AECOM Technical Services Northeast, Inc.
40 British American Boulevard, Latham, New York 12110
T 518.951.2200 F 518.951.2300 www.aecom.com

February 5, 2010

Ms. Michelle Tipple
Engineering Geologist II
New York State Department of Environmental Conservation, Division of Environmental Remediation
21 S. Putt Corners Road
New Paltz, New York 12561-1620

Subject: American Candle Company (former Ferroxcube) Facility
NYSDEC Site. No 356011
Soil Vapor Intrusion Evaluation Work Plan

Dear Ms.Tipple,

AECOM Technical Services Northeast, Inc. (AECOM) has prepared this work plan for the completion of a soil vapor intrusion evaluation for the American Candle Company (former Ferroxcube) facility ("the Site") in Saugerties, New York on behalf of Philips Electronics North America Corporation (Philips).

This work plan was prepared in accordance with the following guidance documents:

- *Final Guidance for Evaluating Soil Vapor Intrusion in New York State*, New York State Department of Health (NYSDOH) Center for Environmental Health, Bureau of Environmental Exposure Assessment. October 2006.
- *DER-13, Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York,* New York State Department of Environmental Conservation (NYSDEC), Department of Environmental Remediation. October 18, 2006

1.0 Introduction

The Site is located at 1033 Kings Highway, Saugerties, Ulster County, New York. A Site Location Map is provided as **Figure 1**. The Site has historically been operated by a series of industrial companies. Ferroxcube, and later Philips Components, manufactured electronic components at the Site from 1961 until 2000. Volatile organic compounds (VOCs), specifically halogenated solvents, were used in production operations and this resulted in releases to soil and groundwater. In 1991, Philips discontinued using these solvents. Philips stopped operations at this facility in January 2001, and the Site was sold to ClearlyTech. In turn, ClearlyTech leased the Site to a perfume and candle-manufacturing firm named American Candle for several years. The Site is currently vacant.

Groundwater in the area of the Site was impacted by historic operations. In 1982, the Ulster County Department of Health discovered halogenated hydrocarbons above drinking water standards in six nearby residential wells. As a result, groundwater and surface soil investigations were conducted, source areas were evaluated, and impacted soil and groundwater were identified. Philips purchased several of the adjacent residential properties and these residences were either demolished or vacated. Currently, two homes in the area

(the Worrad and Cunningham residences) are equipped with activated carbon wellhead filtration systems and are supplied with bottled potable water. These activated carbon wellhead filtration systems are monitored on a quarterly basis. The Town of Saugerties has recently installed a water main along Kings Highway, and advises that municipally-supplied water may be available by the summer of 2010.

The NYSDEC issued a Record of Decision (ROD) in March 1993 identifying the selected Remedial Alternative for the Site. Pursuant to the ROD, a Remedial Design (RD) and, Remedial Action Operation and Maintenance Plan (O&M Plan) were prepared to implement the ROD. The RD, O&M Plan, and subsequent amendments thereto, present the remedy approved by NYSDEC for abatement of VOC impacts to groundwater at the Site.

The former Solvent Storage Shed Area, adjacent to Building 2 on the northern portion of the Site, was identified by the Remedial Investigation completed in 1992 as the probable source area for soil and groundwater impacted by VOCs including tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE), dichloroethane (DCA), 1,1,1-trichloroethane (TCA), and Freon-113. A later investigation detected the presence of VOCs including TCA, DCE, and DCA in overburden (saturated soil) groundwater at the location of a former TCA Aboveground Storage Tank (AST) Area at the south of the Site. No significant concentrations of VOCs were detected in soils at the TCA AST location. A Site Plan included as **Figure 2** shows the location of these former structures, which were removed from the Site prior to 1991.

The remedial activities completed to-date at the Site have included air sparging, soil vapor extraction, groundwater pumping and treatment, chemical oxidant (permanganate) injections, and sodium lactate product injections. The groundwater pump and treatment system was installed at the former Solvent Storage Shed Area in order to maintain hydraulic control of groundwater flow in the bedrock aquifer.

These activities have resulted in substantial mitigation of the VOC impacts to soil and groundwater in these areas. The concentrations of VOCs detected in the Solvent Storage Area in recent sampling events ranged from below detectable limits (BDL) to 0.25 parts per million (ppm) in bedrock groundwater, while concentrations of VOCs in overburden groundwater ranged from BDL to 0.002 ppm. The mobility of VOCs in the overburden is limited by the clayey-silt soils present in the area of the Site. The concentrations of VOCs detected in the TCA AST area have ranged from 0.04 to 4.5 ppm in overburden groundwater. Due to the thickness of clayey-silt soil present in the TCA AST area, VOCs have been BDL in the deeper well in this area since 2006.

2.0 Soil Vapor Intrusion Sampling Rationale

The Site, including the plant buildings and residential areas within approximately 1,000 feet of the Site were evaluated in accordance with the NYDSDOH and NYSDEC SVI Guidance documents.

2.1 Plant Buildings

Soil and groundwater impacted with VOCs were detected in the TCA AST Area and the former Solvent Storage Shed Area. VOCs were also detected during the completion of a soil gas survey completed by O'Brien and Gere at the Solvent Storage Shed Area in 1990. Due to the historical presence of VOCs in soil and overburden groundwater adjacent to the plant buildings, a SVI investigation will be conducted within the plant buildings as described in Section 3 of this work plan.

2.2 Residential Areas

Residences located within approximately 1,000 feet of the Site were evaluated for the applicability of SVI sampling, based on the criteria presented in the NYSDEC SVI Guidance (2006) document including Table 1.1- *Environmental Factors that may Affect Soil Vapor Intrusion*. Based on site-specific environmental factors, as described below, the necessity of conducting SVI sampling at the residences is not indicated.

- Bedrock groundwater impacts from VOCs detected at water supplies at residences to the north (Worrad) and east (Cunningham) of the Site are at very low part per billion (ppb) levels (16 ppb and 5 ppb, respectively). Above the bedrock, VOCs in overburden groundwater were either non-detectable or detectable only at minimal concentrations (2 ppb).

- Given the intervening clayey soils overlying the bedrock and shallow water table zones, these minimal detections of VOCs in groundwater do not represent a VOC vapor source.

- The former VOC source area at the Solvent Storage Shed has largely been mitigated. The solvent storage shed area is located approximately 600 feet from the Worrad Residence, and approximately 1500 feet from the Cunningham residence.

- Water supply wells closest to the Site to the south (Superior Roofing and Clearly Tech water supply wells) were sampled in 2002. No VOCs attributable to the source areas at the Site were detected in these wells, and thus the potential migration of VOCs to these areas in groundwater has apparently been precluded by the regional groundwater flow direction and thickness of interceding clayey soils. Several homes are located along Sensipaugh Lane approximately 600 feet south of the former TCA AST area. Due to their distance from this historic VOC source and the thickness of clayey soils underlying this area, it is unlikely that these homes would have been impacted by the migration of vapors through either the soils or groundwater as described above.

3.0 Former Plant Soil Vapor Intrusion Sampling Program

There are three buildings at the Site which comprise “the Plant”. Two buildings (Buildings 1 and 2) are located adjacent to the former VOC source areas. The remaining building (Building 3) is located approximately 800 feet east of these source areas, and hence would not have been impacted by soil vapors as described by the evaluation of guidance criteria described above. The buildings at the plant are currently inactive, and the heating system is not in use. The buildings are metal-framed and sided structures, and are built at grade on concrete slabs. As part of this SVI investigation three locations will be sampled in Buildings 1 and 2, as shown on **Figure 2**. At each location samples of sub-slab vapor and indoor air will be collected. An outdoor air sample will be collected concurrently. The samples will be analyzed by EPA Method TO-15 for Target Compound List (TCL) VOCs plus Freon-113.

3.1 *Pre-Sampling Inspection and Inventory*

As required by the SVI Guidance document, a building survey will be performed to identify and minimize conditions that may interfere with the proposed testing prior to collecting samples at each structure. The building survey will evaluate the type of building structure, floor layout, air-flow patterns, and the physical condition of the buildings. Information obtained during the building survey, including information on sources of potential indoor air contamination, will be identified on the NYSDOH Indoor Air Quality Questionnaire and Building Inventory Form (NYSDOH, 2006; Appendix B). As shown in NYSDOH Appendix B,

specific information to be evaluated and noted during the building survey includes the following:

1. Occupant name(s) and address;
2. Owner or landlord information;
3. Building characteristics (e.g., commercial/industrial, number of units/tenants, number of floors, building age, etc.);
4. Construction characteristics, including foundation cracks and utility penetrations, ceiling construction and firewall separations, or other openings that may serve as preferential pathways for vapor intrusion;
5. Heating, ventilation, and air conditioning systems, including the type of heating system(s), type of fuel used, presence of a boiler/furnace, presence of aboveground or underground storage tanks, type(s) of air conditioning, and the presence of air distribution ducts;
6. Occupancy and the general use of each floor;
7. Factors that may influence indoor air quality, including attached garages, separate heating units in the garage, petroleum-powered machines stored in the garage, workshop or craft area, smoking in the building, exhaust fans in the kitchen or bathrooms, new carpets, fresh paints, etc.; and,
8. Type of water supply and sewage disposal.

A product inventory will also be conducted throughout the Plant buildings to identify chemicals and products that may bias sampling results. Product names and chemical ingredients listed on container labels will be recorded. If the ingredients are not listed on the label, the product's exact and full name, and manufacturer information, will be recorded. Chemicals or products that are noted as being stored in a questionable manner (e.g., in an open container), that emit odor, or yield positive field screening results, will need to be controlled during the indoor air quality sampling to reduce potential interferences. Control options will include removal of the container, tightly sealing the containers, or relocating the sampling point.

The presence and description of odors and portable vapor monitoring equipment readings (e.g., PID readings) will be noted. Photographs will also be taken as appropriate during the building survey. Floor plans will be sketched to indicate sub-slab soil vapor and indoor air sampling locations, possible indoor air pollution sources, and PID meter readings. The PID meter will have a detection limit of 1 ppb.

3.2 Sub Slab Soil Vapor Sampling

In accordance with NYSDOH SVI Guidance (October 2006), a temporary sample point will be advanced to collect sub-slab soil gas sample at the three sample locations. The samples will be collected from a depth of approximately 2 to 6 inches below the floor slab.

The following steps will be taken to collect samples:

1. A 3/8-inch diameter or maximum 1-inch diameter hole will be drilled through the building floor at the proposed sub-slab soil vapor location with a hammer drill;
2. Upon the confirmation of slab thickness, the drill bit will be advanced approximately 3 inches into the sub-slab material to create an open cavity;
3. The vapor probe will then be installed and flushed with the top of the ground surface. The annular space will be sealed using either modeling clay, beeswax, or other non-volatile emitting material and non-shrinking product;

4. Teflon-lined tubing will be connected to a pre-evacuated 6-L summa canister with a 24-hour regulator;
5. Sufficient time will be provided for the sealing material to set prior to connecting the vapor probe to a Teflon tube;
6. Prior to collection of samples, the temporary vapor probe will be purged by drawing three volumes through the probe using a 60 mL syringe;
7. Upon completion of the purging, the Summa canister will be connected to the probe by Teflon-lined tubing. The flow rate will be regulated using a flow regulator to maintain a flow rate during of about 4 mL/min; and,
8. Upon completion of the 24-hour period, the Summa canister will be retrieved. Prior to disconnecting the Teflon tubing connections, the Summa canister valve will be closed.

During the sampling, the initial and final vacuum readings of each canister will be noted in a Field Form. In addition, smoke tubes will be used during the sub-slab sampling to confirm pressure relationships and airflow patterns, especially between floor levels and sub-slab. Upon completion of the sample collection and screening steps, each penetration hole advanced through the slab will be patched with cement or will be repaired to restore pre-sampling conditions.

3.3 Indoor and Outdoor Air Sampling

Three indoor air samples will be collected within the Plant at the same locations as the sub-slab soil vapor samples. In addition, an outdoor ambient air sample will be collected concurrently to determine the extent to which outdoor sources may be influencing indoor air quality within the sampling area.

Indoor air and outdoor air samples will be collected concurrently with the sub-slab soil vapor sampling. The indoor and outdoor air samples will be collected from the breathing zone height (i.e., 4 to 6 ft above the floor). The indoor air and outdoor air samples will be collected using 6-L Summa canisters over a 24-hour period. A section of disposable Teflon-lined tubing will be extended from the Summa canister to collect the indoor and outdoor air samples from the breathing zone in accordance with the SVI Guidance (NYSDOH, 2006). The field sampling team will maintain a sample log sheet summarizing the sample identification, date and time of sample collection, identification of samplers, sampling methods and devices utilized, vacuum of canisters before and after samples are collected, and sample analyses.

3.4 Soil Vapor Sample Identification

Samples will be assigned a unique identification using the sample location or other sample-specific identifier. The general sample identification format below will be followed.

SS-XX
IA-XX
OA-XX

Where:

SS = Sub-slab Soil Vapor Location identifier

IA = Indoor Air Sample Location identifier

OA = Outdoor Ambient Air Sample Location identifier

XX = Numerical sample identifier (2 characters). This will ordinarily be an arbitrary, sequential number and will correspond to sample location information and numbering.

3.5 Analytical Methodology

The samples will be submitted via UPS or FedEx Ground to TestAmerica, an ELAP-certified laboratory, for analysis of VOCs using USEPA Method TO-15 TCL list VOCs plus Freon-113. The standard turnaround time is 7 business days for results in Electronic Data Deliverable (EDD) format. Reporting limits will meet NYSDOH requirements of 1 µg/m^3 for all VOCs, and 0.25 µg/m^3 for trichloroethene (TCE), unless the sample is found to contain VOC concentrations above those reporting limits. The laboratory will provide an enhanced deliverable package comprising the following elements: analytical report; QA/QC summary; chain of custody; method blank; laboratory control samples – control limits; reporting limits; and surrogate recoveries for GC/MS analysis with control limits. AECOM will subcontract preparation of a Data Usability Summary Report (DUSR) upon receipt of the data, under the appropriate procurement guidelines.

Please feel free to contact me with any questions or comments you may have.

Sincerely,
AECOM

Richard Hixon
Senior Program Manager

Figures 1- Site Location
Figure 2- Site Plan and Sampling Locations

SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADS OF SAUGERTIES, N.Y. (1997) AND WOODSTOCK, N.Y. (1990)

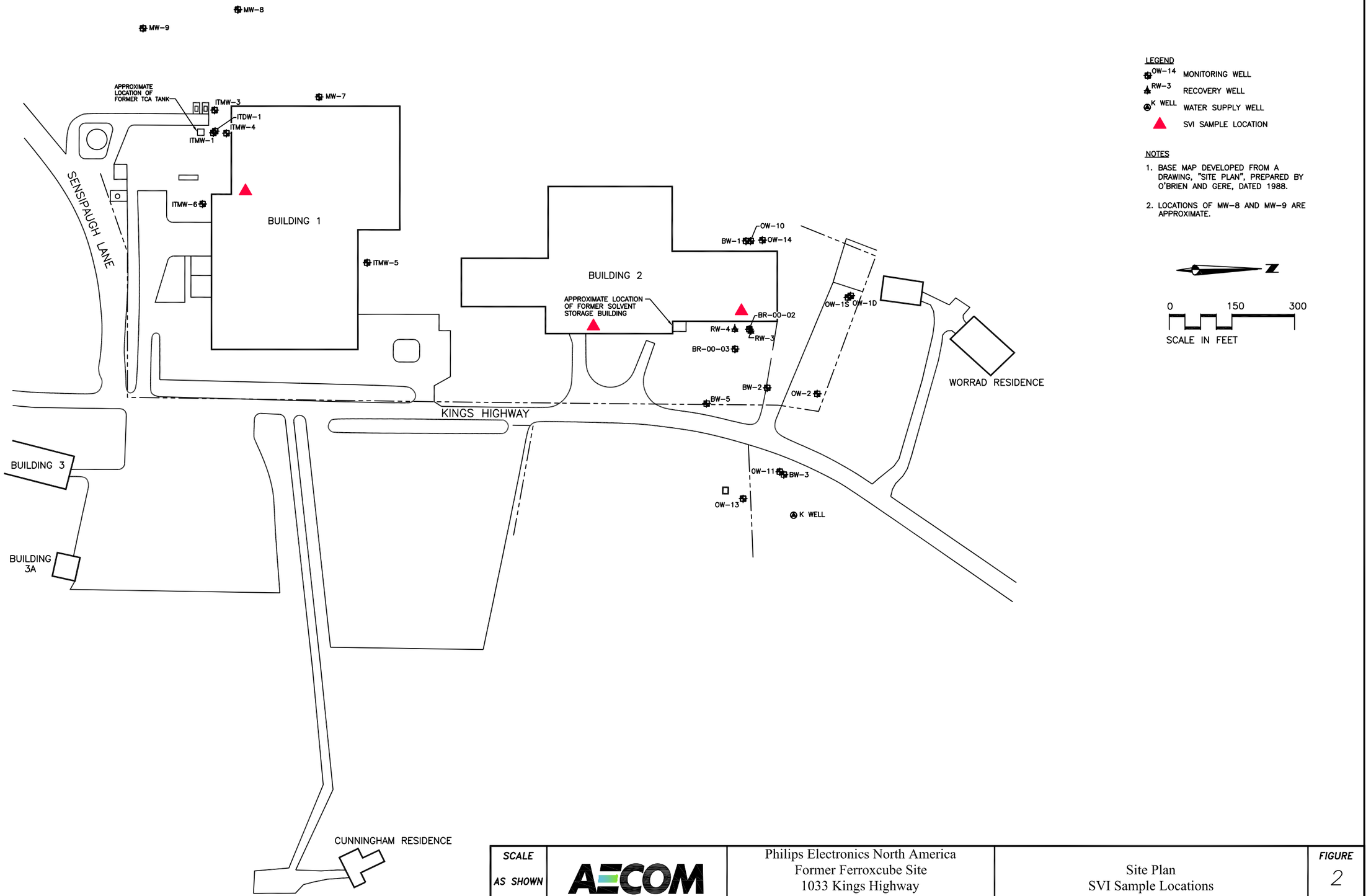
AECOM

PHILIPS ELECTRONICS NORTH AMERICA
FORMER FERROXCUBE SITE
1033 KINGS HIGHWAY
SAUGERTIES, NEW YORK

SITE LOCATION MAP

FIGURE 1

S:\IND PROJECTS\Philips Electronics North America\2111188 Saugerties\Sitemap.dwg



LEGEND

- OW-14 MONITORING WELL
- RW-3 RECOVERY WELL
- K WELL WATER SUPPLY WELL
- SVI SAMPLE LOCATION

NOTES

1. BASE MAP DEVELOPED FROM A DRAWING, "SITE PLAN", PREPARED BY O'BRIEN AND GERE, DATED 1988.
2. LOCATIONS OF MW-8 AND MW-9 ARE APPROXIMATE.

N

0 150 300

SCALE IN FEET

SCALE AS SHOWN	AECOM	Philips Electronics North America Former Ferroxcube Site 1033 Kings Highway Saugerties, NY	Site Plan SVI Sample Locations	FIGURE 2

JOB No. 1006371 FILE No. H:\basket\Figure 2 – Site Plan SVI Sample Locations.dwg Feb/05/10