1050 ACFM EACH
- HEADERS SPLIT INTO (12) WELLS AT 350 ICFM EACH AT THE WELL FIELD

INFLUENT TEMPERATURE
- APPROXIMATELY FROM 50°F TO 70°F

EFFLUENT TEMPERATURE
- DESIGN RANGE 100°F TO 120°F
- OPERATING AT 100°F

INFLUENT VACUUM
- 15" Hg MAXIMUM.

EFFLUENT PRESSURE
- 14.7 PSI MAXIMUM.

VAPOR/LIQUID SEPARATOR T-01 TO T-04
- 165 GALLON CAPACITY
- C/W LEVEL SWITCHES FOR PUMP CONTROL
- C/W LEVEL SWITCHES FOR HIGH HIGH LEVEL ALARM
- LEVEL SWITCHES WIRED TO MCP FOR PUMP CONTROL AND ALARM

TRANSFER PUMP P-01 TO P-04
- SELF PRIMING PUMP
- CONTROLLED BY LEVEL SWITCHES WITH H-O-A SWITCH IN MCP.
- EQUIPPED WITH LOCAL DISCONNECT FOR EMERGENCY SHUT DOWN

INTERLOCK I-1 TO I-4
I-01 : BLOWER B-01 SHUT DOWN AUTOMATICALLY IF LEVEL ALARM HIGH-HIGH (LAHH) IN T-01 IS TRIGGERED
I-02 : BLOWER B-02 SHUT DOWN AUTOMATICALLY IF LEVEL ALARM HIGH-HIGH (LAHH) IN T-02 IS TRIGGERED
I-03 : BLOWER B-03 SHUT DOWN AUTOMATICALLY IF LEVEL ALARM HIGH-HIGH (LAHH) IN T-03 IS TRIGGERED
I-04 : BLOWER B-01 SHUT DOWN AUTOMATICALLY IF LEVEL ALARM HIGH-HIGH (LAHH) IN T-04 IS TRIGGERED

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A	PRELIMINARY DESIGN FOR REVIEW	10/09/08

EARTH TECH INC.
LONG ISLAND, NY

HOT AIR ASSISTED SVE TREATMENT SYSTEM
VAPOR/LIQUID SEPARATION
PROCESS & INSTRUMENT DIAGRAM

SCALE: NONE	APPROVED: –	DRAWN BY: TLo	
DATE: 10/09/08			

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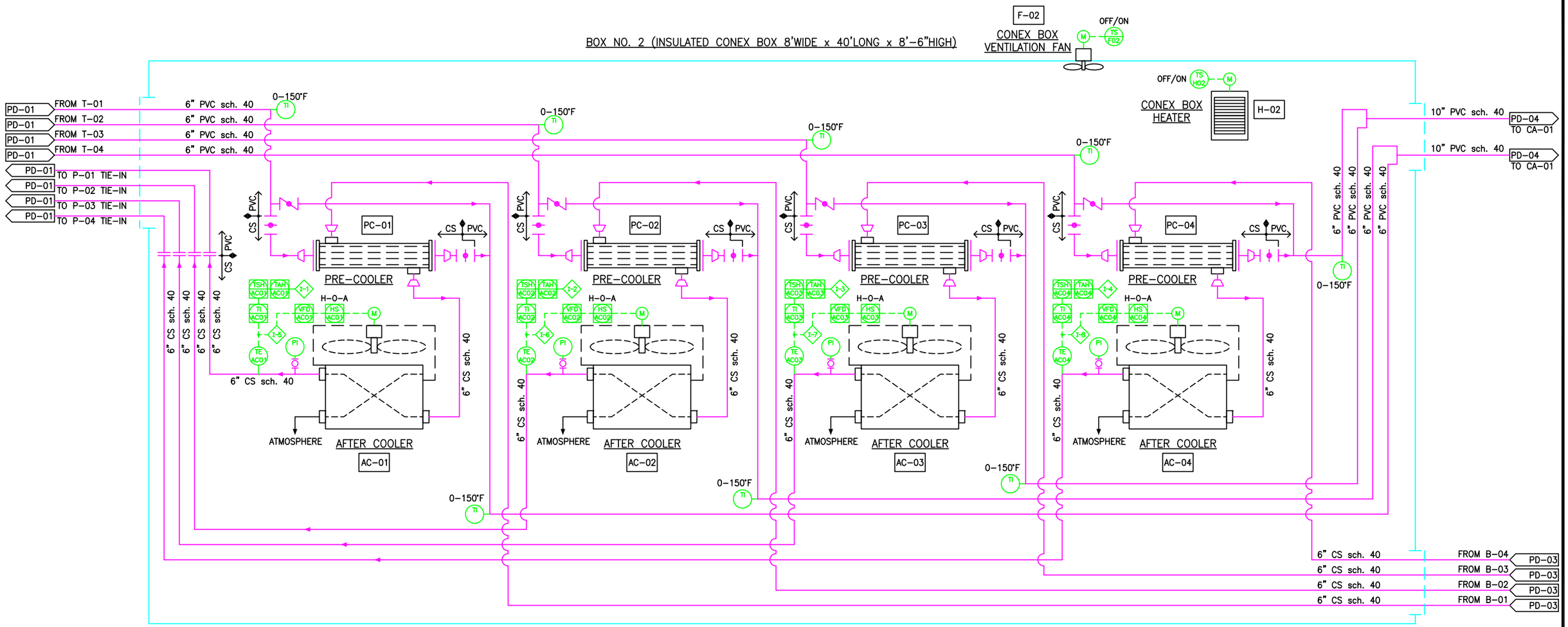

DESIGN DATA:

PRE-COOLER PC-01 TO PC-04

- FOR CARBON FEED TEMPERATURE ADJUSTMENT.
- UTILIZES THE HEAT GENERATED FROM BLOWER DISCHARGE TO ELEVATE TEMPERATURE TO 70°F RANGE WHEN REQUIRED TO MAXIMIZE CARBON ADSORPTION CAPACITY.
- RATED FOR 1050 CFM FLOW RATE.
- INFLUENT TEMPERATURE ADJUSTED BY USE OF BYPASS AND DIVERTING VALVES.
- MANUAL TEMPERATURE ADJUSTMENT PROCESS WITH TEMPERATURE INDICATOR PROVIDED DOWNSTREAM OF PRE-COOLER.

AFTER COOLER AC-01 TO AC-04

- RATED FOR 1050 CFM
- TEMPERATURE REDUCTION FROM 250°F TO 100°F
- C/W TEMPERATURE TRANSMITTER DOWNSTREAM OF HEAT EXCHANGER OUTLET FOR VFD CONTROL AND HIGH TEMPERATURE ALARM.
- HEAT EXCHANGER FAN CONTROLLED BY H-O-A SWITCH IN MCP WITH VFD ADJUSTING THE FAN SPEED TO MAINTAIN THE SET TEMPERATURE AT THE HEAT EXCHANGER OUTLET.
- EQUIPPED WITH LOCAL DISCONNECT FOR LOCAL SHUT DOWN
- DISCHARGE TEMPERATURE TO BE MAINTAINED AT 100°F
- HIGH DISCHARGE TEMPERATURE TO BE SET AT 120°F

INTERLOCK I-1 TO I-8

I-01 : BLOWER B-01 SHUT DOWN AUTOMATICALLY IF HIGH TEMPERATURE ALARM (TAH) IN AC-01 DISCHARGE IS TRIGGERED

I-02 : BLOWER B-02 SHUT DOWN AUTOMATICALLY IF HIGH TEMPERATURE ALARM (TAH) IN AC-02 DISCHARGE IS TRIGGERED

I-03 : BLOWER B-03 SHUT DOWN AUTOMATICALLY IF HIGH TEMPERATURE ALARM (TAH) IN AC-03 DISCHARGE IS TRIGGERED

I-04 : BLOWER B-04 SHUT DOWN AUTOMATICALLY IF HIGH TEMPERATURE ALARM (TAH) IN AC-04 DISCHARGE IS TRIGGERED

I-05 : HEAT EXCHANGER AC-01'S FAN SPEEDS UP OR SLOW DOWN VIA VFD CONTROLLED BY THE TEMPERATURE TRANSMITTER IN AC-01 DISCHARGE.

I-06 : HEAT EXCHANGER AC-02'S FAN SPEEDS UP OR SLOW DOWN VIA VFD CONTROLLED BY THE TEMPERATURE TRANSMITTER IN AC-02 DISCHARGE.

I-07 : HEAT EXCHANGER AC-03'S FAN SPEEDS UP OR SLOW DOWN VIA VFD CONTROLLED BY THE TEMPERATURE TRANSMITTER IN AC-03 DISCHARGE.

I-08 : HEAT EXCHANGER AC-04'S FAN SPEEDS UP OR SLOW DOWN VIA VFD CONTROLLED BY THE TEMPERATURE TRANSMITTER IN AC-04 DISCHARGE.

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EARTH TECH INC.
LONG ISLAND, NY

HOT AIR ASSISTED SVE TREATMENT SYSTEM
TEMPERATURE REDUCTION
PROCESS & INSTRUMENT DIAGRAM

SCALE:	NONE	APPROVED:	DRAWN BY: TLo
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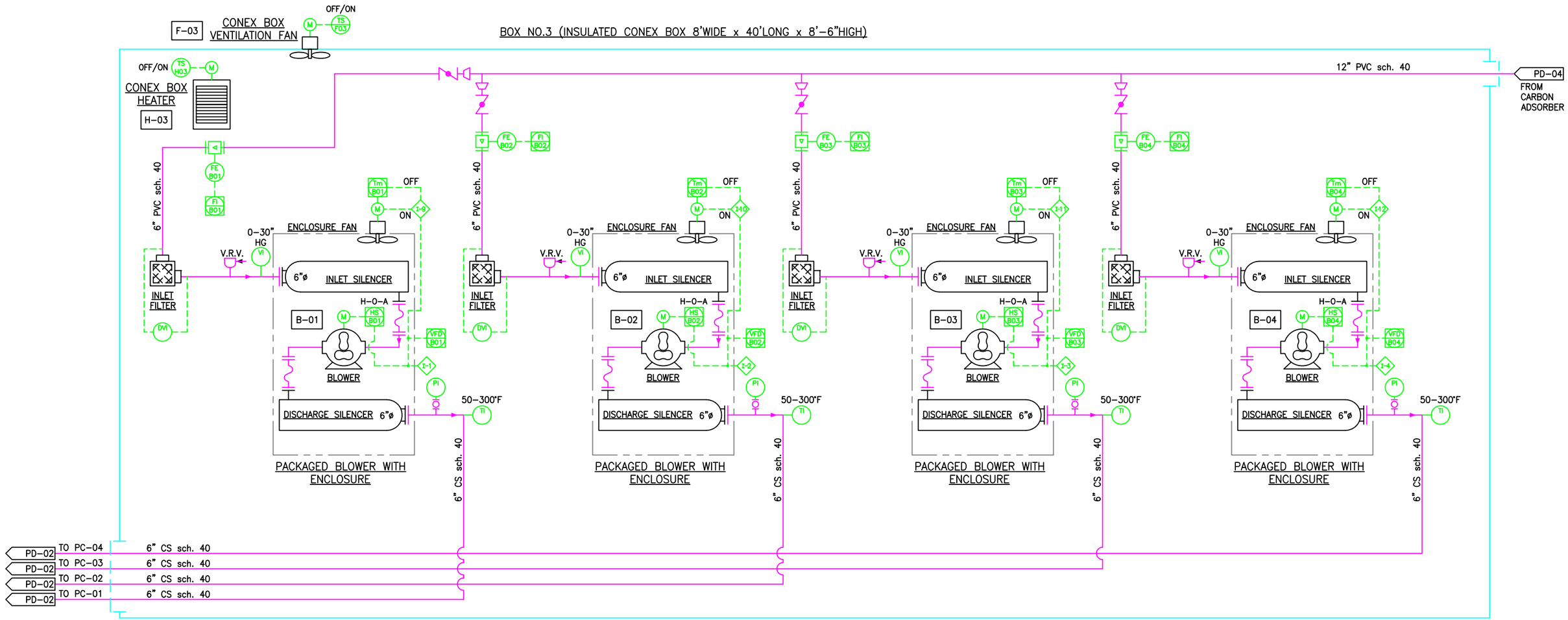
NOTES:



DESIGN DATA:

BLOWER PACKAGE B-01 TO B-04

- PD BLOWER, MODEL EB420C, 75 HP WITH EACH RATED FOR 1178 ICFM
- INLET SILENCER, ABSORPTIVE TYPE WITH INTEGRAL POLYESTER FILTER FOR VACUUM SERVICE
- DISCHARGE SILENCER, ABSORPTIVE TYPE COMPACT DESIGN WITH STUB CONNECTION
- SPRING LOADED VACUUM RELIEF VALVE, FACTORY SET AND INSTALLED
- SUPER SOUNDPROOF ENCLOSURE, FULLY ASSEMBLED, POWDER COAT FINISH WITH ACOUSTIC FOAM INSULATION
- BLOWER SPEED TO BE VFD CONTROLLED WITH SPEED MANUALLY SETTED.
- BLOWER CAN ONLY BE SWITCH ON IF THE CONDITIONS ARE MET:
  - * THE BLOWER ENCLOSURE FAN IS ON.
  - * THE ASSOCIATED TRANSFER PUMP IS IN AUTO OR ON POSITION.
  - * THE ASSOCIATED AFTER COOLER IS IN AUTO OR ON POSITION.

BLOWER FLOW CONTROL

- LOCAL MANUAL ADJUSTMENT WITH BRANCH ISOLATION VALVE.
- FINAL SYSTEM BALANCE COMPLETED VIA VFD AND REMOTE DISPLAY LOCATE IN MCP AND BLOWER VFD INSIDE CONTROL ENCLOSURE.

INTERLOCK I-1 TO I-8

I-01 : BLOWER B-01 SHUT DOWN AUTOMATICALLY IF EITHER HIGH TEMPERATURE ALARM (TAH) IN AC-01 DISCHARGE OR HIGH HIGH LEVEL ALARM (LAHH) IN T-01 IS TRIGGERED.

I-02 : BLOWER B-02 SHUT DOWN AUTOMATICALLY IF EITHER HIGH TEMPERATURE ALARM (TAH) IN AC-02 DISCHARGE OR HIGH HIGH LEVEL ALARM (LAHH) IN T-02 IS TRIGGERED.

I-03 : BLOWER B-03 SHUT DOWN AUTOMATICALLY IF EITHER HIGH TEMPERATURE ALARM (TAH) IN AC-03 DISCHARGE OR HIGH HIGH LEVEL ALARM (LAHH) IN T-03 IS TRIGGERED.

I-04 : BLOWER B-04 SHUT DOWN AUTOMATICALLY IF EITHER HIGH TEMPERATURE ALARM (TAH) IN AC-04 DISCHARGE OR HIGH HIGH LEVEL ALARM (LAHH) IN T-04 IS TRIGGERED.

I-09 : B-01 ENCLOSURE FAN AUTOMATICALLY SWITCHES ON WHEN BLOWER B-01 IS SWITCHED ON AND SHUT DOWN 15 MINUTES AFTER BLOWER B-01 IS SWITCHED OFF.

I-10 : B-02 ENCLOSURE FAN AUTOMATICALLY SWITCHES ON WHEN BLOWER B-02 IS SWITCHED ON AND SHUT DOWN 15 MINUTES AFTER BLOWER B-02 IS SWITCHED OFF.

I-11 : B-03 ENCLOSURE FAN AUTOMATICALLY SWITCHES ON WHEN BLOWER B-03 IS SWITCHED ON AND SHUT DOWN 15 MINUTES AFTER BLOWER B-03 IS SWITCHED OFF.

I-12 : B-04 ENCLOSURE FAN AUTOMATICALLY SWITCHES ON WHEN BLOWER B-04 IS SWITCHED ON AND SHUT DOWN 15 MINUTES AFTER BLOWER B-04 IS SWITCHED OFF.

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EARTH TECH INC.
LONG ISLAND, NY

HOT AIR ASSISTED SVE TREATMENT SYSTEM
BLOWER HOUSING
PROCESS & INSTRUMENT DIAGRAM

SCALE: NONE	APPROVED: —	DRAWN BY: TLo	
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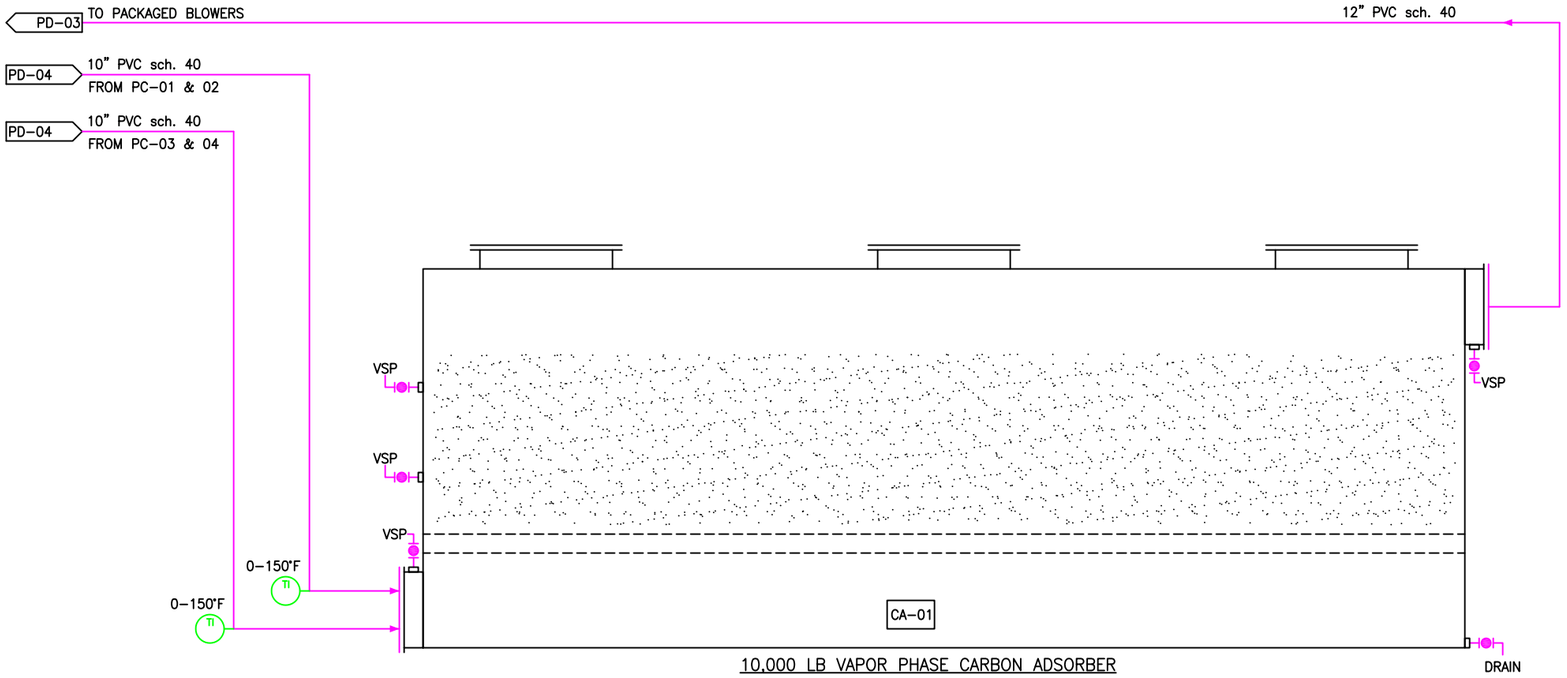
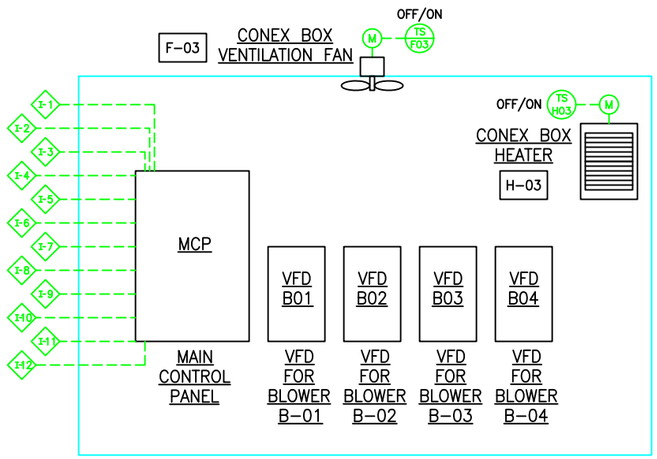


10,000 LB VAPOR PHASE CARBON ADSORBER

DESIGN DATA:

VAPOR PHASE CARBON ADSORBER

- 10,000 LB CARBON STORAGE CAPACITY
- DESIGNED FOR OPERATING FLOW RATE OF 1500 CFM TO 9000 CFM, 70°F @ MAXIMUM 50% RELATIVE HUMIDITY FOR MAXIMUM EFFICIENCY.
- REQUIRE MINIMUM OF 2 BLOWERS TO BE IN OPERATION TO MEET MAXIMUM CARBON ADSORPTION EFFICIENCY.
- EQUIPPED WITH VAPOR SAMPLE PORTS AT VARIOUS CARBON BED DEPTH.



BOX NO.4 (INSULATED CONEX BOX 8'WIDE x 20'LONG x 8'-6"HIGH)

DESIGN DATA:

MAIN CONTROL PANEL

- RELAY BASED CONTROL
- EQUIPPED W/ H-O-A SWITCHES FOR TRANSFER PUMPS P-01 TO P-04
- TRANSFER PUMP RUNNING GREEN INDICATION LIGHTS
- KNOCK-OUT-TANK LEVEL ALARM HIGH-HIGH RED INDICATION LIGHTS.
- EQUIPPED W/ H-O-A SWITCHES FOR BLOWERS B-01 TO B-04
- BLOWER B-01 TO B-04 INLET FLOW METERS.
- BLOWER B-01 TO B-04 RUNNING GREEN INDICATION LIGHT.
- BLOWER ENCLOSURE FANS RUNNING GREEN INDICATION LIGHTS.
- BLOWER DISCHARGE HIGH TEMPERATURE ALARM RED INDICATION LIGHTS.
- EQUIPPED W/ H-O-A SWITCHES FOR AFTER COOLER AC-01 TO AC-04
- AFTER COOLERS AC-01 TO AC-04 FAN RUNNING GREEN INDICATION LIGHTS.
- TEMPERATURE METERS FOR AFTER COOLER AC-01 TO AC-04.
- HIGH TEMPERATURE ALARMS AT AFTER COOLER'S OUTLETS.
- VARIABLE FREQUENCY DRIVES FOR AFTER COOLERS' INTEGRAL CONTROL WITH THE OUTLET TEMPERATURE.
- OPTIONAL AUTO DIALER FOR VARIOUS ALARMING CONDITIONS IF REQUIRED.

BLOWER VFD

- RATED FOR 75 HP MOTOR, 460V, 3 PHASE, 3750 RPM.
- FOR MOTOR START AND MANUAL BLOWER SPEED ADJUSTMENT.

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EARTH TECH INC.
LONG ISLAND, NY

HOT AIR ASSISTED SVE TREATMENT SYSTEM
VAPOR TREATMENT
PROCESS & INSTRUMENT DIAGRAM

SCALE: NONE	APPROVED: –	DRAWN BY: TLo	
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DWG SIZE: 11" x 17" | PROJECT # : Earth Tech | DRAWING NUMBER: PD-04

Appendix B
Health and Safety Plan

Appendix C
Sampling Analysis Plan

Appendix D
Soil Erosion and Sedimentation Control Plan