HVE/SVE System
Construction Completion Report

136 Fuller Road Site
Brownfield Cleanup Program
NYSDEC Site No. C401055
City of Albany and Town of Guilderland
Albany County, New York

February 2013

Chazen Project No. 90618.00

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I certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Design was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Design.

Mr. Daniel W. Stone, P.E.

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1.0 Introduction

A Vacuum Extraction Remediation System referred to as a High Vacuum/Soil Vapor Extraction System (HVE/SVE System) has been constructed at the former Fuller Brush facility located at 136 Fuller Road in the City of Albany (Figure 2). This environmental remediation system was designed and installed to mitigate the source of volatile organic compound (VOC) contamination at this BCP site. The system design was approved by the New York State Departments of Environmental Conservation (NYSDEC) and Department of Health (NYSDOH) as an Interim Remedial Measure (IRM) to mitigate the delineated VOC source area. An area of VOC-impacted soil and groundwater is documented on the site and extends beneath part of the main site building.

The construction of the HVE/SVE Remediation System at the site was completed initially in March of 2011 according to the design specifications detailed in the HVE/SVE Design Report (Chazen, May 2011), which was approved by NYSDEC May 20, 2011, following a 45-day comment period. This pilot testing phase unit ran until September of 2011. A second system replaced the initial pilot study system in November of 2011, with some system modifications that were approved by NYSDEC. The system has been operating since that time as the final design unit, except for short-term maintenance and repair shut downs. Appendix A includes NYSDEC approval documents.

1.1 Past Site Investigation and Regulatory Involvement

A 2007 initial remedial investigation was conducted before the site was accepted into the NYSDEC's Brownfield Cleanup Program (BCP) in April 2009. The 2007 draft remedial investigation report concluded that volatile organic compounds (VOCs), primarily the chlorinated solvent tetrachloroethylene (PCE) and associated degradation products, are present in site soil, groundwater and sub-slab vapors at concentrations greater than the regulatory cleanup standards. The source area was identified as a former tank farm where VOC chemicals were stored in bulk along the northern side of the building circa 1950s to the early 1970s. The footprint of impacted groundwater was identified as extending beneath a section of the building immediately south and hydraulically down gradient of the historic tank farm area. Based on these data, the distribution of the contaminants in the subsurface and the site geologic conditions in this area, the use of a total fluids extraction system consisting of an HVE system and a SVE system was determined to be a practical solution for the removal of the VOCs from the subsurface. This approach provides efficient and aggressive water table depression and treatment of shallow contaminated groundwater, removal of the VOCs trapped in the subsurface in vapor and NAPL form, and also minimizing disturbances to site businesses while providing efficient control and capture of the contaminants. This system was initially installed as an IRM, which proved very effective in removal of the VOCs and was ultimately selected as the preferred remedial alternative for removal of the source area site VOCs.

1.2 Existing Site Use

The site is a 15.72-acre property located at 136 Fuller Road in the City of Albany and Town of Guilderland, Albany County, New York. The site is currently developed with a 266,000-square foot commercial/industrial, single-story building which is predominately occupied by UltrePet LLC, recyclers of polyethylene (PET) plastic bottles and manufacturer of PET plastic resins. Equal Vision Records, a T-

shirt silk screening printer, is a tenant occupying the eastern end of the building. The remaining portion of the site building is vacant warehouse space. Crown Castle International leases a 0.06-acre portion of the northeastern site area for the location and operation of cellular telecommunications tower, antenna and associated equipment (Crown Castle Site # 806676). Crown Castle is not a tenant of the building where the impacted area has been identified.

2.0 HVE/SVE Program Development and System Construction

The selected IRM was designed to meet the remedial action objective, to extract VOC contaminants from the subsurface in the source. Ten extraction wells were installed for use in the pilot test phase of the system operation. Nine of the ten wells were found to be productive recovery wells; one of the wells was found to have poor conductivity with the aquifer and was not used. The nine wells have provided good coverage in the source area and so have been maintained throughout the duration of the extraction process. The locations of the nine extraction wells are shown on Figure 2 and the installation configuration of the wells is shown on Figure 3. All nine extraction wells are set up to be configured for either high vacuum total fluids extraction (HVE) or standard SVE as needed. At current, the system is supporting vacuum extraction in seven of the wells and SVE in two of the wells. The configuration of the wells is changed as needed to sustain the highest level of recovery efficiency based on monitored extraction levels and changes in the site subsurface hydrology.

The HVE/SVE program included installation of the extraction wells, manifolds and remediation trailer, then a pilot test of the system was performed, and then system modifications were made following the pilot test. These elements of the program are described herein and photographs are included in Appendix B.

2.1 Extraction Well Construction

The general well locations are shown on Figure 2 and the typical HVE/SVE recovery well construction details are shown on Figure 3. Each recovery well was constructed with 4-inch diameter, threaded, flush-joint, schedule 40 polyvinyl chloride (PVC) solid casing and 0.01-inch (10 slot) slotted screen. The screen was set from the shallow clay layer to a depth at which a bentonite clay seal and surface enclosure could be installed. In general, most wells were set with between 5 and 15 feet of well screen and vary in depth from 8 to 20 feet below grade.

A pitless adapter was installed at approximately three feet below grade in the exterior recovery wells, and 2-inch PVC pipe was plumbed in trenches back to the remediation trailer where a manifold system connects wells to either the HVE or SVE parts of the trailer extraction system.

To use wells for liquid extraction (HVE), a “stinger” or “drop” tube is installed at the pitless adapter and extends to just above the bottom of the well to allow for maximum vacuum extraction and de-watering efficiency. To use wells for vapor extraction (SVE), no drop tube is used and the vacuum is applied at the level of the pitless adapter.

Two SVE and one HVE wells exist within the interior area of the building. Adaptive connectors were installed at the wellheads instead of subsurface pitless adapters.

2.2 System Piping Configuration and Installation

Figure 2 shows the general well locations and subsurface trench routing and manifold interface connection locations.

Piping for each HVE/SVE well installed outside the site building was connected individually to a manifold via 2-inch diameter, schedule 40 PVC piping at a minimum depth of 3 feet below grade. Trenches were installed two feet wide using the minimum number of trenches necessary to plumb piping back to the northern side of the building. Soil was temporarily staged adjacent to the trenches and then replaced as backfill. Trench backfill was compacted with excavating equipment after piping joints were sealed.

Steel piping was used inside the building to protect HVE/SVE well piping. Piping for these wells was connected individually to the manifold via 2-inch diameter steel piping running along the concrete floor surface and fastened every 10 feet. The steel piping was transitioned to PVC prior to exiting the northern wall of the building. For additional protection, a protective steel box was installed around the steel pipe closest to active facility work, to protect pipes from being damaged.

To connect the nine SVE/HVE wells to the treatment trailer, piping was extended to the northern side of the building, between the electrical equipment and cooling tower. From this location, flexible hoses were connected to the pipes and extend up into the treatment trailer where the hoses are connected to either the SVE or HVE manifold. This system can be reconfigured by switching which manifold inlet a subject well is connected to, along with the removal or addition of the drop pipe at the well head. Piping/hose connections are secured within an insulated wooden pipe chase to prevent freezing during winter operations.

2.3 SVE/HVE Area Cover and Stormwater Management

Following the installation of the HVE/SVE wells, a 60-mil thick synthetic impermeable liner was installed over the unpaved area before the top one foot of surface soil was replaced. This liner serves two purposes: 1) to reduce the potential for the SVE system to short circuit vertically back to the atmosphere, and 2) to redirect surface water collecting on top of the unpaved treatment area to an existing site stormwater drain, substantially reducing storm water infiltration into the source area. A four-inch diameter horizontal perforated drain pipe, embedded in crushed stone, was installed around the perimeter of the unpaved area, on top of the impermeable synthetic liner, and then the top one-foot of soil was replaced.

Stormwater that falls on, flows onto, or melts within the unpaved treatment area is directed to the buried perforated pipe and then flows to an existing three-foot deep, sealed, concrete basin in the southwestern corner of the treatment area (Figure 2). This concrete basin has a single outlet connected to the facility's stormwater management system. Based on a current facility-wide SPDES Permit, water within the basin is discharged to the facility's stormwater system without coming in contact with the contaminated subsurface media.

2.4 Treatment System Trailer

The HVE/SVE piping connects to the remediation trailer, which houses the major system components. Following the pilot test, the remediation trailer was upgraded and replaced. The basic SVE and HVE system components are contained within the enclosure and include (see Figure 4): a cyclonic liquid phase separator, a regenerative fan SVE vacuum blower, a liquid ring total fluids extraction vacuum pump, flow meters, an oil/water separator, transfer pumps, a bag filter unit, and an air stripper. Sample ports, pressure gauges, temperature gauges, ball valves, and check valves are also part of the systems. A system control panel contains electrical controls for treatment equipment in the trailer.

2.5 Pilot Test

The pilot test for the HVE/SVE system was completed between March and September of 2011 with the installation and operation of a moderately sized HVE/SVE remediation trailer unit. Operations of the initial unit provided data that showed substantial contaminant recovery rates, capture and water table suppression in the target area. The pilot system contained a 10-horsepower liquid ring vacuum pump, which provided the vacuum source for the HVE recovery. The pilot system also contained a 1,000 pound liquid phase carbon vessel which was used to provide the final stage of dissolved-VOC stripping from the groundwater phase before discharging to the sewer, and a catalytic oxidizer which was used to thermally oxidize and remove VOCs from the vapor phase before discharging through the air stack to atmospheric air.

Early in the pilot test phase, the air discharge stack was modified to ensure that the discharged vapors from the system are discharged above the building roofline. This discharge stack is 6-inches in diameter and extends to approximately 27 feet above the ground surface, which is approximately two feet above the roof line.

Using for a photoionization detector (PID) and laboratory analysis, monitoring of the pilot system demonstrated that the levels of VOCs present in the vapor phase were sustaining well below the allowable discharge limit. NYSDEC concurred that it was no longer necessary to treat the vapor phase discharge with the catalytic oxidizer. It was also determined that groundwater concentrations observed during the pilot phase could be more economically treated with air stripping instead of liquid phase carbon. These changes are noted below in the design for the existing system.

2.6 Final HVE/SVE System Design

The as-built construction conforms to the approved Design Report, with four notable NYSDEC-approved modifications made following the pilot study phase of operation. Based on the pilot test data and noted subsurface responses to the extraction process, it was determined that the system would be modified to increase extraction efficiency and reduce operating costs and maintenance. System modifications were as follows.

1. Air exiting the HVE/SVE was found to be consistently less than the approved 0.5 pounds per hour discharge limit (consistently lower than 0.2 pounds/hour). As such, the catalytic oxidizer unit was removed from the system and air exiting the system was allowed to discharge directly to the discharge stack without treatment.

2. The liquid phase carbon treatment vessel was eliminated and was replaced by a shallow tray air stripper to provide final removal of dissolved VOCs from the liquid phase before treated groundwater is discharged to the sanitary sewer. This design change has continued to provide treatment sufficient to reduce VOC concentrations in the treated groundwater to concentrations substantially lower than the approved 5 ppm total VOC discharge action level.

3. The original pilot phase system included a10-horsepower liquid ring high vacuum pump (HVE vacuum pump) that could only support three wells at a time. The pump was upsized to a 25-horsepower liquid ring pump to provide a more aggressive removal rate and to allow for the ability to simultaneously apply high vacuum to additional wells. With the larger pump the system can now pump up to seven wells at a time.

4. The original mechanical control system was upgraded to include a computer-controlled system with telemetry. This improvement allows the system to remotely report important operating data and warnings when system failures occur.

In October-November of 2011, the pilot system trailer was replaced with an upgraded system and the upgraded system was activated in mid-November of 2011 and has been successfully operating since that time, except for short-term maintenance and repair shut downs. A revised Piping and Instrumentation Diagram of the upgraded system is included as Figure 4.

4.0 HVE/SVE System Operations, Maintenance, and Monitoring

System performance measurements were collected weekly to document system performance and to ensure compliance with approved discharge concentration limits. During operation, the HVE/SVE system is inspected and maintenance is performed between two and three times each week. Quarterly HVE/SVE Effluent Monitoring Reports have been submitted to NYSDEC and NYSDOH since April 2011. As presented in the OM&M Plan, routine monitoring, cleaning, replacement of filters and maintenance on various parts of the system is monitored each week and, if necessary, the system is adjusted to operate at maximum efficiency parameters.

The system is also equipped with a telemetry system through standard telephone lines. The telemetry system is used to provide daily system monitoring reports and to generate “Alarm” messages when the system becomes unstable, shuts down, or is otherwise operating outside of the acceptable design limits. Alarms and reports are monitored daily by OM&M personnel who respond in a timely manner to non-typical system conditions. The system is then thoroughly checked and necessary maintenance or repairs are performed to bring the system back on line.

5.0 System Modifications or Termination

The system will be maintained according to the NYSDEC approved OM&M Plan until conditions suggest that it is no longer performing a useful function or until the data indicate that the contaminant source area has been sufficiently remediated. System shut down and removal actions will be based on the conditions described and approved by NYSDEC in the project Site Management Plan and will not occur without prior NYSDEC approval.

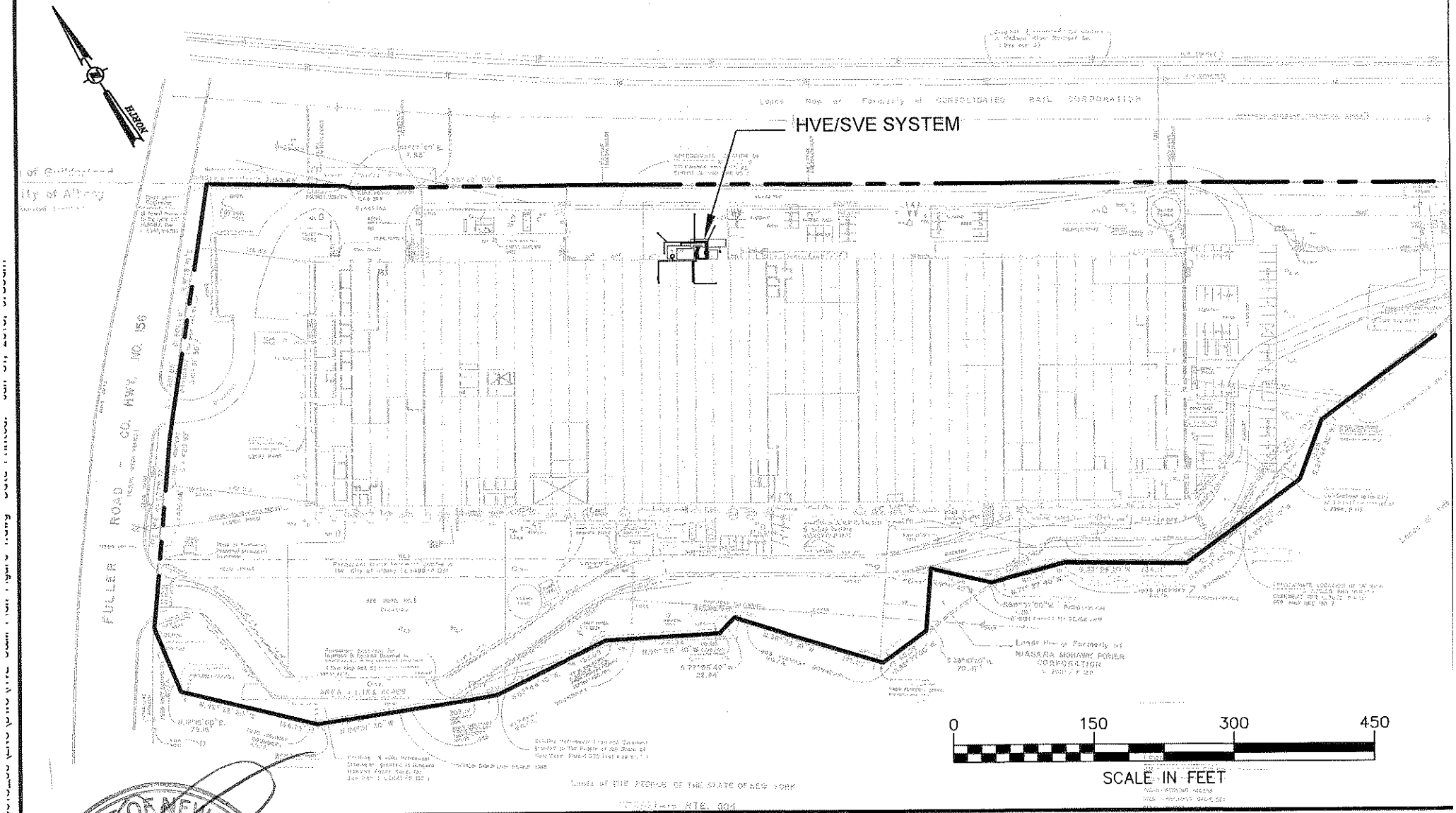
6.0 Conclusions

The HVE/SVE System was installed at the 136 Fuller Road site in November of 2011 following the conclusions of the 2011 pilot study phase. The final system design and configuration is in conformance with the May 2011 Design Report, with improvement modifications, as noted in Section 2.6. No additional testing or system modifications are deemed necessary at this time.

The system is functioning as designed to effectively remove VOC contaminants from the subsurface in the source area, and will continue to be operated as a site remedy. This system will continued to be monitored to document discharge concentrations, and adjusted to achieve maximum practical extraction performance on a weekly basis. Ultimately, the discontinuation of this system will be evaluated, based on a continued review of weekly and monthly system influent and effluent media quality data as described in the Site Management Plan.

Figures

Figure 1:
HVE/SVE System Location Map



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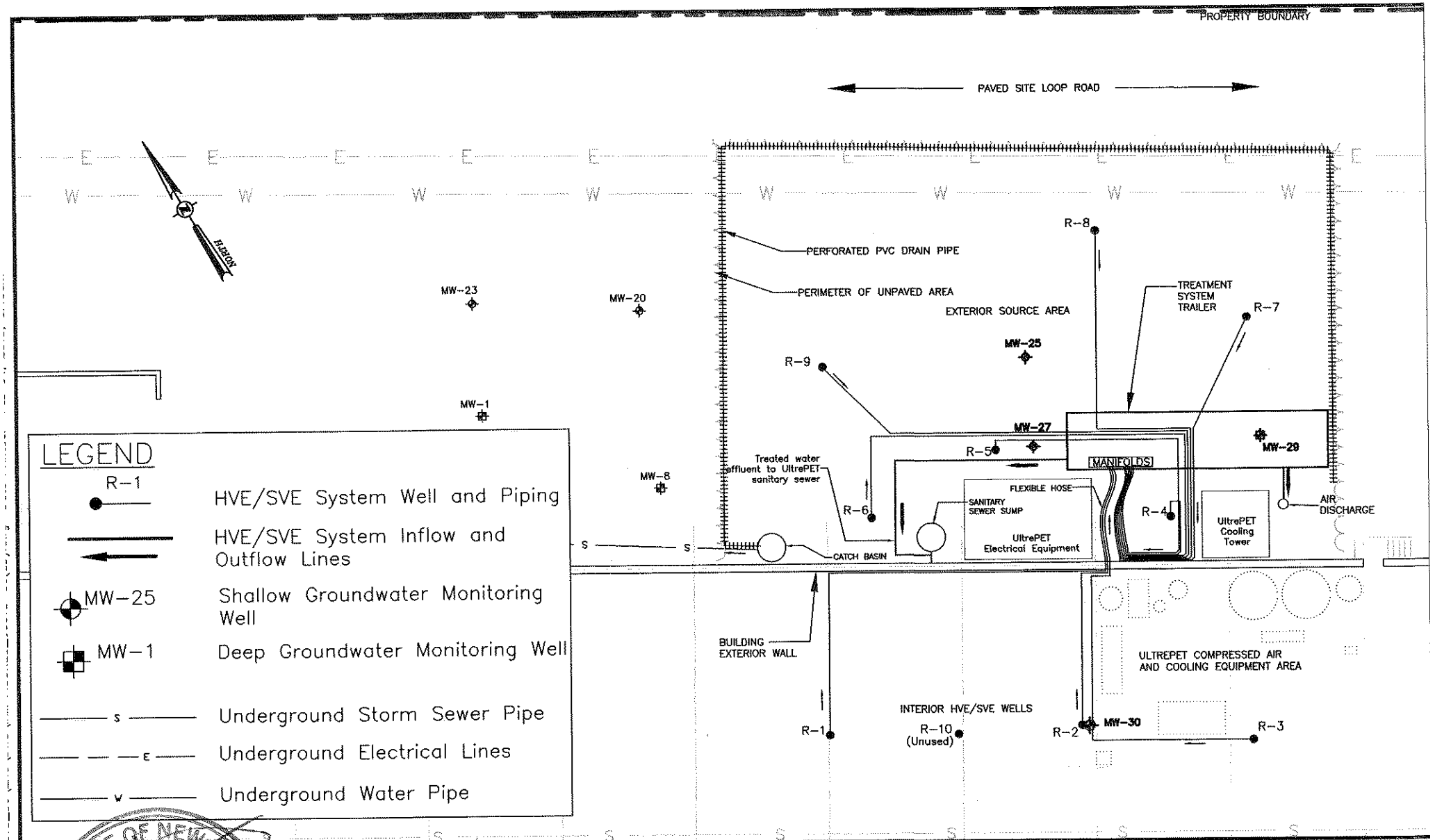
HVE/SVE SYSTEM LOCATION MAP

136 FULLER ROAD
ALBANY, ALBANY CO., NEW YORK

designed CSD	checked ASM
date 1/31/13	scale 1"=150'
project no. 90618.00	
sheet no. FIGURE 1	

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Figure 2:
HVE/SVE System Component Map



I CERTIFY THAT THIS FIGURE ACCURATELY DEPICTS THE AS-BUILT CONDITIONS OF THE HVE/SVE SYSTEM

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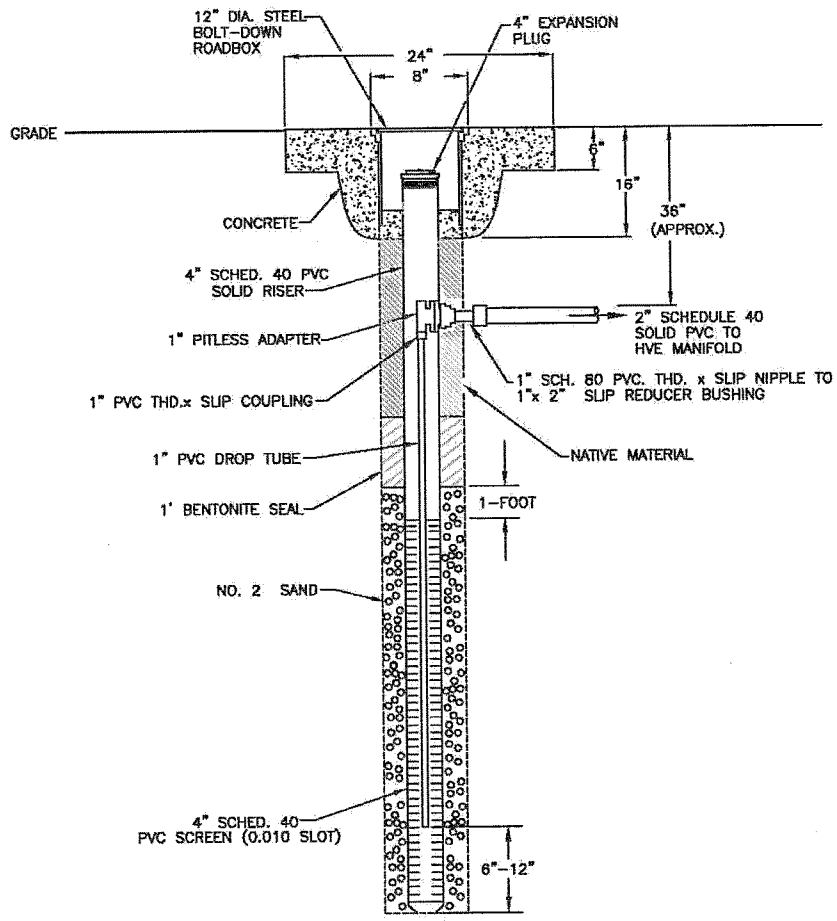
HVE/SVE SYSTEM COMPONENT MAP

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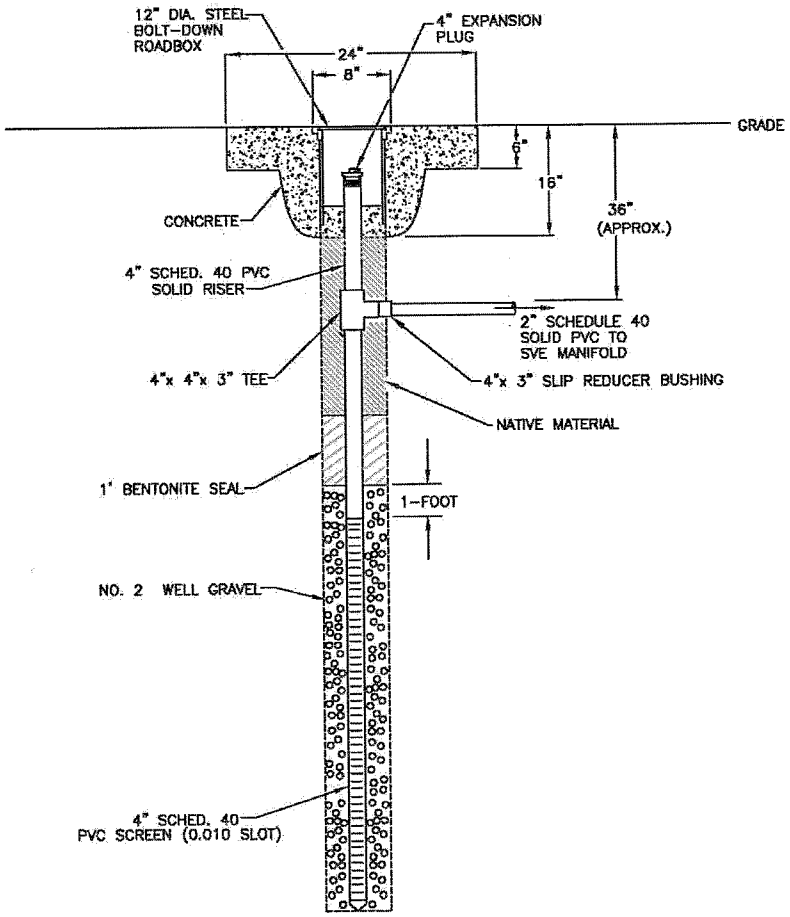
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Figure 3:
HVE/SVE Typical Well Diagrams



HVE WELL CONSTRUCTION DETAIL

NOT TO SCALE



SVE WELL CONSTRUCTION DETAIL

NOT TO SCALE

I CERTIFY THAT THIS FIGURE ACCURATELY DEPICTS THE AS-BUILT CONDITIONS OF THE HVE/SVE SYSTEM

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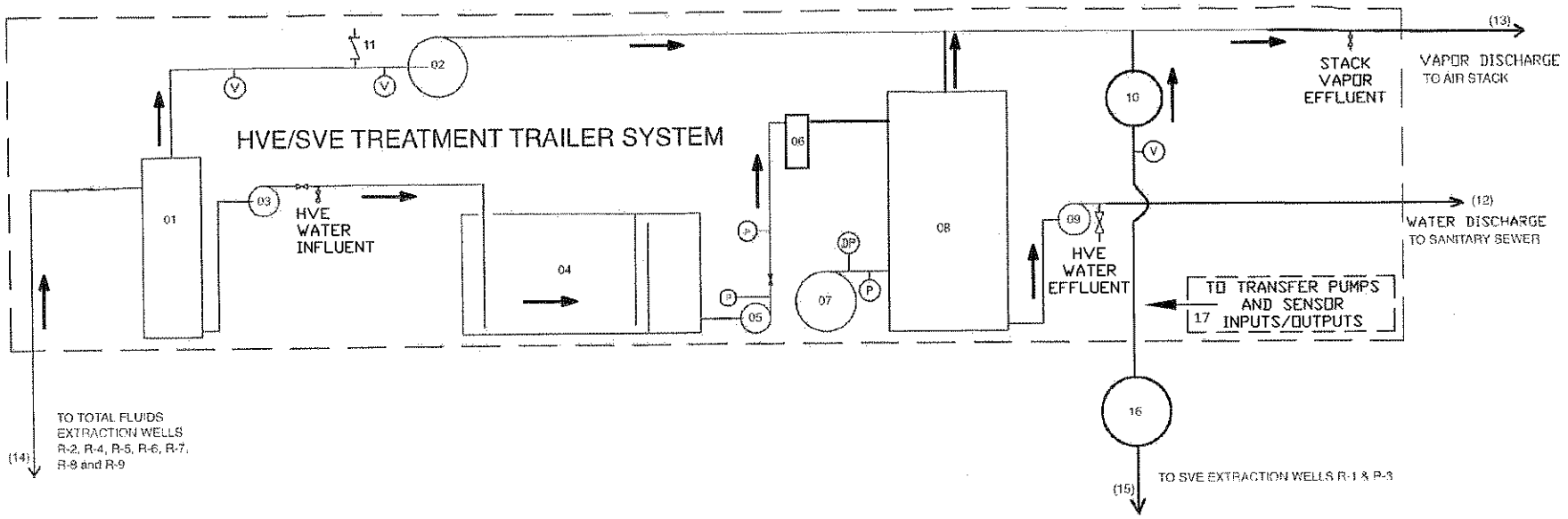
HVE/SVE TYPICAL WELL DIAGRAMS

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Figure 4:
Piping and Instrumentation Diagram



ITEM	DESCRIPTION	ITEM	DESCRIPTION
01	CYCLONE PHASE SEPARATOR	09	TRANSFER PUMP
02	HVE/TFE LIQUID RING PUMP	10	SVE BLOWER
03	TRANSFER PUMP	11	HVE RELIEF VALVE
04	OIL/WATER SEPARATOR	12	DISCHARGE TO SEWER
05	TRANSFER PUMP	13	AIR STACK DISCHARGE
06	BAG FILTER ASSEMBLY	14	TOTAL FLUIDS INLET MANIFOLD
07	AIR STRIPPER BLOWER	15	SVE INLET MANIFOLD
08	SHALLOW TRAY AIR STRIPPER UNIT	16	SVE PARTICULATE FILTER
		17	SYSTEM PLC CONTROLS

DP — DIFFERENTIAL PRESSURE SWITCH

P — PRESSURE GAUGE

SAMPLING PORT

V — VACUUM GAUGE

I CERTIFY THAT THIS FIGURE ACCURATELY DEPICTS THE AS-BUILT CONDITION OF THE HVE/SVE SYSTEM

STATE OF NEW YORK — ANDREW S. MARTINO — 052135 — PROFESSIONAL ENGINEER

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HVE/SVE PIPING AND INSTRUMENTATION DIAGRAM

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Appendix A:
NYSDEC Approval Documents

New York State Department of Environmental Conservation
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Website: www.dec.ny.gov

Joe Martens
Commissioner

March 22, 2011

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Latham, NY 12110

Arlette St. Romain Meader
Senior Environmental Scientist/Project Manager
The Chazen Companies
547 River Street, Troy, NY 12180

Re: 136 Fuller Road Site
Brownfield Cleanup Program
NYSDEC BCP Site No. C401055
Albany County, New York
HVE/SVE IRM Design Work Plan Approval

Dear Mr. Baines/Ms. St. Romain Meader:

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed the *Interim Remedial Measures Work Plan – High Vacuum Extraction/Soil Vapor Extraction* dated December 2010 by Chazen Companies for the 136 Fuller Road BCP Site in Albany, New York. Based on this review, the IRM Work Plan is hereby approved.

For the source area, this IRM Work Plan includes groundwater/DNAPL extraction and treatment via high vacuum extraction (HVE) coupled with soil vapor extraction (SVE). If required, to address the groundwater plume, a second phase of this IRM will utilize in-situ chemical or biological treatment. Deliverables for this IRM Work Plan include the submission of a detailed Design Report and an IRM Construction Completion Report for NYSDEC and NYSDOH review/approval.

Should you have any questions, please contact me at (518) 402-9768.

Sincerely,

P.E.

John Durnin, P.E.
Environmental Engineer 2
Remedial Bureau B, Section B
Division of Environmental Remediation

ecc: J. Quinn, DER, RBB, B. Callaghan, NYSDOH

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B, 12th Floor
625 Broadway, Albany, New York 12233-7016
Phone: (518) 402-9768 • **Fax:** (518) 402-9773
Website: www.dec.ny.gov

Joe Martens
Commissioner

May 20, 2011

Arlette St. Romain Meader
Senior Environmental Scientist/Project Manager
The Chazen Companies
547 River Street, Troy, NY 12180

Kim L. Baines, LEP
NY Regional Manager
Corporate Environmental Advisors, Inc.
950 New Loudon Road, Suite 340
Latham, NY 12110

Re: 136 Fuller Road Site
Brownfield Cleanup Program
NYSDEC BCP Site No. C401055
Albany County, New York
IRM HVE/SVE Design Report Approval

Dear Ms. St. Romain Meader/ Mr. Baines:

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed the *Interim Remedial Measures Design Report, High Vacuum Extraction/Soil Vapor Extraction,* dated May 2011 by the Chazen Companies for the 136 Fuller Road BCP Site in Albany, New York. Based on this review, this IRM HVE/SVE Design Report is hereby approved.

For the source area, this IRM includes groundwater/DNAPL extraction and treatment via high vacuum extraction (HVE) coupled with soil vapor extraction (SVE). If required, to address the groundwater plume, a second phase of this IRM will utilize in-situ chemical or biological treatment. Deliverables for this design include the submission of an IRM Construction Completion Report for NYSDEC and NYSDOH review/approval.

Should you have any questions, please contact me at (518) 402-9768.

Sincerely,

P.E.

John Durnin, P.E.
Environmental Engineer 2
Remedial Bureau B, Section B
Division of Environmental Remediation

ecc: J. Quinn, DER, RBB, M. Schuck, NYSDOH

From: John Durnin
To: Kim Baines
CC: Arlette Meader; Maureen Schuck; Quinn, James
Date: 11/18/2011 3:31 PM
Subject: Replacement Trailer with HVE/SVE System

Hi Kim,

Thank you for the tour of the new/replacement HVE/SVE system trailer today. As a followup to our discussions, some of the notable system features are as follows:

1. Many new or updated equipment,
2. Cyclone separator,
3. Improved (less maintenance) oil/water separator,
4. Larger capacity HVE system (25 Hp motor),
5. Multi-tray air stripper on the discharge of the HVE system, replaced the carbon canisters,
6. All the sensors/control devices are electronic (no mechanical floats to get stuck),
7. An electronic control system integrated with all the level sensors, pumps motors, etc. This system can control the entire system and optimize the "process".
8. The electronic control system has the capability of being accessed and operated remotely.
9. The HVE and SVE influent lines are designed to be easily interchangeable, as needed, to maximize the removal of contaminants.

The HVE/SVE system, equipment and trailer all look good and appear to be an improvement over the previous trailer/system. I'll look forward to seeing the system monitoring data in December 2011.

Thanks,

John

Appendix B:
HVE/SVE System Photographs


Recovery Well
Pitless Adapter
Trench Piping
Adapter
Pipe Trench

Photo 1



Photo 2


Recovery Well
Recovery Well
Recovery Well
Recovery Well
Piping Trench
Piping Trench
Piping Trench
Piping Trench

Photo 3


Vapor Discharge
Stack
System Controls
HVE/SVE Remediation Trailer
Extraction Wells

Photo 4


Stack Pipes
PLC
System
Controls
Pump
Controls
Electric
Load
Center
HVE/SVE
Piping
Manifold
Box

Photo 5

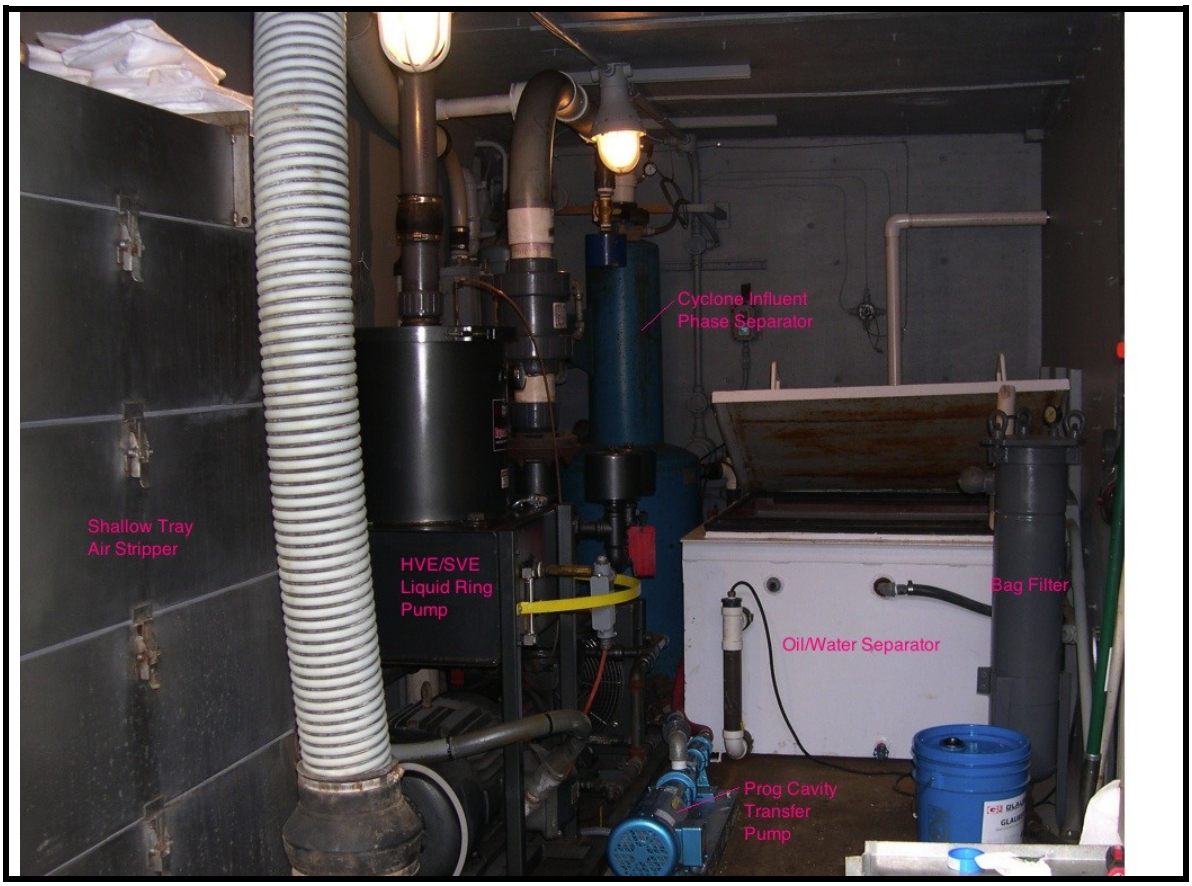

Cyclone Influent
Phase Separator
Shallow Tray
Air Stripper
HVE/SVE
Liquid Ring
Pump
Bag Filter
Oil/Water Separator
Prog Cavity
Transfer
Pump

Photo 6

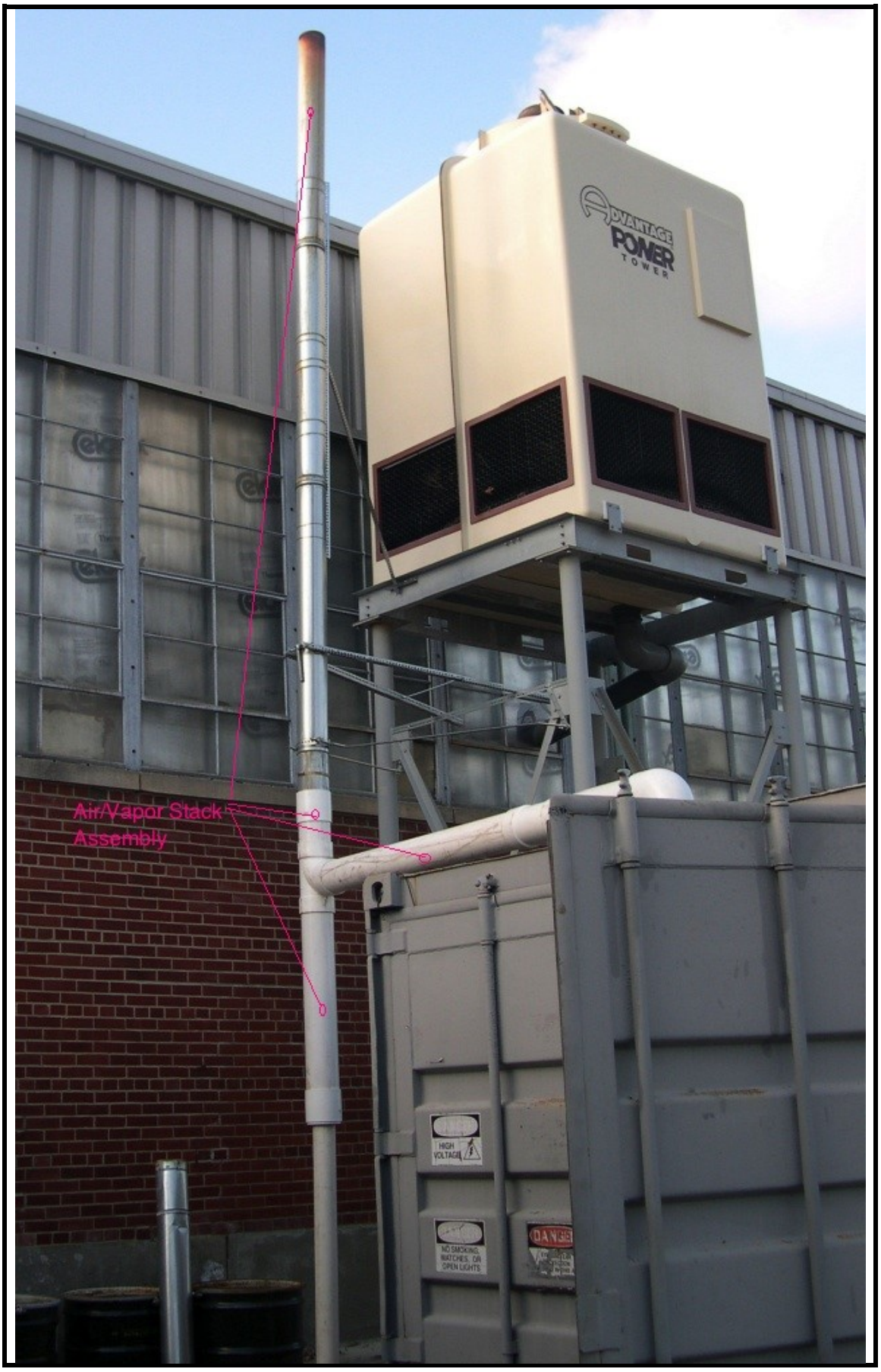

ADVANTAGE
POWER
TOWER
Air/Vapor Stack
Assembly
HIGH
VOLTAGE
NO SMOKING,
MATCHES, OR
OPEN LIGHTS
DANGER

Photo 7