

CSI Environmental, LLC
Environmental and Remediation Specialists

11 November 2010

Patricia Pierre
United States Environmental Protection Agency Region 2
290 Broadway, 19th Floor West
New York, New York 10007

Re: Sub-slab Soil Gas and Indoor Air Sampling Work Plan
EPA ID. CERCLA Docket No. 02-2009-2034
Hercules Incorporated, Gibbstown, New Jersey

Dear Ms. Pierre:

On behalf of Hercules Incorporated (Hercules), a wholly owned subsidiary of Ashland Inc., CSI Environmental, LLC (CSI) is pleased to submit this work plan to obtain sub-slab soil gas and indoor air samples from residences adjacent to the former Higgins Plant in Gibbstown, New Jersey (the Site), see Figure 1. As discussed at our 12 August 2010 meeting this plan has been prepared to address the requests of both United States Environmental Protection Agency (EPA) and New Jersey Department of Environmental Protection (NJDEP) representatives regarding the results of the May 2010 Supplemental Vapor Intrusion (VI) Study.

Background

The former Higgins Plant was decommissioned as of April 2010 and the facility structures with the exception of the former administrative office building and the wastewater treatment plant are gone. The locations where historical operations were performed are labeled on Figure 2 as an aid to understanding sample location selection and results obtained. Site-specific volatile organic compounds (VOCs) of concern applicable to this supplemental study include: benzene, cumene (isopropylbenzene), ethylbenzene, and toluene.

The site-related compounds are hydrocarbons that degrade readily by naturally occurring microbes under aerobic conditions. Supplemental analyses will be performed to characterize oxygen availability in the subsurface. Furthermore, it is virtually a certainty that indoor air samples will detect hydrocarbon compounds because these hydrocarbon compounds (benzene in particular) are ubiquitous in consumer products. Therefore, supplemental data also will be obtained to identify and quantify, to the extent feasible, the contribution of background or other sources in indoor air samples.

The need for sub-slab soil gas and indoor air sampling was discussed during the 12 August 2010 meeting at the Greenwich Township Public Library with representatives from the EPA and the NJDEP in attendance. Some of the soil gas and groundwater sampling results obtained during the Supplemental VI study completed in May of 2010

exceeded both the EPA Vapor Intrusion (VI) (2002) and the most recent New Jersey VI guidance screening levels along Railroad Avenue, which is downgradient of the Site's southern property boundary. As a result, attendees discussed performing sub-slab soil gas and indoor air sampling at nearby residential properties. A brief summary of the 2010 VI soil gas and groundwater data is provided herein along with a plan to collect sub-slab soil gas and indoor air data at potentially affected residences.

In accordance with discussions at the 12 August 2010 meeting, the Sub-slab Soil Gas and Indoor Air Study will include references to both the NJDEP and EPA VI guidance. However, CSI will follow the EPA framework laid out in the 2002 VI guidance as the principal regulatory guidance document. Sampling results will be compared against both EPA and NJDEP screening criteria to be conservative. This approach will ensure the use of the more protective screening criteria and include a greater number of constituents as part of the evaluation.

2010 Supplemental Soil Gas and Groundwater Results Summary

A total of eleven (11) soil gas samples; two (2) ambient air samples; and ten (10) groundwater samples were obtained between May 17th and May 26th 2010 to evaluate potential offsite soil gas and shallow groundwater constituent concentrations. The data obtained during this investigation are summarized in Tables 1, 2 and 3. Constituent concentrations that exceed applicable EPA and NJDEP screening criteria are shown on Figures 3 and 4, respectively. Concentrations of site-related constituents exceeded conservative 10^{-6} EPA screening criteria in analytical results from two (2) groundwater samples and eleven (11) soil gas samples. Concentrations of site-related constituents exceeded NJDEP screening levels from one (1) groundwater sample and ten (10) soil gas samples.

Soil Gas Results

Elevated concentrations of benzene and tetrachloroethene (PCE) were detected in soil gas samples obtained from the soil gas probes (SGPs). The chemical PCE is not site related; its presence in soil gas is most likely related to another source, such as a leaking sewer line, or possibly the former dry cleaning facility (Cobby's Cleaners) that was previously located along Broad Street and had a documented PCE release into the environment (Figure 5). Benzene was detected at concentrations above the EPA Target Soil Gas Criteria (TSGC) (when measured against the conservative 10^{-6} screening levels) at eleven (11) soil gas sample locations and above the NJDEP Residential Soil Gas Screening Level (Res SGSL) at ten (10) soil gas sample locations (Table 1 and Figures 3 & 4). While benzene is a site related contaminant, it is also commonly detected in the environment due to its prevalence in developed areas. Cumene and toluene were also detected in soil gas samples but at concentrations less than the 10^{-6} soil gas screening criteria. PCE was detected at four SGP locations at concentrations above the EPA TSGC and at two locations above the NJDEP Residential SGSL (Table 1 and Figures 3 & 4). Several other non-site related compounds were also detected in soil gas samples at concentrations below their applicable soil gas screening criteria as noted in Table 1. To

be conservative, the sampling described will proceed during this event without regard to the source of benzene. However, as discussed, Hercules will attempt to discern the source of benzene or any other constituents detected and to the extent that it succeeds, any subsequent tasks will be based on site-related constituents only.

Soil gas sampling was performed along the two utilities that transect the Site as shown on Figure 6. Soil gas samples VI-1 and VI-5 were obtained above the public sewer that crosses the southwest corner of the Site. Soil gas samples also were obtained from VI-10 and VI-11, directly adjacent to the public water pipeline located just east of the Tank Farm area (Figure 6). The soil gas results summarized in Table 1 are consistent with subsurface observations and are not indicative of preferential contaminant migration along the buried water supply line. In fact, the lowest soil gas concentrations were detected in the sample from VI-11, located south of the Site and closer to the residential homes.

Groundwater Results

Cumene and benzene were the only volatile organic compounds (VOCs) detected in groundwater samples obtained during the May 2010 VI supplemental investigation. Cumene was detected at concentrations above EPA TGC in groundwater samples obtained from locations VI-7 and VI-8. Benzene was detected at a concentration above both the EPA and NJDEP applicable screening levels in the groundwater sample at one location only (VI-8), as shown in Table 2 and Figures 3 & 4.

Based upon the concentrations of benzene and cumene detected at locations VI-7 and VI-8, Hercules is aware that additional groundwater delineation will need to be performed in the vicinity of these sample locations to sufficiently delineate the extent of groundwater impacts. Additional groundwater delineation will be addressed in another work plan to be submitted under separate cover. This additional groundwater delineation will be performed concurrently with the sub-slab and indoor air sampling outlined herein.

Ambient Air Results

A total of nine compounds were detected in ambient air samples OA-1 and OA-2 (Table 3). Toluene, trichlorofluoromethane, methyl ethyl ketone, dichlorodifluoromethane, and chloromethane were detected at both OA-1 and OA-2. Benzene and cumene were detected in OA-1 while acetone and carbon disulfide were detected in OA-2. Of the nine compounds detected in ambient air only five: acetone, benzene, cumene, methyl ethyl ketone and toluene were also detected in soil gas samples obtained during this investigation. Ambient air concentrations of acetone, cumene, methyl ethyl ketone and toluene were an order of magnitude lower than those in soil gas samples, while concentrations of benzene were two orders of magnitude lower. The indoor air target concentration corresponding to a 10^{-6} incremental lifetime cancer risk is 0.31 ug/m³, so there is a potential for indoor air samples to show unacceptable risks from outdoor (ambient) air quality, and it is important to understand and anticipate this before indoor air samples are collected.

Proposed Sub-slab Soil Gas and Indoor Air Samples

As discussed during the 12 August 2010 meeting and in accordance with applicable EPA and NJDEP guidance, sub-slab soil gas and indoor air sampling is proposed at houses within 100 feet of any location where groundwater concentrations are above the EPA TGCs and at houses within 30 feet of any location that exceeded the NJDEP Residential SGSL for benzene. Figure 7 shows the locations of the applicable Supplemental VI Study sample locations along with their corresponding 30 or 100 ft radii. A total of seven (7) homes fall within these radii. Two homes are located within the 30 ft radius around VI-6 (52 Holly Place and 45 Evergreen Ave.) and one house falls within the 30 ft radius around VI-12 (41 N. Home St.). Four homes fall within the 100 foot radii around VI-7 and VI-8 (37 North Orchard Street, 110 Railroad Ave, 118 Railroad Ave and 126 Railroad Ave). Six (6) additional homes have been added at the agencies' request (40 North Home Ave., 37 Evergreen Place, 44 Holly Place, 40 Holly Place, 38 N. Orchard Street, 40 North Home Ave.).

Sub-slab Soil Gas and Indoor Air Sample Methodology

CSI will attempt to collect sub-slab and indoor air samples from the thirteen (13) homes shown on Figure 7. Indoor air samples will be collected over a 24-hour period followed by the collection of a sub-slab sample. All sampling activities are subject to the property owners granting access.

Access Agreements and Pre-Sampling Survey

Prior to any sampling activity, an access agreement will be prepared requesting permission to obtain samples from the selected residential properties. A representative from Hercules and CSI will visit each residence identified in this plan to discuss the proposed work and need to obtain a signed access agreement to conduct work on their property. Hercules and CSI personnel will revisit property owners not available during the initial visit to discuss the proposed work and to obtain signed access agreements. If, after two attempts to visit homeowners in person, one or more of the indicated homeowners has not been contacted, a letter and access agreement will be sent via certified mail. After all parties have indicated whether access will be granted, a walkthrough of residences where consent is given will be completed approximately 1 week prior to collection of sub-slab and indoor air samples.

During the walkthrough a pre-sampling survey (Attachment 1) will be completed in addition to reviewing EPA Instructions to Occupants (Attachment 2). The goals of the pre-sampling survey include: i) identifying and removing any potential background sources of indoor air emissions for target VOCs in the building and noting lifestyle factors that may affect sample collection and results, ii) determine building construction types, iii) recognizing possible points of VI at the structure, iv) identifying possible sample locations and v) informing the residents of the sampling procedures. A Photoionization detector (PID) capable of detecting volatile organics in air at part per

billion concentrations will be used to help identify possible background sources. Best efforts will be made to identify all containers of consumer products that potentially include VOCs, and temporarily re-locate them to secure storage outside of the house, either in a lock-box, or a detached garage for a minimum of 2 days prior to any sampling.

After sampling is complete, the EPA Instructions to Occupants (Attachment 2) will be reviewed with the residents. The purpose of this review will be to ascertain whether any possible interferences may have transpired that could affect the sample results. For example, product use or accidents involving certain products or sampling equipment during the sampling period could affect results. The results of the post-sampling interview will be documented and considered in evaluation of the sample results.

Indoor Air and Outdoor Air Samples

Single family residences will have one indoor air sample collected from the first floor (living area) and one from the basement or crawl space, if present. Indoor air samples collected from the living area will be collected at breathing height (3-5 ft), while samples collected from the basement or crawl space will be collected as close as possible to possible source areas (e.g. sumps, cracks in the foundation). Indoor Air samples will be collected in a 6-liter summa canister over about a 24 hour period. The sample collection duration of 24 hours has been selected to minimize short-term temporal variability.

Indoor air samples will be held at the lab pending sub-slab sample analysis. If site-related chemicals are detected above the EPA TGC or NJDEP Res SGLs in sub-slab samples, the corresponding indoor air samples will be analyzed using USEPA Method TO-15 within the approved 30 day holding time. If no concentrations detected exceed applicable screening criteria in the sub-slab soil gas sample, the indoor air sample would be discarded to avoid confounding results from possible background sources.

Two ambient air samples per day will be collected concurrently with indoor air samples. The canisters will be placed within the breathing zone and upwind of the properties where indoor air samples are being collected each day. Ambient air samples will be collected in a 6-liter summa canister over a 24 hour period and analyzed using USEPA Method TO-15.

Sub-Slab Soil Gas Samples

If residences contain a basement slab that covers more than 50% of the buildings footprint, sub-slab samples will be collected immediately following the collection of the indoor air samples. If a basement slab covers less than or equal to 50% of the buildings footprint, indoor air samples will be obtained from the crawl space and the first floor living area in addition to a sub-slab sample. One sub-slab sample will be collected in each accessible property from a central location. If any of the houses have unfinished basements with dirt floors or crawl spaces beneath the house a combination of indoor air samples from

the crawl space and exterior soil gas samples will be obtained in lieu of sub-slab samples. If this should occur, CSI and Hercules will consult with EPA and NJDEP representatives regarding the proposed sampling modification to ensure that samples are obtained that will be compliant with the applicable regulatory guidelines.

All sub-slab utilities, including private and public, will be reviewed prior to installation of the sub-slab probes (SSPs), and sample locations will be selected to avoid interference with utilities. The property owner will be consulted on the locations which may need to be moved to a less visible area.

Sub-slab monitoring will include: subsurface gas sample collection for field screening and laboratory analysis, static pressure differential measurement, and pneumatic testing to assess the gas permeability of the sub-slab materials. Sub-slab samples will be collected in 6-Liter summa canisters and a flow controller calibrated to collect a sample over a five minute period. Sub-slab samples will be analyzed using USEPA Method TO-15.

The SSPs will consist of a brass pipe sealed within a 5/8-inch drilled hole through the floor slab, reamed to 1-inch diameter for the upper 2 inches to facilitate placement of a competent seal comprised of fast-setting, anchoring cement. The seals will be allowed to set before sampling. While the seals are setting, a digital micro-manometer will be connected to the sub-slab probe to record the sub-slab to indoor air pressure differential. This data will be used to assess potential pressure gradients between the sub-slab and indoor air. The gas permeability of geologic materials or granular fill beneath the floor slab will be evaluated by measuring the flow rate of soil gas through the probe and the corresponding vacuum. These data may assist in assessing soil gas flow conditions, if needed.

Prior to sample collection, a shut-in test will be conducted by drawing a vacuum on the sample train, closing valves at both ends of the sampling train and monitoring the vacuum within the train for a few minutes. If the vacuum dissipates, the fittings will be tightened, and the shut-in test repeated.

Once the integrity of the sample train has been confirmed, the probes will be purged prior to sampling using a 1-Liter Tedlar bag and vacuum chamber (a.k.a lung box). Field screening will be performed using a PID and O₂/CO₂ meter for three successive Tedlar bag samples. Helium will be used as a tracer to ensure atmospheric air does not bias the sub-slab sample by leaking through the annular seal between the floor slab and probe. A shroud will be placed around the ground surface of each probe prior to sampling. Helium gas will be added to the shroud through a small port. The concentration of helium in the shroud will be recorded with a portable helium detector to confirm that the shroud contains a minimum of 10% helium. Sub-slab gas samples collected in the Tedlar bag will also be screened to confirm that the concentration of helium in the sample is less than 5% of the concentration in the shroud, verifying that the sample consists of at least 95% soil gas prior to collection of the sample for laboratory

analysis. If the helium tracer data indicates an unacceptable leak, the probe will be re-sealed or replaced as needed to obtain a representative sample of soil gas.

After field screening readings stabilize, a sample will be collected for laboratory analysis using a batch-certified 1-Liter Summa™ canister attached to the sampling train via a stainless steel or brass “T”-fitting. The Summa™ canister valve will be opened to draw the sample through the flow controller and closed before the canister vacuum approaches ambient atmospheric pressure. Initial and final vacuum levels in the Summa™ canister will be measured and recorded. Summa™ canisters will be labeled and shipped in batches to the analytical laboratory via overnight courier under chain of custody.

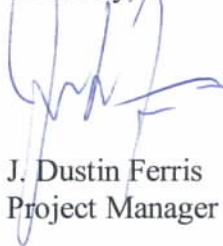
The SSPs will be left in place until a determination can be made whether additional confirmation sampling will need to be done. Once the SSP is determined to no longer be needed it will be properly abandoned and the basement floor repaired to the satisfaction of the home owner.

Reporting

As described above under indoor air and outdoor air samples the sub-slab samples will be analyzed first. If site-related chemicals are detected above the EPA TGC or NJDEP Res SGLs in sub-slab samples, the corresponding indoor air samples will be analyzed using USEPA Method TO-15. If site-related chemicals are not detected above the EPA TGC or NJDEP Res SGLs in sub-slab samples the indoor air samples will not be analyzed. All analytical data obtained will be validated using the appropriate EPA protocol for the TO-15 analytical method. As soon as possible after the validated data are available a report summarizing the analytical data obtained and the sampling performed will be prepared and submitted to the EPA and NJDEP for review. If necessary, this report will contain recommendations for further actions.

Please do not hesitate to call John Hoffman of Ashland at (302)995-3233 or me at (410)268-3077 should you have any questions or require additional information.

Sincerely,



J. Dustin Ferris
Project Manager

cc: John Hoffman; Ashland Chemical Company (w/enclosures)
Erica Bergman; NJDEP (w/enclosure x 3)
Joseph Keller, GES (electronic deliverable)

TABLES

Table 1
 May 2010 Soil Gas
 Analytical Result Summary
 Former Hercules Higgins Plant; Gibbstown, NJ

Chemical Name	EPA TSGC	NJDEP Res SGSL	Sample ID Date Location	SG-VI-1 VI-1 5/26/2010	SG-VI-3 VI-3 5/26/2010	SG-VI-100 VI-3 5/26/2010	SG-VI-4 VI-4 5/26/2010	SG-VI-5 VI-5 5/26/2010	SG-VI-6 VI-6 5/26/2010
Acetone	3500	160000	ug/m ³	120 U	170	120	120 U	520	120 U
Benzene	3.1	16	ug/m ³	42	45	35	77	170	48
Chlorobenzene	600	2600	ug/m ³	9.2 U	10	9.2 U	12	13	9.2 U
Cumene	4000	NE	ug/m ³	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
Cyclohexane	NE	310000	ug/m ³	6.9 U	130	100	6.9 U	6.9 U	6.9 U
Methyl Ethyl Ketone	10000	260000	ug/m ³	15 U	15 U	15 U	15 U	32	15 U
n-Heptane	NE	NE	ug/m ³	8.2 U	30	27	8.2 U	8.2 U	8.2 U
n-Hexane	2000	36000	ug/m ³	18 U	46	39	18 U	18 U	18 U
Tetrachloroethene	8.1	34	ug/m ³	14 U	14 U	14 U	14 U	62	31
Toluene	4000	260000	ug/m ³	7.5 U	9.4	7.9	8.7	24	26

Notes

All concentrations reported in ug/m³ (micrograms per meter cubed).

NJDEP Res SGSL - New Jersey Department of Environmental Protection Residential Soil Gas Screening Level. [NJDEP 2005].

EPA TSGC - United States Environmental Protection Agency target shallow gas concentration corresponding to target indoor air concentration when the soil gas to indoor air attenuation factor is 0.1 (risk factor 10⁻⁶). [USEPA 2002].

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

31 - Concentration exceeds the EPA TSGC

31 - Concentration exceeds the NJDEP Res SGSL

32 - Concentration exceeds both the EPA TSGC and the NJDEP Res SGSL

NE - Not Established

Table 1
 May 2010 Soil Gas
 Analytical Result Summary
 Former Hercules Higgins Plant; Gibbstown, NJ

Chemical Name	EPA TSGC	NJDEP Res SGSL	Sample ID	SG-VI-7	SG-VI-8	SG-VI-10	SG-VI-11	SG-VI-12	SG-VI-13
			Date Location	VI-7 5/26/2010	VI-8 5/26/2010	VI-10 5/26/2010	VI-11 5/26/2010	VI-12 5/26/2010	VI-13 5/26/2010
Acetone	3500	160000	ug/m ³	120 U	160	120 U	120 U	120 U	120 U
Benzene	3.1	16	ug/m ³	45	64	54	11	42	51
Chlorobenzene	600	2600	ug/m ³	9.2 U	10	9.2 U	9.2 U	9.2 U	12
Cumene	4000	NE	ug/m ³	9.8 U	20	9.8 U	9.8 U	9.8 U	9.8 U
Cyclohexane	NE	310000	ug/m ³	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Methyl Ethyl Ketone	10000	260000	ug/m ³	15 U	21	15 U	15 U	15 U	15 U
n-Heptane	NE	NE	ug/m ³	8.2 U	8.2 U	8.2 U	8.2 U	8.2 U	8.2 U
n-Hexane	2000	36000	ug/m ³	18 U	18 U	18 U	18 U	18 U	18 U
Tetrachloroethene	8.1	34	ug/m ³	30	81	14 U	14 U	14 U	14 U
Toluene	4000	260000	ug/m ³	9.4	31	7.5 U	7.5 U	11	9.4

Notes

All concentrations reported in ug/m³ (micrograms per meter cubed).

NJDEP Res SGSL - New Jersey Department of Environmental Protection Residential Soil Gas Screening Level. [NJDEP 2005].

EPA TSGC - United States Environmental Protection Agency target shallow gas concentration corresponding to target indoor air concentration when the soil gas to indoor air attenuation factor is 0.1 (risk factor 10⁻⁶). [USEPA 2002].

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

31 - Concentration exceeds the EPA TSGC

31 - Concentration exceeds the NJDEP Res SGSL

32 - Concentration exceeds both the EPA TSGC and the NJDEP Res SGSL

NE - Not Established

Table 2
 May 2010 Groundwater
 Analytical Result Summary
 Former Hercules Higgins Plant; Gibbstown, NJ

Chemical Name	EPA TGC	NJDEP VI GWSL	Sample ID Data Location	GW-VI-2 5/18/2010 VI-2	GW-VI-3 5/18/2010 VI-3	GW-VI-4 5/18/2010 VI-4	GW-VI-6 5/18/2010 VI-6	GW-VI-7 5/17/2010 VI-7	GW-VI-8 5/17/2010 VI-8	GW-VI-9 5/17/2010 VI-9
Volatile Organic Compounds (VOCs)										
Acetone	220000	1900000	ug/L	25 U	25 U	6.9 J	25 U	25 U	500 U	25 U
Benzene	1.4	15	ug/L	1 U	1 U	1 U	1 U	1 U	650	1 U
Chloroform	80	70	ug/L	1 U	1 U	1 U	1 U	1 U	20 U	1 U
Cumene	8.4	NE	ug/L	1 U	1 U	1 U	1 U	26	2000	1 U
Semivolatile Organic Compounds (SVOCs)										
a,a-Dimethylbenzyl alcohol TIC	NE	NE	ug/L	0.94 U	0.97 U	0.95 U	0.95 U	1.6 E	4.9 U	0.97 U
Bis(2-ethylhexyl) phthalate	NE	NE	ug/L	1.9 U	1.9 U	1.9 U	0.7 J	1.9 U	9.7 U	1.9 U
Diisopropylbenzene TIC	NE	NE	ug/L	0.94 U	0.97 U	0.95 U	0.95 U	24 E	16 E	0.97 U
Phenol	NE	NE	ug/L	0.94 U	0.97 U	0.93 J	0.95 U	0.47 J	5	0.97 U

Notes

All concentrations reported in ug/L (micrograms per liter).

NJDEP VI GWSL - New Jersey Department of Environmental Protection Vapor Intrusion Ground Water Screening Level. [NJDEP 2005].

EPA TGC - United States Environmental Protection Agency target groundwater concentration corresponding to target indoor air concentration where the soil gas to indoor air attenuation factor is 0.001 and partitioning across the water table obeys Henry's Law (risk factor 10-6). [USEPA 2002].

B - Detected in associated blank sample

E - Result exceeded calibration range.

J - Estimated value

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

270 - Concentration exceeds EPA TGC

270 - Concentration exceeds NJDEP VI GWSL

270 - Concentration exceeds both the EPA TGC and the NJDEP VI GWSL

NE - Not Established

NA - Not Applicable

Table 2
 May 2010 Groundwater
 Analytical Result Summary
 Former Hercules Higgins Plant; Gibbstown, NJ

Chemical Name	EPA TGC	NJDEP VI GWSL	Sample ID Data Location	GW-VI-12 5/17/2010 VI-12	GW-VI-100 5/17/2010 VI-12	GW-VI-13 5/17/2010 VI-13	GW-VI-14 5/18/2010 VI-14	TB-1 5/17/2010	EB-1 5/18/2010
Volatile Organic Compounds (VOCs)									
Acetone	220000	1900000	ug/L	25 U	25 U	25 U	25 U	25 U	25 U
Benzene	1.4	15	ug/L	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	80	70	ug/L	1 U	1 U	0.19 J	1 U	1 U	1 U
Cumene	8.4	NE	ug/L	1 U	1 U	1 U	0.2 J	1 U	1 U
Semivolatile Organic Compounds (SVOCs)									
a,a-Dimethylbenzyl alcohol TIC	NE	NE	ug/L	0.97 U	0.95 U	0.95 U	0.97 U	NA	0.94 U
Bis(2-ethylhexyl) phthalate	NE	NE	ug/L	1.9 U	1.9 U	1.9 U	1.5 J	NA	1.9 U
Diisopropylbenzene TIC	NE	NE	ug/L	0.97 U	0.95 U	0.95 U	0.97 U	NA	0.39 J
Phenol	NE	NE	ug/L	0.97 U	0.95 U	0.95 U	0.97 U	NA	0.94 U

Notes

All concentrations reported in ug/L (micrograms per liter).

NJDEP VI GWSL - New Jersey Department of Environmental Protection Vapor Intrusion Ground Water Screening Level. [NJDEP 2005].

EPA TGC - United States Environmental Protection Agency target groundwater concentration corresponding to target indoor air concentration where the soil gas to indoor air attenuation factor is 0.001 and partitioning across the water table obeys Henry's Law (risk factor 10-6). [USEPA 2002].

B - Detected in associated blank sample

E - Result exceeded calibration range.

J - Estimated value

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

270 - Concentration exceeds EPA TGC

270 - Concentration exceeds NJDEP VI GWSL

270 - Concentration exceeds both the EPA TGC and the NJDEP VI GWSL

NE - Not Established

NA - Not Applicable

Table 3
 May 2010 Ambient Air
 Analytical Result Summary
 Former Hercules Higgins Plant; Gibbstown, NJ

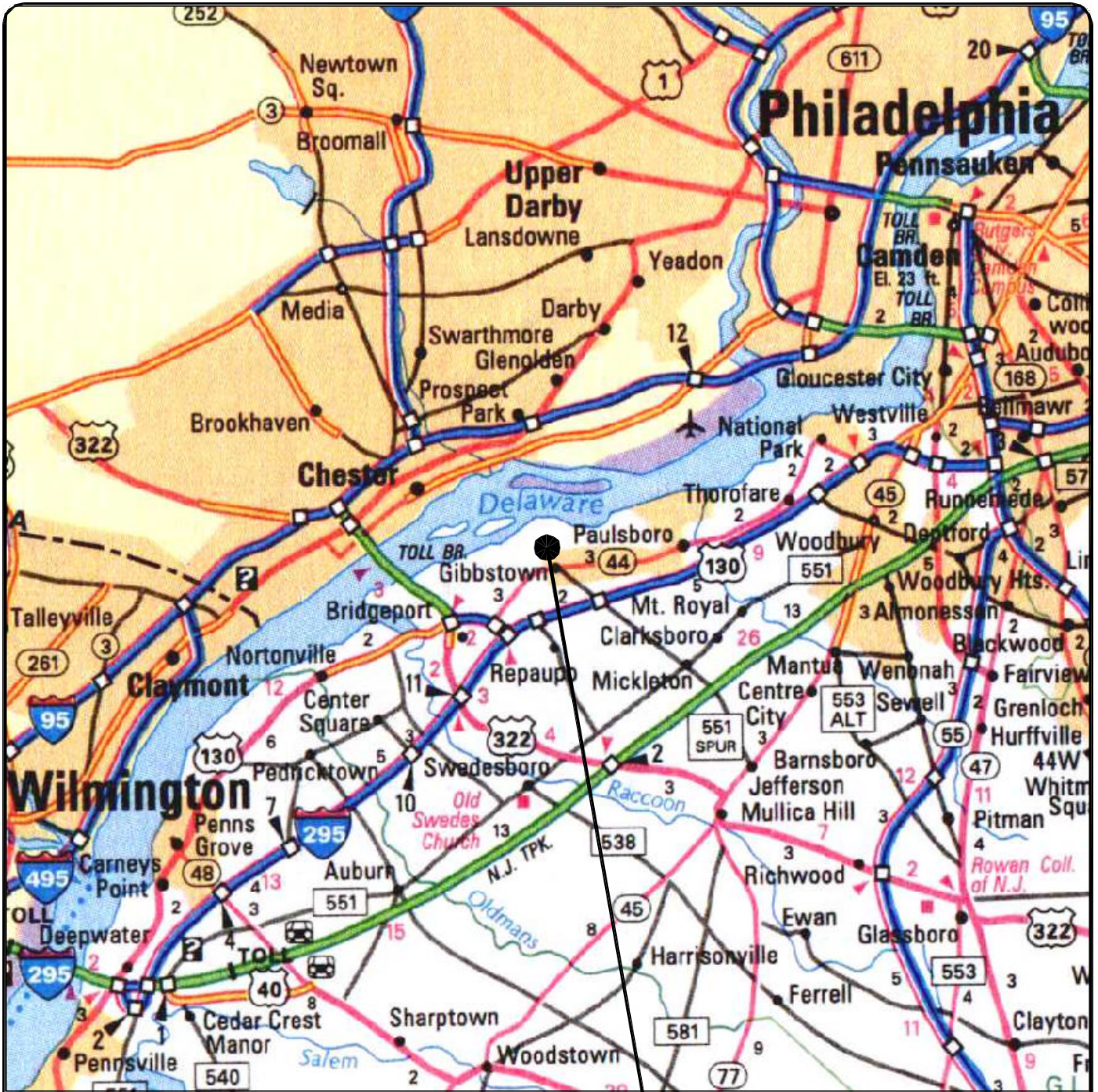
Chemical Name	Sample ID	OA-VI-1	OA-VI-2
	Date	OA-1	OA-2
	Location	5/27/2010	5/27/2010
Acetone	ug/m ³	12 U	20
Benzene	ug/m ³	0.73	0.64 U
Carbon disulfide	ug/m ³	1.6 U	4.4
Chloromethane	ug/m ³	1.3	1.5
Cumene	ug/m ³	1	0.98 U
Dichlorodifluoromethane	ug/m ³	2.6	2.6
Methyl Ethyl Ketone	ug/m ³	2	2.7
Toluene	ug/m ³	1.9	1.4
Trichlorofluoromethane	ug/m ³	1.3	1.5

Notes

All concentrations reported in ug/m³ (micrograms per meter cubed).

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

FIGURES

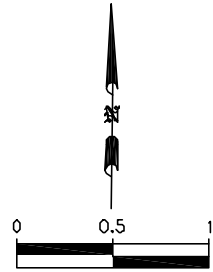


MAP SOURCE: RAND McNALLY ROAD ATLAS 1995



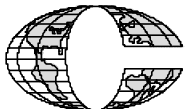
NEW JERSEY

SITE



SCALE: MILES

CSI Environmental, LLC



918 Chesapeake Ave.
Annapolis, MD 21403
410-268-2765

SITE LOCATION

Former Higgins Plant, Gibbstown, New Jersey

HERCULES INCORPORATED / 500 HERCULES ROAD
WILMINGTON, DELAWARE 19808

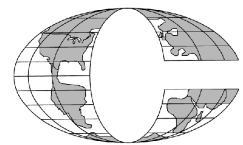
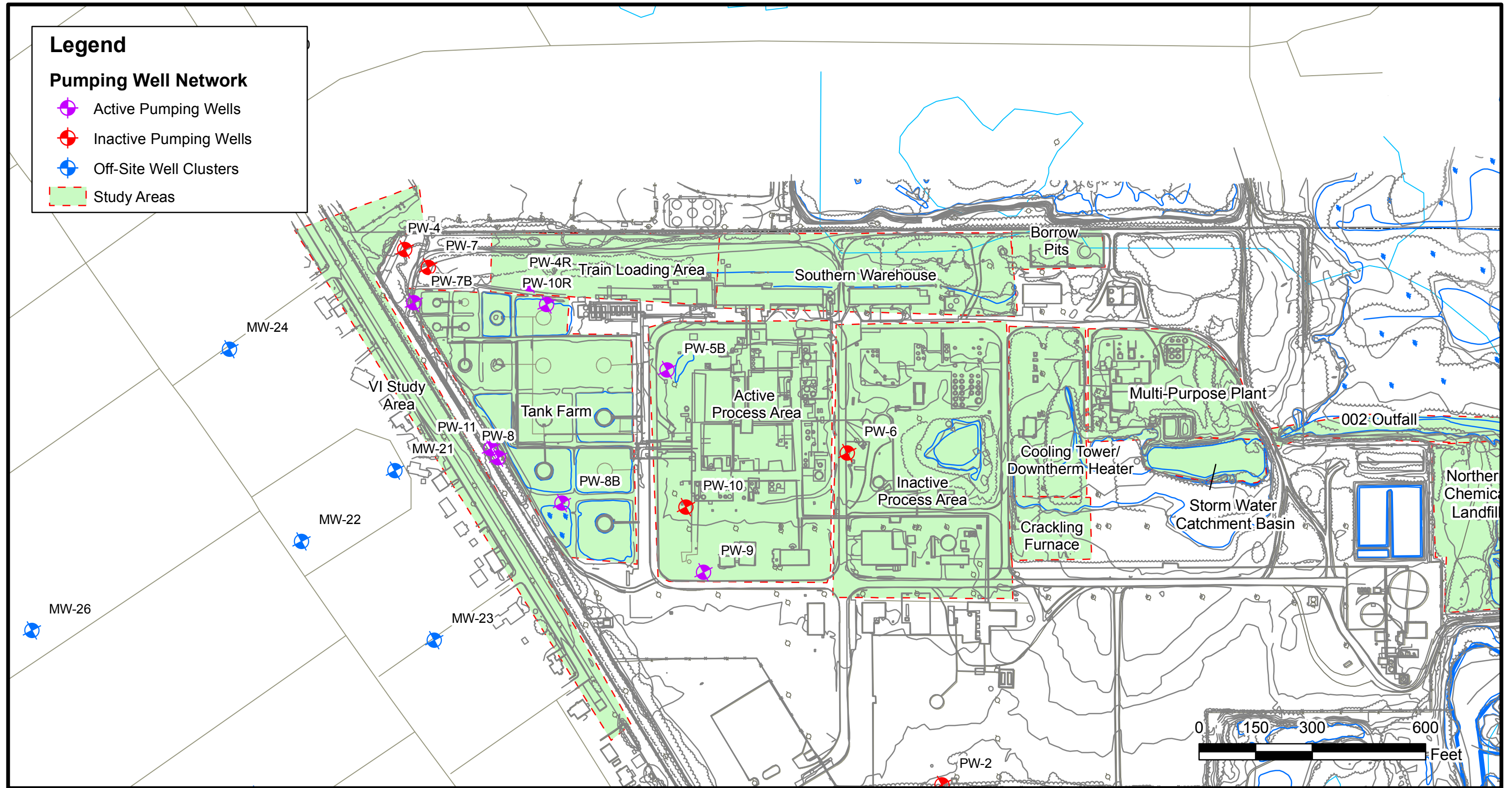
FIGURE

1

Legend

Pumping Well Network

- Active Pumping Wells
- Inactive Pumping Wells
- Off-Site Well Clusters
- Study Areas



CSI Environmental, LLC

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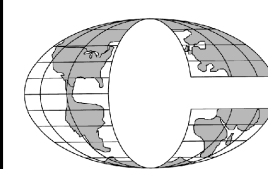
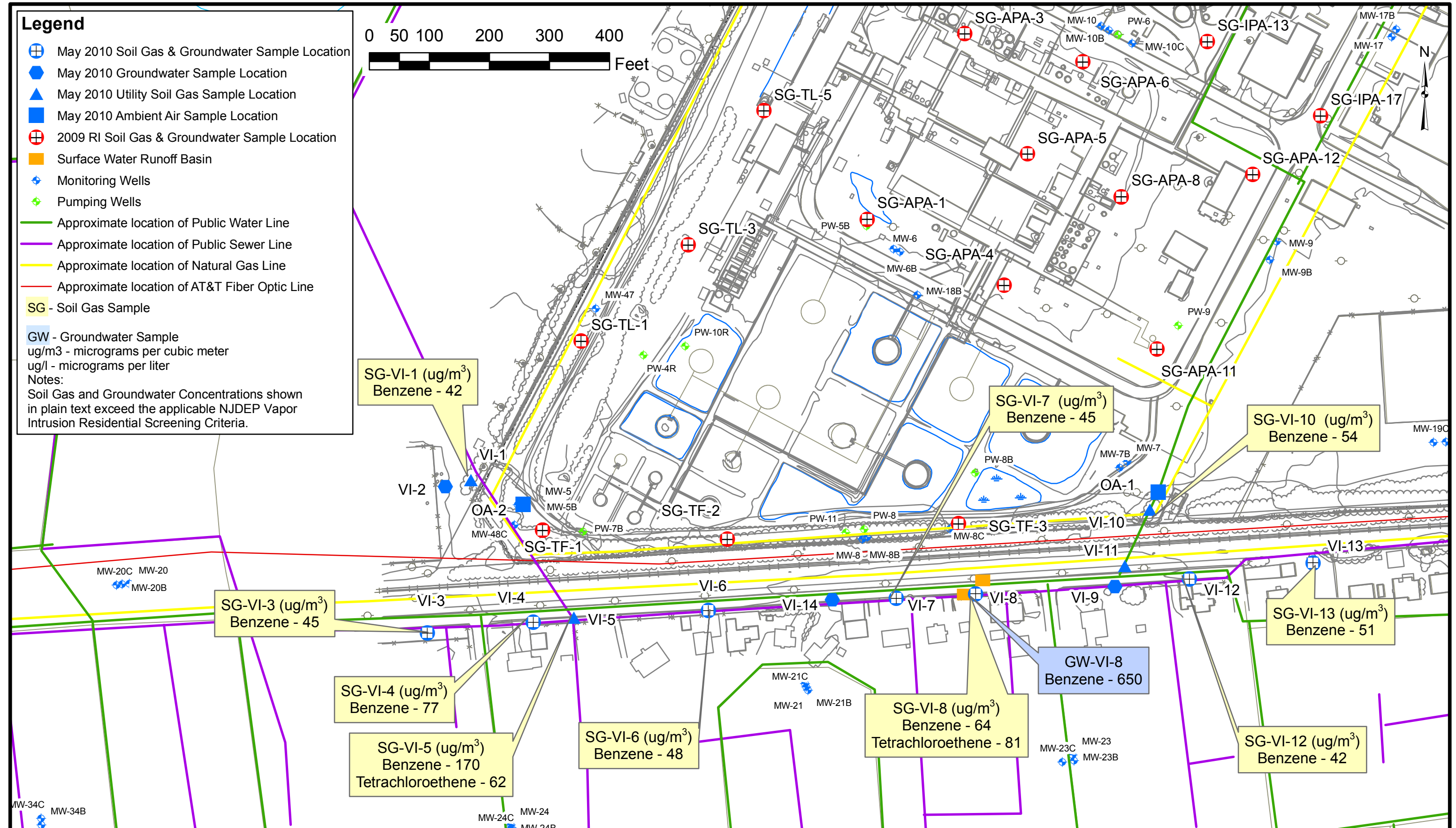
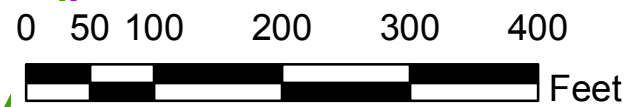
Study Areas Former Higgins Plant, Gibbstown, NJ

Hercules Incorporated
Gibbstown, New Jersey

Figure
2

Legend

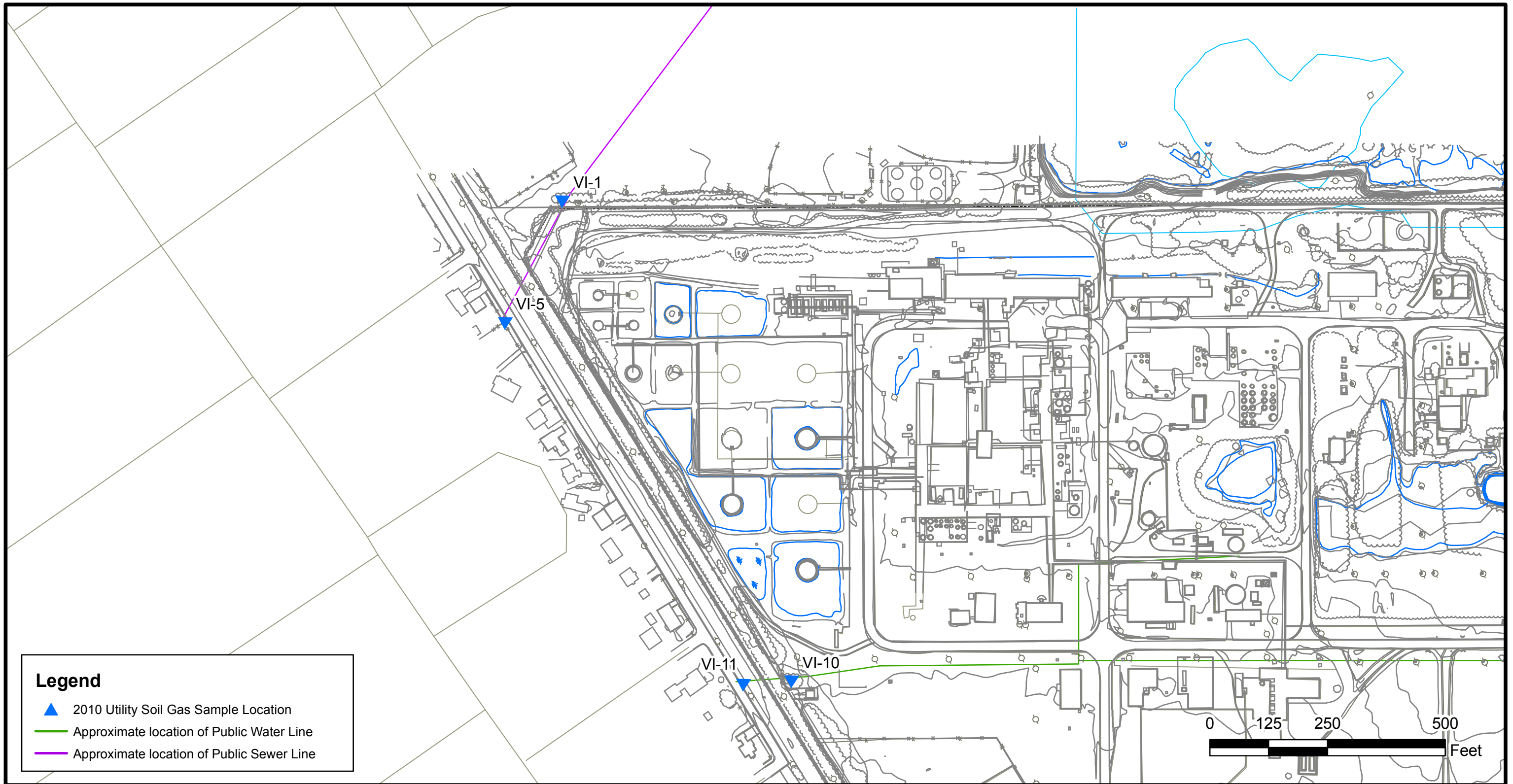
- ⊕ May 2010 Soil Gas & Groundwater Sample Location
- ⬢ May 2010 Groundwater Sample Location
- ▲ May 2010 Utility Soil Gas Sample Location
- May 2010 Ambient Air Sample Location
- ⊕ 2009 RI Soil Gas & Groundwater Sample Location
- Surface Water Runoff Basin
- ⊕ Monitoring Wells
- ⊕ Pumping Wells
- Approximate location of Public Water Line
- Approximate location of Public Sewer Line
- Approximate location of Natural Gas Line
- Approximate location of AT&T Fiber Optic Line
- SG - Soil Gas Sample
- GW - Groundwater Sample
- ug/m³ - micrograms per cubic meter
- ug/l - micrograms per liter
- Notes:
Soil Gas and Groundwater Concentrations shown in plain text exceed the applicable NJDEP Vapor Intrusion Residential Screening Criteria.



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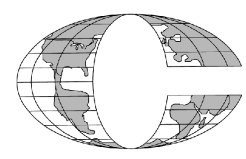
May 2010 Soil Gas and Groundwater Data
 NJDEP Screening Criteria Exceedance Summary
 Former Higgins Plant, Gibbstown, NJ
 Hercules Incorporated
 Gibbstown, New Jersey

Figure
 4



Legend

- ▲ 2010 Utility Soil Gas Sample Location
- Approximate location of Public Water Line
- Approximate location of Public Sewer Line














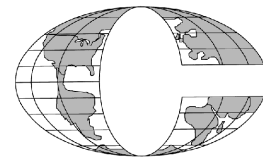
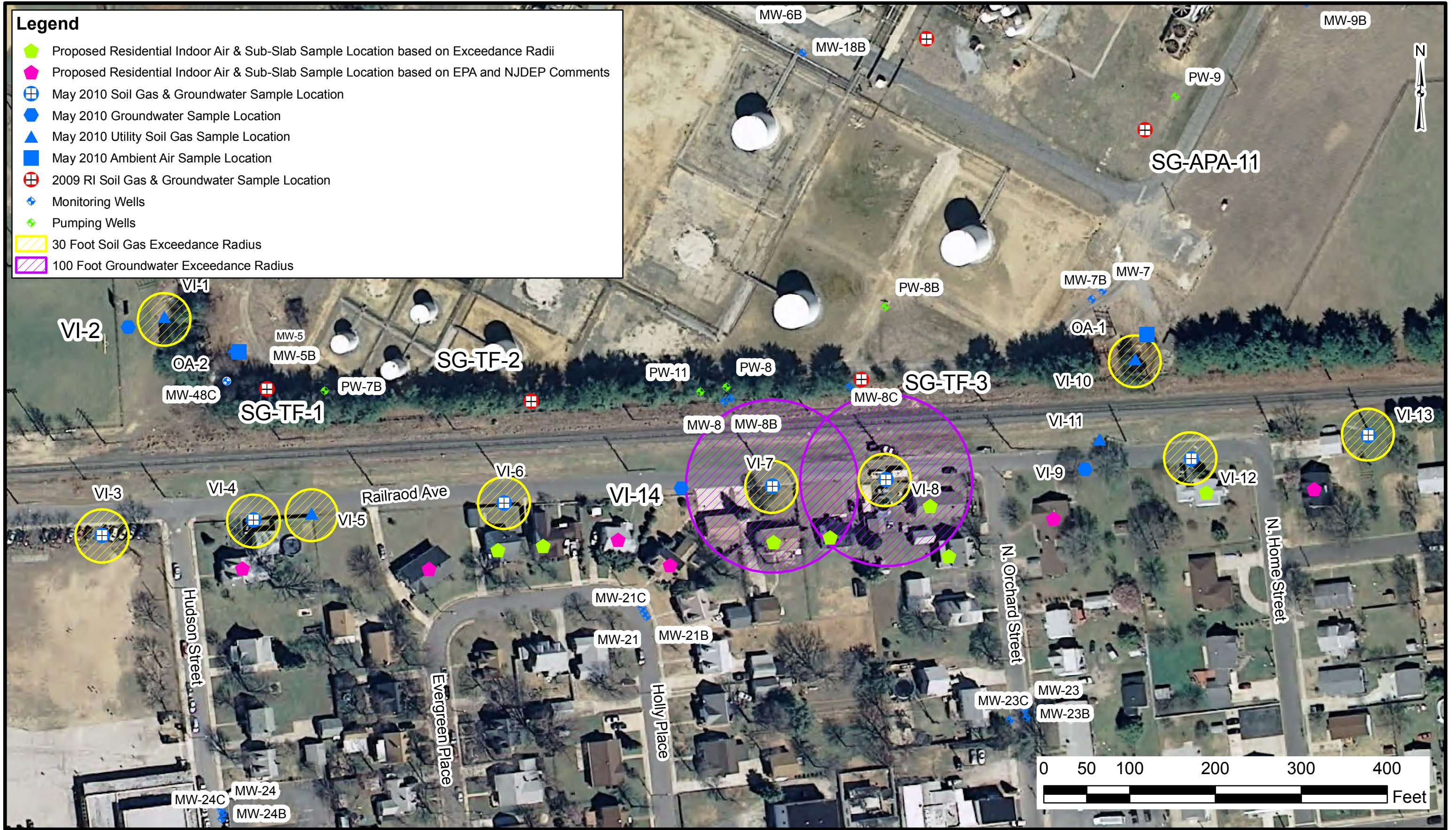
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Utility Sample Locations
Former Higgins Plant, Gibbstown, NJ
 Hercules Incorporated
 Gibbstown, New Jersey

Figure
6

Legend

-  Proposed Residential Indoor Air & Sub-Slab Sample Location based on Exceedance Radii
-  Proposed Residential Indoor Air & Sub-Slab Sample Location based on EPA and NJDEP Comments
-  May 2010 Soil Gas & Groundwater Sample Location
-  May 2010 Groundwater Sample Location
-  May 2010 Utility Soil Gas Sample Location
-  May 2010 Ambient Air Sample Location
-  2009 RI Soil Gas & Groundwater Sample Location
-  Monitoring Wells
-  Pumping Wells
-  30 Foot Soil Gas Exceedance Radius
-  100 Foot Groundwater Exceedance Radius



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May 2010 Soil Gas and Groundwater
 Exceedance Radii
 Former Higgins Plant, Gibbstown, NJ
 Hercules Incorporated
 Gibbstown, New Jersey

Figure
7

Attachment 1
Indoor Air Quality Building Survey

Indoor Air Quality Building Survey

Date: _____

Address: _____

Contact Name: _____

Phone: home: (____) _____ work: (____) _____

List of Currant Occupants/Occupation:

Age (if under 18)	Sex (M/F)	Occupation

Building Construction Characteristics:

What type of building is it? (Circle appropriate responses)

- | | | | |
|---------------|------------------------------------|--------|------------|
| Single Family | Multi-Family | School | Commercial |
| Ranch | 2-Family | | |
| Raised Ranch | Duplex | | |
| Cape | Apartment House (# of units _____) | | |
| Colonial | Condominium (# of units _____) | | |
| Split Level | Other (Specify) _____ | | |
| Mobile Home | | | |

General description of building construction materials: _____

How many occupied stories does the building have? _____

Year built? _____

Has the building been weatherized with any of the following? (Circle all that apply)

- Insulation Storm Windows Energy-efficient windows Other (specify)

Attached garage? (Y/N) _____ Vehicle(s) present? (Y/N) _____

What type of basement does the building have? (Circle all that apply)
Full basement Crawlspace Slab-on-Grade Other (specify) _____

What are the characteristics of the basement? (Circle all that apply)

	<u>Basement Floor:</u>	<u>Foundation Walls:</u>	<u>Moisture:</u>
Finished			
Unfinished	Concrete	Poured Concrete	Wet
Partially Finished (____%)	Dirt	Block	Damp
	Other (specify) _____	Field Stone	Dry

Is a basement sump present? (Y/N) _____ Sealed to indoor air? (Y/N) _____

Does the basement have any of the following characteristics (e.g. preferential vapor pathways) that might permit soil vapor entry? (Circle all that apply)

Cracks Pipe/Utility conduits Other (specify) _____
Foundation/slab drainage Sump pumps

Heating and Ventilation System(s) Present:

What types of heating system(s) are used in this building? (Circle all that apply)
Hot Air Circulation Heat Pump Steam Radiation Wood Stove

Hot Air Radiation Unvented Kerosene Heater Electric Baseboard Heat

Other (specify) Air Conditioner (central/window) Fireplace (wood/gas)

What types of fuels are used in this building? (Circle all that apply)
Natural gas Electric Coal Other (specify) _____

Fuel Oil Wood Solar

What type of mechanical ventilation systems are present and/or currently operating in this building? (Circle all that apply)

Central Air Conditioning Mechanical Fans Bathroom Vent Fan

Individual Air Conditioning Kitchen Range Hood Air-to-Air Heat Exchanger

Open Windows Other (specify) _____

Sources of Chemical Contaminants:

Which of these are present in the building? (Check all that apply)

Potential VOC Source	Location of Source	Major Ingredients	Removed Prior to Air Sampling? (Y/N/NA)
Paint or Paint thinners			
Gas-powered equipment			
Gasoline storage cans			
Cleaning solvents			
Air fresheners			
Oven cleaners			
Carpet / upholstery cleaners			
Hairspray			
Nail polish / remover			
Bathroom cleaner			
Appliance cleaner			
Furniture / floor polish			
Moth balls			
Fuel oil tank			
Wood stove			
Fireplace			
Perfume / colognes			
Hobby supplies			
Scented potpourri, etc			
Other			
Other			
Other			

Do one or more smokers occupy this building on a regular basis? (Y/N) _____

Has anybody smoked in the building in the last 48 hours? (Y/N) _____

Do the occupants frequently have clothes dry-cleaned? (Y/N) _____

Any recent remodeling or repainting? (Y/N, describe) _____

Any obvious pressed wood products (e.g. hardwood plywood wall paneling, particleboard, fiberboard)? (Y/N) _____

Are there any new upholstery, drapes, carpets, or other textiles? (Y/N) _____

Has the building been treated with any insecticides/pesticides? If so, how often and what chemicals are used? _____

Do any of the occupants apply pesticides/herbicides in the yard or garden? If so, how often and what chemicals are used? _____

Outdoor Sources of Contamination:

Are there any stationary emission sources in the vicinity of the building? _____

Are there any mobile sources (e.g. highway, bus stop, high-traffic area) in the vicinity of the building? _____

Weather Conditions During Sampling:

Outside Temperature (°F): _____

Prevailing wind direction: _____

Describe general weather conditions (e.g. sunny, cloudy, rain): _____

Was there any significant precipitation (>0.1 inches) within 12 hours preceding sampling? (Y/N) _____

Type of ground cover (e.g. grass, pavement, etc.) outside the building: _____

General Comments:

Is there any other information about the structural features of this building, the habits of its occupants or potential sources of chemical contaminants to the indoor air that may be of importance in evaluating the indoor air quality of the building?

Attachment 2
Instructions for Occupants

Instructions for Occupants

(to be followed starting at least 48 hours prior to and during a sampling event)

- Do not open windows, fireplace openings or vents.
- Do not keep doors open.
- Do not operate ventilation fans or air conditioning.
- Do not use air fresheners or odor eliminators.
- Do not smoke in building.
- Do not use wood stoves, fireplaces, or auxiliary heating equipment (e.g. kerosene heater).
- Do not use paint or varnishes.
- Do not use cleaning products such as bathroom cleaners, furniture polish, appliance cleaners, all-purpose cleaners, floor cleaners).
- Do not use cosmetics such as hair spray, nail polish, nail polish remover, perfume, cologne, etc.
- Do not partake in hobbies that use solvents.
- Do not apply pesticides.
- Do not store containers of gasoline, oil, or petroleum-based or other solvents within the house or use them in an attached garage.
- Do not operate or store automobiles in an attached garage.