AECOM

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
On- Site In-Well Stripping System Installation

Prepared For:

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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 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 July, 2009;
- 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 4 in-well stripping wells on-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 ;
- O&M the on-site in-well stripping systems for a period of 180 days following start-up.

1.2 Pilot Test Results

AECOM Technical Services Northeast, Inc. hereinafter referred to as AECOM 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, AECOM/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 AECOM 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, AECOM and Wasatch Environmental. AECOM 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. AECOM has selected a project team to efficiently complete the Remedial Action. Key personnel and their assigned responsibilities for implementation of the remedial action include:

- AECOM Project Manager - Mr. Frank Zeske will act as the Project Manager and has over 24 years of hands-on construction management experience involving public and private sector projects. As an AECOM Project Manager 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;
- AECOM 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.
- AECOM 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 periodically executing the site safety and air monitoring program. The Health and Safety Officer will report to Mr. Peter Sullivan, CIH and will consult with him on field activities and documentation.
- Groundwater Treatment and Technlogy Project Manager / Engineer – Pat Hunnewell 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.
- Wasatch Technical Advisor – Les Pennington will be the technical advisor providing assistance on-site during well drilling/installation and will assist in the review of pilot test data.

1.5 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 1 – 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	140.0	14.0	1.4
TCE	340.0	51.0	7.7	1.2
DCE	870.0	261.0	78.3	23.5

The following calculations were used to develop the removal concentrations presented in Table 1. 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 140 ppb.
- Second pass would again reduce the PCE by 90% from 140.0 ppb to 14.0 ppb.
- Third pass would further reduce PCE from 14.0 ppb to 1.4 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 7.7 ppb to 1.2 ppb.

DCE Concentration of 870 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. This configuration would likely further reduce the concentration and minimize any further down-gradient contribution of contamination.

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 probably 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

At present it is proposed that 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. In order to reduce the sound levels to approximately 40 dB at the nearest residence the blower container will be lined with acoustical material and the blowers will be mounted on vibration isolators. In addition, the ventilation louvers will be provided with sound absorbing cylinders or hanging panels. 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 AECOM 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, tree removal will be kept to a minimum at the off-site location to facilitate the installation of the wells on the Suffolk County Water Authority (SCWA) well field property. Tree removal, if any, will be coordinated with SCWA. 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 AECOM/Wasatch/GWTT. The NYSDEC/Engineers trailer will contain one (1) telephone line and all the equipment listed in Specification Section 01590. AECOM 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. AECOM 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. AECOM 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 AECOM.

3.2.2 Site Preparation

Several general site preparation activities will be performed by AECOM 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 AECOM will review the locations and determine if any utilities will be in conflict with the proposed construction plans. If any utility conflicts are identified, AECOM and the appropriate utility company will discuss and the proposed piping will be adjusted to avoid these conflicts. Any revisions made to the utility layout will ensure that a negative slope will be maintained toward the DDC wells for condensate drainage.

  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. AECOM 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, AECOM 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. AECOM will install silt fence, hay bales, geotextile material, and / or other erosion control devices as necessary. 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. The SWPP and Stormwater Permit Process Flow Chart depicts that if the proposed disturbance is less than one acre (which this project is) and that DEC has not stated a need for a permit, which is considered on a case by case basis, then an SWPPP and an Erosion & Sediment Control Plan are not required. However, a basic Soil Erosion and Sediment Control Plan is attached as an appendix.

- **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 AECOM 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 the off-site DDC well installation the active work areas may require full-time security during off-work hours due to 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 AECOM 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. AECOM will clear trees and other vegetation as required for site access and the execution of work. AECOM will minimize disturbance of vegetation and minimize clearing activities outside of construction areas. AECOM 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 AECOM's onsite Health and Safety Officer in compliance with the HASP. AECOM will utilize a combination of dust, vapor and odor suppression measures. Section 5.0 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. AECOM 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** – AECOM 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. AECOM 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. AECOM 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** - AECOM 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. AECOM has confirmed that there are no permits required to install the in-well stripping wells or monitoring wells. AECOM 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 (between 12.5 feet and 15 feet bgs depending upon the location of the well). 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. Two piezometers will be installed in each of the three proposed DDC wells. The deep ("D") piezometers will be screened over the same interval as the lower DDC well screen and the shallow ("S") piezometers will be screened over the same interval as the upper DDC well screen.

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 in accordance with all applicable regulations 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. At least three days prior to construction the Underground Facilities Protection Organization (UFPO) will be notified that a utility layout is required at the site. The location of the wells will be surveyed and marked and any utility/well conflicts will be rectified by field adjustments. If utilities are located within 5' radius of a proposed well, the first 4'-5' soil will be excavated by hand and/or another method of excavation.

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. 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.

3.3.1.5 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 50-hp rotary lobe-type blower capable of supplying up to 500 actual cubic feet per minute (acfm) 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.

3.3.1.6 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 housed in one unit. The blowers for the down gradient treatment zone will consist 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.

3.3.1.7 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 for air to be introduced to the well and a 6" PVC return air line for gas treatment in the treatment system. Figure 8 shows typical trench details. At the down gradient plume area, AECOM 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. AECOM 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.

AECOM 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.

3.3.1.8 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 sand and free of rocks with sharp edges, 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. No material excavated such as asphalt or other debris will not be utilized as backfill.

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 shall be at a minimum 1.5 times the maximum blower pressure. 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 again pressurized to 1.5 times the blower's maximum pressure, the pump is turned off, and the final test pressure is held for another hour for a total of 4 hours.

3.3.1.9 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 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

AECOM 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.

3.4.1 Rotary-Lobe Blower

A Kaeser EB290C 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. Blower curves are provided in Appendix B.

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

AECOM 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. AECOM 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. AECOM 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. AECOM 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** – AECOM 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. AECOM 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 AECOM, 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

AECOM 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

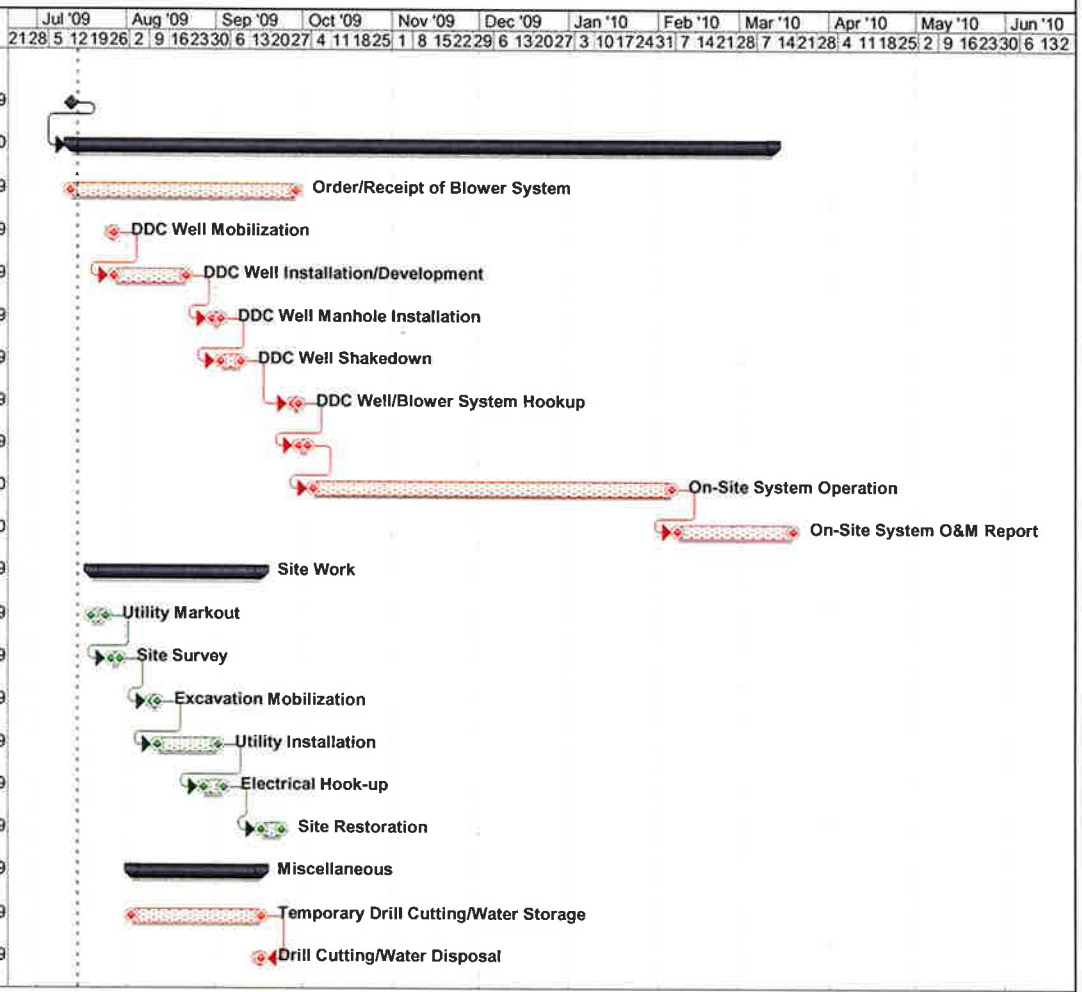
a) Process Flow Acceptance Test According to Specifications Using Water from DDC Wells
b) Sample System Influent and Effluent of Every Process Unit According to Specifications (by others)
c) Perform Analysis at New York State Certified Laboratory (by others)

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

8.0 PROJECT SCHEDULE

AECOM
NATIONAL HEATSET PRINTING
TOWN OF BABYLON, NY
PROPOSED PROJECT SCHEDULE

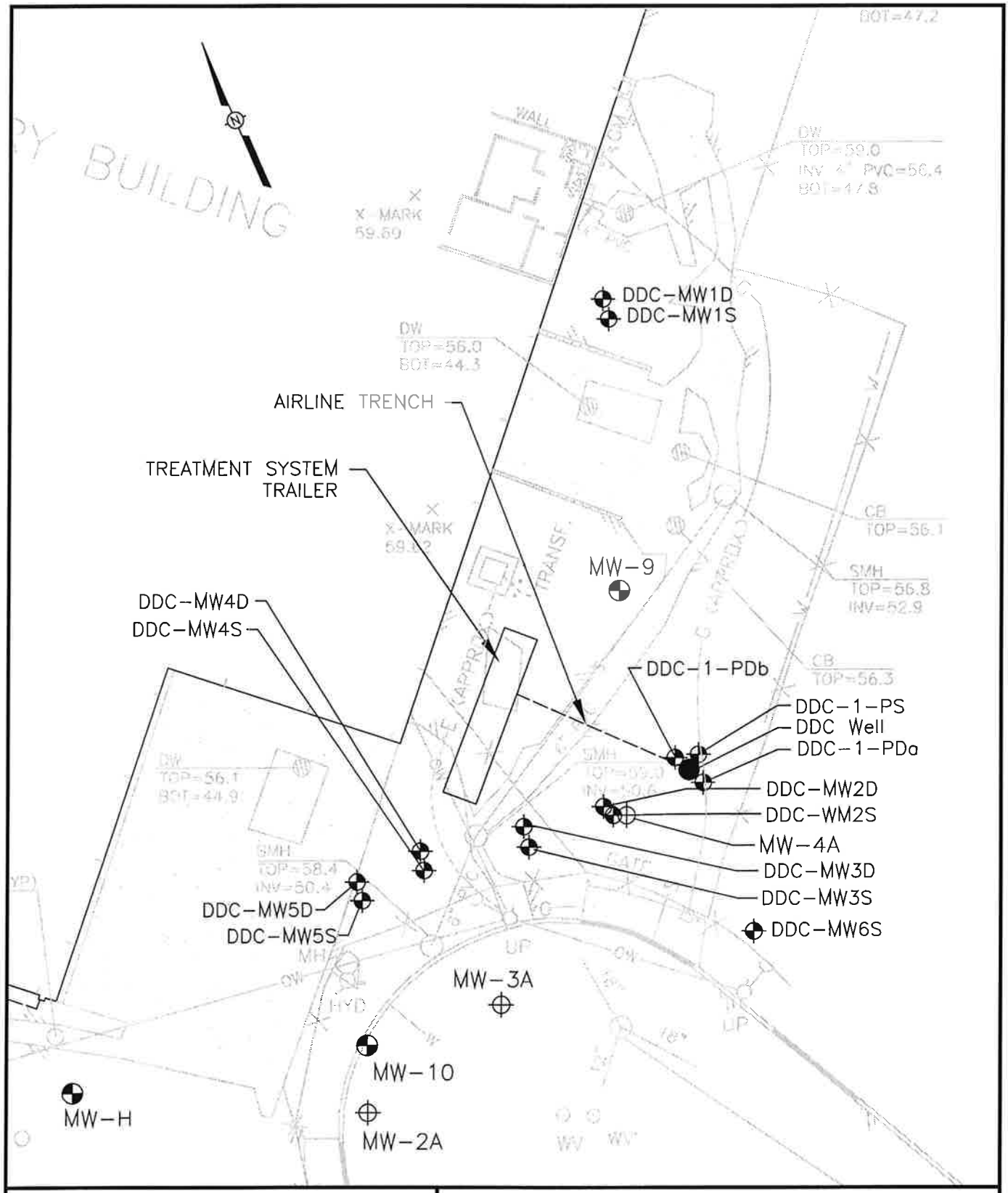
ID	Task Name	Duration	Start	Finish
1				
2		0 days	Mon 7/13/09	Mon 7/13/09
3	**On Site System Installation/Operation**	175 days	Mon 7/13/09	Fri 3/12/10
4	Order/Receipt of Blower System	56 days	Mon 7/13/09	Mon 9/28/09
5	DDC Well Mobilization	1 day	Mon 7/27/09	Mon 7/27/09
6	DDC Well Installation/Development	19 days	Tue 7/28/09	Fri 8/21/09
7	DDC Well Manhole Installation	3 days	Mon 8/31/09	Wed 9/2/09
8	DDC Well Shakedown	5 days	Thu 9/3/09	Wed 9/9/09
9	DDC Well/Blower System Hookup	2 days	Mon 9/28/09	Tue 9/29/09
10	DDC Well/Blower System Shakedown	3 days	Wed 9/30/09	Fri 10/2/09
11	On-Site System Operation	90 days	Mon 10/5/09	Fri 2/5/10
12	On-Site System O&M Report	30 days	Mon 2/8/10	Fri 3/19/10
13	**Site Work**	43 days	Mon 7/20/09	Wed 9/16/09
14	Utility Markout	5 days	Mon 7/20/09	Fri 7/24/09
15	Site Survey	3 days	Mon 7/27/09	Wed 7/29/09
16	Excavation Mobilization	2 days	Mon 8/10/09	Tue 8/11/09
17	Utility Installation	15 days	Wed 8/12/09	Tue 9/1/09
18	Electrical Hook-up	5 days	Fri 8/28/09	Thu 9/3/09
19	Site Restoration	5 days	Thu 9/17/09	Wed 9/23/09
20	**Miscellaneous**	33 days	Mon 8/3/09	Wed 9/16/09
21	Temporary Drill Cutting/Water Storage	33 days	Mon 8/3/09	Wed 9/16/09
22	Drill Cutting/Water Disposal	1 day	Wed 9/16/09	Wed 9/16/09



AECOM
National Heatset Printing - Babylon, NY

Task	Summary	Rolled Up Progress	Project Summary		
Progress	Rolled Up Task	Split	Group By Summary		
Milestone	Rolled Up Milestone	External Tasks	Deadline		

FIGURES

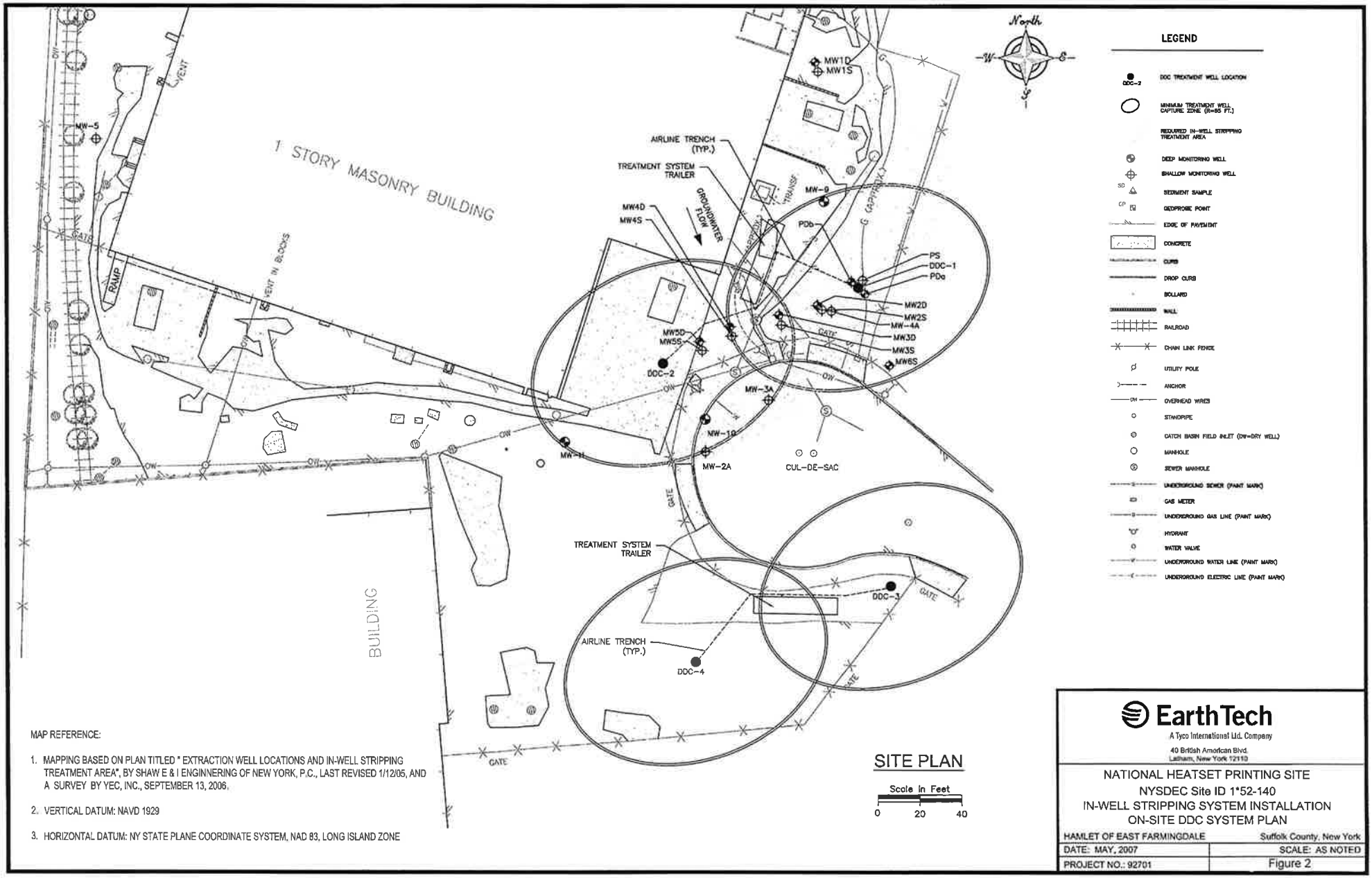


EarthTech
A tyco International Ltd. Company

0' 15' 30' 60'
SCALE

FIGURE 1
SITE PLAN
DDC PILOT TEST
NATIONAL HEATSET PRINTING
BABYLON, NEW YORK

OCTOBER 2006 92701



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

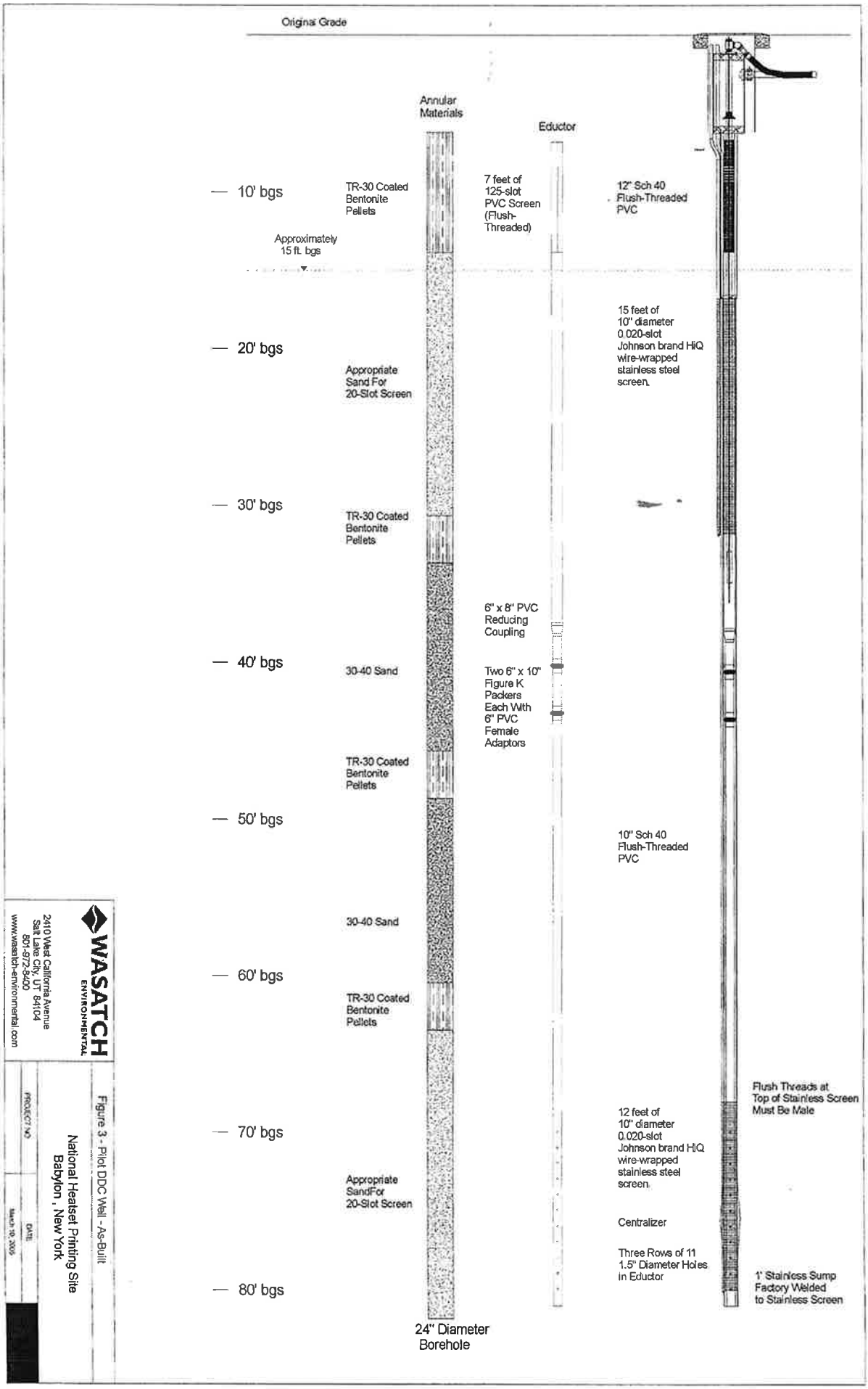
Scale In Feet

0 20 40

EarthTech
A Tyco International Ltd. Company
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

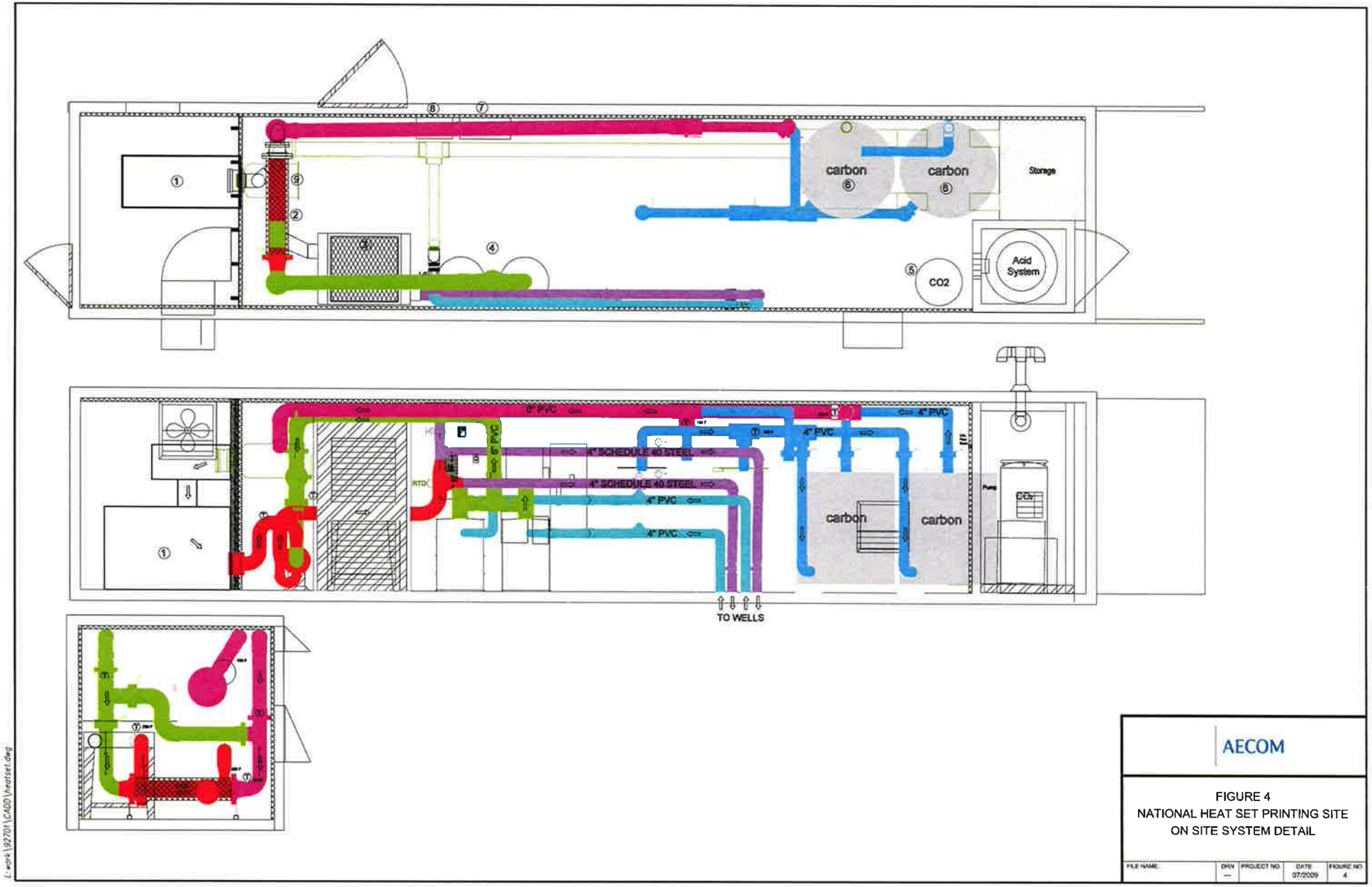
2410 West California Avenue
Salt Lake City, UT 84104
801-972-8400
www.wasatch-environmental.com

PROJECT NO

DATE
March 10, 2009

National Heatset Printing Site
Babylon , New York

Figure 3 - Pilot DDC Well - As-Built



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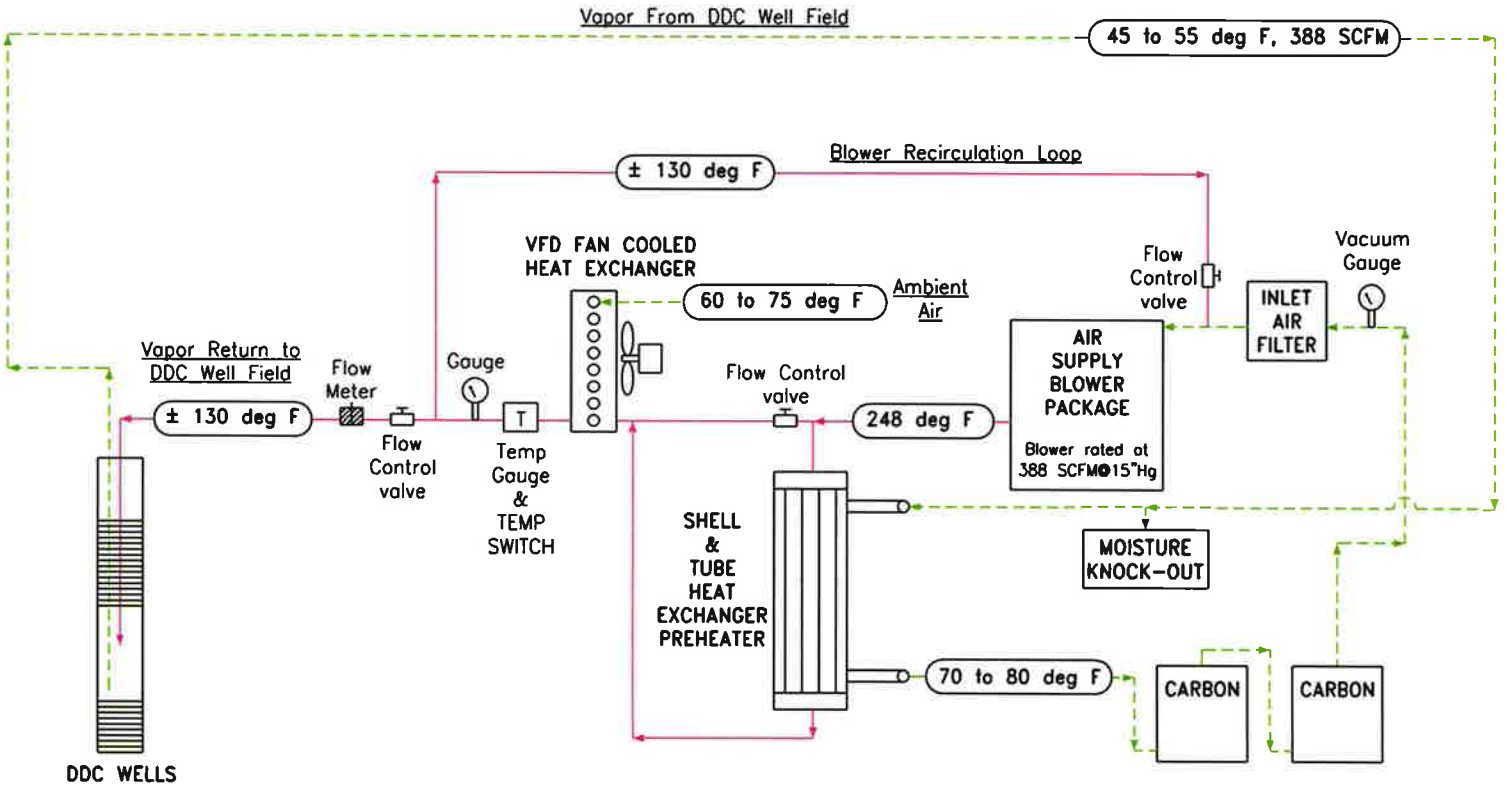
AECOM

FIGURE 4
NATIONAL HEAT SET PRINTING SITE
ON SITE SYSTEM DETAIL

FILE NAME:	DWN	PROJECT NO.	DATE	FIGURE NO.
	—		07/2009	4



NO.	REVISIONS	DATE
B	DESIGN CONDITION UPDATED	06/09/09
A	DESIGN FOR REVIEW	05/19/09

HEAT EXCHANGER INQUIRY

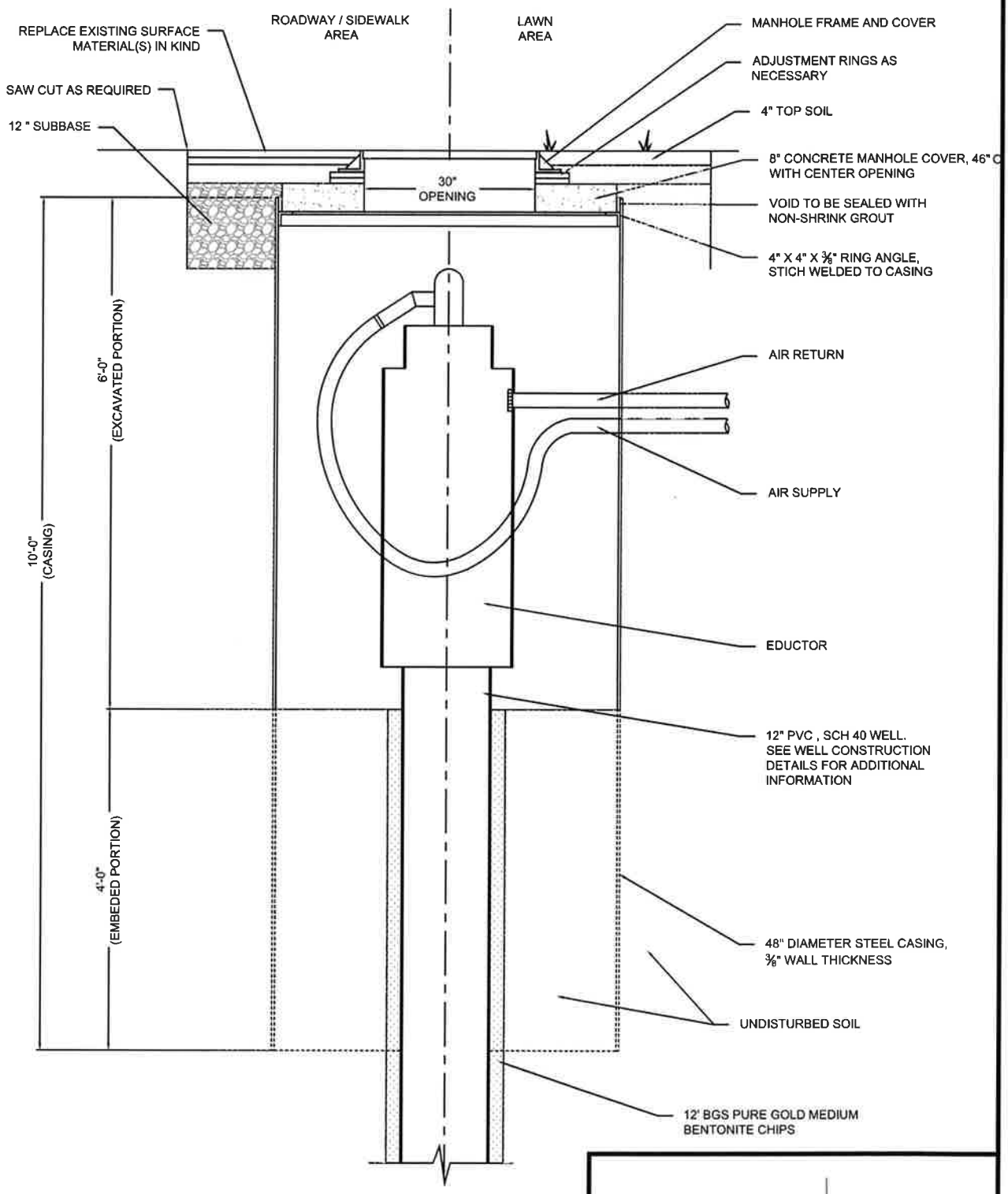
CLOSED LOOP SCHEMATIC

SCALE: NONE	APPROVED: –	DRAWN BY: TLo	
DATE: 05/19/09			

NOTES:
1) NOT ALL VALVES, INSTRUMENTATION AND PIPING, ETC. SHOWN FOR CLARITY.
2) THIS DRAWING IS THE PROPERTY OF GROUND/WATER TREATMENT AND TECHNOLOGY, INC.
3) BASED ON INFORMATION PROVIDED BY AECOM & EQUIPMENT SUPPLIERS.

GROUND/WATER TREATMENT & TECHNOLOGY, INC.
P.O. BOX 1174
DENVILLE, NJ 07834

DWG SIZE: A SIZE	FILE: PD 051909	DWG #: Sk-1



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.

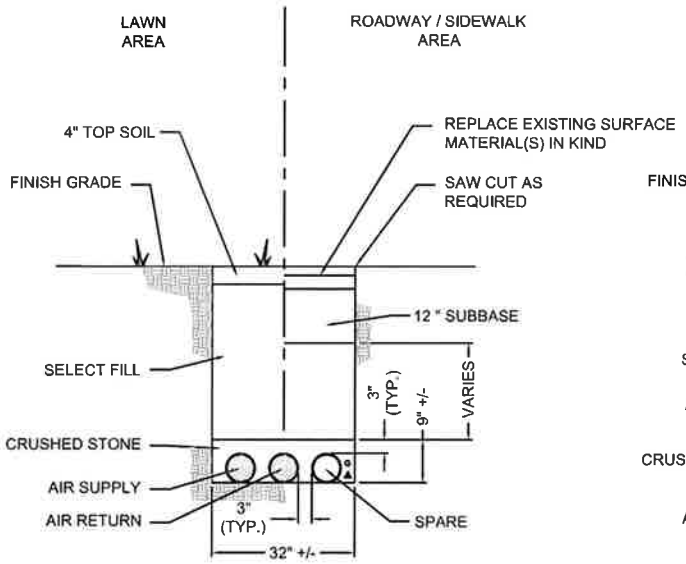
EARTH TECH | AECOM

TYPICAL DDC MANHOLE INSTALLATION DETAIL

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

Plotted By: keith.meisler
Layout-Sheet Name: MANHOLE
Plot File Date Created: Oct/29/2008 3:51 PM

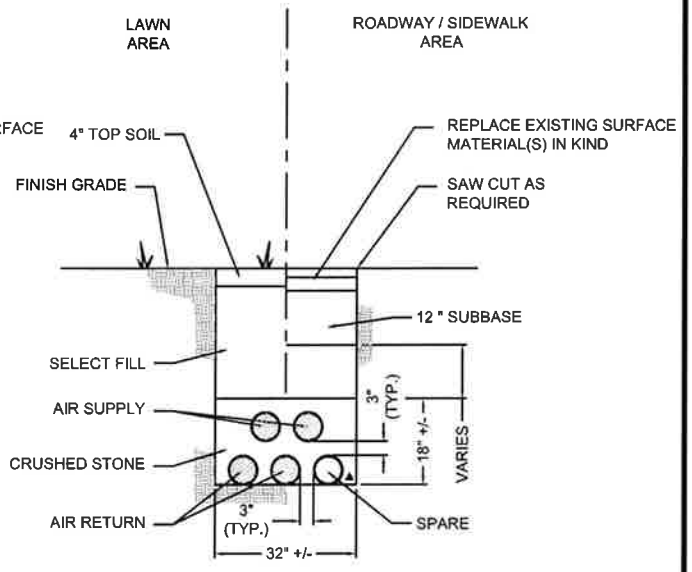
Filename: L:\WORK\92701\CADD\WELLS\802901-D101-A.DWG



SECTION A-A

TYPICAL 1 WELL SET TRENCH DETAIL

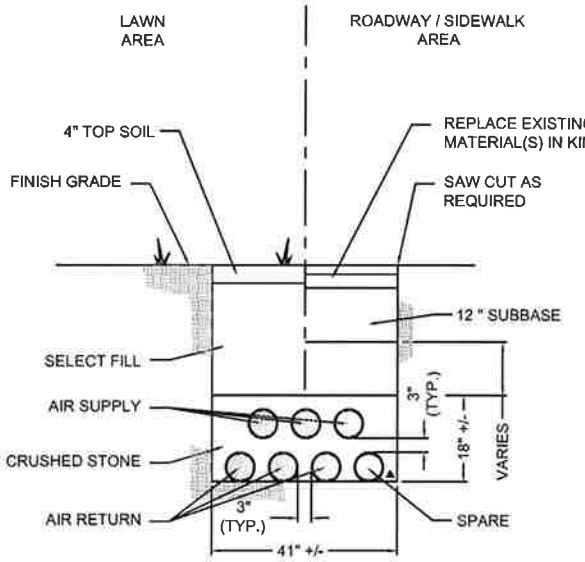
SCALE: NTS



SECTION B-B

TYPICAL 2 WELL SET TRENCH DETAIL

SCALE: NTS



SECTION C-C

TYPICAL 3 WELL SET TRENCH DETAIL

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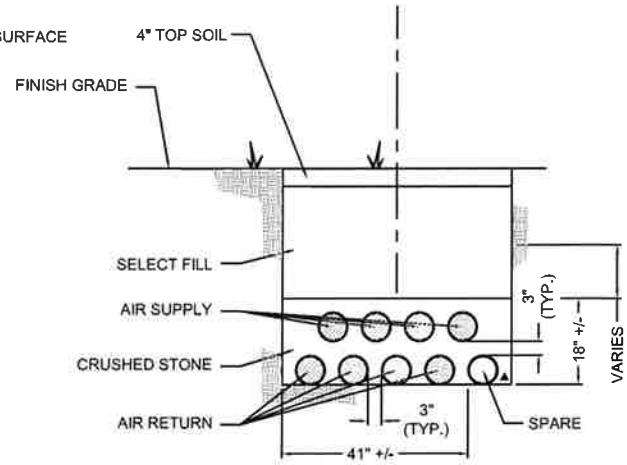


SECTION D-D

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.

AECOM

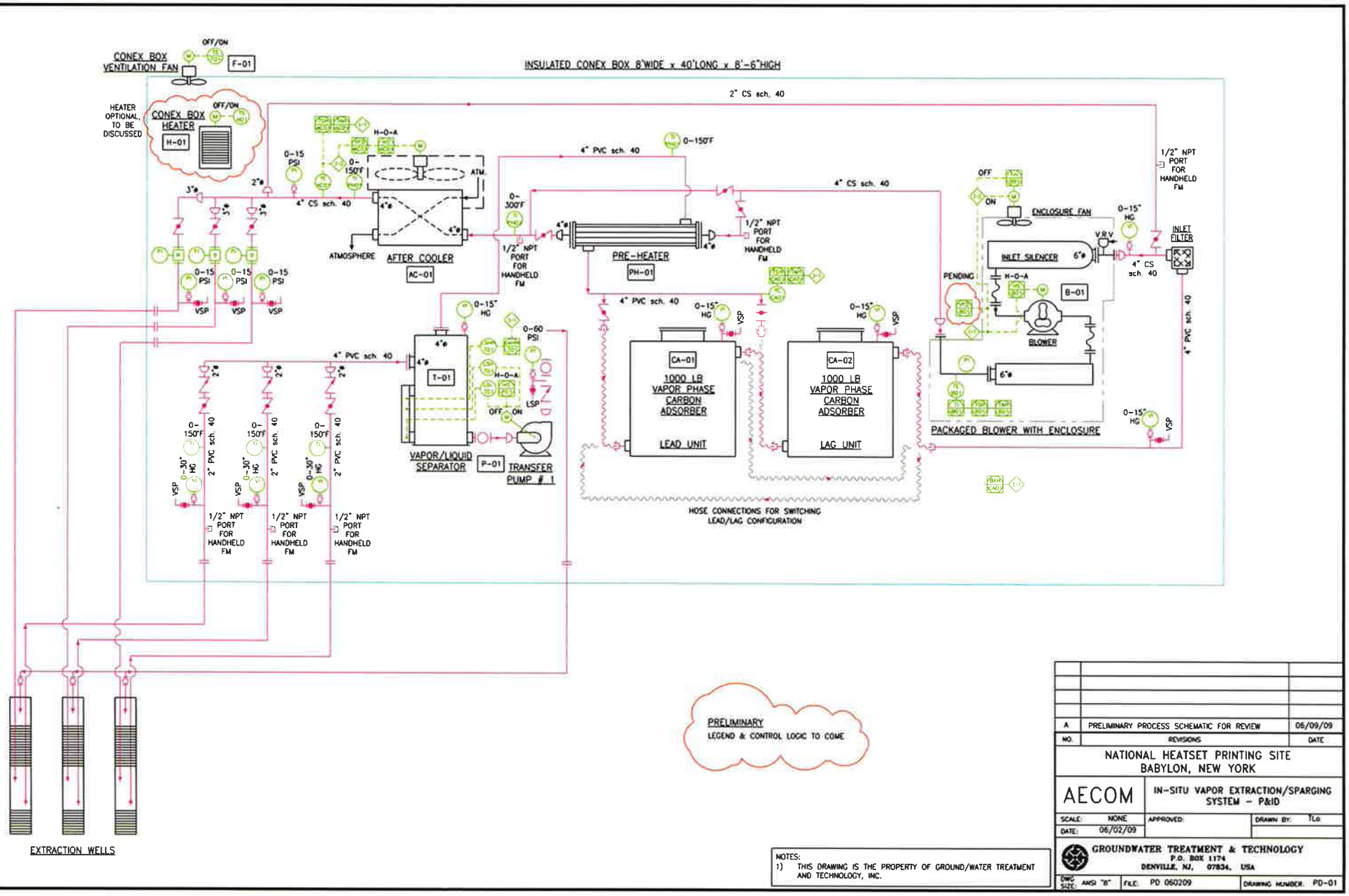
TYPICAL TRENCH DETAILS

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
	—		10/2008	7

Plotted By: MeisterK
Layout-Sheet Name: TRENCH
Plot File Date Created: Jul/10/2009 9.44 AM

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

Appendix A
Piping and Instrumentation Diagram



NOTES:
1) THIS DRAWING IS THE PROPERTY OF GROUND/WATER TREATMENT AND TECHNOLOGY, INC.

NO.	REVISIONS	DATE
A	PRELIMINARY PROCESS SCHEMATIC FOR REVIEW	06/09/09

NATIONAL HEATSET PRINTING SITE
BABYLON, NEW YORK

AECOM

IN-SITU VAPOR EXTRACTION/SPARGING SYSTEM – P&ID

SCALE: NONE | APPROVED: | DRAWN BY: TLo
DATE: 06/02/09

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

DWG SIZE: ANSI "B" | FILE: PD 060209 | DRAWING NUMBER: PD-01

Appendix B
Kaeser Blower Information and Curves

EQUIPMENT SUBMITTAL

KAESER OMEGA BLOWERS
Built for a lifetime.

Compak EB290C

Project Name:

Ground/ Water Treatment

KAESER
OMEGA BLOWERS

Table of Contents

7.2.2 Com-paK Plus Scope of Supply

Each Kaeser Com-paK™ Plus is a compact, sophisticated, and quiet custom designed blower package. We use only the highest quality components for reliable operation and minimal maintenance. Loaded with special features, the Com-paK Plus™ is designed to provide high value for the equipment investment.

Blower: Each Kaeser Com-paK Plus™ package incorporates the heavy-duty Omega Plus™ positive displacement, tri-lobe blower. The Omega Plus™ blower is mounted to the package with motor and drive. Each Omega Plus™ blower is pre-filled with lubricant.

Motor: TEFC/ IP55 enclosure, High Efficiency, Epact, 3 PH, 60 HZ is inverter ready as defined by NEMA MG 31.4, has 3 winding PTC thermistors, and can be started Y-Δ reduced current, solid state, or direct on line. The motor is mounted on the package. The motor wiring and incorporation of the thermistors in the control system by is others.

V-Belt Drive: High capacity type, oil & heat resistant, designed for a 1.5 service factor, belts already pre-tensioned.

Automatic Belt Tensioner: Our proprietary design ensures automatic and proper tensioning of V-belts at all times. Easy visual inspection notifies user of loose belts and necessary adjustments. Quick and easy belt tensioning can be accomplished without removing belt guard. The tensioner provides operator safety, reliability and minimal maintenance.

Guard: Sheet metal construction, OSHA and CE style, totally enclosed, featuring openings for ventilation. The guard is easily removed for maintenance.

Vibration Isolators: Resilient cushioning elements eliminate the transfer of vibration to the foundation and minimize noise. Vibration mounts are already mounted for easy installation.

Oil Drains: Manifolded to the edge of the base for easy routine oil change maintenance. The Teflon-fitted stainless steel ball-type drain valves have gasketed and retained caps that prevent leakage.

Inlet Filter/Silencer: Combination, compact inlet filter/silencer has integral polyester filter element which is easily accessible and washable. The inlet filter/ silencer can be used for inline vacuum service and piped-inlet service as well.

Instrumentation: Each Com-paK Plus™ package includes a pressure gauge, temperature gauge with switch (wiring of the switch by others), and filter differential pressure gauge. Vacuum packages feature a vacuum switch (wiring of the switch by others) instead of a filter differential pressure gauge. The instrument panel includes a Perspex UV cover.

Discharge Silencer: The proprietary silencer is designed specifically for the frequency of the blower to provide maximum attenuation. The silencer includes an integral pulsation dampener and is mounted directly to the blower discharge port. The combination of absorption, reflection, and diffuser sections minimize noise and prevent pipe resonance.

Relief Valve: Model 337 Kunkle spring-loaded relief valve is installed on the discharge silencer of pressure packages and piped through the back of the sound enclosure. Model 215V is installed in the suction line between the inlet silencer and the inlet of the blower for vacuum packages.

Check Valve: A discharge check valve is standard on pressure systems and an inlet check valve is standard on vacuum systems. The swing check style valve features a retained element and is installed on the package.

Compensator: For easy hook-up to system piping, a flexible rubber compensator sleeve (2"-4" connections) or ANSI/DIN flanged arch-type expansion joint (6"-12" connections) is provided at the blower discharge (and the suction of piped inlet and vacuum packages). The purpose of the compensator is to accommodate slight blower to system piping misalignments and vibration isolation.

Lifting Lugs and Transport Provisions: Blower and Motor are supplied with lifting lugs while the base incorporates integral lifting/transporting provisions. Packages are wrapped in plastic, shipped bolted to a platform, and surrounded by a wooden frame.

Sound Enclosure: The full, sound-attenuating enclosure encases the entire package and has sound insulated louvers covering the process air inlet and cooling air inlet openings allowing for proper ventilation. On pressure packages, the discharge check valve and the compensator are covered with a sound-insulated powder-coated steel collar. On vacuum packages and piped-inlet packages, the inlet and discharge connections are covered. The sound-attenuating enclosure has easy open maintenance door(s) located at the front of the package for access to maintenance areas. The doors are gasketed and the seams are sealed with silicone sealant. If the package is installed outdoors, we recommend that the packages be installed under roof to protect against snow loads and ventilation blockage. Enclosures are powder-coated to provide protection against corrosion caused by the elements.

An integral ventilation fan is provided in the enclosure to ensure proper cooling at all blower speeds. The fan wiring is by others. If a fan voltage is not specified, the voltage will be the same as the main blower drive motor. Most local codes require a power supply separate from the main blower motor power supply.

Base: The sound-attenuating enclosure and blower package are mounted on a fabricated steel base that encloses the bottom of the package assembly. Construction in a rigid, very compact frame design minimizes space requirements and allows the assembly to be handled as a unit.

TECHNICAL PROPOSAL		More air flow With less energy	KAESER OMEGA BLOWERS

Project Reference: Ground/Water Treatment
Prepared By: David W. Martine
Location: Wharton, NJ
Date: 05/29/09
Customer: Ground/Water Treatment

KAESER

Com-paK Plus Package EB 290C vac / 52P

Rotary Blower Package

Vacuum application

For an oil-free conveying medium

Available with CE Manufacturer's Declaration within the meaning of Machinery Directive 98/37 EG, a. II B

Ambient conditions:	Temperature: 104 °F	Altitude: 3281	ft a.l.s.
Gas handled			Dry Air
Effective suction capacity Q_1 at design point		781	icfm
Inlet flow at standard conditions: (Standard conditions 14.7 psia, 68 °F and 0% RH)		388	scfm
Blower speed at design conditions:		3720	rpm
Design conditions:			
Inlet pressure (absolute)		7.3	psia
Inlet temperature		68	°F
Pressure difference	15.07 "Hg	7.4	psi
Discharge pressure (absolute)		14.7	psia
Discharge temperature		248	°F
Blower shaft power		34.6	bhp
Motor rated power		50.0	hp
Motor enclosure		TEFC	
Motor voltage / frequency		460V/60Hz	
Type of cooling		Air cooled	
Connection size		6"	
Volumetric efficiency		0.85	
		with enclosure	
Estimated noise level to DIN EN ISO 2151, figures ± 3 dB(A) with sound insulated piping		79	dB(A)
Dimension (L x W x H) inches		61 x 58 x 70	
Estimated Weight		ca. 2352	lbs

Ambient conditions considered during motor sizing.

V 7.2 AD VERSION 22/04/08 T1

Kaeser Compressors, Inc.
P.O. Box 946
Fredericksburg, VA 22408
Tel.: (540) 898-5500 Fax.: -5520

KAESER
OMEGA BLOWERS

OMEGA/OMEGA PLUS ROTARY BLOWERS 05/29/09
- PACKAGE RECOMMENDATIONS - PAGE: 1

Customer: Ground/Water Treatment **Prepared By:** David W. Martine

INPUT DATA:

Operating mode: Vacuum
Kind of package: Com-paK Plus Package
Inlet temperature : 68 °F
Inlet pressure : 7.3 psi
14.87 "Hg

Flow medium:Dry Air
Specific heat constant κ : 1.40
Specific weight at standard conditions : 0.076 lb/ ft³
Pressure difference : 7.4 psi
15.07"Hg
Discharge pressure : 14.7psi
29.93"Hg

Ambient conditions: Temperature: 104 °F Altitude: 3281 ft a.s.l.

Technical data:

NOTE: ACCESSORIES SHOWN ARE INTENDED FOR AIR USE ONLY.

Package: EB 290C vac
Blower: OMEGA 52P
Motor power: 50.0 hp
Operating voltage: 460V/60Hz

Motor size increased by one hp rating!

Blower speed: 3720 rpm
Connection ANSI: 6"
% of maximum speed: 85
Volumetric efficiency: 0.85

Performance data:	max. load	design point
Pressure difference Δp:	7.4 psi 15.07 "Hg	7.4 psi 15.07 "Hg
Suction capacity Q1*:	782 icfm	781 icfm
Inlet air flow Q1 (standard) : Standard conditions 14.7 psia, 68°F and 0 % RH		388 scfm
Discharge temperature*:	246 °F	248 °F
Motor shaft power :	37.8 bhp	38.0 bhp
Blower shaft power*:		34.6 bhp
		with sound enclosure
Sound pressure level** :		79 dB(A)
Sound power level** :		96 dB(A)
Dimension [inches](L x W x H)		61x 58 x 70
Estimated Weight		ca. 2352 lbs

* **Performance data to DIN ISO 1217, part 1, annex C**

** **Measured to DIN EN ISO 2151, figures ± 3 dB(A), with sound isolated pipework.**

Motor shaft power includes belt losses in addition to dirty filter losses of 0.6 psig (40 mbar).
Ambient conditions considered during motor sizing.

The given sound pressure level is valid only if connection is made by a sound-insulated pipeline for the medium inlet and outlet.

V 7.2 AD VERSION 22/04/08 T1

KAESER OMEGA BLOWERS

OMEGA/OMEGA PLUS ROTARY BLOWERS - PACKAGE RECOMMENDATIONS -

Customer: Ground/Water Treatment **Prepared By:** David W. Martine

Kind of package: Com-paK Plus Package Operating mode:Vacuum

Inlet temperature : 68 °F

Inlet pressure : 7.3 psi 14.87 "Hg Valve set pressure: 7.5 psi

Input inlet flow: 781 icfm

Package: EB 290C vac

Blower: OMEGA 52P Blower speed: 3720 rpm

Motor power: 50.0 hp ***Motor size increased by one hp rating!*** Connection ANSI:6"

Operating voltage: 460V/60Hz % of maximum speed: 85

Nameplate data:

related to 14.7 psia and 68°F

Pressure difference Δp: 7.4 psig 15.07 "Hg

Discharge pressure p2 : 14.7 psia Inlet pressure p1*: psia

*Inlet pressure related to max. pressure difference

Suction capacity Q1: 782 icfm

Related to inlet conditions

Accessories:

NOTE: ACCESSORIES SHOWN ARE INTENDED FOR AIR USE ONLY.

	yes	no		yes	no
Vacuum valve: 1x 3" V	☒	☐	Sound enclosure:	☒	☐
Unloaded start up valve: Call KCI	☐	☒			
Check plate: 6"	☐	☒	Inlet silencer-suction from pipe:	☒	☐

Optional for package with sound enclosure:

Sound enclosure for outdoor installation:	☒	☐	extra outlet silencer:		
			diffuse exhaust into room:	☐	☒
			with compensator for pipeline	☐	☒

Instrumentation:

Temperature gauge with switch point:	☒	☐
Pressure gauge:	☒	☐
Filter differential pressure switch:	☐	☒

Comments for project: Ventilation Fan Motor to be 460 volt, 3 phase, 60 Hz and will require a separate disconnect from main blower motor.

EB290C/

Scope of Supply

Blower

- Rotary tri-lobe, positive displacement, horizontally mounted Omega Blower

Package	Blower	Horsepower
EB290C	Omega 52P	50

Electric Motor / Drive

- Motor, EPACT compliant
- V-belt drive and easily removable, fully-enclosed guard
- Auto V-belt tensioner maintains belt tension, prolongs belt life, and simplifies maintenance

Package

- Elevated table-top style, heavy duty compact base frame with integral sub-base
- Inlet silencer, absorptive type with integral polyester filter for pressure or vacuum service
- Discharge silencer, absorptive type compact design with stub connection
- Spring loaded relief valve, factory set and installed
- Inlet check valve installed on vacuum packages
- Flexible connector on discharge connection
- Mounted Gauges (pressure, temperature with switch) and a vacuum switch
- Super soundproof enclosure, fully assembled, powder coat finish with acoustic foam insulation

Performance Data

Electrical Data Drive Motor

						wye-delta starting (2-wire per phase)			direct online (1-wire per phase)		
Hp	Voltage	FLA +/- 10%	Nominal Eff	Insulation Class	Enclosure Type	Jumper Connection	Disconnect Fuse	Wire Size (75°C or higher)	Jumper Connection	Disconnect fuse	Wire Size (75°C or higher)
50			92.4	F	TEFC						
	460	50				Y -> Δ	80 AMP	6 AWG	Δ	100 AMP	2 AWG

Notes:
1. Disconect fuses should be of dual element time delay design.
2. Breaker should be suitable for a heavy duty starting load and of inverse time delay design that complies to regulations outlined in NEC 430.52
3. Fuse and wire sizes determined in accordance to NEC 240.6, 430.52 and tables 250.122, 430.248, 430.250, 430.252.

EB290C/

Enclosure Fan Data								
Power	Voltage	Phase	Current Draw	Jumper Connection	Quantity	Enclosure Type	Fan Type	Flow
430W	460	3	1.00	Y	1	TEFC	Radial	825 CFM

Notes:
1.) Nominal power in Watt
2.) Current in A (+/- 10)
3.) Default fan selection is 460V. If other voltage is required, it must be noted at time of order.
4.) Fan requires separate power supply
5.) Fan should run at the same time as main motor. If fan is able to run for 15 minutes after machine is turned off, it will improve thermal conditions inside enclosure

Oil System Data	
Drive End Capacity	0.50 quarts
Gear End Capacity	0.60 quarts
Oil Type	SB 220

Package Connections										
Hp	Cable Entry		Length (in.) D	Width (in.) W	Height (in.) H1/H2	Floor (sq ft)	Weight (lb)		Connection Size (in.)	Type
	Drive Motor	Fan Motor					EB290C			
50	2 x 2" NPT & 1 x 1/2" NPT	2 × M16	58 1/2	61 7/16	70 / 89 3/4	25	2352		6	ANSI 125/150

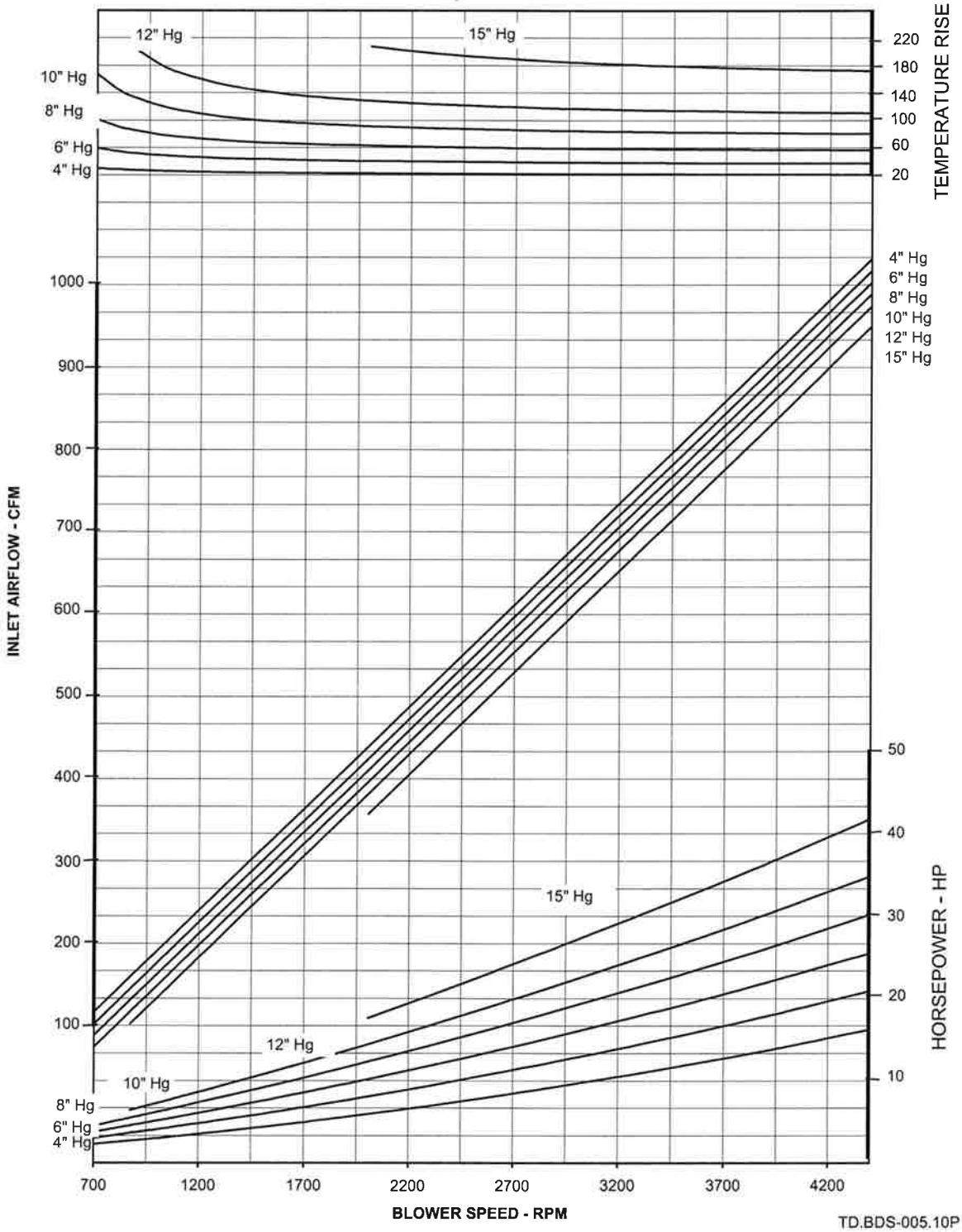
Ventilation of Blower Room	
Air Inlet Opening	5.5 sq. ft
Cooling Fan Capacity (forced ventilation)	2,300 CFM
Max Heat Rejection	30,400 BTU / HR

Ventilation values based on 968 CFM @ 15.PSIG ΔP, 100Hp and ambient inlet. Max. room temp. = 104°F and cooling air temp = 95°F. Discharge piping length = 5 ft.

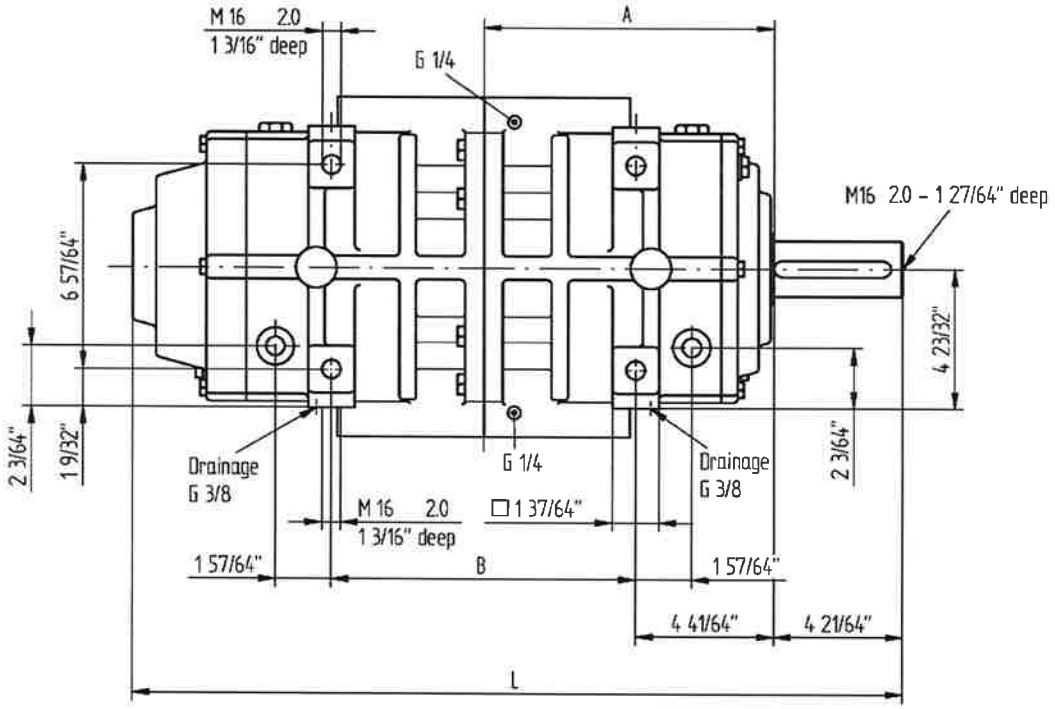
KAESER COMPRESSORS

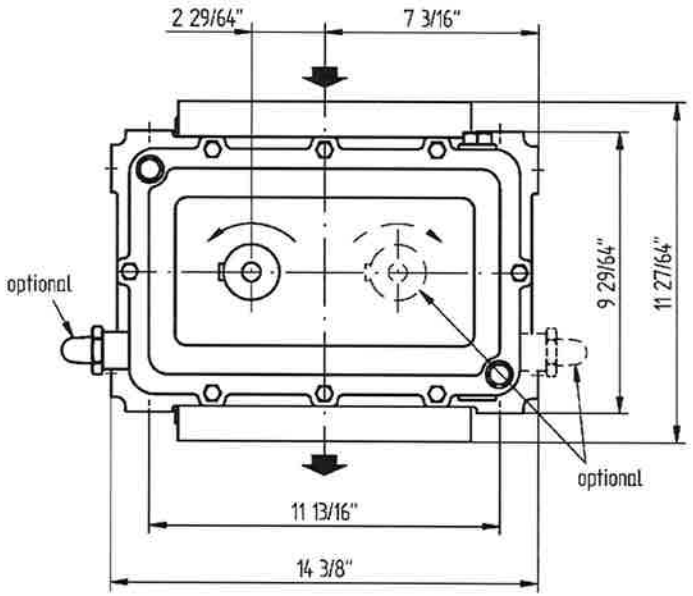
OMEGA 52 PLUS

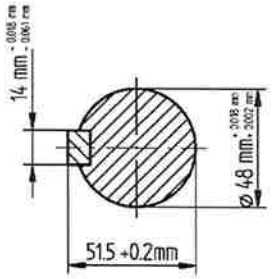
VACUUM PERFORMANCE
14.7 psia and 68 °F

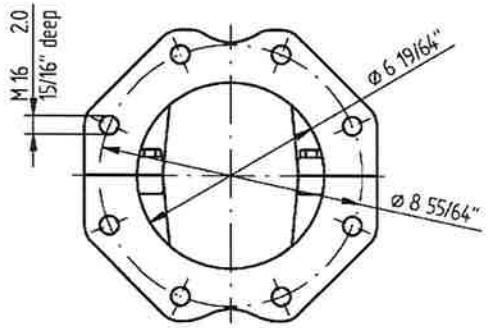


TD.BDS-005.10P
Versions: 2.0









Model	A	B	L
OMEGA 52 PLUS	9 49/64"	10 15/64"	25 63/64"

Connecting flange 150 mm ND 6 DIN 2501

Please note :

Thread and shaft dimensiones in mm all other in inches

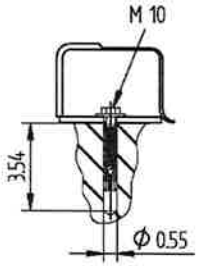
Blower must be mounted on a completely flat surface

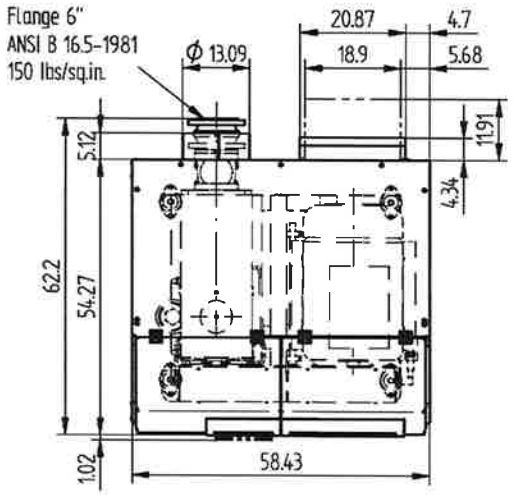
Permisible flatness : 0.002"

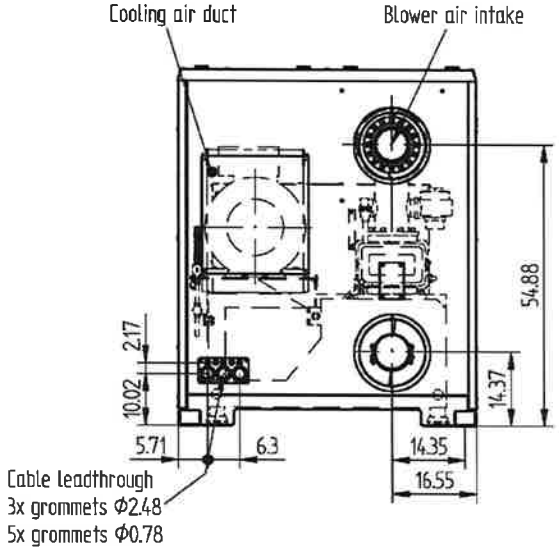
OMEGA 5 PLUS horizontal

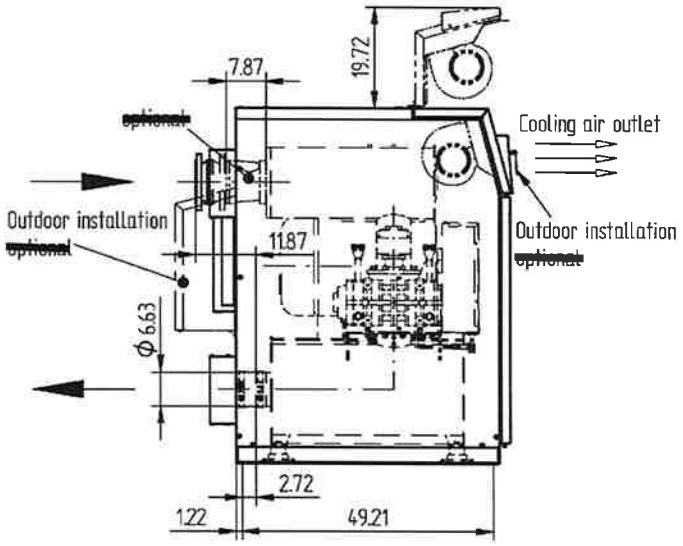
Stand	Datum:	Name:	CAD-Datei:
24.01.08	24.01.08	Strobel	MB002390-USE.dft

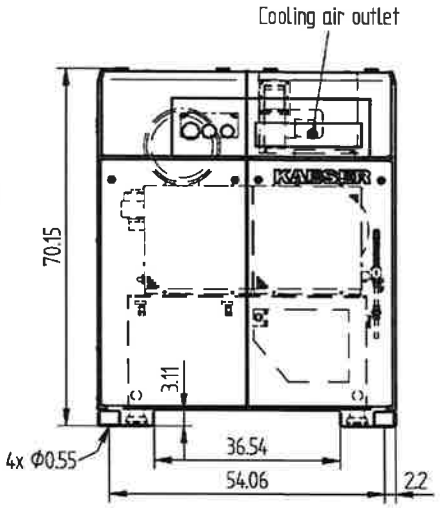
KAESER KOMPRESSOREN – Werk Gera –











EB 290/420 C vac

Stand:	Datum:	Name:	CAD-Datei:
07.04.08	15.02.06	Strobel/My	MB002265-3-USE.dft

KAESER KOMPRESSOREN — Werk Gera —

Datenblatt für Drehstrom-Käfigläufermotoren

Data sheet for three-phase Squirrel-Cage-Motors

SIEMENS

Kunden-Auftrags-Nr./Client-Order-No.:

Siemens-Auftrags-Nr./Order-No.:

Angebots-Nr./Offer-No.:

Item-Nr./Item-No.:

Komm.-Nr./Consignment-No.: 893148.7

Anlage/Project:

Bestell-Daten/ *Ordering Data*

Motortyp *Motortyp*	**1LA92072WA60-Z**
Kurzangaben *Order Codes*	A11 + K20 +K40 +Y82 +U40

Elektrische Daten/*Electrical Data*

Bemessungsspannung *Rated motor voltage*	(6) 400 VD/690 VY, 50 Hz; 460 VD, 60 Hz	
Frequenz *Frequency*	50 Hz	60 Hz
Bemessungsleistung *Rated motor power*	37 kW	50 HP
Bemessungsdrehzahl *Rated motor speed*	2950 min^{-1}	3555 min^{-1}
Bemessungsmoment *Rated motor torque*	120 Nm	100 Nm
Bemessungsstrom *Rated motor current*	64 A / 37,1 A	57 A
Anzugs-/ Bemessungsstrom *Starting-/ Rated motor current*	7	8,4
Kipp-/ Bemessungsmoment *Breakdown/ Rated motor torque*	3,3	3,7
Anzugs-/Bemessungsmoment *Starting-/ Rated motor torque*	2,4	2,7
Wirkungsgradklasse *Efficiency class*	EFF 1	EPACT
Wirkungsgrad 100% pn / EPACT nom.eff *Efficiency 100 % Pn / (IEEE 112b)*	94 %	92,4 %
Leisuntsfaktor bei 100% Pn *Power factor at 100 % Pn*	0,89	0,88
Design Letter / Code Letter		-/- / -/-
CC 032A		ja/yes

Mechanische Daten/ *Mechanical Data*

Schalldruckpegel (LpfA) 50 Hz/60Hz *Noise 50Hz/60 Hz*	71 dB(A) / 75 dB(A)
Trägheitsmoment *Moment of inertia*	0,2 kgm^2
Lager AS *Bearing AS*	6312 ZC3
Lager BS *Bearing BS*	6212 ZC3
Art der Lagerung *Locating bearing*	Festlager BS (Standard) - locating bearing
Kondenswasserlöcher *Drain Holes*	nein/no
Nachschmiereinrichtung *Regreasing device*	nein/no
Schmiermittel *Type of lubrication*	Esso Unirex N3
Fettgebrauchsdauer: 40°C *Relubrication interval at 40°C*	4000 h
Fettmenge Nachschmierung :40°C *Quantity of grease for relubrication*	15 g
Äußere Erdungsklemme *External earthing*	nein/no
Anstrich *Paintwork*	Sonderanstrich RAL7030 steingrau - special paintwork RAL7030 stone grey

Umgebungsbedingungen/ *Site conditions*

Umgebungstemperatur *Ambient temperature*	-30.0 - +40°C
Höhe über Meeresspiegel *Altitude above sea level*	1000 m
Normen und Vorschriften *Standards and specifications*	IEC, DIN, ISO, VDE, EN

Allgemeine Daten/*General Data*

Baugröße *Frame size*	200 L
Bauform *Type of construction*	IM B3
Gewicht in kg , Bauform IM B3 ohne Opt. *Weight in kg, Type of construction IM B3 without opt.*	214 kg
Gehäusematerial *Frame material*	Aluminium - aluminium
Schutzart *Degree of protection*	IP 55
Kühlart, TEFC *Method of cooling, TEFC*	IC 411
Vibrationsklasse *Vibration class*	N (Standard)
Isolation *Insulation*	F ausgenutzt nach B - F, utilized to B
Betriebsart *Duty type*	S1
Drehrichtung *Direction of rotation*	bidirektional - bidirectional

Klemmenkasten/ *Terminal box*

Klemmenkastenmaterial *Material of terminal box*	Aluminium - aluminium
Typ *Typ*	gk 430
Gewinde Kontaktschraube *Terminal screw thread*	M6
Max. Leiterquerschnitt *Max. cable cross-sectional area*	25 mm^2
Kabeldurchmesser von ... bis ... *Cable diameter from ... to ...*	27 mm / 35 mm
Kabeleinführung *Cable entry*	2xM50x1,5-1xM16x1,5
Kabelverschraubung *Cable gland*	3 Verschlussstopfen - 3 plugs

Explosionsschutz/ *Explosion protection*

Zündschutzart *Type of protection*	ohne (Standard) - without

Sonderausführungen/ *Special configurations*

A11 - 3 Kaltleiter für Abschaltung
A11 - 3 PTC thermistors for tripping
K20 - Lagerung für erhöhte Querkräfte
K20 - bearings for cantilever forces
K40 - Nachschmiereinrichtung
K40 - regreasing device
Y82 - Zusatzschild mit Kundenangaben .....
Y82 - extra rating plate.....

U40 – Kaeser Ausführung
U40 – Kaeser design

Technische Änderungen vorbehalten. Differenzen zwischen berechneten und Leistungsschilddaten möglich
Technical and ordering data are subject to change. There may be descrepancies between calculaded and rating plate values.

Bemerkungen/*Remarks:*

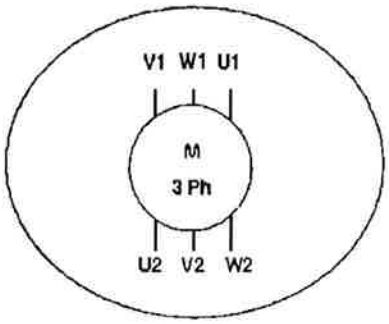
Y82=37 kW; 400VD; 50 Hz; SF 1,15
Y82=Efficiency : 94 %; (EN 60034); Temp.rise 80 K
Y82=Kaeser Nr.: 893148.7

26.03.2004

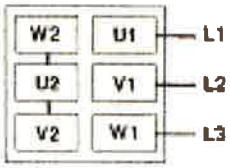
00_76_50_60_2DL04 1.0

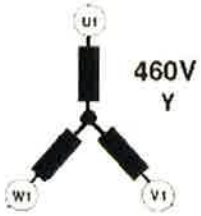
Wiring Diagram for Com-paK Plus Motors 50 HP- 250 HP

- 3600 RPM (2-Pole), 3-Phase squirrel cage induction motors with 6-leads.
- 1800 RPM (4-Pole), 3-Phase squirrel cage induction motors with 6-leads.
- Frequency: 60HZ, Voltage: 460V (1.15 S.F.) with ±10% variability.
- Allowable starting methods: Full Voltage/Direct On Line (Δ @ 460V), Solid State Ramp Starting (Δ @ 460V), or Reduced Current/YΔ (460V).

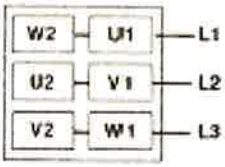


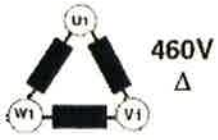
460V Y-Connection:





460V Δ-Connection:





Electrical Diagrams

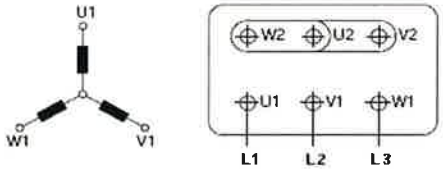
Extractor

3-phase extractor motor for 230V-Δ / 400V-Y / 460V-Y /// 60 Hz

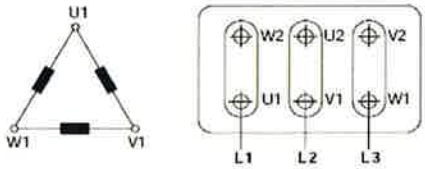
Base-mounted blower	Model	Maximum flow rate	60Hz	230V-Δ/400V-Y	230V-Δ	400V-Y	460V-Y	
			Mat-No.:	Power	Current	Current	Power	Current
EB C	CMP-616-2T	824	893352.0	0.50 Hp	1.74 A	1.00 A	0.50 Hp	1.00 A

Connection diagram

Star configuration - Y



Delta configuration - Δ

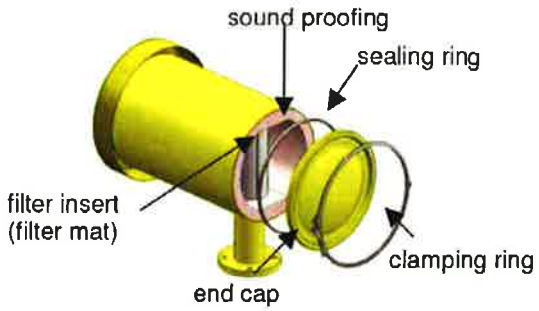


- Enclosure specification: IP55
- Power supply cable: directly to motor terminal box
- The extractor fan should be so connected that it runs concurrent with the blower motor.
- Direction of airflow is out of the sound enclosure.
- Make sure that earth is connected.
- Make sure that cables connected in the terminal box are not under mechanical tension.
- If the extractor fan stops while the rotary blower is in operation the temperature inside the enclosure can rise to an unacceptable level.
- In such a case, a supply of cooling air must be provided or the blower motor stopped to avoid damage.
- If the extractor fan is arranged to continue running for about 15 minutes after the blower motor has stopped, this improves the thermal conditions in the sound enclosure.

Attention!

- The extractor fan specification is found on the nameplate or in the service manual.
- Observe the instructions in the service manual supplied with the fan.
- The main power supply connection and the protective measures required must be carried out by an authorized electrician to the provisions of European Standards and the regulations of the local Electricity Supply Authority.
- The electrician is to observe valid regulations concerning the connection of electric motors.
- Observe the regulations laid down in EN 60204-1.
- Make sure all electrical connections are tight and cannot loosen.
- The terminal must be suitable for the cross-section and type of conductor used.
- Make sure that no exceptional bending forces or strains are applied to the cable, conductors and terminals.
- Lay the connecting cable such that it cannot be damaged by, for example, movement of the motor swing frame.
- Avoid cable contact with the machine, exceptional friction and radiation of heat.
- The cable used or its sheathing has to be resistant to the normal wear to be expected by movement of the swing frame and to the effect of pollutants in the atmosphere.
- A fine-stranded cable is recommended for the connection lines.

9.2.2.3 Filter Inserts Com-paK Plus

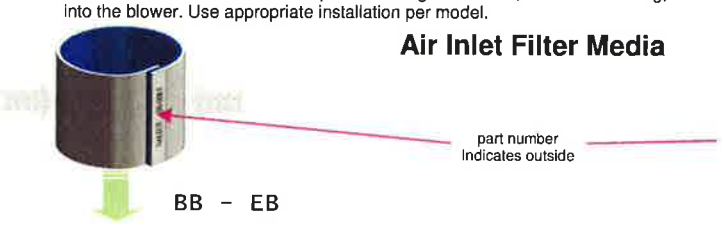


BB - FB

Model	Connection Size	Internal Width	Length	Dimensions filter mat	Filter part-no.	Sealing ring part-no.	Clamping ring part-no.
EB 290 C	6	6 2/3	9	9 x 23 2/3^{+25}	893606.0	893829.0	893722.0

- Measurements above in inches.
- The filters are in the form of mats to be wound around the inlet port and retained by means of hook and loop strips.
- Flow direction to the blower is important during installation; if it is done wrong, then the filter sheet material will be sucked away into the blower. Use appropriate installation per model.

Air Inlet Filter Media



BB - EB

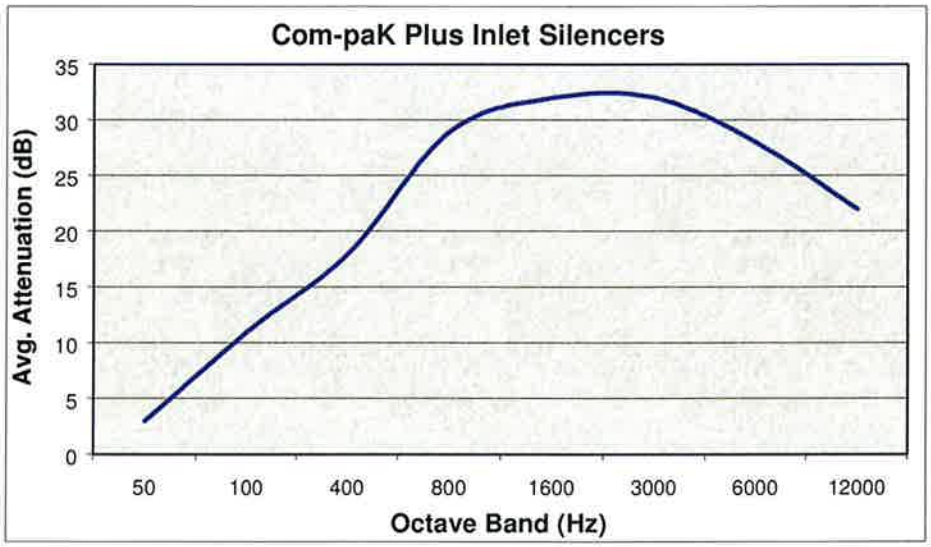
Technical Data

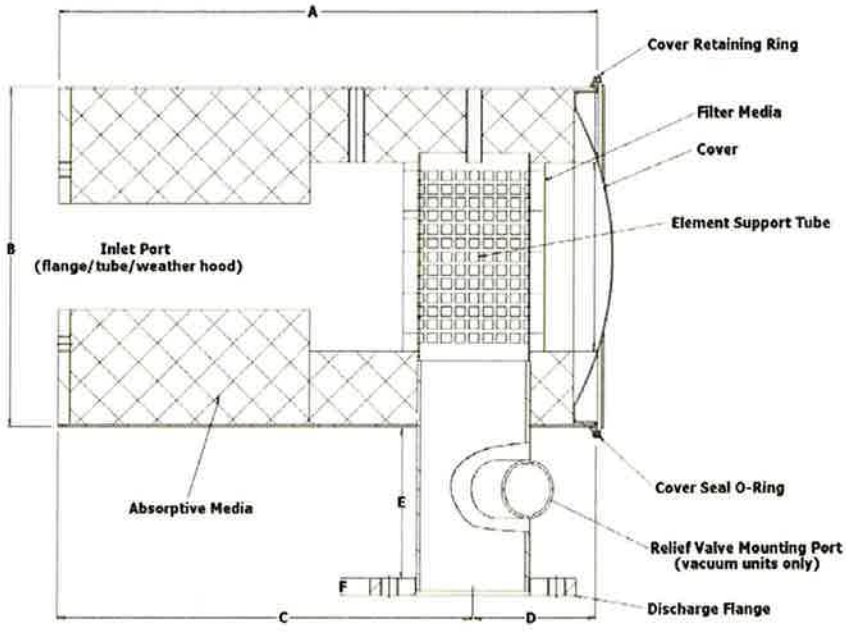
Filter Class (DIN 24185)	EU 4
Filter Class (EN 779)	G 4
Flammability (DIN 53438)	F1
Temperature Resistance	212°F
Efficiency	90%
Face Velocity (ft/sec)	1.6 / 5.0 / 8.2
Rated Flow (cfm/ft^2)	98 / 295 / 492
Initial Pressure Loss	< 1 inch H_2O
Max. Pressure Differential	0.62 PSI
Dust Retention (lbs/ft^2)	0.139
Filter Material	Polyester

Particle Retention

Particle Size	Efficiency
0.5	5%
1.0	20%
1.5	30%
2.0	40%
2.5	50%
3.0	60%
4.0	85%
5.0	>99%%

8.1.5.1 Inlet Silencer – Standard Com-paK Plus





Com-paK Plus Package Inlet Filter/Silencer Dimensions BB-EB						
Models	A	B	C	D	E	F
EB290C	33"	13¾"	25"	8"	11"	¾"

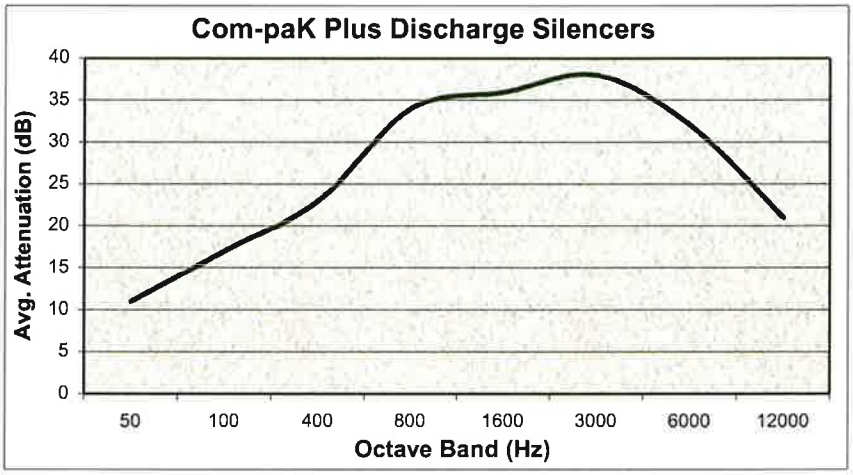
Com-paK Plus Package Inlet Filter/Silencer Dimensions FB-HB						
Models	A	B	C	D	E	F

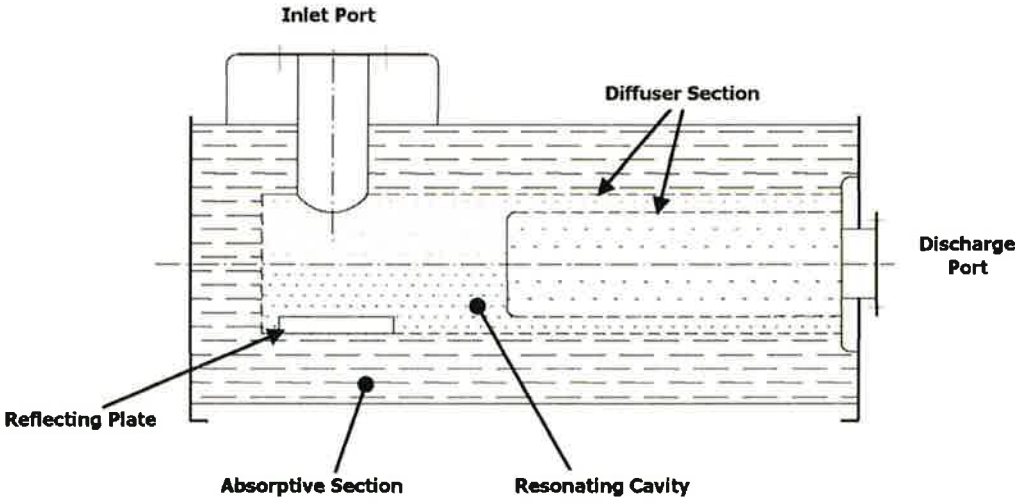
Com-paK Plus Package Inlet Filter/Silencer Connection Sizes					
Model Number					EB290C
Connection Size					6" Flange

Notes:

1. This silencer is proprietary in design.
2. The Com-paK Plus inlet filter/silencer is for use on Com-paK Plus packages only.
3. Maximum pressure: 22 psig.
4. Maximum temperature < 320°F

8.1.5.2 Discharge Silencer – standard Com-paK Plus





Com-paK Plus Package Discharge Connection Sizes					
Model Number					**EB290C**
Connection Size					6" Flange

Notes:

1. This silencer is proprietary in design.
2. The Com-paK Plus discharge silencer is integral to the base assembly and cannot be sold separately.
3. Maximum pressure: 22 psig.
4. Maximum temperature < 320°F

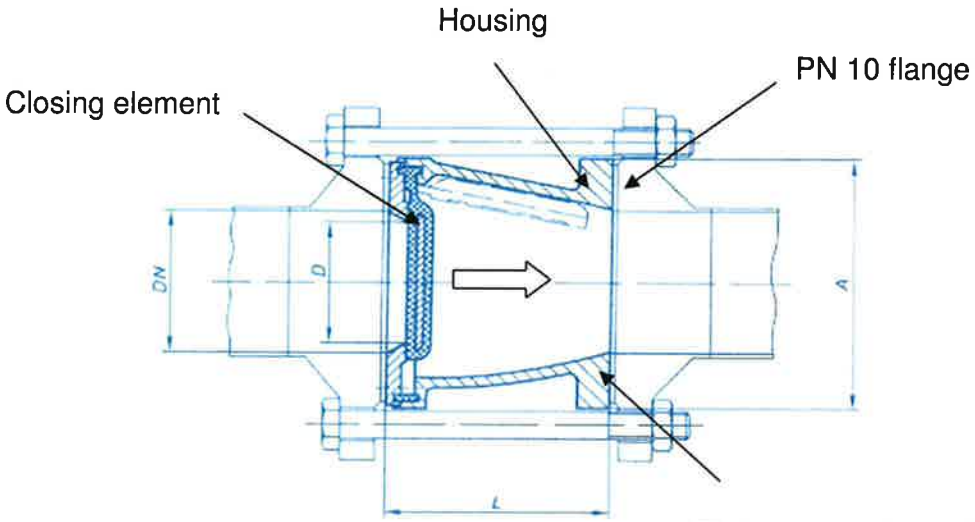
8.1.2.2 Check Plates

Check Plate for rotary blower packages

Complete with connecting bolts and gaskets, without flanges							Without Accessories	
Part No.	DN	L	A	D	Free Passage in % of DN	Closing Element Part No.	Part No. Check plate Com-paK*	Part No. Check Plate Standard Aggregate
884584.0	DN 150	7.87	8.46	5.12	75	891470.0	887738.0*	890449.0

Dimensions in inches

* For refitting

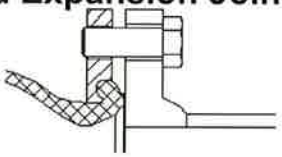


Thickness of gasket 0.08 in

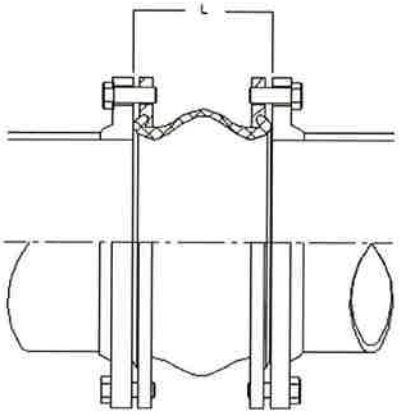
Features:

- Short mounting form
- Low flow resistance
- Silicon constructed material for operating temperatures up to 200°C
- Nominal pressure of PN 4
- Positive locking closing element and cover seal as one component

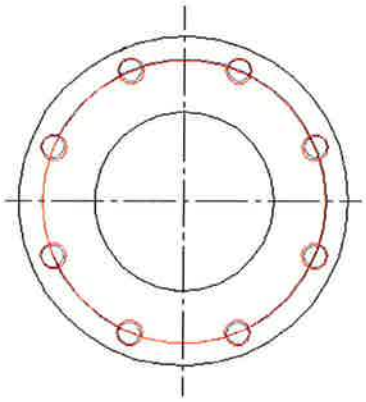
8.1.4.2 EBC, FBC, HBC Flanged Expansion Joints



DETAIL

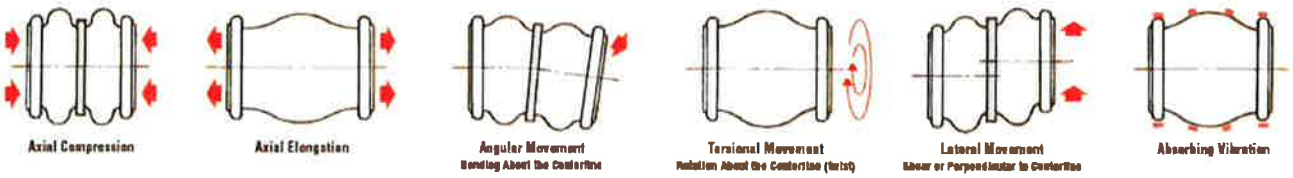


ELEVATION VIEW / CROSS SECTION



TYPICAL END VIEW

ANSI 150#	DN PN150#	Part no.	L		Variability (+/-)	
			Inch	mm	Inch	mm
6"	DN 150	AN8808070	6	152	½ - 5/8	12-19



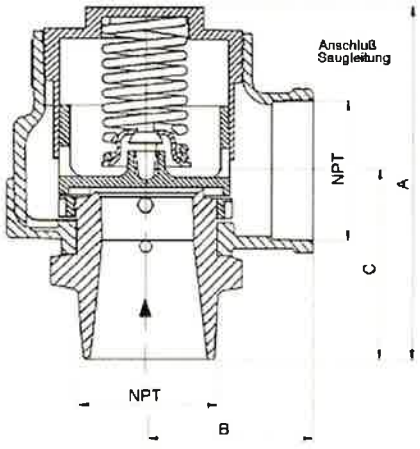
Construction Details:

- Spherical design "flowing-arch" reduces turbulence, sediment buildup, thrust area and the effects of thrust on the piping system equipment when compared to the "high-arch" design of hand-built standard products.
-EPDM elastomers rated for 300 F. Higher temperature elastomers are available upon request.
-Flanges are full faced and flat, ANSI B16.5, Class 150lbs. Or AWWA C207, Table 3, Class E.
-The following parts not included and required for installation:
1. Flange Bolting 2. Gasket 3. Sealants and Consumables 4. Mating Flange*
-This drawing is not to scale.

*Size and number of Mating Flange Bolts req. – 6" (3/4" x 8), 8" (3/4" x 8), 10" (7/8" x 12), 12" (7/8" x 12)

8.1.3.2 CompaK Plus Vacuum Relief Valve

8.1.3.2 CompaK Plus Vacuum Relief Valve



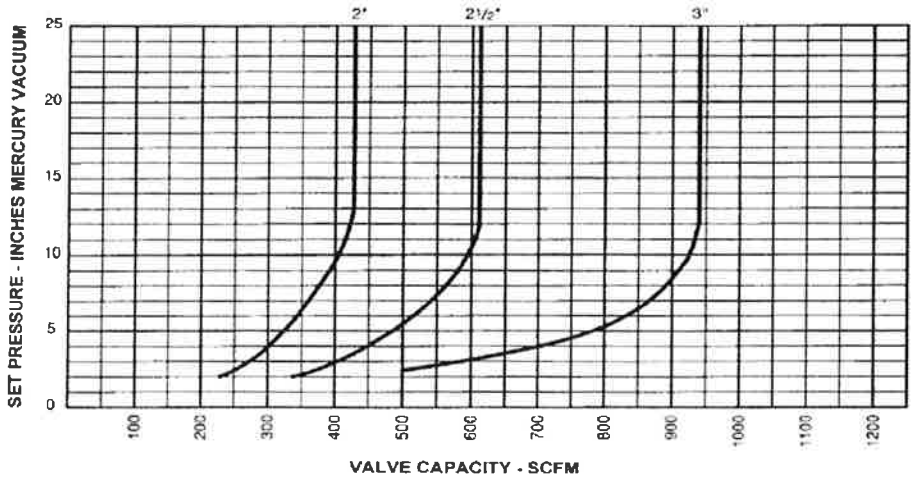
Type	Thread Connection NPTF	A (in)	B (in)	C (in)
337-H	2" x 2"	7"	3"	3-1/4"
337-J	2-1/2" x 2-1/2"	8"	3-1/2"	3-3/4"
337-K	3" x 3"	9"	4"	4-1/4"

General Information:
The sole purpose of the relif valve is the protection of the rotary blower package against excess pressure. It is not to be used as a regulating device.

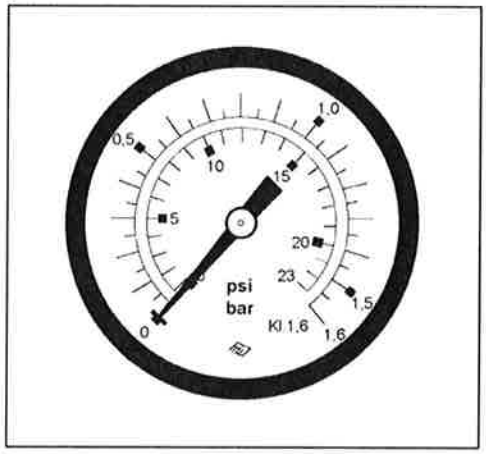
The vacuum relief valve must be installed so that the spring and valve seat are veritical. The system is connected to the female port with the male port directed downwards.

8.1.3.3 CompaK Plus **Relief Valve**

VACUUM RELIEF VALVES



8.1.1.1 Pressure Gauge Set



Range: **0-1.6 bar (g)**
0-23 psi (g)

Part no. 884225.0

On blowers with sound enclosure the gauge is mounted in a 64 mm hole provided in the sound enclosure.

On blowers without sound enclosure an angled fixing bracket, part no 884468.0, must be ordered separately in which to mount the gauge.

Other options:

Part No: 884225.00010	with shutoff valve	scale: bar/psi
Part No: 884225.00020	down to - 50 °C	scale: bar/psi
Part No: 884225.00030		scale: bar/kPa

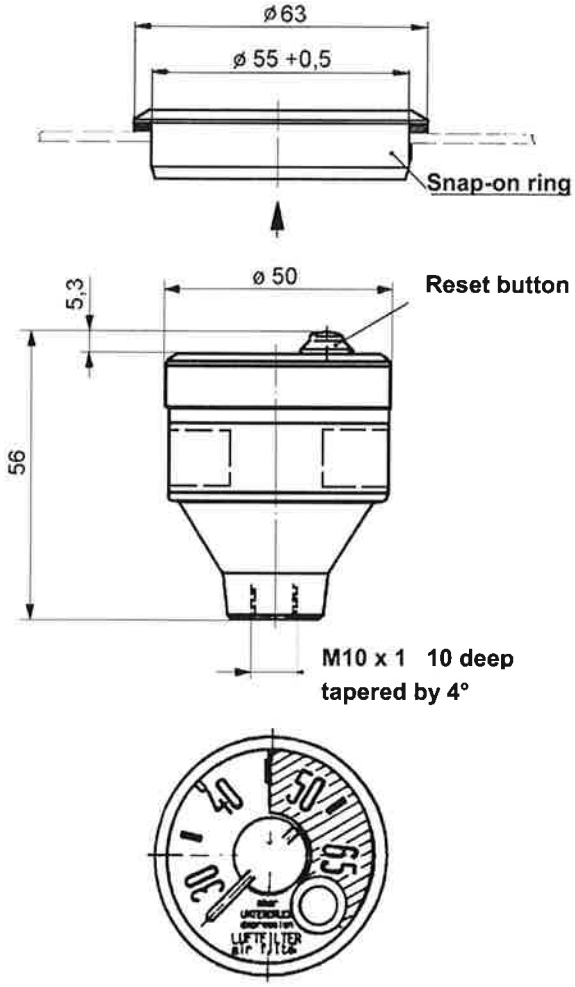
Scope of delivery / parts list

Item	Quantity	Part no.	Description
1	1	890458.0	¼" male stud tapered fitting
2	2	9.0675.0	Insert for Tecalan pipe
3	1	9.0616.0	Tecalan pipe
4	1	6.1704.0	Pressure gauge fitting
5	1	891485.1	Pressure gauge, 1.6 bar

8.1.1.4 Maintenance indicator for front panel installation

Range: pressure difference 65 mbar
Maintenance has to be carried out when the pointer enters the red field.

Maintenance indicator
consists of:
1 off maintenance indicator with snap-on ring
1 off 1/8" fitting
1 off fitting for maintenance indicator
2 m Tecalan pipe

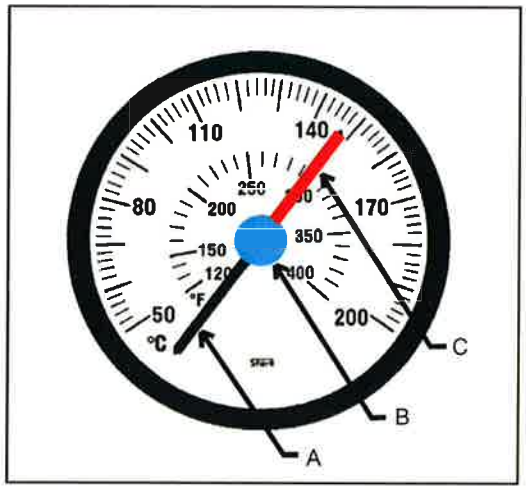


Part no.: 885593.0

On units with a sound enclosure the gauges have to be fitted in the holes provided in the sound enclosure.

Pull off the snap-on ring from the maintenance indicator and push it into the Ø 55 hole. Push the indicator into the snap-on ring from the rear.

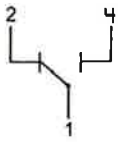
8.1.1.3 Temperature gauge with switch



A – Discharge temperature dial
B – Protective cover
C – Setpoint temperature dial

Range: **50 – 200° C**
120 – 400° F

Cutout point: changeable
Switching: ON / OFF control without return line
Contacts: 5 Amps / 220 V non-inductive; 50/60 Hz



Part No: 891636.3

On units with sound enclosure, the temperature gauge switch is mounted in the 60.5 mm hole provided in the enclosure.

On units without sound enclosure a bracket, part No 884468.0, must be ordered separately in which to mount the instrument.

Scope of delivery / parts list

Item	Quantity	Part no.	Description
1	1	883838.0	Protective sleeve for heat sensor
2	1	891636.0	Temperature gauge switch with sensor

Note: On Com-paK Plus™ packages the gauge is installed on the front panel and connected to the correct temperature sensing port. On all other packages, the gauge is shipped loose.

Note: There is a contact inside the gauge that may be connected to the control system.

Note: Maximum setting of the cutout point: inlet temperature is +240° F.

Setpoint adjustment:
The switching point is set by an adjustable screw located beneath the protective cover (**B**) on the front of the gauge. This adjustable screw turns the setpoint temperature dial (**C**). When the discharge temperature dial (**A**) reaches the setpoint temperature dial (**C**) the contact switch switches from 1-2 to 1-4.

9.3.4 Lubrication Requirements

TECHNICAL DATA – OMEGA AND OMEGA PLUS BLOWERS
LUBRICATION REQUIREMENTS

OMEGA BLOWER – LUBRICATION REQUIREMENTS

Oil Quantity Required to Fill Blowers to Middle of Sight Glass – U.S. Ounces

MODEL				HORIZONTAL CONSTRUCTION/VERTICAL AIR FLOW		
				Drive End	Gear End	Total
OMEGA 5 & 5P Series				16.9	20.3	37.2

OIL CHANGES:	
Mineral Oil	1500-2000 Hours
Synthetic	6000-8000 Hours

9.4.1 Kaeser Standard Paint Specifications

Layers of coating material for blower parts (standard design)

- Bare blower -

	Material	Manufacturer	Kaeser Part No.
1. Primer before mechanical processing (cast parts)	Tarponal^{R}-PUR/grey zinc dust primer, lack lustre, Thickness: 20-25 µm	Rhodius	9.4004.0
2. Primer bare blowers	Percotex LA – Universal - wash primer, 2–comp. light-grey, lack lustre, RAL 7035 mixture 10 : 1 with Percotex hardener 4040 Thickness: 30 – 35 µm	Spies – Hecker Spies – Hecker	892137.0 892138.0
3. Top coat	DD-structural lacquer (2-comp.), yellow, RAL 1032 mixture 10 : 1 with Tarponcryl special hardener Thickness: 25 – 35 µm	Rhodius Rhodius	892073.0 892074.0
	Total thickness: 75 – 95 µm		

- Frame, swing frame, belt guard -

	Material	Manufacturer	Kaeser Part No.
1. Primer (bright steel parts)	Expox-primer bluish grey, RAL 7031 thickness: 30 - 35 µm or Percotex LA – Universal - wash primer, 2-comp. light grey, matt, RAL 7035 mixture 10 : 1 with Percotex hardener 4040 Thickness: 30 - 35 µm	Schwaabeton Spies - Hecker Spies - Hecker	9.4016.0 892137.0 892138.0
2. Top coat	2-c-AC top coat anthracite grey, RAL 7016 sheeny mixture 10 : 1 with hardener Thickness: 25 – 35 µm	Rhodius Rhodius	892050.0
	Total thickness: 55 - 70 µm		

- **Inlet and discharge silencer -**

	Material	Manufacturer	Kaeser Part No
1. Primer (by manufacturer)	Rhodius artificial resin primer stone grey, RAL 7030 sheeny Thickness: 30-35 µm	Rhodius	
2. Top coat	see bare blowers		
	Total thickness: 55 - 70 µm		

- Motor – (supplied by Germany)

	Material	Manufacturer	Kaeser Part No
1. Primer (by manufacturer)	different for each manufacturer		
2. Top coat	see frame, swing frame, belt guard		
	Total thickness: 55 - 70 µm		

- Sound enclosure -

	Material	Manufacturer	Kaeser Part No
1. Pretreatment	- degreasing - zinc or ferro phospha-tising		
2. Powder coating	Powder RAL 7016 anthracite resicoat EP/SP powder sheeny structure 180/5 RAL 1032, yellow Syntha-Pulvin sheeny structure 180d/10 thickness: 80 µm ± 20 µm 10 µm	AKZO Nobel Powder Coatings GmbH	9.4058.0 9.4080.0

- Special paint available upon request at additional costs

KAESER COMPRESSORS

Built for a lifetime.™

MATERIAL SAFETY DATA SHEET

Kaeser Compressors, Inc.
511 Sigma Drive • Fredericksburg, VA 22408

I.

Product Name: **Omega Blower SB-150, SB-220, SB-320**
Date Issued/Revised: February 23, 2007
Chemical Family: Synthetic based lubricant
Use: Lubricant and corrosion inhibitor
Manufacturer: Royal Purple, Ltd.
Address: 1 Royal Purple Lane, Porter, Texas 77365 USA
Phone: 281-354-8600 Emergency Phone: 281-354-8600 Fax: 281-354-7600

II.

Component:	CAS Number:	Percentage:
• Poly Ester Synthetic	68515-49-1	3.0 to 5.0%
• Poly Alpha Olefin Synthetic	68037-01-4	40 to 60%
• Synthetic Olefin	9003-29-6	30 to 45%
• Synthetic Oxidation Inhibitor	68921-45-9	0.5 to 1%
• Synthetic Corrosion Inhibitor	28015-99-8	0.5 to 1%
• Synthetic Ashless EP Additive	68511-50-2	1.0 to 5%

This product contains no hazardous substance within the definition of OSHA Regulation 29 CFR 1910.1200.

III.

Main Hazards / Health Effects:
Eyes: May cause irritation.
Inhalation: Hydrocarbon mist may line breathing passages with oil making breathing difficult.
Ingestion: May cause diarrhea.
Skin: May irritate the skin after prolonged periods of contact.

IV.

First Aid:
Eyes: Flush with water until all residual material is gone. If irritation persists, seek medical help.
Inhalation: Clear air passage. If respiratory difficulty continues, seek medical help.
Ingestion: Wash out mouth immediately. Do not induce vomiting. Consult physician.
Skin: Wash thoroughly with hand cleanser, followed by soap and water. Contaminated clothing should be dry cleaned before reuse.

V.

Extinguishing Media:
Suitable: Foam, dry powder, Halon®, carbon dioxide, sand, earth and water mist.
Unsuitable: Water jet.
Protective Equipment for Fire Fighting: Self-contained breathing apparatus.

VI.

Accidental Release Measures:
Personal Precautions: Wear gloves and protective overalls.
Environmental Precautions: Do not allow it to enter drains.
Spillage: Contain spill and keep from entering waterways. Absorb on porous material. Large quantities can be pumped.

VII.

Handling and Storage:
Handling: No special handling precautions necessary.
Storage: Do not store at elevated temperatures.

VIII.

Exposure Control / Personal Protection:
Respiratory Protection: Hydrocarbon absorbing respirator if misting.
Hand Protection: Oil-proof gloves for hypersensitive persons.
Eye Protection: Glasses, if applied to parts in motion.
Body Protection: Overalls.

IX.

Physical and Chemical Properties:
Physical State: Liquid
Color: Clear
Odor: Mild Hydrocarbon
pH: Neutral
Boiling Range / Point °F (°C): >700 (>371)
Pour Point °F (°C): <-35 (<-37)
Flash Point (COC) °F (°C): >470 (>243)
Autoignition Temperature °F (°C): >600 (>315)

Evaporation Rate (Butyl Acetate): Negligible
Vapor Pressure (kPa): <0.01
Percent Volatiles: None
Density (g/cm³): >0.87
Flammability: Not flammable at ambient temp.
Oxidizing Properties: None
Water Soluability: Insoluable
Vapor Density: Greater than air

X. Stability and Reactivity:

Stability: Chemically stable under normal conditions. No photoreactive agents.
Conditions to Avoid: Powerful sources of ignition and extreme temperatures.
Materials to Avoid: Strong inorganic and organic acids, oxidizing agents.
Hazardous Decomposition Products: Burning generates smoke, airborne soot, hydrocarbons and oxides of carbon, sulfur and nitrogen. Residue mainly comprised of soot and mineral oxides.

XI. Toxicological Information:

Acute Toxicity: Not known
Irritancy-Skin: Very mild
Skin Sensitization: Not known
Subacute / Sub-chronic Toxicity: Not known
Genotoxicity: None known
Chronic Toxicity: None known

California Prop 65: N/A
Carcinogen: NTP: No
IARC: No
OSHA: No
EC Classification (67 / 548 / EEC): No
LD-50: >2000mg/l - extrapolated from component data
LC-50: Not applicable

XII. Ecological Information:

Mobility: When released into the environment, adsorption to sediment and soil will be the predominant behavior.
Behavior: Relatively well behaved. Bioaccumulation potential nil.
Environmental Fate: Due to its fluid nature and specific gravity, this product will float or spread across water making it a nuisance contaminant. It is not thought to be toxic to marine or land organisms.

XIII. Waste and Container Disposal:

Waste Disposal: Consider recycling. This product, as sold, does not meet the RCRA characteristics of a hazardous waste. Under RCRA, it is the responsibility of the user, at the time of disposal, to determine whether the product meets the RCRA criteria for hazardous waste. Contact a waste disposal company or local authority for advice.
Container Disposal: See waste disposal section listed above.

XIV. Transport Information:

DOT: Nonhazardous
UN No.: N/A
DOT: Nonhazardous

Air Transport (ICAO, IATA): Bulk Nonhazardous
Sea Transport (IMO, IMDG): Bulk Nonhazardous
Road and Rail Transport (ADR / RID): Bulk Nonhazardous

XV. Regulatory Information:

Labeling Information: None needed
EC Annex 1 Class.: N/A
R Phrases: N/A
SARA 311 / 312: None
S Phrases: S-3 keep cool, S-16 keep away from ignition sources
Ozone Depleting Chemicals: N/A

CERCLA: Nonhazardous
TSCA: All components are listed
WHMIS (Canada): Not regulated
Canadian DSL: All components are listed
40 CFR Part 372 (SARA Section 313): N/A
RCRA Hazard Class: Nonhazardous
TSCA 12B Components: None

XVI. Other Information:

Signature: A.J. Gustavsen

Prepared By: A.J. Gustavsen, Ph.D.

Date Issued/Revised: February 23, 2007

LEGEND

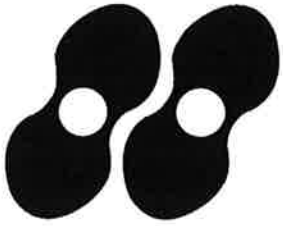
I. Identification of the Substance / Preparation and Company
II. Composition Information on Ingredients
III. Hazards Identification
IV. First Aid Measures
V. Fire Fighting Measures
VI. Accidental Release Measures
VII. Handling and Storage
VIII. Exposure Control / Personal Protection
IX. Physical and Chemical Properties
X. Stability and Reactivity
XI. Toxicological Information
XII. Ecological Information
XIII. Waste Disposal
XIV. Transport Information
XV. Regulatory Information
XVI. Other Information

NFPA SYMBOL

HMIS SYMBOL

HEALTH	0
FLAMMABILITY	1
REACTIVITY	0
PPI	N/A

24-Hour Emergency Parts Shipment Guarantee



Kaeser Compressors, Inc. guarantees to ship any standard parts required for emergency breakdown repairs on Kaeser Omega rotary lobe blowers within one working day of our receiving the order, or the parts are free.

Kaeser Compressors, Inc. further guarantees replacement and repair parts for Kaeser Omega rotary lobe blowers will be available for a minimum of 10 years from the original unit purchase date.

KAESER
OMEGA BLOWERS

Built for a lifetime.™

Kaeser Compressors, Inc. ▪ P.O. Box 946 ▪ Fredericksburg, VA 22404
Tel. (540) 898-5500 ▪ Fax (540) 898-5520 ▪ www.kaeser.com

KAESER COMPRESSORS

Built for a lifetime.™

Warranty

Omega Blower

Model: _____ **Serial No.:** _____ **Start-Up Date:** _____

Kaeser Compressors, Inc. of Fredericksburg, Virginia (herein referred to as Kaeser), warrants that the Kaeser Omega-paK, Omega-paK Plus, and Com-paK Plus packages manufactured by it and delivered hereunder will be free of defects in material and workmanship for a period of twelve (12) months from date of start-up not to exceed eighteen (18) months from the date of shipment from Kaeser, whichever occurs first. The Omega and Omega Plus bare blowers are warranted to be free of defects in material and workmanship for a period of twenty-four (24) months from the date of start-up not to exceed thirty (30) months from the date of shipment from Kaeser, whichever occurs first. Omega Plus bare blowers, when purchased as a part of a standard Com-paK Plus package, are warranted to be free of defects in material and workmanship for a period of sixty (60) months from the date of start-up not to exceed sixty-six (66) months from the date of shipment from Kaeser, whichever occurs first. Should any failure to conform to this warranty be reported to Kaeser within said period, Kaeser shall, upon Purchaser promptly notifying Kaeser in writing thereof, correct such nonconformity by suitable repair to such equipment or, at its option, by furnishing a replacement part FOB point of shipment provided the Purchaser has installed, maintained and operated such equipment in accordance with good industry practices and has complied with all procedures outlined in the Kaeser Service Manual. Return of equipment to Kaeser shall be at Purchaser's risk and expense. Blower accessories furnished by Kaeser but manufactured by others shall carry whatever warranty the manufacturer conveyed to Kaeser and which can be passed on to the Purchaser. Kaeser shall not be liable for any repairs, replacements or adjustments to the equipment or any cost of labor performed by the Purchaser or others without Kaeser's prior written approval. Damage to equipment caused by the use of non-genuine replacement parts is not covered under this warranty.

The effects of corrosion, erosion and normal wear and tear are specifically excluded from the Kaeser warranty.

Kaeser makes no other warranty or representation of any kind whatsoever, expressed or implied, except that of title, and all implied warranties, including any warranty of merchantability and fitness for a particular purpose, are hereby disclaimed.

Correction by Kaeser of nonconformities whether patent or latent, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of Kaeser and its Distributors for such nonconformities whether based on contract, warranty, negligence, indemnity, strict liability or otherwise with respect to or arising out of such equipment.

Kaeser Compressors, Inc. ▪ P.O. Box 946 ▪ Fredericksburg, VA 22404
Tel: (540) 898-5500 ▪ Fax: (540) 898-5520 ▪ www.kaeser.com

ISO

Omega Blower Warranty-Registration Card

In order for Kaeser Compressors, Inc. to properly handle requests regarding warranty or non-warranty, please fill out and mail this form within 30 days after start-up, otherwise warranty is void.

CONTACT NAME: _____

COMPANY NAME: _____

STREET ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

I have read the attached warranty and limitation of liability statement concerning Kaeser Rotary Lobe Blowers with Omega Profile.

Signed by: _____ Date: _____

The equipment has been installed in accordance with Kaeser Service Manual. ☐ Yes ☐ No

The equipment was started and adjusted by an authorized distributor technician. ☐ Yes ☐ No

MODEL: _____

SERIAL NO.: _____

PART NO.: _____

START-UP DATE: _____

DISTRIBUTOR:

Limitation of Liability

The remedies of the Purchaser set forth herein are exclusive, and the total liability of the Company and its Distributors and Suppliers with respect to this contract or the Equipment and services furnished hereunder, in connection with the performance or breach thereof or from the manufacture, sale, delivery, installation, repair, or technical direction covered by or furnished under this contract, whether based on contract, warranty, negligence, indemnity, strict liability, or otherwise shall not exceed the purchase price of the unit of Equipment upon which such liability is based.

The Company and its Distributors and Suppliers shall in no event be liable to the Purchaser, and successors in interest or any beneficiary or assignee of this contract for any consequential, incidental, indirect, special, or punitive damages arising out of this contract or any breach thereof, or any defect in, or failure of, or malfunction of the Equipment hereunder, whether based upon lost goodwill, lost profits or revenue, interest work stoppage, impairment of other goods, loss by reason of shutdown or non-operation, increased expenses of operation of the Equipment, loss of use of power system, cost of purchase of replacement power or claims of Purchaser or customers of Purchaser for service interruption whether or not such loss or damage is based on contract, warranty, negligence, indemnity, strict liability, or otherwise.

P-1501US.5/02

ATTENTION
After-Sales Service

PLACE STAMP HERE

KAESER COMPRESSORS INC
PO BOX 946
FREDERICKSBURG VA 22404

GROUND/WATER TREATMENT
& TECHNOLOGY, INC.

P.O. BOX 1174 DENVILLE, NEW JERSEY 07834
Phone (973)-983-0901 • Fax (973) 983-0903

SUBMITTAL COVER SHEET FROM CONTRACTOR

DATE: June 9, 2009

To: AECOM
40 British American Blvd.
Latham, NY 12110
Attn: Frank Zeske

RE: National Heatset Printing Site, Babylon, NY
Closed Loop Vapor Extraction/Sparging Treatment System
GWTT Submittal No. 04 – Heat Exchangers Technical Documents
# of Pages: 6, including cover page

Please find enclosed (1) electronic copy in PDF format of the following item:

Specification/ Drawing No.	Prepared by:	Description
Heat Exchanger Technical Document	TLo	American Industrial design document based on the design temperature schematic provided - Require approval - Delivery is 6 to 8 weeks after receipt of order.

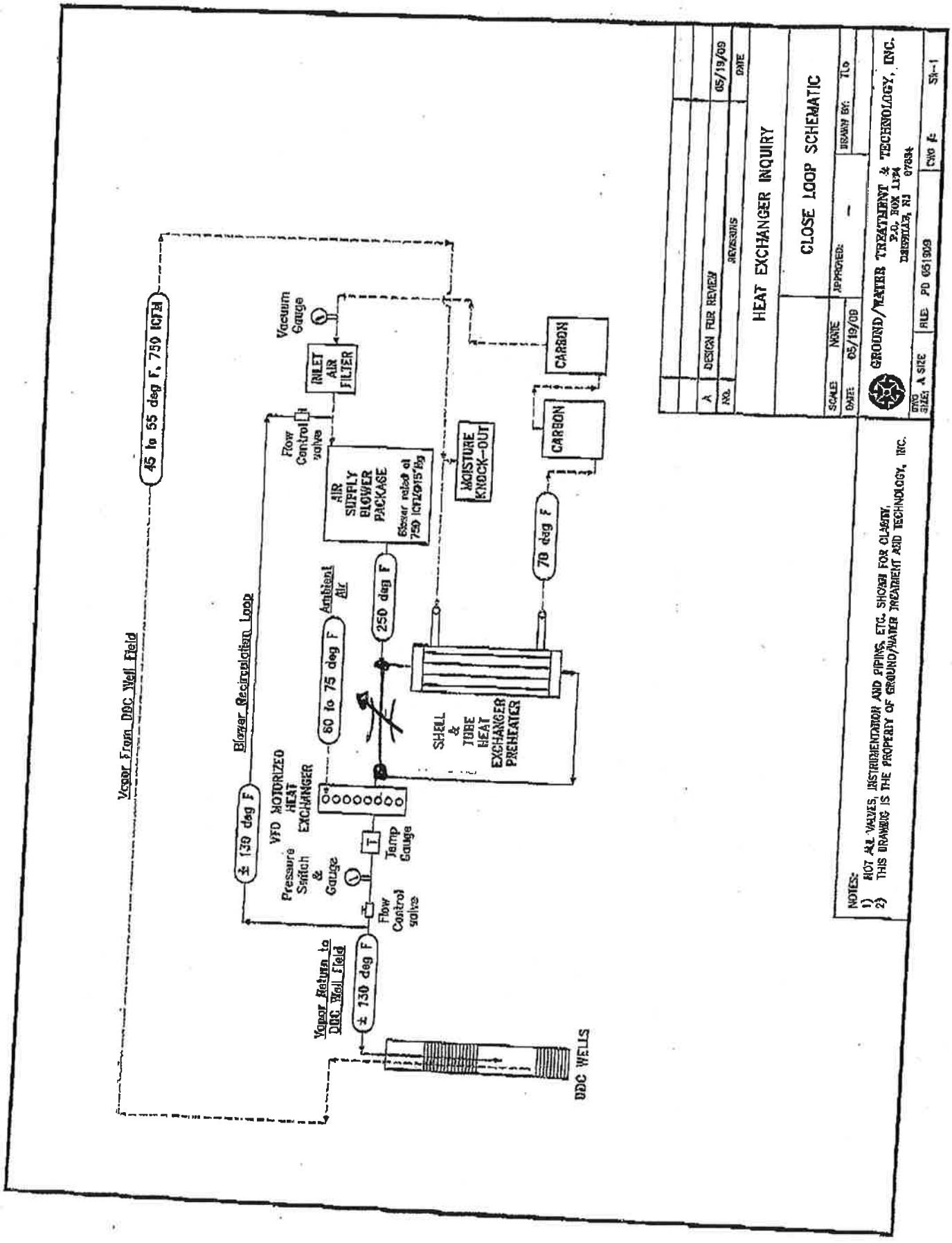
Remarks:
This is also a critical path item requiring an expedited review and approval so lead time can be kept to a minimum for delivery.

These are transmitted as checked below:

__X__ For approval	_____ Resubmit	_____ Approved as noted
_____ For your use	_____ Submit	_____ Approved as submitted
_____ As requested	_____ Return	_____ Returned for corrections
__X__ For review	_____ Returned for corrections	

Sincerely,
Ground/Water Treatment & Technology, Inc.

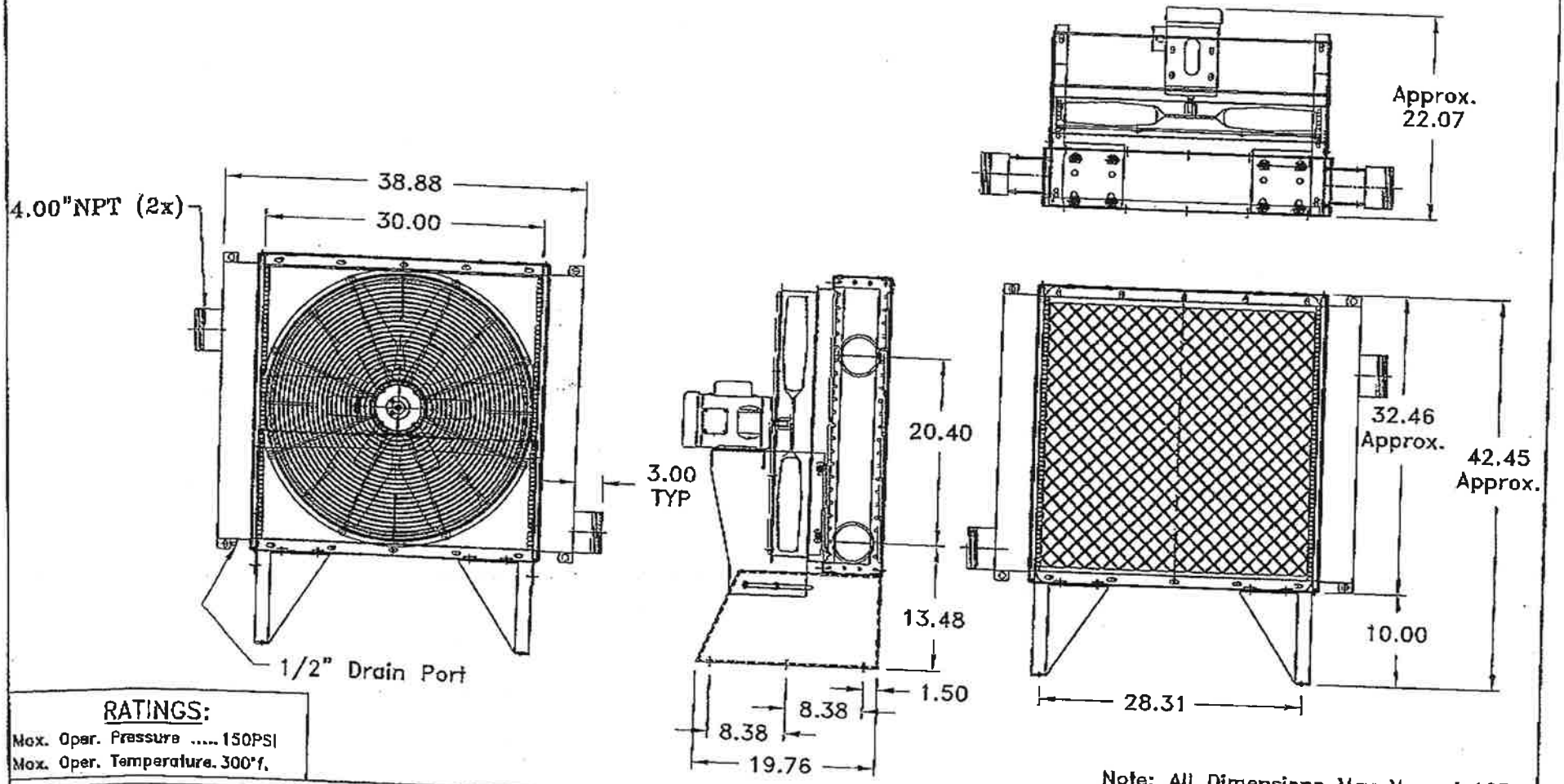
Tony Lo (e-copy)
Dist:


Vapor From DDC Well Field
45 to 55 deg F, 750 ICFM
Blower Recirculation Loop
Vacuum Gauge
INLET AIR FILTER
Flow Control valve
AIR SUPPLY BLOWER PACKAGE
MOISTURE KNOCK-OUT
CARBON
CARBON
70 deg F
250 deg F
Ambient Air
60 to 75 deg F
SHELL & TUBE HEAT EXCHANGER PREHEATER
± 130 deg F
VFD MOTORIZED HEAT EXCHANGER
Pressure Switch & Gauge
Temp Gauge
Flow Control valve
Vapor Return to DDC Well Field
± 130 deg F
DDC WELLS
HEAT EXCHANGER INQUIRY
CLOSE LOOP SCHEMATIC
A DESIGN FOR REVIEW 05/19/09
NO. REVISIONS DATE
SCALE: NONE
DATE: 05/19/09
APPROVED: -
DRAWN BY: TLO
GROUND/WATER TREATMENT & TECHNOLOGY, INC.
P.O. BOX 1134
TRENTON, NJ 07834
DWG SIZE: A SIZE
FILE: PD 051909
DWG #: SK-1
NOTES:
1) HOT AIR VALVES, INSTRUMENTATION AND PIPING, ETC. SHOWN FOR CLARITY.
2) THIS DRAWING IS THE PROPERTY OF GROUND/WATER TREATMENT AND TECHNOLOGY, INC.

NO.	QTY.	PART NO.	PART DESCRIPTION	MATERIAL
1	1	117-0036	Front Screen	Steel
2	1	117-0037	Back Panel	Steel
3	1	110-3008	Venturi Ring	Steel
4	1	308-0015	Fan Guard	Zinc Plated Steel
5	1	307-0040	Fan	Steel
6	1	117-0048	Motor Mount Bracket	Steel
7	1	117-0029	Unit Mount Bracket (Left)	Steel
8	2	117-0129	Air Shield	Steel
9	1	306-1022	Motor 1HP/3PH/60/208-230/460TEFC	

NO.	QTY.	PART NO.	PART DESCRIPTION	MATERIAL
10	1	117-0305	Core	
11	1	117-1029	Manifold (Inlet)	Steel
12	1	117-1030	Manifold (Outlet)	Steel
13	240	196-0019	Fins	Aluminum
14	177	197-0025	Tubes	Copper
15	1	199-0017	Gasket & Bolt Kit	
16	1	199-1007	cabinet Hardware Kit	
17	1	199-2015	Motor Hardware Kit	

ACA6301-92807



RATINGS:

Max. Oper. Pressure 150PSI
Max. Oper. Temperature. 300°f.

Note: All Dimensions May Vary ±.125

American Industrial Heat Transfer Inc.
Phone: 847-731-1000
Fax: 847-731-1010
3905 Route 173
Zion, IL 60099

Model:	Description:					
ACA6301-92807	Assembly					
Dwg. By:	Appr. By:	Cust. Approved By:	Scale:	Date:	Size:	Rev.:
EJD			1=16	7/25/02	A	0

American Industrial Heat Transfer, Inc.

3905 Route 173 Zion, Illinois 60099 Toll free 1-800-338-5959 www.aihti.com

Customer: **Ground Water Treatment**

Model Selection: ACA 6 30 1 - 92807

Required Sq.ft: 43.4 Date: June 2, 2009

Unit Design Sq.Ft: 43.4 Job:

Performance of One Unit

TUBE SIDE			FAN SIDE		
Vapor Circulated		AIR			AIR
Specific Gravity		1.00	Elevation	feet	0
Flow Rate	scfm	375.00	FAN Flow		4450
Calc Flow Rate	scfm	375.0			
Flow Rate	acfm	0.0		Fs	1574
Compressor Discharge/Inlet	acfm	323.4 / 375.0			
Operating Pressure	psig	7.3	Atmospheric Pressure	psia	14.696
Operating Presssure	in. water	0.0			
Temperature Entering	F	223.0	68.00		100.0
Temperature Exiting	F	125.8			108.6
Approach Temperature	F	25.8			
Specific Heat	Btu / lb-f	0.2504			0.2502
Viscosity	centipoise	0.0179			0.0187
Conductivity	Btu/hr ft^2 F/ft	0.0150			0.0158
Calculation					
Total Heat Load	Btu/hr	40618			40618
Dry Air	Btu/hr	40235	1652.8	lbs/hr	
Vapor	Btu/hr	382	8.7	lbs/hr	
Condensed	Btu/hr	0	0.0	lbs/hr	
Density	lb / ft^3	0.0856			0.0709
Flow Rate	lbs / Hr	1661.6			18929.6
Mass Velocity	lbs / Hr-ft^2	16295			5200
Pressure Differential	Inches H2O	1.9	Static Pressure	Inches H2O	0.22
Pressure Differential	psi	0.070	Face Velocity	ft / min	724
Velocity Tubes	Ft / sec	52.86	Fin Velocity	ft / min	1222.34
Nr		10170			5558
U clean	Btu / hr ft^2 F	16.6			
Fouling Requested	hr ft^2 F / btu	0.0005		Material	218
Selection					
Required Surface	Sq. ft.	43.40		LMTD	56.8
Effective Surface	Sq. ft.	43.44		Service Btu / hr ft^2 F	16.5
Configuration					
Tube Diameter	inch	0.375	Fins Per Inch		8
Tube Wall	inch	0.025	Estimated 1=		1
Length Tubes	inch	30.0	Enter Number Passes		1
Parallel Tube Rows		6	Estimated Nozzle	inch	4.3
Number Tubes		177	Nozzle size	inch	4.00
Coil Weight Empty	lbs	114.2	Manifold	inch	4.00

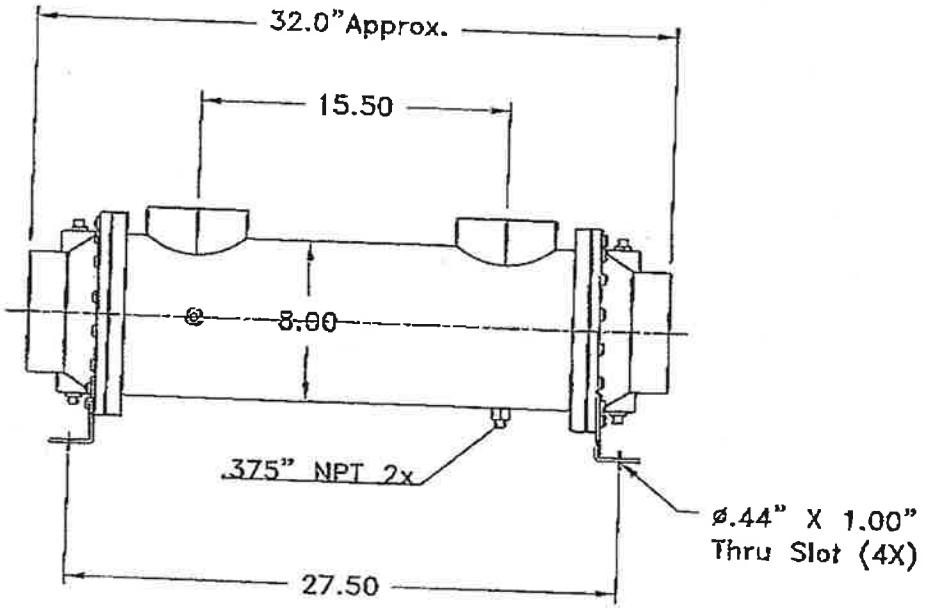
Construction Materials

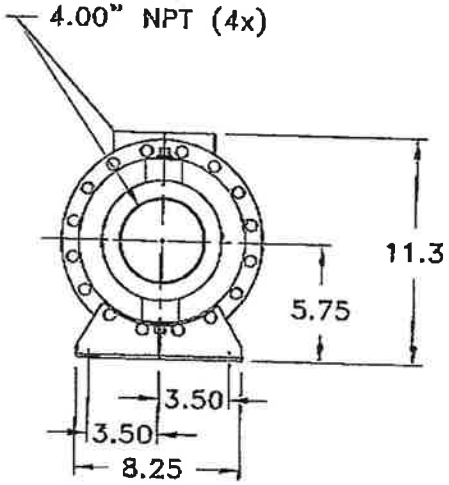
Tubes Copper	Fins Aluminum	Cabinet Carbon Steel	
Tanks Steel	Tube-Sheets Steel	Gaskets Hypalon	
Coating Enamal		Fan Nylon Composite	
Coil Size 30 X 30		Nozzle 4.0 NPT	
HP 1 Phase 3	Hertz/Volts 60/208 230-460	Class TEFC	RPM 1140
Brazed coil core	Serviceable core X		

MATERIAL LIST:	
Shell	Steel
Bonnet/Channel	Cast Iron
Tube Sheet	Steel
Baffle	Steel
Tube	Copper
Mfg. Bracket	Steel
Seal	Hypalon

Notes:
1. All Dimensions May Vary ±.125
2. 4.0" Shell Ports.

CS1724-97873





RATINGS:

Max. Oper. Pressure Tubes..150PSI
Max. Oper. Pressure Shell..300PSI
Max. Oper. Temperature.....300°F.

American Industrial Heat Transfer Inc.
Phone#: 847-731-1000
Fax#: 847-731-1010
3905 Route 173
Zion, IL 60099

Model:	Description:						
CS1724-97873	Assembly						
Dwg. By:	Appr. By:	Cust. Approved By:	Scale:	Date:	Size:	Rev.:
ML			1=9	06/04/09	A	0

American Industrial Heat Transfer, Inc.

Shell & Tube Heat Exchanger Sizing

Sizing of One Unit

Contact: Mark Loeffler

Job:

Customer: **Ground Water Treatment**

Selection: **CS1724-97873**

Units: One

Required Sq.Ft: **23.4** Selection Sq.Ft: **23.6** 6/2/09 10:58 AM

Application Conditions						
		Shell Side				**Tube Side**
Circulated		Air stream 1			375.0	Air stream 2
Fluid	SCFM	375.00	CFM/SCFM		76.0	76.0
Specific Gravity	S	1.000	ACFM @ Pressure		68	1.000
Viscosity	Cp	0.017	0.020			0.020
Specific Heat	BTU/lb f	0.246				0.251
Conductivity	BTU/hr ft2 F/ft	0.014				0.019
Temperature Inlet	F.	45.0	Ambient F		68	250.0
Temperature Outlet	F.	70.0				120.0
Operating Pressure	PSIG	-7.3			PSIG	7.3
Number Passes Tube Side		1				1
Total Fouling - Requested		0.0020			Calc	0.0037
Maximum Working Pressun	PSIG	225			PSIG	150
Calculations						
Heat Exchanged Total	BTU/hr	11197	Heat Exchanged Total		BTU/hr	11197
Heat Exchanged Dry Air	Btu/Hr	10750	Heat Exchanged Dry Air		BTU/hr	10909
Heat Exchanged Vapor	Btu/Hr	546	Heat Exchanged vapor		BTU/hr	288
Heat Exchanged Latent	Btu/Hr	25628	Heat Exchanged Latent		BTU/hr	0
Density	Lb/cu.ft.	0.0424			Inlet	0.0831
Total Fluid	Lbs/hr	1824			Inlet	340
Calc Velocity	fps	101.955				9.4
Pressure Drop	PSIG	0.72				0.00
Coefficients		23				5
Calc U	Clean	4.02			Dirty	3.96
Selection	Sq.ft.	23.6			Overall U	3.98
Required Area	Sq.Ft.	23.4			MTD Corr F	120.08
Design						
					Tube-sheet	1.13
Tube Diameter	Inch	0.625	Tube Wall		Inch	0.035
Tube Length	Inch	24			Number Tubes	72
Shell Diameter	Inch	8.00	Shell Wall		Inch	0.120
Fluid Volume	Cubic in.	580				460
Material Coef.		218			Pitch	0.781
Baffle Spacing	Inch	10.9			Number crosses	2.00
			Estimated Nozzle		Inch	1.2

Construction Materials			
Tubes	Copper		
Stationary tube-sheets	Steel	Floating tube-sheet	
Baffle	Brass	Packing ring	
Shell	Steel	Retainer ring	
Bonnets / Channels	Steel	Channel Cleanouts	
Gaskets	Hypalon	Packing Seal	
Shell Side Nozzle Inch	4.0" NPT	Tube Side Nozzle Inch	4.0" NPT

American Industrial Heat Transfer, Inc 3905 Route 173 Zion, IL 60099

Tel: 847-731-1000 Fax: 847-731-3440 Website: www.aihtl.com

Appendix C
Health and Safety Plan

AECOM

Health and Safety Plan
National Heatset Printing

East Farmingdale, Suffolk County, New York

NYSDEC Site #1-52-140

Contract Number D005539

Prepared For:

New York State Department of Environmental Conservation

Bureau of Remedial Construction

625 Broadway

Albany, New York 12203

Prepared By:

AECOM, Inc.

40 British American Boulevard
Latham, New York 12110

July 10, 2009

Project No. 92701

HEALTH AND SAFETY PLAN
SUPPLEMENT APPROVAL

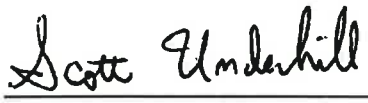
This Health and Safety Plan (HASP) Supplement was prepared for AECOM Technical Services Northeast, Inc. (hereinafter referred to as AECOM, Inc.) employees performing work under the New York State Department of Environmental Conservation (NYSDEC) Superfund Standby Contract for Remedial Investigation Services (contract No. D004436) and Design/Construction Services (contract No. D004445) based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury.

By signing below, I acknowledge that I have reviewed and hereby approve the HASP Supplement for the National Heatset Printing site. This HASP Supplement has been written for the exclusive use of AECOM, Inc., its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

Approved by:

July 10, 2009
Date

Peter Sullivan, CET, CIT
SH&E Training Director
AECOM Environment
978.589.3444



July 13, 2009
Date

Scott Underhill, PE
Program Manager
518-951-2200 ext. 208

July 13, 2009
Date

Frank Zeske
Project Manager
518-951-2200 ext. 242

July 11, 2009
Date

Prepared by Kevin Seise
Industrial Hygienist

TABLE OF CONTENTS

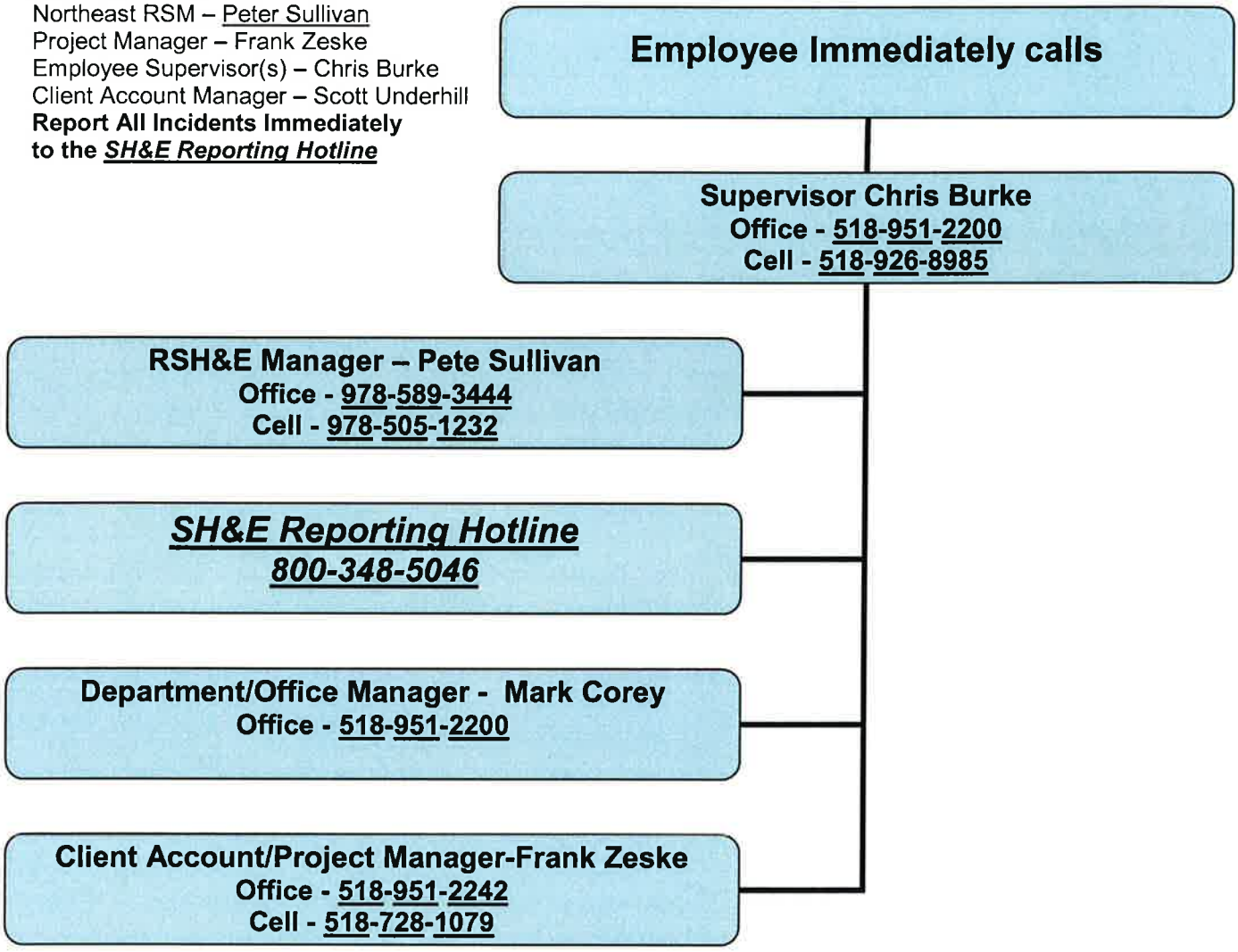
ATTACHMENTS

FIGURES

TABLES

Emergency Contact Phone Tree

Key Personnel:
Northeast RSM – Peter Sullivan
Project Manager – Frank Zeske
Employee Supervisor(s) – Chris Burke
Client Account Manager – Scott Underhill
Report All Incidents Immediately to the *SH&E Reporting Hotline*



AECOM Medical Records and Medical Consultant
In the event of a non-critical injury, and once preliminary reporting been completed, if the injury employee desires/needs to speak with a medical professional to consult on the nature of their injury and treatment options, employees may contact WorkCare directly if they have not be directed to call WorkCare, been contacted by WorkCare directly, or they have been unable to speak directly with any of the personnel identified in the Emergency Contact Phone Tree provided above.

Work Care North
Alameda, CA 94502
Telephone: 510-748-6900
Fax: 510-748-6915

1.0 INTRODUCTION

This Health and Safety Plan (HASP) (including Attachments A-D) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the National Heatset Printing site, located at One Adams Boulevard, in the Hamlet of East Farmingdale, Town of Babylon, Suffolk County. This HASP also identifies chemical and physical hazards known to be associated with the AECOM-managed activities addressed in this document.

HASP Supplements will be generated as necessary to address any additional activities or changes in site conditions which may occur during field operations. Once generated, each Supplement will be inserted in Attachment E and reviewed/acknowledged by field personnel prior to the start of applicable work activities.

1.1 CLIENT SPECIFIC SAFETY REQUIREMENTS

Client-specific health and safety guidelines are included in Attachment D of this HASP. All site activities must be performed in accordance with client-specific requirements and procedures.

The NYSDEC Contract Document D005539 has provided specific requirements for health and safety. The following contract specifications are required by the client:

- Specification Section 01200 –Health and Safety
- Specification Section 01010 – Summary of the Work

1.2 AECOM ENVIRONMENT SAFETY POLICY

AECOM Environment (AECOM) is committed to providing our employees with a safe and healthy work environment. It is not only our obligation to each other, but also a sound business practice to do so. Work related injuries and illnesses cause needless pain and suffering, cost money, and adversely affect our reputation with our clients. It is our firm belief that all work related injuries and illnesses are preventable, and it is therefore our goal to have a workplace that is free from occupational injuries and illnesses. Every attempt shall be made to eliminate the possibility of injuries and illnesses. No aspect of the company's activities, including expediency and cost, shall take precedence over the health and safety of our employees.

1.2.1 Maximum Duration of the Work Day for Field Activities

An employee may not work a shift that exceeds 16 hours in duration. For the purpose of this policy, the work shift includes time spent at lunch and on break. If an employee works more than one shift during the course of a calendar day, the total number of hours worked in that day cannot exceed 16 hours.

1.2.2 Short Service Employee

A Short Service Employee (SSE) is an employee with fewer than six months experience working supervised on field projects or an employee who has not completed required training or received required certifications.

Short Service Employees will not be assigned to this project unless they are supervised on site by a qualified person.

1.3 HEALTH AND SAFETY PLAN (HASP)

1.3.1 HASP Purpose

The purpose of this HASP is to identify hazards associated with this project and specify engineering and administrative controls and personal protective equipment necessary to mitigate the risks associated with these hazards. This HASP addresses the hazards recognized prior to writing or updating the documents. As new hazards are encountered, a Job Hazard Assessment (JHA) or Job Safety Analysis (JSA) must be conducted and the results input into the HASP.

This HASP also assigns responsibilities for the implementation of safety programs on this project and defines monitoring and emergency response planning specific to the project.

1.3.2 HASP Applicability

This site-specific Health and Safety Plan (HASP) has been developed by AECOM. It establishes the health and safety procedures required to minimize potential risk to AECOM and contractor personnel involved with the environmental services at the National Heatset Printing site, located at One Adams Boulevard, in the Hamlet of East Farmingdale, Town of Babylon, Suffolk County. AECOM is conducting this work on behalf of the New York State Department of Environmental Conservation.

The provisions of this plan apply to AECOM personnel who will potentially be exposed to safety and/or health hazards related to activities described in Section 3.0 of this document.

Client, Subcontractor employees, and third party personnel performing work that potentially exposes them to the chemical and physical hazards at the site must work under their own HASP and are also expected to review and acknowledge this HASP as a recognition of the SH&E standards that AECOM expects outside personnel to uphold.

This HASP has been written to comply with the requirements of the Occupational Safety and Health Administration (OSHA) Personal Protective Equipment Standard (29 CFR 1910.132) for all activities and the OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) for tasks where there are potential exposures to subsurface contaminants. All activities covered by this HASP must be conducted in complete compliance with this HASP and with all applicable federal, state, and local health and safety regulations. Personnel covered by this HASP who cannot or will not comply will be excluded from site activities.

This plan will be distributed to each employee involved with the proposed activities at the site, including subcontractor employees. Each employee must sign a copy of the attached health and safety plan sign-off sheet (see Attachment A).

This HASP only pertains to the tasks that are listed in Section 3.0. A task specific HASP or addendum to this HASP will be developed at a later date for any other subsequent investigative/remedial activities at the site.

1.4 ORGANIZATION/RESPONSIBILITY

The implementation of health and safety at this project location will be the shared responsibility of the AECOM Project Manager (PM), the AECOM Regional Safety, Health & Environment Manager (RSHEM), the AECOM Project Site Safety Officer (SSO) and other AECOM personnel and AECOM's contractors implementing the proposed scope of work.

1.4.1 AECOM Project Manager

The AECOM PM (Frank Zeske) is the individual who has the primary responsibility for ensuring the overall health and safety of this project. As such, the PM is responsible for ensuring that the requirements of this HASP are implemented. Some of the PM's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies, including AECOM subcontractors, have received a copy of it;
- Providing the RSHEM with updated information regarding conditions at the site and the scope of site work;
- Providing adequate authority and resources to the on-site SSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SSO and RSHEM;
- Maintaining regular communications with the SSO and, if necessary, the RSHEM;
- Coordinating the activities of all AECOM subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project, and
- Conducting random project audits.

1.4.2 AECOM Regional Safety, Health & Environment Manager

The AECOM RSHEM (Peter Sullivan) is the individual responsible for the preparation, interpretation and modification of this HASP. Modifications to this HASP which might result in less stringent precautions cannot be undertaken by the PM or the SSO without the approval of the RSHEM. Specific duties of the RSHEM include:

- Writing, approving and amending the HASP for this project;
- Advising the PM and SSO on matters relating to health and safety on this site;
- Recommending appropriate personal protective equipment (PPE) and respiratory equipment to protect personnel from potential site hazards;
- Facilitating Incident investigations; and,
- Maintaining regular contact with the PM and SSO to evaluate site conditions and new information which might require modifications to the HASP; and
- Conducting random project audits.

1.4.3 AECOM Site Safety Officer

All AECOM field technicians are responsible for implementing the safety requirements specified in this HASP. However, one field technician will serve as the SSO. The SSO for this site will be designated by the PM and is subject to change depending on the phase of the project. The SSO will be on-site during all activities covered by this HASP. The SSO is responsible for enforcing the requirements of this HASP once work begins. The SSO has the authority to immediately correct all situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies, including all subcontractors, have reviewed this HASP, and submitted a completed copy of the HASP review and acceptance form (Attachment A);
- Assuring that all personnel to whom this HASP applies have attended a pre-entry briefing and any subsequent safety meetings that are conducted during the implementation of the program;
- Maintaining a high level of health and safety consciousness among employees implementing the proposed investigative activities;
- **Securing Work Permits. The SSO must determine what, if any, work permits must be secured from the facility prior to the commencement of activities. If required, the SSO must determine how long the work permit is good for and verify that all the provisions of the work permit can be met by AECOM and its subcontractors.**
- Procuring the air monitoring instrumentation required and performing air monitoring for investigative activities;
- Procuring and distributing the PPE and safety equipment needed for this project for AECOM employees;
- Verifying that all PPE and health and safety equipment used by AECOM is in good working order;
- Verifying that AECOM contractors are prepared with the PPE, respiratory protection and safety equipment required for this program;
- Preparing an initial Job Safety Analysis (JSA) during the initial mobilization and revising the Job Safety Analysis if conditions or tasks change and communicating with all workers the results of the Job Safety Analysis. See attachment B for a JSA form. The JSA will be reviewed daily by all workers and updated as needed.
- Notifying the PM of all noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of all personnel within the established restricted areas to ensure that required safety and health procedures are being followed;

- Conducting accident/incident investigations and preparing accident/incident investigation reports;
- Conducting the pre-entry briefing prior to beginning work and subsequent safety meetings as necessary; and
- Initiating emergency response procedures in accordance with Section 11.0 of this HASP.

1.4.4 AECOM Field Personnel

All AECOM field personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Assess each task prior to beginning work on that task for hazards and necessary precautions.
- Assess the work area for changing conditions and new hazards and address the hazards;
- Stop work and initiate corrective actions if work site hazards create unacceptable risk;
- Reading this HASP in its entirety prior to the start of on-site work;
- Submitting a completed HASP Review and acceptance form (Attachment A)to the AECOM SSO prior to the start of work;
- Attending the required pre-entry briefing prior to beginning on-site work and any subsequent safety meetings that are conducted during the implementation of the program;
- Bringing forth any questions or concerns regarding the content of the HASP to the PM or the SSO prior to the start of work;
- Reporting all Incidents, injuries and illnesses, regardless of their severity, to the AECOM SSO; and,
- Complying with the requirements of this HASP and the requests of the SSO.

1.4.5 Contractors

Additionally, contractors hired by AECOM are responsible for:

- Reading the HASP in its entirety prior to the start of on-site work;
- Attending the required pre-entry briefing prior to beginning on-site work and any subsequent safety meetings that are conducted during the implementation of the program;
- Ensuring that their equipment is in good working order via daily inspections;
- Operating their equipment in a safe manner;
- Appointing an on-site safety coordinator to interface with the AECOM SSO;
- Providing AECOM with copies of material safety data sheets (MSDS) for all hazardous materials brought on-site; and,
- Providing all the required PPE, respiratory equipment and safety supplies to their employees.

1.5 HEALTH AND SAFETY EXPECTATIONS

Commitment to safety, health, and environmental excellence requires that all work proceed only after it is safe and environmentally sound to do so. The responsibility for ensuring that this takes place rests with every worker present at this property. Effectively meeting these responsibilities depends upon open communication between individuals and their supervisors prior to work beginning, and – in certain cases – after safety, health and/or environmental issues are identified. Completing a Job Safety Analysis (JSA) to aid in planning safe work performance will be an integral part of meeting safety, health and environment (SHE) expectations.

The safety and health of on-site personnel will take precedence over cost and schedule considerations for all project work. All AECOM personnel have the authority to STOP WORK if they see a potential or actual hazard that may threaten the safety of people or the environment. Upon stopping work, the SSO must be immediately

notified and provided with information regarding the nature of the safety, health or environmental concern. The SSO should meet with the worker with the intent of resolving the worker's concerns. Once the concerns are resolved to the satisfaction of the worker, work can proceed.

If the concerns are not resolved to the satisfaction of the worker and/or the SSO, work does not proceed. The AECOM RSHEM will be contacted to obtain assistance in resolving the concerns. Using his/her expertise, safety, health, and environmental rules, regulations, and procedures, the AECOM RSHEM will attempt to resolve the matter with all parties involved. Work will not resume until this criterion is met.

1.6 MANAGEMENT OF CHANGE/MODIFICATION OF THE HASP

1.6.1 Management of Change

This document discusses the physical hazards associated with the proposed activities. However, unanticipated site-specific conditions or situations might occur during the implementation of this project. Also, AECOM and/or the contractors may elect to perform certain tasks in a manner that is different from what was originally intended due to a change in field conditions. As such, this HASP must be considered a working document that is subject to change to meet the needs of this dynamic project.

1.6.2 HASP Modification

Should significant information become available regarding potential on-site hazards, it will be necessary to modify this HASP. All proposed modifications to this HASP must be reviewed and approved by the AECOM RSHEM before such modifications are implemented. Any significant modifications must be incorporated into the written document as addenda and the HASP must be reissued. The AECOM PM will ensure that all personnel covered by this HASP receive copies of all issued addenda. Sign-off forms will accompany each addendum and must be signed by all personnel covered by the addendum. Sign-off forms will be submitted to the AECOM PM. The HASP addenda should be distributed during the daily safety meeting so that they can be reviewed and discussed. Attendance forms will be collected during the meeting.

1.6.3 Job Safety Analysis (JSA)

AECOM and/or AECOM's contractors will prepare a Job Safety Analysis (JSA) for each task to be performed prior to commencing work. The use of new techniques will be reviewed and if new hazards are associated with the proposed changes, they will be documented and evaluated on the JSA form. An effective control measure must also be identified for each new hazard. JSA forms will be reviewed by the SSO prior to being implemented. Once approved, the completed forms will be reviewed with all field staff during the daily safety meeting. A blank JSA form is presented as Attachment B.

1.6.4 Employees Working Alone

Employees working alone at project sites will review the JSA for their tasks as they are conducting their daily overview and reconnaissance of the site. After completing the JSA review/revision and site reconnaissance, the employee should call the Project Manager and report any new hazards or site conditions observed.

2.0 SITE INFORMATION AND SCOPE OF WORK

AECOM will conduct environmental services at the National Heatset Printing site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Work Plans developed for the National Heatset Printing site. Deviations from the listed SOW will require that a Safety Professional review and changes made to this HASP, to ensure adequate protection of personnel and other property.

The following is a summary of relevant data concerning the National Heatset Printing site, and the work procedures to be performed. The Work Plan prepared by AECOM as a companion document to this HASP provides significantly greater details concerning both site history and planned work operations.

2.1 SITE INFORMATION

This section provides a general description and historical information associated with the site.

2.1.1 General Description

The National Heatset Printing site is located at One Adams Boulevard in the Hamlet of East Farmingdale, Town of Babylon, Suffolk County. The site contains one multi-tenant industrial building approximately 4.5 acres in size. The local topography surrounding the Heatset Site consists of relatively flat terrain with a slight south-southwest slope. There are no surface water bodies located within the National Heatset Printing Site property boundaries.

2.1.2 Site Background and Previous Investigations

The National Heatset Printing Company occupied a portion of the existing building form July 1983 to April 1989. Their operations consisted of lithographic tri-color printing of newspaper and periodical advertisements and the manufacture of lithographic printing plates. An inspection conducted by the Suffolk County Department of Health (SCDHS) in 1983 and 1986 reported improper storage and discharge of waste materials.

In 1987, National Heatset Printing filed for bankruptcy at which time it was discovered that that National Heatset disposed of its chemical inventory by dumping the materials onto soils and into a leaching pool located off the rear of the building on the northeast side of the property.

Environmental investigations conducted by 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, primarily Tetrachloroetheylene (PCE).

A Remedial Investigation (RI) was performed for the NYSDEC from August 1997 to January 1999. The RI reported the presence of a groundwater plume containing VOCs, which extended approximately 7,100 feet downgradient of the site. The highest concentrations of PCE in groundwater were detected at approximately 80 feet bgs. 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.

3.0 SCOPE OF WORK AND ASSUMPTIONS

3.1 PROJECT GOALS

The focus of the Project includes the supply, construction, installation, operation, maintenance, and monitoring of an in-well stripping system.

3.2 FIELD TASKS

The following bullets summarize work to be conducted on site:

- Conduct a Pilot Test in accordance with the Contract Documents and report results and recommendations to the State's Representative for evaluation.
- Install air purifying equipment to meet air discharge standards, if necessary, during the pilot test.
- Supply or fabricate and install up to 10 in-well stripping wells: Up to 4 on-site and up to 6 off-site depending on Contractor's pilot test results and under the direction of the State's Representative.
- Supply, fabricate, and install the necessary above ground equipment components or systems for completely functional and operational in well stripping systems that include air compressors, vapor phase treatment vessels, power and system controls, etc. in accordance with the Contractor's approved Work Plan.
- Furnish above ground equipment in enclosures or containers that shall be trailer mounted or portable.
- Test and startup in well stripping systems at the on-site and off-site locations.
- Operate and maintain the on-site and off-site in-well stripping system for a period of 360 days following start-up.

3.2.1 Additional Work Operations

The following additional tasks will also be performed as necessary in support of planned site activities:

Mobilization/Demobilization: Mobilization and demobilization represent limited pre and post-task activities. These activities include driving to and from the site; initial site preparations, such as trailer and toilet facilities setup; and post-work activities, such as removing files and office equipment and general housekeeping.

Equipment Decontamination: AECOM and subcontractor personnel will perform decontamination of equipment used to perform work within controlled work areas.

Investigative-Derived Waste (IDW) Management: IDW will be collected and categorized as non-hazardous or hazardous. Potentially hazardous IDW (purge water, and decontamination fluids, and soil cuttings [if any]) will be tested and disposed of within 90 calendar days of completing the field activities. Potentially hazardous IDW waste will be staged onsite, then delivered to an IDW storage facility for processing. Non-hazardous IDW (normal trash) will be disposed of in a timely fashion during fieldwork.

3.3 ASSUMPTIONS

- All work can be performed using Level D Personal Protective Equipment;
- Site management will assist in locating subsurface utilities, vessels, and structures located on the property and outside the scope of the utility locator service; and
- No confined spaces will be entered on this project.

4.0 CHEMICAL HAZARD ASSESSMENT AND CONTROL

4.1 CHEMICAL CONTAMINANTS OF CONCERN

4.1.1 Chlorinated Solvents

Overexposure to the chlorinated solvents that might be present in the site soils and groundwater can result in depression of the central nervous system, symptoms of which include dizziness, headache, giddiness and drunken-like behaviors. Chronic overexposures can result in liver and kidney damage. The OSHA permissible exposure limit (PEL) for trichloroethylene is 100 ppm, as an 8-hour time-weighted average (TWA). The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a threshold limit value (TLV) of 50 ppm, as an 8-hour TWA. The OSHA PEL for tetrachloroethylene is 100 ppm, as an 8 hour TWA with the ACGIH recommending a TLV of 25 ppm, as an 8 hour TWA. The OSHA PEL and ACGIH TLV for 1,1,1-trichloroethane is 350 ppm, as an 8-hr TWA.

4.1.2 Volatile Organic Compounds (VOCs & SVOCs)

Volatile Organic Compounds refer to a group of volatile compounds or mixtures that are relatively stable chemically and that exists in the liquid state at temperatures of approximately 32° to 82°F.

VOCs are typically organic solvents used for extracting, dissolving, or suspending materials such as fats, waxes, and resins that are not soluble in water. The removal of the solvent from a solution permits the recovery of the solute intact with its original properties. Solvents are used in paints, adhesives, glues coatings, and degreasing/ cleaning agents.

Semivolatile Organic Compounds (SVOCs) are less volatile chemicals that tend to persist in the environment.

Inhalation and percutaneous absorption are the primary routes of exposure. Organic compounds are metabolized or they accumulate in the lipid-rich tissues such as the liver, fat cells, or the nervous system.

Solvent inhalation by workers can cause effects ranging from an alcohol-like intoxication to narcosis and death from respiratory failure. Symptoms that include drowsiness, headache, dizziness, dyspepsia, and nausea.

4.2 SUMMARY OF HAZARDOUS PROPERTIES OF POTENTIAL CONTAMINANTS

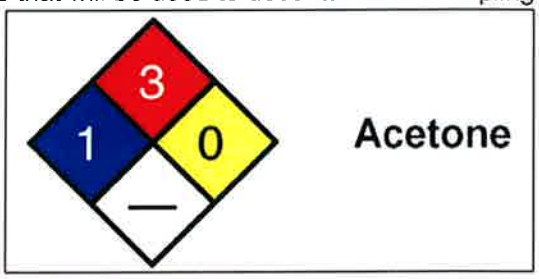
Chemical Name	PEL[1]	TLV[2]	VP[3]	VD[4]	SG[5]	SOL[6]	FP[7]	LEL[8]	UEL[9]
Tetrachloroethylene	100	50	14	5.7	1.62	0.02	N/A	N/A	N/A
Trichloroethene	5	N/A	40.5 atm.	N/A	N/A	N/A	N/A	N/A	N/A
Vinyl Chloride	1	1	2580	N/A	N/A	0.1	N/A	3.6	33.0
1,1,1,-Trichloroethane	100	N/A	58	N/A	N/A	0.1	N/A	8	10.5
1,2-Dichloroethane	200	N/A	180-265	N/A	N/A	0.4	N/A	5.6	12.8
1,2-Dichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hydrogen Chloride	5	N/A	40.5 atm.	N/A	N/A	67	N/A	N/A	N/A

[1] Permissible Exposure Limit in ppm
[2] Threshold Limit Value in ppm
[3] Vapor Pressure in mm Hg
[4] Vapor Density (air = 1)
[5] Specific Gravity (water = 1)
[6] Solubility in Water in %
[7] Flash Point in °F
[8] Lower Explosive Limit in % by volume
[9] Upper Explosive Limit in % by volume
NA = Not Applicable
? = Not known
C = Ceiling limit not to be exceeded

4.3 HAZARD SUBSTANCES BROUGHT ON SITE BY AECOM

A material safety data sheet (MSDS) must be available for each hazardous substance that AECOM or its contractors bring on the property. This includes solutions/chemicals that will be used to decontaminate sampling equipment and gases needed to calibrate air monitoring equipment.

In addition, all containers of hazardous materials must be labeled in accordance with OSHA's Hazard Communication Standard. Either the original manufacturer's label or an NFPA 704M label specific for the material (as shown to the right) is considered to be an acceptable label.



4.4 CHEMICAL EXPOSURE AND CONTROL

4.4.1 Chemical Exposure Potential

Employees can be exposed by inhalation to the chemicals of concern during the installation of the soil borings and sampling activities. Another route of potential exposure to the contaminants of concern is via direct dermal contact with soils and groundwater during sampling.

Although highly unlikely, exposure to all of the contaminants of concern can occur via ingestion (hand-to-mouth transfer). The decontamination procedures described in Section 9.0 address personal hygiene issues that will limit the potential for contaminant ingestion.

4.4.2 Chemical Hazard Control

The chemical hazards associated with the investigative and sampling activities can be controlled in several ways, including:

AECOM will perform air monitoring (Section 6) in the worker's breathing zone to determine exposure to the chemicals of concern during the installation of soil borings and the sampling program. If exposures exceed the action levels, respiratory protection as discussed in Section 7, will be donned.

To avoid direct dermal contact with contaminated media, protective clothing, as described in Section 7 will be required when collecting samples and decontaminating sampling equipment.

4.5 HAZARDOUS WASTE MANAGEMENT

Waste generated as a result of OM&M or investigation activities will be containerized local to the point of generation, sampled for characterization purposes and secured prior to off-site transportation and disposal. Upon receipt of analytical results, the AECOM project team will work with the Client to properly characterize, profile and dispose of the waste(s).

5.0 PHYSICAL HAZARDS AND CONTROLS

5.1 BACK SAFETY

Using the proper techniques to lift and move heavy pieces of equipment is important to reduce the potential for back injury. The following precautions should be implemented when lifting or moving heavy objects:

- Bend at the knees, not the waist. Let your legs do the lifting;
- Do not twist while lifting;
- Bring the load as close to you as possible before lifting;
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip and fall hazards;
- Use mechanical devices to move objects that are too heavy to be moved manually; and,
- If mechanical devices are not available, ask another person to assist you.

5.2 CONCRETE AND ASPHALT CORING & CUTTING

Cutting and coring concrete and asphalt can involve numerous hazards. The noise generated as a result of the tools used, and adequate hearing protection is necessary when conditions outlined in the Noise section below are encountered. Tools used which can include drills and saws, must be appropriately guarded to prevent hands, PPE, and other objects from being caught-up in the moving parts and drawing employees in. Dust may also be generated while cutting concrete and either respiratory protection or dust suppression will need to be utilized to prevent exposure. Additional consideration must be given chemical hazard concerns that may exist in the materials underlying the concrete.

5.3 CORROSIVE LIQUIDS

Site activities may require the use of corrosive liquids for preserving samples once collected, identifying substances in the field, or as part of system operations and maintenance. When corrosive liquids are identified in the work area, PPE upgrades will need to include an appropriate glove to mitigate the hazard, protective eye wear to guard against splashing liquids, and the potential need for poly-coated Tyvek to be worn. Additionally, the job task will be analyzed to determine if splashing and spilling can be minimized through the use of special equipment or procedures. Examples include using a funnel, identifying an alternative substance for use, and more.

5.4 CUTS AND LACERATIONS

Geoprobe soil samples are collected in acetate liners that must be cut open in order to collect the sample. Additionally, tubing will need to be cut to facilitate groundwater sampling. Additional tasks for the job may also pose laceration hazards. Tube-cutters are available and should be used to eliminate this hazard. However, if it is necessary to use knives or blades, follow the safety precautions listed below:

- Keep your free hand out of the way
- Secure the acetate liner so it won't roll or move while you are cutting
- Use only sharp blades; dull blades require more force which results in less knife control
- Pull the knife at an angle to your body; pulling motions are easier to manage
- Don't put your knife in your pocket
- Use a hooked knife (i.e. linoleum knife) or a utility knife with a self-retracting blade
- Wear leather or Kevlar® gloves when using knives or blades.

5.5 DRILLING HAZARDS

Use of a drill rig to advance soil borings and install monitoring wells will require all personnel in the vicinity of the operating rig to wear steel-toed boots, hard hats, hearing protection and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities.

Additionally, the following safety requirements must be adhered to:

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency stop.
- The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment.
- A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools, which could rotate, the driller must shut down the rig prior to initiating such work.
- Driller's Drillers, helpers and geologists must secure all loose clothing, long hair, or jewelry when in the vicinity of drilling operations.
- Only equipment, that has been approved by the manufacturer, may be used in conjunction with drilling equipment Pins that protrude excessively from augers shall not be allowed
- No person shall climb the drill mast while tools are rotating.
- No person shall climb beyond 6 feet above ground on the drill mast without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder that meets the requirements of OSHA standards.
- When using the rig's hoist to lift or move objects other than the equipment associated with the direct push operation, an assessment of the force required to perform the lift and the rig's design specifications must be made to determine whether the lift can be made safely. In all cases personnel must not be in line with the cable when it is under tension.
- If drilling operations are to be performed within an enclosed space proper procedures must be followed to prevent the accumulation of carbon monoxide within the work area.
    - Open doors and windows and provide ventilation to the outside.
    - Employ the use of a mechanical ventilation system, i.e. blower or fan, appropriately sized for the room to circulate fresh air.
    - Connect equipment exhaust points to hoses that can be direct ventilated to an outside area.

5.5.1 Rotating Parts

Exposure to rotating parts can occur when working near the drilling rig or the internal combustion engine. All rotating parts should be covered with guards to prevent access by workers. When performing maintenance activities that require the rotating parts to be exposed, workers should not allow loose clothing, hands, or tools to approach the rotating parts. Guards must be replaced as soon as possible after completing the maintenance task.

Operation of drilling equipment also creates hazards associated with pinch points and rotating equipment. Employees will evaluate work procedures to avoid placing their body and extremities in the path of rotating equipment and tools to avoid being struck by moving equipment, tools and machinery. Similarly, these

hazards also create pinch point hazards where the body and extremities, especially the hands, can be caught in moving equipment and crushed. Employees will evaluate equipment and tool use procedures to identify pinch points and develop procedures to avoid placing body parts in a position where they can be caught in moving equipment, tools and machinery.

5.6 DRIVING SAFETY

Drivers must be licensed to drive the class of vehicle they are operating and trained in defensive driving. Only AECOM personnel may drive AECOM vehicles or vehicles rented for AECOM business; client, subcontractor, or other work-related personnel may ride. Drivers and passengers must comply with all traffic laws and posted signs, and will not operate a vehicle if under the influence of impairing medication, alcohol, or any other substance.

Make sure that the following basic safe driving practices are followed at all times while working on this project:

- Always wear a seat belt while operating a motor vehicle or while traveling as a passenger.
- Obey speed limits and local traffic laws at all times.
- Obtain proper directions to the site in advance and take the route that is most likely to be free of known traffic hazards (e.g., congestion, construction, etc.) and that avoids travel through potentially dangerous neighborhoods.
- Abstain from distractions while driving (e.g., the use of cell phones, eating/drinking, reading maps, etc.) If necessary, stop the vehicle and pull over to perform such activities safely. ***AECOM policy is engine on, cell phone off***. You must NOT operate a vehicle while talking on your cell phone, regardless of "hands free" or not. If you receive a call, pull over to answer it. Do NOT allow other distractions to interfere with your safe operation of the vehicle.
- Do not operate a motor vehicle if you are tired and/or have not had sufficient rest. AECOM's H&S policy 1.2 limits the maximum length of the workday to 16 hours for fieldwork. This limit includes the time spent driving to/from a site.
- All unattended personnel transport vehicles will not be allowed to idle, and must be turned off when not in use.

5.6.1 Planning / Preparation

- Prior to departure, check traffic reports, weather conditions, road construction, and road closures. If necessary, develop an alternate route and new, approved JMP (Journey Management Plan).
- Prior to entering the vehicle, inspect the vehicle.
- Leave early to allow for contingencies.

5.6.2 DOT

If you are to operate a vehicle exceeding 10,000 pounds (or vehicle and trailer with a combined weight over 10,000 pounds), or you are to transport greater than 1,000 pounds of hazardous materials, you MUST comply with DOT regulations. These are NOT addressed in this HASP; contact the H&S Department if this applies.

5.6.3 Secure Packing

Do not move your vehicle unless all equipment and supplies are secured. Items and material which may roll, slide, or move about in your vehicle while traveling are a major hazard. Secure the load!

5.6.4 Emergency Procedures

Always move out of traffic if possible; even if those in front of you have stopped. Stopping on an active highway can precipitate being hit from the rear. If you must stop on an active roadway, leave at least one car length in front of you, and watch the rear mirror, so you can ease up if someone behind can't stop. Keep your flashers on in this situation. If you are the only driver coming to a stop on an active roadway, leave the flashers on and when safe to do so, exit the car and get to a safe location.

If you must stop due to vehicle failure, etc. try to coast out of traffic. Put on your flashers, and tie a white handkerchief, etc. on the driver's side door or mirror. If you remain in the vehicle, lock the doors. Use your cell phone to summon help.

5.7 FLYING OBJECTS HAZARDS

Activities involving the use of power tools, drilling rigs, and hand tools, among other activities, can create flying object hazards where objects can become projectiles. When flying objects represent projectiles employees need to use equipment that is appropriately guarded to minimize the creation of projectile hazards, and also use the appropriate PPE including hard hats, safety goggles, face shields to prevent projectiles from causing injuries to employees.

5.8 HAND SAFETY

5.8.1 Glove Selection

To protect onsite workers from hand injuries, the following gloves will be used for when performing a specific duty:

Brightly colored gloves will be used to help emphasize and easily locate the hands. The color of gloves will be changed monthly to draw attention to the hands.

Pinch points are found between a moving object and a stationary object, or between two continuously moving objects. Yellow hand stickers will be placed on equipment to remind workers of pinch points.

5.8.2 Working with Glassware

Glass bottles, laboratory equipment, and VOA vials can break and cause lacerations and puncture wounds. The follow preventive measures should be taken to reduce the potential for broken glassware.

- Package all glassware such that there is no glass to glass contact during transportation or storage;
- Assume that any time glass strikes another object it is damaged;
- Inspect all glassware for cracks, scratches, and other damage before using;
- Lids and caps should be "finger tight" unless there is a torque specification and you use a torque wrench;
- Never fill a glass container (other than VOA vials with a septum) liquid full, always leave an air space to buffer thermal expansion of the liquid; and
- Avoid rapid temperature changes when filling glass containers.

Glass often has flaws that cannot be detected by visual inspection and the force needed to open and tighten lids can cause these flaws to fracture the glass. Any time force is applied to glass, workers should wear leather or preferably Kevlar® gloves. Kevlar® glove liners are available for use under Nitrile or cotton gloves.

5.8.3 Hand Tools

Rules for the safe use of hand tools:

- Select the right size tool for the job. Don't use "cheaters" and avoid pulling old tools from the waste stream. There's a reason why they were thrown away!
- All hand tools must be in safe condition.
- Handles must be sound, straight and tight-fitting.
- Always inspect tools before use and replace or repair worn or damaged tools.
- Always keep the cutting edges sharp and never test a cutting edge with your finger.
- When working on an elevated surface (ladder, truck, scaffold), ensure your tools are secure. Falling tools can cause serious injury.
- Always carry your tools correctly and never put sharp or pointed tools in your pocket.
- When carrying hand tools, always point the cutting edge to the ground.
- Always keep your tools in a dry place to prevent rust.
- Cutting tools must be kept sharp and properly shaped.
- Secure work pieces prior to cutting or drilling.
- Keep the unused hand and other people away from the tool.

5.8.4 Specific Tool Use

5.8.4.1 Screwdrivers

Most screwdrivers are not designed to be used on electrical equipment. Use an insulated screwdriver for electrical work.

Do not hold an object in the palm of one hand and press a screwdriver into it; place the object on a bench or table. Never hammer with a screwdriver. Never use a screwdriver with a broken handle, bent or burred blade, etc.

5.8.4.2 Pliers

Do not use pliers as a substitute for hammers, wrenches, pry bars, etc. Use insulated pliers when doing electrical work. Inspect the pliers frequently to make certain that they are free of breaks or cracks.

Use the right type of pliers for the specific task – adjustable, locking (Vise Grip®), standard, bolt size fit, pipe wrench.

5.8.4.3 Hammers

Use the correct hammer for the specific type of striking work (task) to be done. Always wear safety glasses when using a hammer to strike an object. Always use the claw portion of a hammer to remove nails and not as a pick or awl. Have an unobstructed view and swing when using a hammer. Watch for overhead interference on back and forward swing. Use a good grip and use something other then your hand to hold a nail when starting hammering. Check for defects on the handle and head before using. If the hammer head shows signs of mushrooming, replace it immediately.

Handles may be wood, tubular/solid steel or fiberglass. Replace any hammer with a loose handle before the head flies off and causes injury to you or someone else. Tighten loose handles with the proper wedges; never use nails or staples for wedges. If a steel or fiberglass handle is loose replace it, since it is more difficult to repair than a wooden one. Some fiberglass handles can be tightened with the aid of a repair kit with epoxy materials.

5.8.4.4 Wrenches

Select the correct size of wrench for the job. Never use a pipe wrench as a wrench handle extension. Too much leverage can ruin a tool and cause injury.

To avoid sudden slips, stand in a balanced position and always pull on the wrench instead of pushing against the fixed jaw, particularly when a pinch point is created. Wear gloves when using a wrench in a confined space.

Whenever possible use a box end wrench instead of an open end wrench to avoid slipping.

5.8.4.5 Chisels

Always wear safety goggles or a face shield when using a chisel. Drive chisels outward and away from your body. Do not use chisels to pry. Keep edges sharp for most effective work and protect when not in use. Driven tools (chisels, punches, etc.) must be dressed to remove any mushrooming. Use the proper hammer when using a chisel.

5.8.4.6 Knives

Always perform a through Job Safety Analysis (JSA) to define the proper cutting tool for the task.

Always place the item to be cut on a solid surface, attempt to hold the cut item without your hand and cut in a direction away from the body and hand.

Always keep hands and body clear of the knife stroke. Always keep the cutting tool blades sharp.

Make sure there is plenty of open space around you when using any cutting tool.

Use the following safer tools in replace of fixed open blade knives (FOBK) whenever possible:

- Self-retracting utility knives
- Guarded utility knives
- Shears, snips, and/or scissors
- Concealed blade cutters
- Pipe cutters
- Specialty cutters (e.g. Geoprobe Acetate Liner Cutter)
- Ratcheting tools

5.9 HEAVY EQUIPMENT

The use of heavy equipment for earth moving work poses potential hazards to employees. Such equipment can cause trauma injuries to the operator or nearby workers. It may also roll over, or fall on sloped ground or unstable soil. AECOM personnel are to remain clear of operating heavy equipment to the extent feasible.

Operators of earth moving equipment must be experienced or trained in the use of the equipment. They must inspect the equipment each day before use to assure that it is in safe operational condition. The equipment must be set up in a stable configuration, with the outriggers fully extended and supported on stable soil to prevent rollover. The rear swing-radius must be barricaded to prevent injuries to persons passing behind the equipment.

When employees must work near the equipment, eye contact and clear communication must be maintained.

5.10 HEAVY EQUIPMENT – DRILL RIGS

Drill rigs are considered to be heavy equipment, and therefore precautions must be incorporated into job activities when working in close proximity to drill rigs. In addition the wearing the PPE that has been determined to be necessary for the project, employees will need to ensure that Drill Rig Operators conduct inspections of the drill rig on a daily basis. A drill rig inspection is included in Attachment C as a reference.

Focal points of the inspection should include checking hydraulic lines, tools and drilling equipment, emergency stop switches, and other parts of the equipment to insure that they are maintained in a safe operating condition.

Employees will also consider the staging their work area so that they are not within the shadow of the drill rig's mast. Working within this area creates a potential to be contacted by the drill rig if it were to tip over on its side. Likewise, when establishing a drilling location, the rig shall be positioned so that it won't clip overhead power lines should it tip over.

5.11 INSECTS, SPIDERS, WASPS AND BEES

Employees are encouraged to review AECOM SHE SOP 610 – Biological Hazards Injury & Illness Prevention, for detailed discussion on working around insects within the workplace and procedures that can be used to minimize and prevent exposure.

5.11.1 Ticks

Ticks are bloodsuckers, attaching themselves to warm-blooded vertebrates to feed. Deer ticks are the most common carriers of Lyme disease, a bacterial infection that is transmitted to humans through the bite of the tick.

Personnel should carefully inspect themselves each day for the presence of ticks or any rashes. This is important since prompt removal of the tick can prevent disease transmission. Female deer ticks are about one-quarter inch in length and are black and brick red in color. Males are smaller and all black.

Removal of the tick is important in that the tick should not be crushed and care must be taken so that the head is also removed. If the head is not completely removed or if the tick is allowed to remain for days feeding on human blood, a condition known as **tick paralysis** can develop, this is due to a neurotoxin that the tick apparently injects while engorging. This neurotoxin acts upon the spinal cord causing loss of coordination, weakness and paralysis.

One characteristic symptom of Lyme disease is a bulls-eye rash that develops around the bite site. The rash appears in about 60-80% of all Lyme disease cases. Contact your OHSC immediately if you develop such a rash.

Tick season typically lasts from April through October; peak season is May through July; seasons can very depending on climate. Wear light-colored clothing (easier to spot ticks) with long sleeves and make sure that shirts are tucked into pants and pants are tucked into socks or boots. Ticks have a tendency to crawl upwards. These procedures will make it more difficult for a tick to reach your skin.

Studies have determined that repellants containing DEET as a main ingredient are most effective against mosquitoes and ticks. DEET can be directly applied to the exposed skin of adults and/or clothing. Products containing DEET can't be used with Fire Resistant Clothing (FRC) as it diminishes the garments' capacity to resist ignition in a fire. Permethrin is another repellent; however, it can only be directly applied to clothing.

5.11.2 Mosquitoes

Mosquitoes, carriers of the West Nile Virus, Yellow Fever and other diseases, are indigenous to the area. As mentioned above, DEET is an effective mosquito repellent and is recommended. Although concentrated DEET formulations protect longer than those that are more dilute, little improvement is offered by concentrations of the active ingredient higher than 50 percent. Adverse effects, though documented, are infrequent and are generally associated with gross overuse of the product. Users should avoid the temptation to apply the most concentrated product available. The transient protection offered by more dilute preparations can be extended by reapplication. When using DEET care should be taken to reapply the repellant when its effectiveness wears off.

5.11.3 Spiders

Spiders and wasps may be found in derelict buildings, sheltered areas, and even on open ground. Exercise care when collecting samples and avoid reaching into areas where visibility is limited. If bitten by a spider, notify a co-worker or someone who can help if you should you have an allergic reaction or develop other symptoms

related to spider venom. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the bite such as developing a rash, excessive swelling or pain at the site of the bite or sting or any swelling or numbness beyond the site of the bite.

Black Widow Spider

Abdomen usually shows hourglass marking.

The female is 3-4 centimeters in diameter.

Have been found in well casings and flush-mount covers.

Not aggressive, but more likely to bite if guarding eggs.

Light, local swelling and reddening of the bite are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea.

If bitten, see physician as soon as possible.

Brown Spiders (Recluse)

Central and South U.S., although in some other areas, as well.

¼-to-½-inch-long body, and size of silver dollar.

Hide in baseboards, ceiling cracks, and undisturbed piles of material.

Bite either may go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of affected tissue, and very slow healing.

If bitten, see physician as soon as possible.

Studies have determined that repellants containing DEET as a main ingredient are most effective against mosquitoes and ticks. DEET can be directly applied to the exposed skin of adults and/or clothing. Products containing DEET can't be used with Fire Resistant Clothing (FRC) as it diminishes the garments' capacity to resist ignition in a fire. Permethrin is another repellent; however, it can only be directly applied to clothing.

5.11.4 Wasps and Bees

Wasps (hornets and yellow-jackets) and bees (honeybees and bumblebees) are common insects that may pose a potential hazard to the field team if work is performed during spring, summer or fall. Bees normally build their nests in the soil. However, they use other natural holes such as abandoned rodent nests or tree hollows. Wasps make a football-shaped, paper-like nest either below or above the ground. Yellow-jackets tend to build their nests in the ground but hornets tend to build their nests in trees and shrubbery. Bees are generally more mild-mannered than wasps and are less likely to sting. Bees can only sting once while wasps sting multiple times because their stinger is barbless. Wasps sting when they feel threatened. By remaining calm and not annoying wasps by swatting, you lessen the chance of being stung.

Wasps and bees inject a venomous fluid under the skin when they sting. The venom causes a painful swelling that may last for several days. If the stinger is still present, carefully remove it with tweezers or y scraping a credit card or other blunt object against the sting site in the opposite direction in which the stinger is embedded. Some people may develop an allergic reaction, i.e. anaphylaxis, to a wasp or bee sting. If such a reaction develops, **seek medical attention at once**. Persons who are allergic to bee and wasp stings should carry an epinephrine pen, e.g. epi-pen, with them that is prescribed by a doctor and used to

help abate swelling that occurs due to their allergy. Even if an employee utilizes their epi-pen, they still need to seek medical attention for follow-up care and observation.

5.12 NOISE EXPOSURE

The use of drilling equipment can expose the field team to noise levels that exceed the OSHA PEL of 90 dB for an 8-hour day. Exposure to noise can result in the following:

- Temporary hearing losses where normal hearing returns after a rest period;
- Interference with speech communication and the perception of auditory signals;
- Interference with the performance of complicated tasks; and,
- Permanent hearing loss due to repeated exposure resulting in nerve destruction in the hearing organ.

Since personal noise monitoring will not be conducted during the proposed activities, employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone two (2) feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating (NRR) of 27 dB.

5.13 OVERHEAD MATERIALS

Overhead materials can include objects, tools, utilities, equipment and machinery that are, or have the potential to be, elevated above the work area. Overhead materials pose a significant safety risk because of the force that can be generated when they fall and strike an employee. Special attention should be paid when setting up a work area to evaluate the potential for overhead materials to cause traumatic blunt force trauma. Consideration must be given to potential for these overhead objects to be contacted during the course of work by AECOM employees and Subcontractors, and what the result of contacting these overhead materials will be.

If possible, the work area should be adjusted or moved so that no overhead materials present a hazard. Likewise, if the object overhead can be relocated to remove the hazard, that is the preferred course of mitigation. When the hazard can't be eliminated, then protective measures to shield the employees from being struck by falling objects should be taken. As a last resort, and as part of the minimum PPE for site work, employees working in areas where falling objects pose a hazard will wear a hard hat.

5.14 PINCH POINTS

The use of hand tools, mechanical equipment, heavy machinery and more can create pinch points within the working area. Pinch points can be recognized when moving objects are present in the work space in close proximity to employees, and it is reasonable to assume that a part of the employee's body can be caught between the moving objects. Pinch points will be considered when performing a Job Safety Analysis for the task being performed and recommendations will be made to reduce the potential for body parts to become caught in moving parts, including but not limited to:

- The use of PPE, e.g. gloves, boots, etc, to protect exposed body parts;
- Guarding machinery and equipment to prevent body parts from being caught in the moving objects;
- Using tools as an extension of the body to avoid placing body parts in the path of harm. When tools are used as an extension of the body consideration will be given to how the tool may become a hazard if it is caught within moving parts.

5.15 POISONOUS PLANTS

Employees are encouraged to review AECOM SHE SOP 610 – Biological Hazards Injury & Illness Prevention, for detailed discussion on working around poisonous plants within the workplace and procedures that can be used to minimize and prevent exposure.

All undeveloped property potentially has poison ivy, oak, or sumac growing in areas where vegetation is not controlled. These plants can also be found in cultivated and landscaped areas. Perform a hazard analysis

appropriate for the working conditions and consider the existence of poisonous plants. Use appropriate PPE to prevent exposure, including but no limited to, full length clothing, Tyvek coveralls, and dermal barrier creams.

1.1.1.1.1 Poison Ivy Grows in West, Midwest, Texas, East. Several forms – vine, trailing shrub, or shrub. Three leaflets (can vary 3-9). Leaves green in summer, red in fall. Yellow or green flowers. White berries.	 
1.1.1.1.2 Poison Oak Grown in the East (NJ to Texas), Pacific Coast. 6-foot tall shrubs or long vines. Oak-like leaves, clusters of three. Yellow berries.	 
1.1.1.1.3 Poison Sumac Grows in boggy areas, especially in the Southwest and Northern states. Shrub up to 15 feet tall. Seven to 13 smooth-edged leaflets. Glossy pale yellow or cream-colored berries.	 

If you must enter areas containing such plants, wear protective clothing, such as Tyvek® coveralls, Nitrile or latex gloves, and boot covers. The use of a barrier cream such as Ivy Block can prevent the active agent in poisonous plants from affecting skin and Tecnu cleansing wipes can remove the plant oil from exposed skin.

Avoid using mowers and weed trimmers in areas where poison ivy and oak are likely. Additional care should be taken during early winter after the leaves have fallen from the poisonous plants; the poison still exists in the vines and stubble remaining above the ground. Wash any contaminated skin immediately with cold water and mild soap.

5.16 SLIPS, TRIPS AND FALL HAZARDS

On any work area, it is expected that the ground might be uneven. The ground surface might be unreliable due to settling. Surface debris might be present and wet or swampy areas can exist.

Employees should walk around, not over or on top of debris or trash piles. When carrying equipment, identify a path that is clear of any obstructions. It might be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on site.

During the winter months, snow shovels and salt crystals or calcium chloride should be kept on site to keep work areas free of accumulated snow and ice. Furthermore, use sand or other aggregate material to help keep work surfaces from being slippery, especially where salt/calcium chloride cannot be used. In addition, make sure work boots have soles that provide good traction. When walking on ice is necessary crampons or Yaktrax® should be used.

Maintaining a work environment that is free from accumulated debris is the key to preventing slip, trip and fall hazards at construction sites. Essential elements of good housekeeping include

- Orderly placement of materials, tools and equipment;
- Placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish;
- Prompt removal and secure storage of items that are not needed to perform the immediate task at hand; and,
- Awareness on the part of all employees to walk around, not over or on, equipment that might have been stored in the work area.

5.17 SPLASHING LIQUIDS

Groundwater sampling activities can produce splashing hazards in the work area. Employees will use techniques that minimize the production of splashing hazards while handling liquids, including groundwater, sample container preservatives, decontamination solutions and any other liquids in the work area. Employees will also evaluate the working tasks to consider the use of goggles while working with liquids.

5.18 TRAFFIC SAFETY

5.18.1 Basic Procedures

To make certain that motorists are aware of our presence, all employees who are potentially exposed to traffic hazards should **wear orange or yellow ANSI Class II or III safety vests**. Work area should be delineated with traffic cones, or other suitable warning barriers, to prevent motorists from inadvertently driving through. As for vests, cones or other barrier materials should be reflectorized if work will be performed during dusk or evening hours. Where it is not feasible to implement such procedures, a standby observer should be assigned to warn the work crew of any impending traffic hazards.

5.19 UTILITY HAZARDS

5.19.1 Underground Utilities

New York law requires that a utility clearance be performed at least two (2) working days prior to initiation of any subsurface work.

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to request a mark-out of natural gas, electric, telephone, cable television, water and sewer lines in the proposed drilling locations. In many locations, a separate location request must be submitted to the municipality providing potable water, sanitary and storm sewerage. Work will not begin until the required utility clearances have been performed.

Utility clearance organizations typically do not mark-out underground utility lines that are located on private property. As such, the drilling contractor must exercise due diligence and try to identify the location of any private utilities on the property being investigated. AECOM can fulfill this requirement in several ways, including:

- Obtaining as-built drawings for the areas being investigated from the property owner;
- Visually reviewing each proposed soil boring locations with the property owner or knowledgeable site representative;

- Performing a geophysical survey to locate utilities;
- Hiring a private line locating firm to determine the location of utility lines that are present at the property;
- Identifying a no-drill zone; or
- Hand digging in the proposed soil boring locations if insufficient data is available to accurately determine the location of the utility lines.

5.19.2 Overhead Utilities

All overhead lines will be considered "energized" unless properly de-energized, grounded and tested by the utility company before working within the clearance distance as defined below. The AECOM SSO must observe de-energizing process and reconfirm that the lines are de-energized on a daily basis.

Any vehicle or mechanical equipment that is capable of having parts of its structure elevated near energized overhead lines shall be operated so that a minimum clearance of 10 feet is maintained at all times. This 10 foot distance shall be increased a minimum of 0.4 inches for each 1 kV over 50 kV. If the voltage of the overhead line is unknown, maintain a clearance distance of 35 feet from ground projection of the nearest power line to the vehicle. Any work within the clearance distance must be approved by the Regional Health and Safety Manager and the utility company.

Precautions must be taken when handling lengths of pipe or tubing that can approach overhead power and utility lines. When working with pipe or tubing, maintain a distance equal to the length of pipe plus the clearance distance defined above.

5.20 WEATHER

5.20.1 Inclement Weather

The Site Safety Officer will check the weather forecast for the project area each morning prior to mobilization. Predicted weather conditions will be included in the Job Safety Analysis. Weather changes should initiate a review and update of the JSA as necessary.

Severe weather can occur with little warning. The employee must be aware of the potentials for lightning, flash flooding and high wind events.

Be Prepared, Know What is Coming your Way

- Listen to the radio for severe weather alerts.
- Check the Storm Prediction Center's web page for alerts and warnings.

http://www.spc.noaa.gov/products/wwa/

- Pay attention to the weather in your area, up wind of your location, and in the watershed up stream from your location.
- When in the field, be aware of the route you must take to get to shelter.
- When working in low areas be aware of the potential for flash flooding and the route to higher ground.

5.20.2 Heat Stress

Types of Heat Stress

Heat related problems include **heat rash, fainting, heat cramps, heat exhaustion and heat stroke**. **Heat rash** can occur when sweat isn't allowed to evaporate; leaving the skin wet most of the time and making it subject to irritation. **Fainting** may occur when blood pools to lower parts of the body and as a result, does not return to the heart to be pumped to the brain. Heat related fainting often occurs during activities that require standing erect and immobile in the heat for long periods of time. **Heat cramps** are painful spasms of the muscles due to excessive salt loss associated with profuse sweating.

Heat exhaustion results from the loss of large amounts of fluid and excessive loss of salt from profuse sweating. The skin will be clammy and moist and the affected individual may exhibit giddiness, nausea and headache.

Heat stroke occurs when the body's temperature regulatory system has failed. The skin is hot, dry, red and spotted. The affected person may be mentally confused and delirious. Convulsions could occur. EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH. A person exhibiting signs of heat stroke should be removed from the work area to a shaded area. The person should be soaked with water to promote evaporation. Fan the person's body to increase cooling.

Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks.

Early Symptoms of Heat-Related Health Problems:

decline in task performance	excessive fatigue
incoordination	reduced vigilance
decline in alertness	muscle cramps
unsteady walk	dizziness

Susceptibility to Heat Stress Increases due to:

lack of physical fitness	obesity
lack of acclimatization	drug or alcohol use
increased age	sunburn
dehydration	infection

People unaccustomed to heat are particularly susceptible to heat fatigue. First timers in PPE need to gradually adjust to the heat.

The Effect of Personal Protective Equipment

Sweating normally cools the body as moisture is removed from the skin by evaporation. However, the wearing of certain personal protective equipment (PPE), particularly chemical protective coveralls (e.g., Tyvek), reduces the body's ability to evaporate sweat and thereby regulate heat buildup. The body's efforts to maintain an acceptable temperature can therefore become significantly impaired by the wearing of PPE.

Measures to Avoid Heat Stress:

The following guidelines should be adhered to when working in hot environments:

- Establish work-rest cycles (short and frequent are more beneficial than long and seldom).
- Identify a shaded, cool rest area.
- Rotate personnel, alternative job functions.
- Water intake should exceed sweat produced. Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst. **DO NOT DEPEND ON THIRST TO SIGNAL WHEN AND HOW MUCH TO DRINK**. Consume enough liquid to force urination every two hours. In humid climates ice water or ice should be consumed to help maintain normal body temperature since evaporation does not provide an efficient mechanism for heat removal.
- Eat light meals before and during work shifts. Avoid highly salted foods.
- Drink sports drinks such as Gatorade® diluted 1:1 with water.
- Save most strenuous tasks for non-peak heat hours such as the early morning or at night.

- Avoid alcohol during prolonged periods of heat. Alcohol will cause additional dehydration.
- Avoid double shifts and/or overtime.

The implementation and enforcement of the above mentioned measures will be the joint responsibility of the Project Manager and health and the Site Safety Officer. Potable water and fruit juices should be made available each day for the field team.

Heat Stress Monitoring Techniques

Site personnel should regularly monitor their heart rate as an indicator of heat strain by the following method:

Radial pulse rates should be checked by using fore-and middle fingers and applying light pressure top the pulse in the wrist for one minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beats/minute, the next work cycle will be shortened by one-third and the rest period will be kept the same. If, after the next rest period, the pulse rate still exceeds 110 beats/minute, the work cycle will be shortened again by one-third.

5.20.3 Cold Stress

Type of Cold Stress

Cold injury is classified as either localized, as in frostbite, frostnip or chilblain; or generalized, as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness and inadequate clothing.

The likelihood of developing frostbite occurs when the face or extremities are exposed to a cold wind in addition to cold temperatures. The freezing point of the skin is about 30° F. When fluids around the cells of the body tissue freeze, skin turns white. This freezing is due to exposure to extremely low temperatures. As wind velocity increases, heat loss is greater and frostbite will occur more rapidly.

Symptoms of Cold Stress

The first symptom of frostbite is usually an uncomfortable sensation of coldness, followed by numbness. There might be a tingling, stinging or aching feeling in the affected area. The most vulnerable parts of the body are the nose, cheeks, ears, fingers and toes.

Symptoms of hypothermia, a condition of abnormally low body temperature, include uncontrollable shivering and sensations of cold. The heartbeat slows and can become irregular, the pulse weakens and the blood pressure changes. Pain in the extremities and severe shivering can be the first warning of dangerous exposure to cold.

Maximum severe shivering develops when the body temperature has fallen to 95° F. Productive physical and mental work is limited when severe shivering occurs. Shivering is a serious sign of danger. Immediately remove any person who is shivering from the cold.

Methods to Prevent Cold Stress

When the ambient temperature, or a wind chill equivalent, falls to below 40° F (American Conference of Governmental Industrial Hygienists recommendation), site personnel who must remain outdoors should wear insulated coveralls, insulated boot liners, hard hat helmet liners and insulated hand protection. Wool mittens are more efficient insulators than gloves. Keeping the head covered is very important, since 40% of body heat can be lost when the head is exposed. If it is not necessary to wear a hard hat, a wool knit cap provides the best head protection. A facemask may also be worn.

Persons should dress in several layers rather than one single heavy outer garment. The outer piece of clothing should ideally be wind and waterproof. Clothing made of thin cotton fabric or synthetic fabrics such as polypropylene is ideal since it helps to evaporate sweat. Polypropylene is best at wicking away moisture while still retaining its insulating properties. Loosely fitting clothing also aids in sweat evaporation. Denim is not a good protective fabric. It is loosely woven which allows moisture to penetrate. Socks with a high wool content are best. If two pairs of socks are worn, the inner sock should be smaller and made of cotton,

polypropylene or similar types of synthetic material that wick away moisture. If clothing becomes wet, it should be taken off immediately and a dry set of clothing put on.

If wind conditions become severe, it might become necessary to shield the work area temporarily. The SSO and the PM will determine if this type of action is necessary. Heated break trailers or a designated area that is heated should be available if work is performed continuously in the cold at temperatures, or equivalent wind chill temperatures, of 20° F.

Dehydration occurs in the cold environment and can increase the susceptibility of the worker to cold injury due to significant change in blood flow to the extremities. Drink plenty of fluids, but limit the intake of caffeine

5.20.4 Work/Rest Cycles for Cold Weather

If wind chill temperatures fall below **minus 25° F**, breaks from the cold will occur at a rate of one every hour. If wind chill temperatures fall below **minus 45° F,** all work will cease and persons will be required to go indoors. Also see Section 1.1.1 regarding shift duration. However, these guidelines can be modified at any time based on actual site conditions and professional judgment rendered by either the Field Manger and/or SSO. For example, the Field Manger and/or SSO will evaluate field crew fitness; the condition of their cold-weather gear, including boots; and will observe employees alertness, including fatigue and rate of cold tolerance/acclimation.

If weather conditions warrant, portable tents might become necessary to shield the work area from wind, rain, snow, etc. The SSO and the Field Manager will determine if this type of action is necessary. However, under no conditions will the tents be heated and as a precautionary measure, a Photoionization Detector (PID) with a 10.6 ev lamp will be used to monitor the breathing zone of personnel inside the tent. See Section 6 for action levels based on PID readings. A JSA should be prepared and discussed with all workers detailing the precautions for working in these cold weather conditions.

5.21 WELL DEVELOPMENT AND GROUNDWATER MONITORING

During purging and development of borings into monitoring wells, the PPE indicated in Section 7 below will be worn to avoid chemical contact / exposure, as well as physical trauma. Bailing wells requires proper gloves, eye protection, and possibly protective coveralls to prevent splashing. Back and lifting precautions outlined in Section 5.1 shall be used to avoid ergonomic injuries.

5.22 CONFINED SPACES

No confined space entries are planned or allowed on this project.

When working in industrial settings, it is common to need to enter a confined space to make observations, collect samples, or perform other duties. AECOM employees or sub contractors must not enter any confined space containing a hazard.

A confined space is defined as any space that meets the following criteria:

- Is not designed for human occupancy
  (excludes vehicles, elevator cabins etc,)
  (includes elevator shafts and wells, tanks, vaults, etc.)
- Is large enough to physically enter with the whole body, and
- Has a restricted exit path (you must climb over pipes, through man ways, etc.)

If the confined space contains any hazard, entry may only be made if permitted in writing by the space owner or the Regional Health and Safety Manger, the entry is monitored by an observer, and with the prior written approval of the AECOM Regional Health and Safety Manager.

Typical hazards include but are not limited to:

Flammable materials

Toxic materials

Corrosive materials

Exposed electrical circuits

Falls greater than six feet

Moving machinery

Oxygen deficient atmosphere

If there is any doubt about whether a space meets the above criteria, call the AECOM Health and Safety Staff.

6.0 AIR MONITORING

6.1 MONITORS

6.1.1 Photoionization Detector

As a precautionary measure, a Photoionization Detector (PID) with a 10.6 ev lamp will be used to monitor the breathing zone of personnel during the proposed activities. If the PID indicates sustained (5 minute) breathing zone vapor concentrations in excess of 5 ppm as isobutylene, respiratory protection, as described in Section 7.2 of this document, will be donned.

Task	Instrument	Action Limit and Action
All tasks involving potential exposure to contaminated soils and/or groundwater	Photoionization Detector	**5 ppm as isobutylene**; Don respiratory protection as discussed in Section 7

6.2 PERSONAL AIR SAMPLING

The need for personal air sampling is not anticipated by AECOM during the activities covered by this HASP. The AECOM Project Manager, or the AECOM Regional Health and Safety Manager can prescribe personal air sampling based on observations or concerns recognized during the project.

6.3 CALIBRATION AND RECORDKEEPING

Equipment used by AECOM will be calibrated in accordance with AECOM's standard operating procedures. A log of the calibrations and readings will be kept in the field notebook. Daily calibration information will also be recorded in the field notebook.

7.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) will be worn during these activities to prevent on-site personnel from being injured by the safety hazards posed by the site and/or the activities being performed. In addition, chemical protective clothing will be worn to prevent direct dermal contact with the site's chemical contaminants. The following table describes the PPE and chemical protective clothing to be worn for general site activities and for certain specific tasks.

7.1 PERSONAL PROTECTIVE EQUIPMENT

PPE Item	General	Soil boring	Clearing & Grubbing	Sampling
Hard Hat	1 & 2	✓	✓	2
Traffic Vests	2	2	2	2
Steel Toed Safety Shoes	1	✓	✓	✓
Safety Glasses with Side shields	1	✓	✓	✓
Goggles or Face shield	3	3	3	3
Hearing Protection	4	✓	4	4
Tyvek Coveralls	5	5	5	5
Nitrile Gloves	5	5	5	5
Heavy Duty Work or Kevlar Gloves	6	6	6	6
Ivy Block® or Ivy Screen® barrier cream	7	7	7	7
Snake Protection	8	8	8	8
Polycoated Tyvek coveralls with hood, double Nitrile gloves, rubber boots, and taped transitions.	9	9	9	9

✓ Required PPE

1 All employees must comply with NYSDEC safety requirements.

2 Traffic vests and hardhats are required when working within twenty feet of any public road or any private road with active traffic. Hard hats are also required when working around heavy equipment, when falling objects may cause impact injuries, or when working around energized electrical lines.

3 Goggles or a Face Shield are necessary when splashing liquid hazards are present in the work area. If tool use presents a hazard of creating high velocity object hazards, a Face Shield is recommended to protect against face and eye trauma.

4 Hearing protection should be worn around soil boring equipment if normal conversation cannot be understood.

5 Tyvek coveralls and Nitrile gloves are only required of those that are likely to come in direct contact with potentially contaminated soils and/or groundwater. Tyvek coveralls and Nitrile gloves will be worn to protect workers from poison ivy and poison oak when contact cannot be avoided.

6 Heavy duty work gloves should be worn when handling tools and equipment that present pinch point and laceration hazards. Kevlar gloves should be used when cut and laceration hazards are present.

7 Ivy Block® or Ivy Screen® barrier cream should be worn on exposed skin where there is a potential for exposure to poison ivy or oak.

8 Snake protection (e.g., boots and snake chaps) should be worn when walking through vegetated areas.

9 When working in areas with high potential for excessive contact with hazardous chemicals, precautions will be taken to reduce the potential for direct dermal contact that may incorporate the use of polycoated Tyvek, double gloves, and additional protective measures based upon the permeability of the PPE chosen and the potential for chemicals of concern to degrade the selected PPE.

If the sustained PID reading exceeds 250 ppm as isobutylene or if irritating dust is encountered Level B PPE must be donned.

7.2 RESPIRATORY PROTECTION

Although not likely, respiratory protection as described below will be required if worker breathing zone PID concentrations are sustained above the action levels in the following table.

Task	Action Limit	Respiratory Protection	Level
All tasks involving potential exposure to contaminated soils and/or groundwater	5 ppm as Isobutylene for 5 minute	Half or full face mask respirator with combination organic vapor/HEPA/acid gas/chlorine/hydrogen chloride cartridges	C
	10 ppm as Isobutylene	Full face respirator with combination organic vapor/HEPA/acid gas/chlorine/hydrogen chloride cartridges	C B
	50 ppm as isobutylene	Supplied air respirator, **STOP WORK**	
All tasks with the potential to produce Dust	1.5 mg/m^3 particulates in air	Half or full face mask respirator with combination organic vapor/HEPA/acid gas/chlorine/hydrogen chloride cartridges	C
	3.0 mg/m3 particulates in air	**STOP WORK** and apply dust suppression techniques until levels have returned to ambient conditions	C

Respiratory protection (half or full face mask respirator with combination organic vapor/HEPA/acid gas/chlorine/hydrogen chloride cartridges should also be donned if odors become objectionable at any time or if respiratory tract irritation is noticed.

All employees who are expected to don respiratory protection must have successfully passed a qualitative or quantitative fit-test within the past year for the brand, model and size respirator they plan to don.

If worn, respirators will be cleaned after each use with respirator wipe pads and will be stored in plastic bags after cleaning. Respirators will be thoroughly cleaned using disinfectant material within one week following any respirator use. Refer to the cleaning instructions provided with the respirator or specified by Appendix B-2 to the OSHA regulations at 29 CFR 1910.134.

7.3 OTHER SAFETY EQUIPMENT

The following is a list of additional safety items that may need to be available at the project site depending on the facility activity level, proximity to emergency assistance and other factors:

- Portable, hand-held eyewash bottles,
- First aid kit,
- Type A-B-C Fire extinguisher,
- Fire blanket,
- Emergency telephone and, if available, two-way radio on facility frequency,
- Emergency air horn,
- Drinking water, ice and cups,
- Caution tape or traffic cones,
- High visibility traffic vests (if working near vehicle traffic),
- Traffic cones or barricades,
- Flashlight/lantern,
- Spill containment kit.

8.0 SITE CONTROL

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, hazardous work areas will be clearly identified and decontamination procedures will be required for personnel and equipment leaving those areas.

8.1 DESIGNATION OF ZONES

AECOM designates work areas or zones as suggested in the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November 1985. They recommend that the areas surrounding each of the work areas to be divided into three zones:

- Exclusion or "Hot" Zone
- Contamination Reduction Zone
- Support Zone

8.1.1 Exclusion Zone

An exclusion zone will be established around the work area. The perimeter of the exclusion zone will be marked with caution tape, traffic cones or other identifier so that employees, visitors, and client or host employer personnel are aware of the work being conducted.

All AECOM and contractor personnel entering these work areas must wear the prescribed level of protective equipment.

8.1.2 Contamination Reduction Zone

A decontamination zone will be established adjacent to each work area. Personnel will remove contaminated gloves and other disposable items in this area and place them in a plastic bag until they can be properly disposed of.

8.1.3 Support Zone

At this site the support zone will include the area outside of the exclusion zone.

8.1.4 Site Access Control

The public will be restricted from the project site and monitoring well locations (during monitoring) by fences, barricade tape, traffic cones, and/or signs.

8.1.5 Parking and Staging Areas

Parking will be restricted to areas that have been cleared of tall grass and combustible material. Vehicles parked on the public streets will be marked with cones both in front of and behind the vehicle.

8.2 GENERAL SITE SAFETY PRACTICES

The following measures are designed to augment the specific health and safety guidelines provided in this plan.

- The "buddy system" will be used at all times by all field personnel. No one is to perform field work alone. Standby team member must be intimately familiar with the procedures for initiating an emergency response. If an employee will be alone in a work area, they will develop a procedure to contact their Supervisor or PM on a regular schedule to confirm that the employee is safe. Subcontractors working on-site with AECOM employees can help fulfill the role of a Buddy while site activities are occurring.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in the immediate work area and the decontamination zone. Water and Ice may be consumed in all areas to prevent heat stress but precautions must be taken to prevent contamination of the water and ice.

- Smoking is prohibited in all work areas. Matches and lighters are not allowed in these areas.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking or any other activities.
- Beards or other facial hair that interfere with respirator fit are prohibited.
- The use of alcohol or illicit drugs is prohibited during the conduct of field operations.
- All equipment must be decontaminated or properly discarded before leaving the site in accordance with the project work plan.
- Parking and pedestrian areas will be established and communicated to all workers.

9.0 DECONTAMINATION

9.1 PERSONAL DECONTAMINATION

Proper decontamination is required of all personnel before leaving the site. Decontamination will occur within the contamination reduction zone.

Regardless of the type of decontamination system required, a container of potable water and liquid soap should be made available so employees can wash their hands and face before leaving the site for lunch or for the day.

9.2 PPE DECONTAMINATION

Disposable PPE, such as Tyvek coveralls, gloves, etc. will be removed in the decon zone and placed in garbage bags. Final disposal of contaminated PPE will be in accordance with the work plan.

If worn, respirators *assigned to an individual* will be cleaned after each use with respirator wipe pads and will be stored upright in plastic bags. Respirators will be thoroughly cleaned using disinfectant material within one week following any respirator use. Respirators *that have the potential to be shared by employees* within the workplace will be completely dismantled and thoroughly cleaned after each use. Refer to the cleaning instructions provided with the respirator or specified by Appendix B-2 to the OSHA regulations at 29 CFR 1910.134.

9.3 EQUIPMENT DECONTAMINATION

Equipment will be decontaminated prior to being moved to other locations. Decontamination procedures will be specified by the Project Manager.

10.0 MEDICAL MONITORING AND TRAINING REQUIREMENTS

Each worker subject to this HASP shall have copies of documentation that the requirements for training, medical surveillance, and respirator use are current. Copies of these documents shall be made available to AECOM or AECOM's client upon request.

10.1 MEDICAL MONITORING

All personnel performing activities covered by this HASP must be active participants in a medical monitoring program that complies with 29 CFR 1910.120(f). Each individual must have completed an annual surveillance examination and/or an initial baseline examination within the last year prior to performing any work on the site covered by this HASP.

10.2 HEALTH AND SAFETY TRAINING

10.2.1 HAZWOPER

All personnel performing activities covered by this HASP must have completed the appropriate training requirements specified in 29 CFR 1910.120 (e). Each individual must have completed an annual 8-hour refresher training course and/or initial 40-hour training course within the last year prior to performing any work on the sites covered by this HASP.

10.2.2 Pre-Entry Briefing/Tailgate Meetings

Prior to the commencement of daily project activities, a pre-entry briefing or tailgate meeting will be conducted by the SSO to review the specific requirements of this HASP, review and revise the JSA, discuss Incidents, Near Misses and lessons learned from the previous day's activities, and discuss site conditions that have changed since the previous day or trip to the site. Attendance at the daily tailgate meeting is mandatory for all personnel covered by this HASP at the site and must be documented on the attendance form provided in Attachment D. HASP sign-off sheets should also be collected at the time of the tailgate meetings. All documentation should be maintained in the project file.

The pre-entry briefing must be completed for each new employee before they begin work at the site. Short safety refresher meetings will be conducted, as needed, throughout the duration of the project.

11.0 EMERGENCY RESPONSE

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." According to AECOM policy, AECOM personnel shall not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). AECOM response actions will be limited to evacuation and medical/first aid as described within this section below. As such this section is written to comply with the requirements of 29 CFR 1910.38 (a).

The basic elements of an emergency evacuation plan include:

- employee training,
- alarm systems,
- escape routes,
- escape procedures,
- critical operations or equipment,
- rescue and medical duty assignments,
- designation of responsible parties,
- emergency reporting procedures and
- methods to account for all employees after evacuation.

11.1 SPILL RESPONSE

Employees are only authorized to respond to incidental spills and releases of hazardous substances. The following criteria must be met for a spill to be considered incidental with the employee having the ability to respond to the spill:

- Quantity of spilled material is minimal enough where additional, third party assistance is not needed to manage the spill
- Material is not immediately threatening to impact an open water way
- The conditions of the spill do not present a hazardous condition that is immediately dangerous to life and health (IDLH)
- The employee responding has:
    - received training on proper spill response techniques relative to the spilled material
    - full knowledge of what has been spilled and the proper clean up techniques to be used
    - the means to protect themselves against exposure to harmful conditions caused by the spill including the necessary PPE
    - the means to containerize and dispose of the spilled material properly

Employees may be equipped with the following materials, assembled into a spill response kit, to manage incidental workplace spills:

- Absorbent pads or media, i.e. speedy-dry, kitty litter

- Broom and dust pan to clean up spent granular spill control media or impacted earth
- Shovel to clean up impacted earth or create a dam or dyke to prevent the spill area from increasing
- Disposal drums and over-pack drums
- Appropriate waste identification labels
- Appropriate PPE

If a spill is not considered incidental, then additional assistance will be sought to aid in clean-up. The responding employee shall contact the Project Manager and provide initial notification of the release. The Project Manager will then notify the client representative and determine a suitable course of action. Chem-trec may be contacted to provide additional support in responding to a spill. Consideration will need to be given to whether or not the spill is deemed to be a reportable quantity (RQ) by the EPA, if the National Spill Response Center needs to be contacted due to surface water impact, and if local, state or federal agencies need to be contacted to provide information related to public health threats and environmental impact.

All spills must be reported to the AECOM PM and RSHEM, with the PM providing notification to the client representative, no matter how small the spill is. After initial response actions have been completed an incident investigation will be performed to determine the root causes of the incident and corrective actions, and lessons learned shall be shared to prevent future reoccurrence. Once the response is complete, the responding employee will also conduct an inventory of supplies used during the response effort and re-stock any used response equipment that could not be decontaminated and reused.

11.2 EMPLOYEE TRAINING

Employees must be instructed in the site-specific aspects of emergency evacuation. On-site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed.

11.3 ALARM SYSTEM/EMERGENCY SIGNALS

An emergency communication system must be in effect at all sites. The simplest and most and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices can not be clearly perceived above ambient noise levels (i.e., noise from heavy equipment; drilling rigs, backhoes, etc.) and anytime a clear line-of-sight can not be easily maintained amongst all AECOM personnel because of distance, terrain or other obstructions.

Verbal communications will be adequate to warn employees of hazards associated with the immediate work area. The property is occupied but AECOM may not have access to facility phones. Therefore, AECOM will bring a portable phone to the site to ensure that communications with local emergency responders is maintained, when necessary.

11.4 ESCAPE ROUTES AND PROCEDURES

The escape route from the site and an emergency muster point will be determined and provided to all workers during the project mobilization.

Prior to mobilizing to a new project area, the Site Safety Officer or his designee will confirm that the escape routes are clear and lead to a safe area.

11.5 EMPLOYEE ACCOUNTING METHOD

The SSO is responsible for identifying all AECOM personnel on-site at all times. AECOM and its subcontract employees will notify the SSO when they enter and leave the site. The SSO will account for all AECOM and its subcontract employees following an evacuation.

11.6 INJURIES AND ILLNESSES

The phone numbers of the police and fire departments, ambulance service, local hospital, and AECOM representatives are provided in the emergency reference sheet on page 1. This sheet will be posted in the site vehicle.

11.6.1 First Aid

Minor injuries will be treated on site using materials from the first aid kit or other local sources. All cuts and abrasions will be cleaned with potable water and a clean dressing applied. The injured employee will be evaluated at the end of the work day and the following day when the employee arrives at the project site to determine whether the wound has started the healing process. The wound will be protected from contamination during the project activities.

11.6.2 Professional Treatment

In the event an injury or illness requires more than first aid treatment, the SSO will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the on-site project manager and the RSHEM.

If the injured employee can be moved from the accident area, he or she will be brought to the CRZ where their PPE will be removed. If the person is suffering from a back or neck injury the person will not be moved and the requirements for decontamination do not apply. The SSO must familiarize the responding emergency personnel about the nature of the site and the injury. If the responder feels that the PPE can be cut away from the injured person's body, this will be done on-site. If this not feasible, decontamination will be performed after the injured person has been stabilized.

11.7 DESIGNATION OF RESPONSIBLE PARTIES

The SSO is responsible for initiating emergency response. In the event the SSO can not fulfill this duty, the alternate SSO will take charge.

11.8 EMERGENCY RESPONSE DRILLS

For projects with durations of greater than four days on site, the SSO will initiate an evacuation drill during the first five days and shall repeat the drills at least quarterly. Deficiencies noted during the drills will be documented as a Near Loss, a Root Cause Analysis conducted and corrective actions initiated.

A table-top run through of the evacuations procedures from the manufacturing site will be conducted the first day on the site and reviewed with all workers arriving on site after that date.

Emergency Response drills and subsequent personnel briefings on evacuation procedures will be documented in the safety briefing agenda or briefing notes.

11.9 INCIDENT REPORTING AND INVESTIGATION

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an Incident investigation and report. The investigation should be conducted as soon as emergency conditions are under control. The purpose of the investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. An AECOM Incident investigation form is presented in Attachment E of this HASP. The injured AECOM employee's supervisor, the AECOM Project Manager, and the RSHEM should be notified immediately of the injury.

If a subcontractor employee is injured, they are required to notify the AECOM SSO. Once the incident is under control, the subcontractor will submit a copy of their company's Incident investigation report to the AECOM SSO.

Figure 11-1. Drilling Site Control Layout

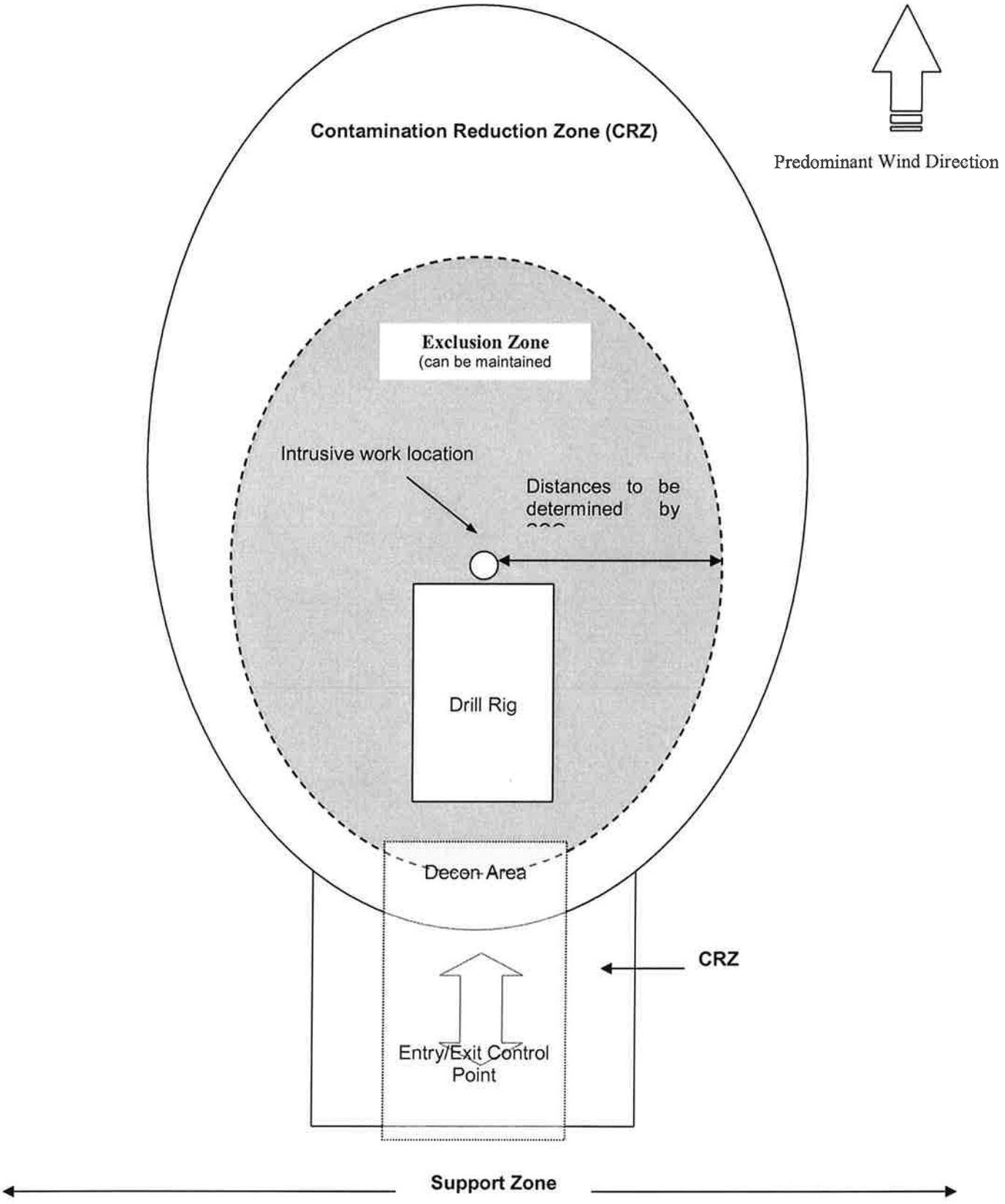
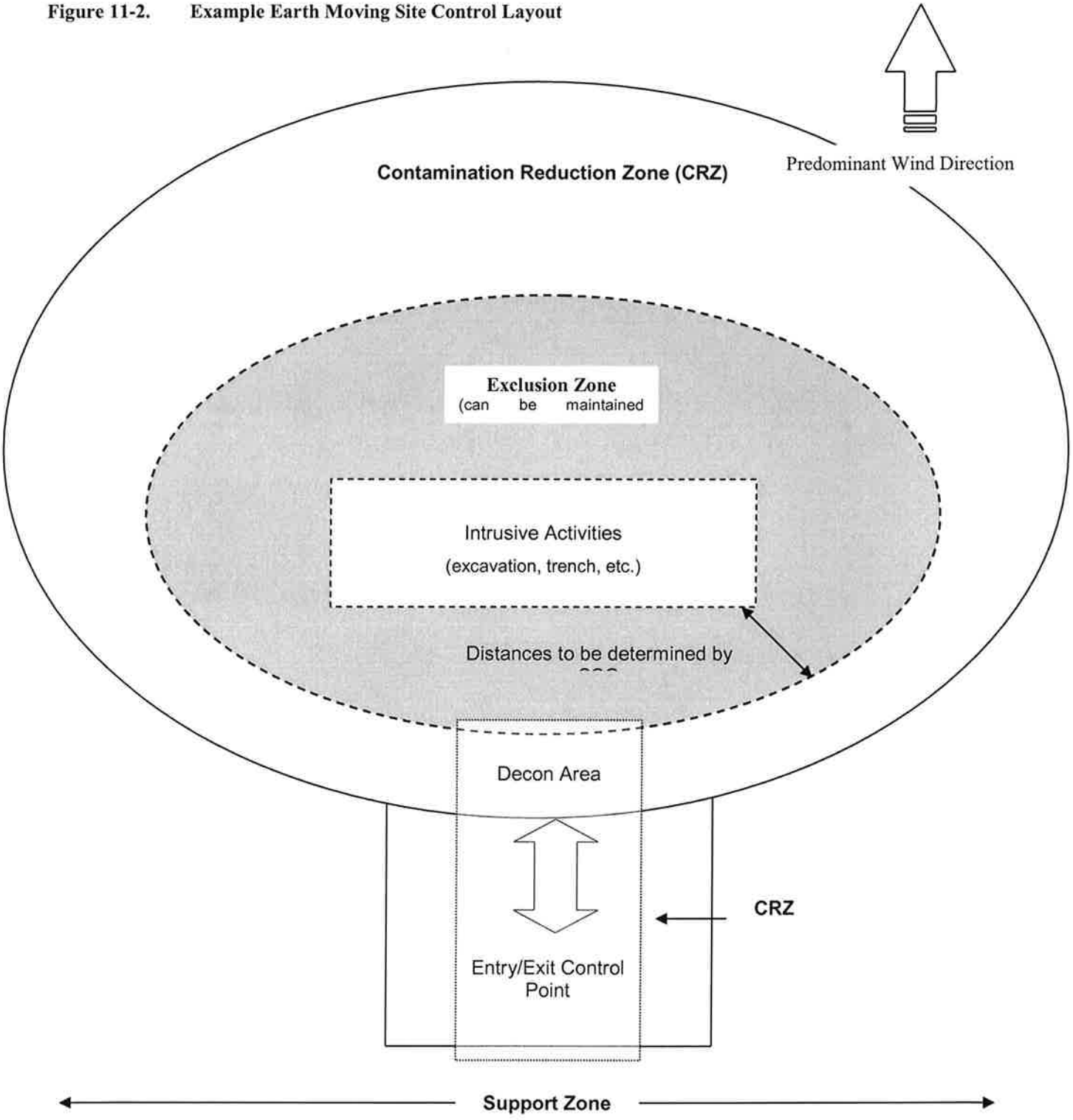


Figure 11-2. Example Earth Moving Site Control Layout



12.0 EMERGENCY RESPONSE PLANNING

12.1 EMERGENCY ACTION PLAN

Although the potential for an emergency to occur is remote, an emergency action plan has been prepared for this project should such critical situations arise. The only significant type of onsite emergency that may occur is physical injury or illness to a member of the AECOM team. The emergency action plan will be reviewed by all personnel prior to the start of field activities.

Three major categories of emergencies could occur during site operations:

1. Illnesses and physical injuries (including injury-causing chemical exposure)
2. Catastrophic events (fire, explosion, earthquake, or chemical)
3. Safety equipment problems

12.1.1 Emergency Response Coordinator

Prior to beginning site activities, the PM will complete Table 9-1 by filling in the names of the Emergency Coordinator (EC) and the alternate EC. The duties of the EC and the alternate EC have been specified in *SH&E 205, Emergency Response Planning and Prevention.*

12.1.2 Site-Specific Emergency Procedures

Prior to the start of site operations, the EC shall fill in the following with any site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures:

Table 12-1. Emergency Planning

Emergency	Evacuation Route	Muster Location
Chemical Spill	• Upwind	• Field Trailer, Parking Area
Fire/Explosion	• Away from hazard	• Field Trailer, Parking Area
Tornado	• Nearest Permanent Structure	• Field Trailer, Parking Area
Lightning	• Towards Office Trailer, Parking Area	• Trailer or Vehicle
Additional Information		
Communication Procedures	• Hand held radios (on site communication), air horn • All emergencies dial 911 on trailer telephone or cellular phone	
CPR/First Aid Trained Personnel	• Site Safety Officer and/or Site Supervisor	
Site-Specific Spill Response Procedures	• See Section 9.1.3 of this Health and Safety Plan	

Prior to the start of site operations, an on-site meeting will be coordinated with the local Fire Department. In the event a fire breaks out, or one is suspected, which can not be controlled by available onsite equipment, the local fire department will be informed immediately. All work that would endanger health or safety of on-site or off-site personnel shall be stopped until the fire has been brought under control and the danger has passed.

12.1.3 Spill Containment Procedure

Work activities may involve the use of hazardous materials (i.e. fuels, solvents) or work involving drums or other containers. The following procedures will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use.
- Containers of hazardous materials will be stored appropriately away from moving equipment.

At least one spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (i.e. speedy dri) shall be available at each work site (more as needed).

- All hazardous commodities in use (i.e. fuels) shall be properly labeled.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.
- For drums/containers, follow the procedures in SH&E 405, *Handling Drums and Large Containers*, to minimize spillage.

12.1.4 Site-Specific Emergency Procedures

Prior to the start of site operations, the EC shall fill in the following with any site-specific information regarding evacuations, muster points, spill response, communication, and other site-specific emergency procedures.

12.1.5 Accident/Incident Reporting

All accidents and incidents that occur on-site during any field activity will be promptly reported to the SSO and the FM in accordance with AECOM Safety Procedure SH&E 101, *Injury, Illness, and Near-Miss Reporting*.

If any AECOM employee is injured and requires medical treatment, the FM will contact **AECOM's Incident Reporting Line at (800) 348-5046 immediately**. The FM will initiate a written report, using the ***Supervisor's Report of Incident*** form (see SH&E 101). The FM will complete the first two sections of this form and forward to the CTO Manager for completion of Section 3. The report will then be provided to the H&SP before the end of the following shift.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures; however, copies of all documentation (which at a minimum must include the OSHA Form 301 or equivalent) must be provided to the SSO within 24 hours after the accident has occurred.

Table 12-2. Emergency Contacts

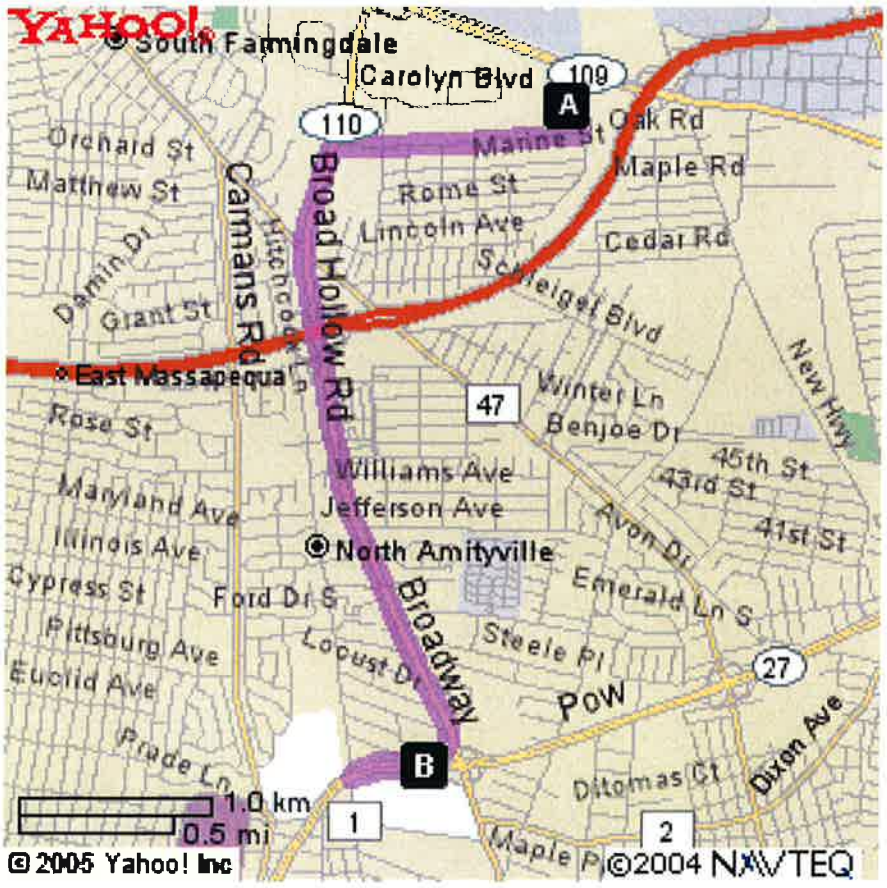
Emergency Coordinators / Key Personnel			
Name	**Title/Workstation**	**Telephone Number**	**Cellular Phone**
Keith A. Decker	Project Director	518-951-2200ext. 229	518-229-7214
William P. Lindheimer	Site Superintendent/PM	518-951-2200 ext.302	518-312-9201
Walter Howard	Site Superintendent Task Manager – Drilling	518-951-2200 ext. 387	N/A
Peter Sullivan	RSHEM	978-589-3444	978-505-1232
Minda K. Murray	Site Safety Officer	518-951-2200 ext. 330	518-810-6488
Incident Reporting	**Corporate Safety Administrator**	**800-348-5046**	
Keith A. Decker	Emergency Coordinator (EC)		Same as above
William P. Lindheimer	Secondary EC		Same as above

Organization / Agency	
Name	**Telephone Number**
Suffolk County Police Department	911 or 631-852-6000
Village of Babylon Fire Department	911 or 631-226-1212
State Police	911 or
Ambulance Service ***(EMT will determine appropriate hospital for treatment)***	911 or
Hospital ***(Use by site personnel for non-emergency cases only)*** **South Oaks Hospital** 400 Sunrise Highway, Amityville NY	
Poison Control Center	800-222-1222
Pollution Emergency	800-292-4706
National Response Center	800-424-8802
Chem-Trec	800-424-9300
Title 3 Hotline	800-535-0202

Public Utilities	
Name	**Telephone Number**
Dig Safe	1-800-dig-safe

Government Agencies	
NYSDEC Albany Office	518-402-9621
NYSDEC Region 1 Office	631-444-0204
NYSDEC Spill Hotline	1-800-457-7362
Suffolk County Department of Health	631-853-3000 631-852-4820 Emergencies

Figure 12-1. Route Map to South Oaks Hospital, Amityville, NY



Directions

1. Start at **1 ADAMS BLVD, FARMINGDALE** - go **0.1** mi
2. Turn Right on **ALLEN BLVD** - go **0.8** mi
3. Turn Left on **BROADHOLLOW RD[RT-110]** - go **0.6** mi
4. Continue to follow **RT-110 SOUTH** - go **1.4** mi
5. Turn Right onto **POW[RT-27]** toward **NEW YORK** - go **0.4** mi
6. Make a U-turn at **COUNTY LINE RD** onto **POW[RT-27]** - go **0.3** mi
7. Arrive at **400 SUNRISE HWY, AMITYVILLE,** on the Right

13.0 PERSONNEL ACKNOWLEDGEMENT

By signing below, the undersigned acknowledges that he/she has read and reviewed the AECOM Health and Safety Plan for the National Heatset Printing site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

PRINT NAME	SIGNATURE	ORGANIZATION	DATE

Attachment A

Task Hazard Analyses

Task Hazard Analyses

TASK	HAZARDS	MINIMUM PPE	HAZARD CONTROLS
Mobilization/ Demobilization: Mobilization/demobilization activities typically present limited hazards as compared to the majority of site tasks. However, the potential still exists for exposures to a variety of hazards, typically physical in nature. Applicable SH&Es: • 201, General Safety Rules • 404, Manual Lifting • 210, Walking-Working Surfaces	Physical: • Fall hazards during trailer setup • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Leather gloves while handling sharp edges or operating powered tools/machinery. • Safety harness with lanyard while working at heights of 6 feet or greater above the next lower level.	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions during mobilization/demobilization activities. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.
Air Monitoring: • Provide direct read air monitoring for PPE upgrades or downgrades and off site migration.	Physical: • Confined spaces • Slips, trips, falls, and protruding objects • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Insect, plants, and animals	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials.	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.

TASK	HAZARDS	MINIMUM PPE	HAZARD CONTROLS
• If necessary, conduct ambient air monitoring at the site perimeter or at down wind locations. • Perform personal air sampling. Applicable SH&Es: • 201, General Safety Rules	Chemical: • See Table in Section 6 of the HASP for specific chemical hazards		

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Earth Moving: Earth moving (e.g., excavating, grading, trenching, etc.) typically involves the removal or backfilling of material. This is usually accomplished through mechanical means using a variety of heavy equipment. Personnel working in the area of earth moving activities should be alert to their surroundings and keep in visual contact with the equipment operators. Applicable SH&Es: • 402, Excavation and Trenching • 513, Heavy Earth-Working Equipment	Physical: • Soil collapse • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. • Leather gloves while handling sharp edges or operating powered tools/machinery.	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Keep vehicles away from the edge of the excavation to prevent the vehicle from falling in. • Always keep in view of drivers of heavy equipment or vehicles. • Flagging for temporary work locations. • Routinely use hand signals to communicate with the equipment operators. • Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning equipment or starting sampling activities. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Equipment Decontamination: This task includes selecting, constructing, and removal of the decontamination areas, as well as performing equipment decontamination. Applicable SH&Es: • 510, High Pressure Washers • 604, Decontamination	Physical: • High pressure washer (eye/body impact) • Flying debris • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards. • Decon solutions and/or detergents	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Face shield (if splash or high impact hazards exist) • Leather gloves while handling sharp edges or operating powered tools/machinery. • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. • Rain suit or Apron (as needed) • Safety harness with lanyard when working near excavations ≥ 6 feet in depth during construction of decon area.	• Do not direct high pressure spray in the direction of site personnel. • Never decon PPE with the high pressure washer. • Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Always keep in view of drivers of heavy equipment or vehicles. • Routinely use hand signals to communicate with the equipment operators. • Use sunscreen lotion 15 SPF or higher on exposed skin..

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Sampling and Testing: Sampling involves collecting known or unknown materials for characterizing purposes. These materials may include water, groundwater, sediments, soil, soil gas, leachate, sludge, or other unspecified material Applicable SH&Es: • 406, Drum Sampling • 407, Tank and Large Container Sampling	Physical: • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. • Respiratory Protection (full face respirator) as needed • Leather gloves while handling sharp edges or operating powered tools/machinery.	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning equipment or starting sampling activities.

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Well Installation/ Abandonment: Activities associated with borehole or well installation (placing a new well) and/or abandonment (removing or filling an existing well to prevent further use) presents the worker with very similar hazards. The potential hazards for both operations focus on drill rig use, manual lifting, elevated noise, rotating parts, etc. Applicable SH&Es: • 403, Drilling • 310, Overhead Electrical Lines • 517, Traffic Safety	Physical: • Rotating/moving equipment • Flying debris • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. • Respiratory Protection (full face respirator) as needed • Leather gloves while handling sharp edges or operating powered tools/machinery.	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Always tuck-in loose clothing, long hair, etc. while working near rotating equipment. • Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning equipment or starting abandonment activities. • Use sunscreen with SPF greater or equal to 15.
Hot Work: This procedure is for all welding and cutting operations as well as use of spark-producing equipment, around areas with flammable or combustible materials. Types of work include, but are not limited to, welding, plasma cutting, torching, brazing, and engine or heater operations.	Physical: • Fire • Hot surfaces • Burns • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions).	• Evaluate surrounding work area for additional hazards that may be present. • Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in logbook. • Coordination with client personnel required to be performed prior to start of work

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Applicable SH&Es: • 411, Welding, Torch Cutting and Other Hot Work	• Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals • Lacerations Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	• Leather gloves and leggings and other leather clothing (i.e. uppers, coveralls) as needed • Leather gloves while handling sharp edges or operating powered tools/machinery. • Welding shield with appropriate UV lens when welding. Full face shield when grinding, etc. • Respiratory Protection (full face respirator) as needed	activities. • Use cut resistant gloves when working with sharp objects. • Ensure completion of required hot work permit • Welding can generate fumes that may cause adverse health affects. Ventilation of the work area may be necessary

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Clearing and Grubbing: Clearing and grubbing typically involves the removal of plants (e.g., trees, bushes, etc.). This is usually accomplished through physical and mechanical means using a variety of tools and equipment. Personnel working in the area of clearing and grubbing activities should be alert to their surroundings and keep in visual contact with the equipment operators. Applicable SH&Es: • 519, Fork Lift Vehicles • 520, Heavy Earth-Working Equipment • 525, Chainsaw Operations • 533, Wood-Chipping Equipment	Physical: • Flying debris • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insects, plants, and animals • Electrical Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Leather gloves while handling sharp edges or operating powered tools/machinery.	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions during mobilization/demobilization activities. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Test Pitting: Perform earthmoving operations (test pitting) to locate and sample contaminated materials. Personnel working in the area of heavy equipment operations should be alert to their surroundings and keep in visual contact with the equipment operators at all times Applicable SH&E: • 405, Handling of Drums and Large Containers • 402, Excavation • 513, Heavy Earth-Working Equipment	Physical: • Confined spaces • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Respiratory Protection (full face respirator) as needed • Leather gloves while handling sharp edges or operating powered tools/machinery. • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. Additional equipment • Safety harness (tied off appropriately) for fall protection when working near excavations ≥ 6 feet in depth • Multi-gas meter/tripod (if entry is required)	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Keep vehicles away from the edge of the excavation to prevent the vehicle from falling in. • Always keep in view of drivers of heavy equipment or vehicles. • Flagging for temporary work locations. • Routinely use hand signals to communicate with the equipment operators. • Where possible, perform sampling outside of the test pits. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.

Demolition: Performing demolition of site structures. Applicable SH&Es: • 404, Manual Materials Handling • 501, Ladders • 505, Powered Hand Tools • 121, Electrical Safety • 515, Cranes and Lifting Devices • 411, Welding, Torch Cutting and Other Hot Work • 512, Fork Lift Vehicle • 210, Working Surfaces • 514, Manlifts	Physical: • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals • Suspended loads Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Leather gloves while handling sharp edges or operating powered tools/machinery. • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. • Safety harness (tied off appropriately) for fall protection when working at heights ≥ 6 feet.	• Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Keep vehicles at least 3 feet away from the edge of the excavation to prevent the vehicle from falling in. • Always keep in view of drivers of heavy equipment or vehicles. • Flagging for temporary work locations. • Routinely use hand signals to communicate with the equipment operators. • Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning equipment or starting sampling activities. • Provide adequate light (5-foot candles) • If necessary, assess structures for asbestos content prior to demolition. • Use water spray during demolition to minimize particulate emissions. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Drilling/Geoprobe: Drilling activities are performed with various types of rigs (e.g., hollow stem, air rotary, geoprobe, etc) and for a variety of construction/environmental activities. Drilling can be performed to help characterize soils, set pilings, well installation/abandonment, etc. Applicable SH&Es: • 403, Drilling • 310, Overhead Electrical Lines • 517, Traffic Safety	Physical: • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. • Respiratory Protection (full face respirator) as needed • Leather gloves while handling sharp edges or operating powered tools/machinery.	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning equipment or starting sampling activities • Keep all guards in place while operating or near a rotating or moving equipment. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.
Surveying: Surveying activities typically present limited hazards as compared to the majority of site tasks. However, the potential still exists for exposures to a variety of hazards, typically physical in nature. Applicable SH&Es: • 517, Traffic Safety	Physical: • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Leather gloves while handling sharp edges or operating powered tools/machinery.	• Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions. • Use Deet® containing product in areas of possible exposure to ticks, mosquitoes, etc. • Sunscreen SPF 15 or higher as needed

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Cranes, Hoisting and Rigging: This job task includes all work associated with cranes, hoisting, or rigging functions. The function of this job is to move heavy material by mechanical means. Applicable SH&Es: • 515, Cranes and Lifting Devices	Physical: • Overhead fall hazards • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Leather gloves while handling sharp edges or operating powered tools/machinery. • Work clothing (coveralls or work uniform appropriate for weather conditions). • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials.	• Evaluate surrounding work area for additional hazards that may be present. • Coordination with site management is required prior to start of sampling activities. • Provide awareness to dangerous plants, animals, insects that may be present at the location. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Container Handling: Collection of containers (e.g., drums, pails, etc.) for overpacking, segregation and disposal. (Refer to SOP 507, Handling of Drums and Large Containers for further guidance and procedures). Applicable SH&Es: • 404, Manual Materials Handling • 405, Handling of Drums and Large Containers • 408, Unknown Hazardous Waste Drum Handling • 512, Fork Lift Vehicles	Physical: • Explosion • Pressurized containers • Splash/Skin • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Sunburn • Pinch points • Insect, plants, and animals Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Level B: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest when working near heavy equipment and other vehicle traffic • Hearing protection (as necessary). • Work clothing (coveralls or work uniform appropriate for weather conditions). • Leather gloves while handling sharp edges or operating powered tools/machinery. • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. • Respiratory Protection (full face respirator), supplied air • Addition equipment: • Multi-gas meter	• Bond/ground equipment during flammable material transfer. • Evaluate surrounding work area for additional hazards that may be present and modify work activities accordingly. • Keep area surrounding work areas free of obstructions. • Always keep in view of drivers of heavy equipment or vehicles. • Routinely use hand signals to communicate with the equipment operators. • Weight load considerations • Use non-sparking brace tools while handling unknown containers. • Use sunscreen lotion 15 SPF or higher on exposed skin as necessary.

TASK	HAZARD	MINIMUM PPE	HAZARD CONTROL
Construction of Temporary Structure: This procedure involves construction of a sprung structure to support excavation activities.	Physical: • Overhead hazards • Slips, trips, falls, and protruding objects • Heavy lifting • Vehicle/equipment traffic • Hazardous noise • Heat/cold stress • Severe weather • Pinch points Chemical: • See Table in Section 6 of the HASP for specific chemical hazards	Modified Level D: • ANSI approved hardhat. • ANSI approved safety glasses. • ANSI approved steel toe safety shoes/boots. • High visibility reflective safety vest • Hearing protection (as necessary). • Leather gloves while handling sharp edges or operating powered tools/machinery. • Work clothing (coveralls or work uniform appropriate for weather conditions). • Protective chemical gloves, coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials. • Safety harness (tied off appropriately) for fall protection when working near at heights or falls ≥ 6 feet from the next lowest level • Respiratory Protection (full face respirator) as needed Additional Safety Equipment: • Multi-gas meter • Tag Lines	• Evaluate surrounding work area for additional hazards that may be present. • Provide awareness to dangerous plants, animals, insects that may be present at the location • No personnel should be under suspended loads at any time • Always provide site security to prevent unauthorized persons from entering the work location. • Always ensure the operator of equipment can see you at all times. Never assume he can see you. • Consult CP 419 for guidance regarding Pre Steel erection procedures and written notifications • Completion of Steel Erection Coordination Checklist • Completion of on-site THA to delineate all hazards associated with steel erection • Structural stability must be maintained at all times • Workers will not be permitted to walk on the top surface of any structural steel member, without HSM approval. • All beams and members must be secured prior to release from the hoisting line • A structural steel competent person must be present during steel erection activities • Site inspections must be conducted on steel erection operationsat a minimum daily.

Appendix D
Sampling Analysis Plan

AECOM

Sampling & Analysis Plan
National Heatset Printing

East Farmingdale, Suffolk County, New York
NYSDEC Site #1-52-140
Contract Number D005539

Prepared For:

New York State Department of Environmental Conservation
Bureau of Remedial Construction
625 Broadway
Albany, New York 12203

Prepared By:

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Latham, New York 12110

April 3, 2006
Final July 10, 2009
Project No. 92701

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1.0 INTRODUCTION

1.1 General

This Sampling and Analysis Plan (SAP) has been prepared by AECOM Technical Services Northeast, Inc. hereinafter referred to as AECOM, Inc., for use in conjunction with the Remedial Action Work Plan (RAWP) at the National Heatset Printing Site (Site) located in the Hamlet of East Farmingdale, Town of Babylon, Suffolk County, New York. The purpose of this SAP is to detail the tasks and procedures to be undertaken as part of this RAWP.

The two major components of this SAP are the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPjP). The FSP provides the detailed procedures for the collection of environmental samples. The FSP has been prepared in accordance with the United States Environmental Protection Agency's (EPA's) "Compendium of Superfund Field Operation Methods," where applicable.

The QAPjP prescribes requirements for assuring that the remediation is planned and executed in a manner consistent with the project's quality assurance objectives. The objective of the QAPjP is to ensure that the technical data generated during the remediation are of sufficient quality for making informed decisions regarding Site groundwater, surface water, sediment, soil, and air quality and the characteristics of any waste identified at the Site. The content and format of the QAPjP are based on EPA's "Combined Work/Quality Assurance Project Plans For Environmental Monitoring," May 1984 and the USEPA's "Data Quality Objectives For Remedial Response Activities," March 1987. Whenever possible, any deviations from this SAP will receive prior approval.

1.2 Site Description & Background

The National Heatset Printing site is located at One Adams Boulevard in the Hamlet of East Farmingdale, Town of Babylon, Suffolk County (see Figure 1 at the end of this section). The site contains one mulit-tenant industrial building approximately 4.5 acres in size. The local topography surrounding the Heatset Site consists of relatively flat terrain with a slight south-southwest slope.

There are no surface water bodies located within the Heatset Site property boundaries.

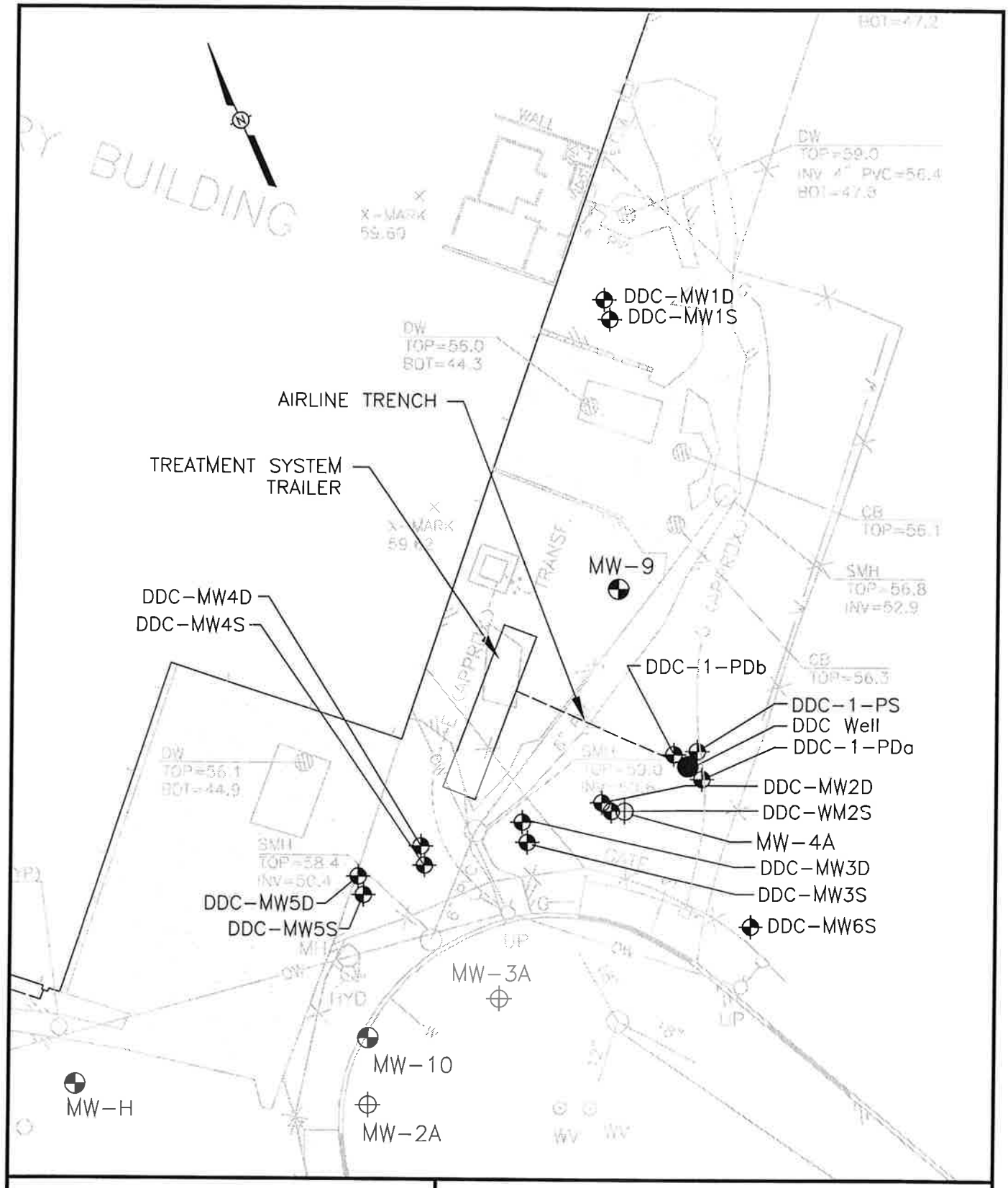
The National Heatset Printing Company occupied a portion of the existing building form July 1983 to April 1989. Their operations consisted of lithographic tri-color printing of newspaper and periodical advertisements and the manufacture of lithographic printing plates. An inspection conducted by the Suffolk County Department of Health (SCDHS) in 1983 and 1986 reported improper storage and discharge of waste materials.

In 1987, National Heatset Printing filed for bankruptcy at which time it was discovered that that National Heatset disposed of its chemical inventory by dumping the materials onto soils and into a leaching pool located off the rear of the building on the northeast side of the property.

Environmental investigations conducted by 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, primarily Tetrachloroethylene (PCE).

A Remedial Investigation (RI) was performed for the NYSDEC from August 1997 to January 1999. The RI reported the presence of a groundwater plume containing VOCs, which extended approximately 7,100

feet downgradient of the site. The highest concentrations of PCE in groundwater were detected at approximately 80 feet bgs. 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.



EarthTech
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

2.0 FIELD SAMPLING PLAN

This section outlines the procedures that will be used in the collection of water and air samples and the parameters for which each sample will be analyzed. The field sampling tasks are listed below:

- Soil Sampling - Waste characterization (soil, sludge, water, and/or debris) prior to off site transport and disposal.
- Groundwater Sampling – Sampling of groundwater for VOCs analysis prior to start-up of the DDC well pilot test;
- Wastewater Sampling - Sampling of water from Decontamination activities.
- Air Sampling – Sampling of off-gases for VOC analysis throughout pilot test;
- Sample Containers and Preservatives
- Holding Times.

2.1 Soil Sampling

Soil samples will be collected as described in the appropriate sections of the Remedial Action Work Plan. These sections describe the collection procedures, sampling equipment, locations and frequencies for the soil samples. These schedules are based on the requirements for soil disposal.

All sampling equipment will be properly disposed or decontaminated before being reused. Samples will be collected and placed in pre-cleaned sample containers provided by the laboratory performing the analysis. All necessary preservatives will be added to the sample containers at the laboratory prior to being shipped to the site (see section 2.5). Samples will be stored at 4 degrees Centigrade until delivered to, and analyzed by the laboratory. This will be accomplished by utilization of an on-site refrigerator and/or coolers with ice. Soil VOC samples will be collected as grab samples. No compositing of soil sample will be performed unless required by the disposal facility.

2.2 Groundwater Sampling

Groundwater samples will be collected as described in the appropriate sections of the Remedial Action Work Plan. These sections describe the collection procedures, sampling equipment, locations and frequencies for the groundwater samples. These schedules are based on the requirements for monitoring the effectiveness of the in-well stripping system, radius of influence of the in-well stripping system and tracer tests. Sampling of groundwater monitoring wells will also be performed as part of the full scale in-well stripping system installation and operation and maintenance as described in the contract documents.

All sampling equipment will be properly disposed or decontaminated before being reused. Samples will be collected and placed in pre-cleaned sample containers provided by the laboratory performing the analysis. All necessary preservatives will be added to the sample containers at the laboratory prior to being shipped to the site (see section 2.5). Samples will be stored at 4 degrees Centigrade until delivered to, and analyzed by the laboratory. This will be accomplished by utilization of an on-site refrigerator and/or coolers with ice. Groundwater VOC samples will be collected as grab samples.

2.3 Wastewater Sampling

Wastewater samples will be collected as described in the appropriate sections of the Remedial Action Work Plan. These sections describe the collection procedures, sampling equipment, locations and

frequencies for the wastewater samples. Samples of wastewater will be analyzed before being transported to a permitted facility for proper treatment and disposal.

Samples will be transferred directly into pre-cleaned sample collection containers that are supplied by the laboratory performing the analyses. All necessary preservatives will be added to the sample containers at the laboratory prior to being shipped to the site (see Section 2.5). Samples will be stored at 4 degrees Centigrade until delivered to, and analyzed by the laboratory. This will be accomplished by utilization of an on-site refrigerator and/or coolers with ice.

2.4 Air Sampling

Air quality samples will be collected as described in the appropriate sections of the Remedial Action Work Plan. These sections describe the collection procedures, sampling equipment, locations and frequencies for the air quality samples.

Samples will be collected directly into pre-cleaned, evacuated, and dried sorbent sample collection containers that are prepared and supplied by the laboratory performing the analyses. All necessary preservatives will be added to the sample containers at the laboratory prior to being shipped to the site (see Section 2.5). Samples that require preservation by low temperatures will be stored at 4 degrees Centigrade until delivered to, and analyzed by the laboratory. This will be accomplished by utilization of an on-site refrigerator and/or coolers with ice.

2.5 Sample Containers & Preservatives

Sample containers and preservatives will be provided by the contracted laboratories and stored on-site in a clean and dry location. Sample containers and preservatives by matrix and analysis are listed in the table below.

TABLE 1
SAMPLE CONTAINERS & PRESERVATIVES

Analysis	Matrix	Container	Preservative	Method
TCLP Semi-volatiles	Soil	500 ml glass*	4 degrees C	EPA 8270
TCLP Metals	Soil	500 ml glass*	4 degrees c	EPA 6010
TCLP Pesticides/Herbicides	Soil	500 ml glass*	4 degrees c	EPA 8081, 8151
Reactive Cyanide	Soil	500 ml glass*	4 degrees C	EPA 7.3.3.2
Reactive Sulfide	Soil	500 ml glass	4 degrees C	EPA 7.3.4.2
TCLP Volatiles	Soil	20 ml glass	4 degrees c	EPA 8260
Total PAHs	Soil	250 ml glass	4 degrees C	EPA 8270
Total BTEX (benzene, toluene, ethylbenzene, xylenes)	Soil	125 ml glass	4 degrees C	TBD
Total Metals	Soil	250 ml glass**	4 degrees C	EPA 6010

Total Metals	Water	500 ml plastic	HNO3 to pH <2	EPA 6010
Semi-volatiles	Water	1000 ml amber glass	4 degrees C	EPA 8270
Pesticides/Herbicide	Water	1000 ml amber glass	4 degrees C	EPA 8081, 8151
Volatiles	Water	40 ml glass	4 degrees C or	EPA 8260
Paint Fitter	Water	500 ml glass	4 degrees C	As per 846
Total Cyanide	Water	500 ml plastic	4 degrees C NaOH to pH>12	TBD
Percent Sulfur	Soil	250 ml glass**	4 degrees C	TBD
PCBs	Soil	500 ml glass***	4 degrees C	EPA 8080
Ignitability	Soil	500 ml glass***	4 degrees C	As per 846
BTU/lb	Soil	500 ml glass***	4 degrees C	As per 846
Flashpoint	Soil	500 ml glass***	4 degrees C	As per 846
Reactivity	Soil/Water	500 ml glass***	4 degrees C	As per 846
Corrosivity	Soil/Water	500 ml glass***	4 degrees C	As per 846
Percent Solids	Soil	500 ml glass***	4 degrees C	
pH	Soil	500 ml glass***	4 degrees C	9045C
Volatiles	Air	Summa canister	None	EPA TO-14

* May be analyzed from the same sample container and/or extract.
** May be analyzed from same sample container.
*** May be analyzed from same sample container.
Note: All glass containers will be sealed with Teflon lined caps. All water samples for organic fractions will be collected in duplicate.

2.6 Holding times

The following identifies samples by type and matrix and their related holding times.

TABLE 2
WASTE CHARACTERIZATION SAMPLES

Sample Type	Matrix	Holding Time*
TCLP Pest./Herb.	Soil	5 days (extraction) 40 days (after extraction)
TCLP Semi-Volatiles	Soil	5 days (extraction) 40 days (after extraction)

TCLP Mercury	Soil	5 days (extraction) 28 days (after extraction)
TCLP Metals	Soil	160 days
TCLP Volatiles	Soil	14 days
Reactive Sulfide	Soil	7 days
Reactive Cyanide	Soil	14 days
PCBs	Soil	5 day (extraction) 40 days (after extraction)
Ignitability	Soil	N/A
Reactivity	Soil	Cyanide 14 days Sulfide 7 days
Corrosivity	Soil	2 days
Percent Solids	Soil	N/A

TABLE 3
WATER and WASTEWATER SAMPLES

Sample Type	Matrix	Holding Time*
Volatiles	Water	14 days
Spectrometric	Water	Indefinitely
Semi-volatiles	Water	5 days (extraction) 40 days (after extraction)
Metals	Water	180 days
Total Cyanide	Water	14 days
Corrosivity	Water	Analyze immediately

TABLE 4
OFF-GAS SAMPLES

Sample Type	Matrix	Holding Time
Volatiles	Air	24 days

- NYS ASP Category B deliverables required. Duplicates, matrix spike, and matrix spike duplicate samples will be collected at a rate of 1 per 10 samples.

- Samples will be analyzed on a priority basis and reported within 72 hours from VTSR at laboratory unless method required extraction or analytical processes prevent an expedited deliverable. Category B deliverables will be provided within 30 days.
- TCL volatiles and semi-volatiles will be determined at a minimum rate of 1 per every group of 10 confirmation samples or portion thereof.
- Soil samples will be collected as grab samples and not composited unless required by the disposal facility.
- QA/QC samples will be collected as required per analytical method and QAPjP.

3.0 QUALITY ASSURANCE PROJECT PLAN

3.1 Sample Labeling, Handling & Shipping

3.1.1 Sample Identification/Labeling

All samples will be assigned a unique identification code consisting of three or four parts. These parts generally consist of the project, sample type, location, and additional identification codes, as needed. Examples of the codes used for each sample type are identified below.

Sequential numbering of monitoring well locations in the Supplemental Investigation will begin with numbers following those used in the previous studies.

Numbering of the soil samples and water samples will employ the designation "05" in the suffix to designate the year in which they were sampled. Air quality samples will employ the designation of the month, day, and year (mm/dd/yy).

Waste Characterization Samples (designated with the location prefix of "WC")

Example: NHP (project) WC-04-05 (Location)

Verification Samples (designated with the location prefix of "SB")

Example NHP (project) VS-04-05 (Location) 10-12' (depth)

Groundwater Samples (designated with the location prefix of "GW")

Example NHP (project) GW-01-05 (Volume based on BSA)

Off-Gas Sample (designated with the location prefix of "PRCB" (PreCarbon), "MidCB" (Mid Carbon), and "PSTCB" (Post Carbon)

Example NHP (project) PRCB-01-06-11-05

3.1.2 Quality Assurance/Quality Control Samples

Matrix Spike/Matrix Spike Duplicate Samples QA/QC samples will include a matrix spike (MS) and matrix spike duplicate (MSD) sample at a frequency of not less than one MS/MSD pair per every 10 samples collected for each matrix (aqueous and sediment/soil). They will receive the following code:

Example: WC-MS-01 or WC-MSD-01

Field Duplicate Samples Field duplicate samples are sent blind to the laboratory. The sample location where the blind field duplicate is collected will be marked both in the field notebook and on the copy of the chain-of-custody record retained by the sampling team (see **Attachment A**). A blind field duplicate sample will be collected at a frequency of one per every 10 samples for each matrix (aqueous and sediment/soil). They will be given the following code

Example: WC-FD-01

Equipment Blanks Equipment blanks are not required when dedicated sampling equipment is used. If non-dedicated sampling equipment is used in the excavation/post-excavation soil sampling program, field blanks will be analyzed at a frequency of one field blank per every 10 samples collected. In either case, they receive the following code:

Example: EB-#-mm-dd-yy (where mm/dd/yy represents the date the field blank was collected and # represents the order collected, if more than one equipment blank is collected on any given day.)

Trip Blanks Trip blanks are used to monitor potential sample volatile organic contamination during shipment to and from the laboratory. It also provides information on laboratory water quality since the laboratory provides the trip blank water. One trip blank will submitted for analysis for each day volatile organic samples are collected. A trip blank will be included in each cooler that contains volatile organic samples, therefore all volatile organic samples and containers will be shipped to and from the laboratory in a minimum number of coolers to minimize the number of trip blanks required.

Example: TB -mm/dd (where mm/dd represents the date the trip blank was collected)

All sample containers will be labeled prior to sample collection. A non-removable label on which the following information is recorded with a permanent waterproof marker (pen for volatiles) will be affixed to each sample container for shipment to the laboratory:

- project name/location (FS);
- sample identification code;
- date and time the sample was collected (except for field duplicates);
- type of sample (WC or GW);
- grab or composite; and
- analysis requested.

3.1.3 Containers, Preservation, and Holding Times

All sample containers used will be of traceable quality purchased and supplied by the laboratory. The selection of sample containers used to collect the samples is based on the following considerations:

- sample matrix;
- analytical methods;
- potential contaminants of concern;
- reactivity of container material with sample; and
- QA/QC requirements.

All samples will be collected and preserved, and all analytical holding times, will conform to the NYSDEC Analytical Services Protocols (October, 1995). Required containers, preservatives and holding times are presented in Tables A, B, C and D.

3.1.4 Chain-of-Custody Protocol and Shipping Requirements

A chain-of-custody record (**Attachment A**) will be initiated by AECOM upon sample collection, and by the laboratory providing the sample containers. The laboratory record traces the path of the initial sample bottles and preservation at the laboratory to the field for sample collection. The AECOM chain of

custody is initiated at the point of sample collection, and documents the handling of the samples during shipment.

The AECOM Project Manager or designated representative will notify the laboratory of the anticipated schedule of upcoming field sampling activities. This notification will include information concerning the number and type of samples, as well as the anticipated date(s) of shipment of samples to the laboratory.

The laboratory will be responsible for supplying insulated containers (typically coolers) for storing and shipping the samples. Each sample-shipping cooler has a unique identification number marked on the outside and inside, and is sealed with two adhesive tags assigned with unique identification numbers assigned by the laboratory. The seal number may be recorded on the chain-of-custody form. Separate numbered seal tags are provided for return shipment.

All sample bottles within each shipping container are individually labeled with an adhesive identification tag provided by the laboratory. In the event that laboratory tags are not available, AECOM sample identification tags are used.

Field samplers receiving the sample containers check each cooler for the integrity of the seals. Coolers with both seals broken are returned to the laboratory with the containers unused. Field samplers break the seals and inspect the contents for breakage.

Once the sample containers are filled, they are immediately placed in the cooler with sealed bags of ice ("wet ice") or synthetic ice packs ("blue ice") to maintain the samples at 4o C. The field sampler indicates the Client Name, Project Number, Site Location, Sampler, AECOM Contact, Laboratory Contact, Lab Identification, Date Report Required, Sample Identification, Date, Time, Sample Matrix, Collection Vessel, Lowering Device, Number of Sample Containers, Preservative and an indication of whether the sample is a Composite or Grab sample in the spaces provided on the appropriate chain-of-custody form for each sample. The Comment column of the chain of custody form is used to record specific considerations associated with sample acquisition, such as the analyses to be performed.

The identification numbers of each cooler shipped are written on the chain-of-custody form and the respective shipping manifest (if applicable). The chain-of-custody forms are signed and placed in a sealed plastic Ziploc bag in the cooler. The completed shipping containers are closed, and two paper seals are affixed to the latch and lid. The seals must be broken to open the cooler and if the seals are broken before receipt at the laboratory the possibility of tampering is plainly indicated.

The cooler is shipped to the laboratory via an overnight courier or hand delivered under appropriate chain-of-custody procedures. Whenever possible, the samples will be shipped within 24 hours of collection. Samples will not be shipped later than 48 hours following collection. When the laboratory receives the coolers, it will check the custody seals prior to opening the cooler and sign the chain of custody form following inspection of the cooler's contents, thus accepting custody of the samples.

3.1.5 Cleaning of Field Sampling Equipment

All non-dedicated hand equipment and tools, including split spoons used to collect samples for chemical analyses (including trowels, spatulas, spoons, scoops, hand augers, split-spoons) will be decontaminated using the following procedures:

- Wash with citrus based cleaner;
- Tap water rinse or distilled/deionized water rinse;
- Hexane rinse (sampling equipment used for collecting samples for pesticides and PCBs only);

- Tap water rinse or distilled/deionized water rinse;
- 10% nitric acid rinse (sampling equipment used for collecting samples for metals analysis only) and;
- Distilled/deionized water rinse.

If equipment is to be stored for future use, allow it to air dry, and then wrap it in aluminum foil (shiny-side out) or seal in plastic bags. Decontamination fluid will be discharged directly to the ground away from any surface water or containerized on-site if necessary

Drilling and Geoprobe equipment will be decontaminated by washing with a citrus based cleaner and rinsing with tap water. If necessary equipment will be steam cleaned.

3.2 Analytical Methods

3.2.1 Contract Laboratory

The analytical laboratory contracted to perform the sample analyses will be a New York State Department of Health (NYSDOH) approved laboratory and American Industrial Hygiene Association (AIHA) accredited and/or a successful National Instiute for Occupational Safety and Health (NIOSH) proficiency test program participant for the appropriate analysis.

All samples will be analyzed following the NYSDEC, ASP (October 1995) CLP procedures with complete NYSDEC CLP/Category B deliverables if required.

3.2.2 Data Quality Requirements

Data quality objectives (DQO) for data measurement are generally defined in terms of six parameters: precision, accuracy, representativeness, comparability and completeness (PARCC). The following DQOs have been established to ensure that the data collected as part of this program are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this Quality Assurance Manual are used to assess the uncertainty associated with decisions related to the Site.

3.2.2.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. To maximize precision, established sampling and analytical procedures are consistently followed. Analytical precision is monitored through analysis of matrix spike duplicates and field duplicates. Matrix spike duplicates for organic compounds are analyzed at a frequency of once for every 10 samples as specified by the ASP. Precision is expressed as the relative percent difference (%RPD):

$$\%RPD = 100 \times 2[(X1 - X2)/(X1 + X2)]$$

where X1 and X2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values. The equation is taken from "Data Quality Objectives for Remedial Response Activities" (EPA/540/G-87/003, March 1987).

3.2.2.2 Accuracy

Accuracy measures the bias in a measurement system. Laboratory accuracy is assessed through use of laboratory internal QC samples, matrix spikes, and surrogate recovery. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on similar

samples. A matrix spike and matrix spike blank are analyzed once for every twenty samples, as specified in the ASP.

Accuracy values can be presented in a variety of ways. Average error is one way of presenting this information; however, more commonly, accuracy is presented as percent bias or percent recovery. Percent bias is a standardized average error (the average error divided by the actual or spiked concentration and converted to a percentage). Percent bias is unit-less and allows accuracy of analytical procedures to be compared easily. Percent recovery provides the same information as percent bias. Routine organic analytical protocols require a surrogate spike in each sample. Percent recovery is defined as:

% Recovery = (R/S) x 100
Where S = spike surrogate concentration
R = reported surrogate concentration
and % Bias = % Recovery - 100

This equation is taken from "Data Quality Objectives for Remedial Response Activities" (EPA/540/G-87/003, March 1987). Percent recovery criteria published by the NYSDEC as part of the 1991 NYSDEC ASP and those determined from laboratory performance data are used to evaluate accuracy in matrix spike and blank spike quality control samples.

3.2.2.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which sample data accurately and precisely represent actual conditions. In the field, the representativeness of the data depends on selection of appropriate sampling locations, collection of an adequate number of samples, and use of consistent sampling procedures. The sampling procedures, as described in the attachments, are designed with the goal of obtaining representative samples for each of the different matrices.

In the analytical laboratory, the representativeness of the analytical data is a function of the procedures used in processing the samples. The objective for representativeness is to provide data of the same high quality as other analyses of similar samples using the same methods during the same time period within the laboratory. Representativeness is determined by comparing the quality control data for these samples against other data for similar samples analyzed at the same time.

3.2.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Analytical results are comparable to results of other laboratories with the use of the following procedures/programs: instrument standards traceable to National Institute of Standards and Testing (NIST) or NYSDEC sources; the use of standard methodology; reporting results from similar matrices in consistent units; applying appropriate levels of quality control within the context of the laboratory quality assurance program; and participation in inter-laboratory studies to document laboratory performance. By using traceable standards and standard methods, the analytical results can be compared to other laboratories operating similarly. The QA Program documents internal performance, and the inter-laboratory studies document performance compared to other laboratories. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

3.2.2.5 Completeness

Completeness is the percentage of measurements made that are judged to be valid measurements. The completeness goal is to generate the maximum amount possible of useable data (i.e., 100% usable data). Data is considered usable unless qualified during validation as "R", rejected.

3.2.2.6 Reporting Limits

The estimated reporting limits or practical quantification limits that are desired for each analysis are the Contract Required Detection Limits specified in the NYSDEC ASP (October 1995). All such limits are dependent upon matrix interferences and reporting limits may vary as a result of dilution.

3.2.2.7 Field Analysis DQOs

The DQOs established for field analyses are described in Section 2.1.3.

3.2 Field Quality Assurance Samples

3.3.1 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method. Field duplicate samples are defined as a second sample collected from the same location, at the same time, in the exact same manner as the first and placed into a separate container (with no prior mixing). Field duplicate samples are collected at a frequency of one per every ten-(10) samples per matrix. Each duplicate sample is analyzed for the same parameters as the samples collected that day. Thus, both field and laboratory variability is evaluated. Acceptance and control limits for the laboratory follow NYSDEC ASP guidelines for organic analyses. However, any deviations in the data with respect to the limits will be discussed in the report. Although there are no established QC limits for field duplicate RPD data, AECOM considers RPD values of 40% or less an indication of acceptable sampling and analytical precision.

3.3.2 Split Samples

Split samples are usually used for performance audits or inter-laboratory comparability of data. The collection of split samples is not anticipated during the course of this project. However, if the NYSDEC (or other appropriate agency) requests split samples to be collected, then the following applies: A split sample is defined as two separate samples taken from a single aliquot that has been thoroughly mixed or homogenized prior to the formation of the two separate samples.

3.3.3 Equipment Blanks

Equipment blanks are not required when dedicated sampling equipment is used. If non-dedicated sampling equipment is used in the excavation/post-excavation soil sampling program, field blanks will be analyzed at a frequency of one field blank per every 10 samples collected.

3.3.4 Trip Blanks

Trip blanks are used to monitor potential sample volatile organic contamination during shipment to and from the laboratory. It also provides information on laboratory water quality since the laboratory provides the trip blank water. One trip blank will be submitted for analysis for each day that aqueous volatile organic samples are collected. A trip blank will be included in each cooler that contains volatile organic samples, therefore all volatile organic samples and containers will be shipped to and from the laboratory in a minimum number of coolers to minimize the number of trip blanks required.

3.3.5 *Field Testing QC*

Field QC check control limits (pH, specific conductance and turbidity) are detailed below. In addition, field determinations of pH, specific conductance, and turbidity, are obtained in duplicate for every 20 aqueous samples collected.

- **pH:** If the pH QC sample (pH 10.0 buffer after initial calibration with pH 4.0 and 7.0 buffers) exceeds + 0.5 pH units from the true value, the source of the error is determined and the instrument re-calibrated. If a continuing calibration check with pH 7.0 buffer is off by + 0.5 pH unit, the instrument is re-calibrated.
- **Specific conductance:** QC samples must be within +10% of the true values. The specific conductance QC sample is a 0.01 M or 0.1 M potassium chloride solution.
- **Turbidity:** QC samples must be within + 10% of the true values. The turbidity QC sample is a commercially prepared polymer standard (Advanced Polymer System Inc. or equivalent).
- **Temperature:** Temperature measurements are performed with a factory calibrated thermometer or thermocouple.

3.3 Laboratory Quality Assurance Samples

3.4.1 *Method Blanks*

Method blanks are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instrument as the sample is prepared and analyzed in the laboratory. A method blank is defined as an aliquot of laboratory deionized water on which every step of the method is performed and analyzed along with the samples. Method blanks are analyzed at a frequency of one (1) for every 10 samples analyzed, or every analytical batch, whichever is more frequent.

3.4.2 *Spiked Samples*

Two types of spiked samples are analyzed as part of the analytical QA/QC program, and include matrix spikes (MS) and matrix spike duplicates (MSD). Matrix spike samples are analyzed to evaluate instrument and method performance on samples of similar matrix. Matrix spike duplicates are analyzed to determine the precision of the method and instrument. These samples are analyzed and the percent recovery is determined to assess matrix interferences affects on the methods. One MS/MSD sample will be analyzed for every 10 samples.

3.4 Field Equipment Calibration & Maintenance

3.5.1 *Calibration*

Field equipment that may be used during collection of environmental samples at the Site includes a pH meter, conductivity meter, turbidimeter, thermometer, dissolved oxygen meter and a photoionization detector (HNU PI-101 or equivalent). Calibration and standardization of the pH, specific conductivity, turbidity and dissolved oxygen meters is summarized below:

- The pH meter is calibrated in accordance with EPA Method 150.1. It is checked with pH 7 buffer every ten samples, two hours, or every time it has been turned off for more than two hours and then turned on again, whichever occurs first.

- The specific conductance meter is calibrated in accordance with EPA Method 120.1. It is checked at the beginning of the workday and every time it has been turned off for more than two hours and then turned on again, whichever occurs first.
- The turbidity meter is calibrated in accordance with EPA Method 180.1. It is checked at the beginning of the workday and every time it has been turned off for more than two hours and then turned on again, whichever occurs first.
- The dissolved oxygen meter is calibrated following the manufacturer's instruction and checked whenever the instrument has been turned off.
- Temperature is measured with a thermometer, or with a platinum electrode that has been factory calibrated and coupled to the pH meter.
- All air monitoring instruments (PID, dust monitor, and multi-gas meters) used for soil screening and health and safety surveys is calibrated following the manufacturer's instructions, at the beginning of the day, whenever the instrument is shut-off for more than two hours and at the field representative's discretion.

3.5.2 Maintenance

Preventive maintenance of field equipment is performed to keep all instruments in proper working order. All preventative maintenance activities are recorded in the logbooks, along with documentation of any problems and repairs. Review of these logs and internal communication between QA/QC personnel and field personnel allow for identification and correction of potential problems.

Prior to field sampling events, each piece of field equipment is inspected to ensure it is operational. If necessary, the equipment is serviced. Meters that require charged batteries are fully charged or have fresh batteries. Due to AECOM's extensive inventory of supplies and equipment, downtime should not occur. Field personnel carry key spare parts and equipment into the field to prevent downtime.

Field equipment returned from a site is inspected to confirm it is in working order. This inspection is recorded in the logbook or field notebooks, as appropriate. The last user is responsible for recording any equipment problems in the logbook.

3.6 Data Documentation

Field notebooks will be initiated at the start of on-site work. One notebook will be dedicated to the AECOM representative overseeing intrusive activities and the collection of post-excavation samples. Another notebook dedicated to the perimeter air monitoring will be initiated and maintained by the SSO, and a third notebook will be dedicated to the field analysis of the excavation samples. All original forms and notebooks used during field activities become part of the permanent project file. Each field notebook will include the following daily information, where applicable:

- date;
- meteorological conditions;
- crew members;
- brief description of proposed field activities for that day;
- locations where work is performed;
- problems and corrective actions taken;
- records of all field measurements;

- description of all modifications to the work plan;
- record of all field data sampling point locations;
- pertinent sample collection information;
- chain-of-custody information; and
- calibration of field equipment.

3.7 Corrective Actions

Corrective actions are required when a problem arises that impedes the progress of the investigation as detailed in the project plans, or when field or analytical data are not within the objectives specified in the Work Plan or QAPjP. Corrective actions include those actions implemented to promptly identify, document, and evaluate the problem and its source, and to correct the problem. These corrective actions are documented in the project file. Prior to implementing any deviations from the approved procedures contained in the QAPjP, the Project Manager and Quality Assurance Officer (QAO) must be notified.

3.7.1 Field Procedures

Project personnel continuously monitor ongoing work performance as part of their daily responsibilities. If a condition is noted that would have an adverse impact on data quality, corrective actions are taken. Situations that require corrective action include the following:

- standard operating procedures and or protocols identified in the project-specific work plan or QAPjP have not been followed;
- equipment is not calibrated properly or in proper working order;
- QC requirements have not been met; and
- performance or system audits identify issues of concern.

The problem, its cause, and the corrective action implemented are documented. The QAO is responsible for initiating and approving corrective actions.

3.7.2 Laboratory Procedures

Instrument and method performance and data validity are monitored by the analytical laboratory performing the analyses. The laboratory calibrates its instruments and documents the calibration data. Laboratory personnel continuously monitor the performance of its instruments to ensure that performance data fall within acceptable limits. If instrument performance or data fall outside acceptable limits, or when any condition is noted that has an adverse effect on data quality, then the laboratory implements appropriate corrective actions. Situations that require corrective action include the following:

- protocols defined by the project-specific QAPjP have not been followed;
- identified data acceptance standards are not obtained;
- equipment is not calibrated properly or in proper working order;
- sample and test results are not completely traceable;
- QC requirements have not been met; and
- performance or system audits identify issues of concern.

The laboratory QAO is responsible for initiating and approving corrective actions. The corrective actions may include one or more of the following:

- re-calibration or standardization of instruments;

- acquiring new standards;
- repairing equipment; and
- reanalyzing samples or repeating portions of work.

System audits and calibration procedures with data review are conducted by the laboratory at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work. When AECOM provides independent data validation, the laboratory is notified as soon as possible of any situations requiring corrective action so that corrective actions can be implemented in a timely manner.

3.8 Data Reduction, Review, and Reporting

3.8.1 Laboratory Data

The laboratory is required to meet all applicable documentation, data reduction, and reporting protocols as specified in the October 1995 NYSDEC ASP CLP deliverable format. Calculations of sample concentrations are performed using the appropriate regression analysis program, response factors, and dilution factors, where applicable. The laboratory (through its assigned QAO) conducts its own internal review of the analytical data generated for a specific project prior to sending the data to AECOM. Deficiencies discovered during the laboratory internal data validation, as well as the corrective actions used to correct the deficiency are documented in the laboratory Case Narrative submitted with each data package.

The laboratory reports the data in tabular form by method and sample. The laboratory is required to submit analytical results that are supported by a complete NYSDEC ASP CLP data package to enable the quality of the data to be determined. This standard backup data includes supporting documentation (chromatograms, raw data, etc.), sample preparation information, and sample handling information (i.e., chain-of-custody documentation).

3.8.2 Field/Engineering Data

Field data (information collected in the field through observation, manual measurement, and/or field instrumentation) is recorded in the project field logbook, data sheets, and/or forms. This data is reviewed by the field manager and the project manager for adherence to the work plan and QAPjP requirements. The final reporting of the data is reviewed by the project field personnel, who also participate in data reduction and evaluation.

Field documentation, data calculations, transfers, and interpretations are conducted by field personnel, and reviewed for accuracy by the appropriate task manager, project manager and/or QAO for:

- general completeness;
- readability;
- usage of appropriate procedures;
- appropriate instrument calibration and maintenance;
- reasonableness in comparison to present and past data collected;
- correct sample locations; and
- correct calculation and interpretations.

Approximately 5% of all calculations are checked through recalculation. If appropriate, field data forms, and calculations are included in project report appendices. Original field logs/forms, documents and data reduction are kept in the project file.

3.9 Quality Assurance Controls

The Project Manager and the QAO are responsible for ensuring that quality QA/QC records such as chain-of-custody forms, field notebooks, and data summaries are being properly prepared. The Project Manager is responsible for ensuring that all records are properly filed. Information received from outside sources, such as laboratory analytical reports, is retained at AECOM. Access to working project files is restricted to project personnel.

3.9.1 Field Audits

The Project Manager and Project QA/QC Officer are responsible for ensuring that all field investigations are performed in accordance with the requirements and specifications outlined in this QAPjP. The QAO is responsible for providing QA/QC supervision and guidance relative to all work performed by AECOM employees and subcontractors assigned to the project.

As part of AECOM's field QA/QC program, a field audit is performed by AECOM's QAO or a designated representative on projects where sampling activities extend for more than one week. The primary purpose of the field audit is to monitor project sampling practices. The QA/QC field audit is performed during sampling to evaluate the performance of work during the collection of samples for laboratory analysis.

For projects of short duration (i.e., continuous fieldwork of less than one week), a formal audit of field activities is not performed. The field team leader or appropriate task manager monitor field performance and document all work performed in field notes, a narrative, and a checklist of tasks. The Project Manager and/or Project QA/QC Officer review this documentation to ensure the necessary information has been recorded and conduct discussions with field team members to verify that field activities were performed according to the project Work Plan, QAPjP and HASP. The QAO communicates concerns, if any, to the field team as appropriate. A field audit will not be performed in conjunction with this project.

3.9.2 Meetings

Periodic meetings between the Project Manager and QAO will be held to review quality assurance procedures, fieldwork, laboratory performance and data documentation and review. Any potential problems identified during the review are documented and addressed. If necessary, they are reported to management for review and appropriate corrective action.

ATTACHMENT A
CHAIN-OF-CUSTODY FORM

AECOM
40 British American Blvd.
Latham, NY
12110
P 518.951.2200
F 518.951.2300
www.aecom.com

CHAIN-OF-CUSTODY RECORD

Page____ of____

REPORT TO		DATA DELIVERABLE INFORMATION	CHECK DELIVERY METHOD
COMPANY	PHONE	☐NEW YORK STATE ASP "B" ☐NEW YORK STATE ASP "A"	☐SAMPLES DELIVERED IN PERSON ☐BY COMMON CARRIER
NAME	FAX	☐OTHER_____	
ADDRESS		FEDERAL EXPRESS AIRBILL NUMBER	**UPS AIRBILL NUMBER**
CITY / STATE / ZIP			

CLIENT / PROJECT NAME	CLIENT PROJECT #

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	REQUESTED ANALYSES	COMMENTS
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RELINQUISHED BY	DATE / TIME	ACCEPTED BY	DATE / TIME	ADDITIONAL REMARKS	COOLER TEMP.
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WHITE: LABORATORY COPY YELLOW: REPORT COPY PINK: CLIENT'S COPY