June 12, 2007

Mr. James H. Craft
Engineering Geologist
Division of Environmental Remediation
New York State Department of Environmental Conservation
6274 East Avon-Lima Road
Avon, NY 14414-9519

Subject: Baseline Soil Vapor Intrusion Report
Former Monarch Chemical Facility
61 Gates Avenue, Geneva, NY
VCP No. V00119-8
Delta Project No. 8E0703168P

DELTA

Dear Mr. Craft:

On behalf of HB Fuller Company (HB Fuller), Delta Consultants, Inc. (Delta) is presenting the following Baseline Soil Vapor Intrusion (SVI) Report for the above-noted facility for review and approval by the New York State Department of Environmental Conservation (NYSDEC).

SITE BACKGROUND

Site investigations have been ongoing since 1996 and have identified the presence of volatile organic compounds (VOCs) within the groundwater and soil adjacent to the northern end of the subject building. The following compounds have been detected in the soil and in the groundwater at the site: tetrachloroethene (PCE), trichloroethene (TCE), cis, 1,2-dichloroethene (cis 1,2-DCE), 1,1-dichloroethene (1,1-DCE), vinyl chloride, 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), chloroform, ethylbenzene, toluene, xylene, and isopropylbenzene. Figure 1 illustrates the extent of total VOC impacts in groundwater. The SVI survey was conducted to evaluate the potential soil vapor intrusion exposure pathway related to the detected VOCs.

SAMPLING PROGRAM DESCRIPTION

This SVI survey was conducted in accordance with the Final New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in New York State (October 2006). A work plan describing the SVI survey procedure was submitted to NYSDEC and NYSDOH on February 21, 2007, and approved on 2 March 2007. The tasks completed as part of this effort are summarized in the sections which follow.

SCOPE OF WORK

Pre-Sampling Building Survey

A pre-sampling building inspection was conducted by Gregory Drumm, CIH (Delta) on March 22, 2007, prior to the collection of soil vapor samples. As part of this task, an evaluation was conducted of the building structure, floor layout, air flow patterns, and of physical conditions existing within the building. In addition, potential sources of indoor air contamination were identified within the building through an inventory of chemicals and products. A photoionization

detector (PID) survey was conducted in conjunction with the chemical inventory to evaluate potential sources of indoor air contamination, if any. Procedures were also established with site personnel to ensure that optimum conditions would exist immediately prior to the collection of samples. As part of this task, the NYSDOH Indoor Air Quality & Building Inventory Form was completed (**Appendix A**).

Findings of the March 22, 2007 pre-sampling building survey are presented below.

- The site is occupied by a one-story industrial building with an "open-floor-plan" warehouse and production area, and attached office area located at the south end (front) of the building. Two laboratory areas are located along the western portion of the building. The building was reported to be more than 100 years old, with several additions constructed between the 1930s and 1960s.
- The facility is primarily heated by natural gas space heaters, along with hot air circulation and electric baseboard units for the office areas. The ceiling-mounted gas space heaters located in the warehouse and production area operate intermittently, causing blowing air movements.
- Slight air movement, based on observation with smoke tubes, was noted moving from the warehouse area toward the production processes. Other slight air movements were noted coming from the laboratory area toward the warehouse and from the east work area into the warehouse.
- Three operating ceiling fans are located in the southern warehouse portion of the production area and two scrubber systems are located at the northern end of the production area.
- Air infiltration was noted at the space around the south docks (partially wind-driven), adjacent to the offices.
- Chemicals observed in the office areas included air fresheners/deodorizers, aerosol adhesive, EnDust, wasp/hornet spray, and carpet/upholstery stain remover.
- Chemicals observed in the warehouse area included car polish/wax, spray paint/enamel, stencil ink, latex paint, rust/stain remover and hand cleaner.
- Chemicals observed in the bulk receiving area included various oils and lubricants, cleaners, pipe cement, silicone spray, and enamel paint.
- Chemicals observed in the boiler room/compressor area included gasoline in a riding lawn mower, compressor fluid, and compressor blow-down collection fluids.
- A flammable liquids cabinet located in the warehouse/production area contained 20+ gallons of sealer enamel, 50+/- miscellaneous spray cans, several gallons of lubes/oils, and 20+/- gallons of paint.
- Laboratories contained numerous (hundreds) bottles of various compounds in small quantities. Most of these materials were noted to be aqueous-based (non-volatile). One of the labs has a flammable liquids storage cabinet, which contained approximately one-gallon quantities or less of isopropyl alcohol, acetic acid, alcohol sanitizer, and an emulsion.
- The production area periodically uses spray enamel to stencil codes, names, etc. onto drums and containers. A quart of xylol is also used with the stenciling materials. The stenciling process was observed to produce a notable solvent odor which lingered for several minutes after stenciling was completed.

A chemical inventory of the items identified during the pre-sampling survey is presented in **Appendix B.**

Air and Vapor Sample Locations

On March 27, 2007, samples were collected at one upwind outdoor location (UW-1) and at four co-located indoor (IA-1 through IA-4) and sub-slab (SS-1 through SS-4) locations within the building. The upwind location was along the western fence line at an estimated distance of 80 feet north of the building's northwest corner. Interior locations are shown on **Figure 2**. Specific sample locations were reviewed and approved onsite by Ms. Debbie McNaughton (NYSDOH) prior to installation. Specific sample locations are as follows.

- The upwind outdoor air sample (UW-1) was collected at the northwest corner of the property.
- IA-1 and SS-1 were collected within the office area break room.
- IA-2 and SS-2 were collected within the warehouse.
- IA-3 and SS-3 were collected in the brick building located on the northwest side of the building and proximate to monitoring well MW-117 and the exterior aboveground storage tank (AST) farm. This area is the oldest portion of the building and is primarily utilized as a passage way.

- IA-4 and SS-4 were collected in proximity to the interior production area and exterior AST farm.

Air and Vapor Sampling Procedures

The outdoor and indoor air samples were collected at a height of three- to four-feet above grade. Sub-slab samples were collected consistent with the procedures for permanent sub-slab vapor probe installations as specified in the NYSDOH VI Guidance. These installations were performed as follows.

- Four-inch-diameter holes were bored into the concrete floor of the BCS building. Borings were located away from building footers or areas susceptible to airborne contamination, away from access and egress areas associated with facility operations, and away from sub-slab utilities.
- Each hole was installed to a depth of approximately two inches beneath the floor and into the subgrade bedding materials.
- Visual observations of the bedding materials and sub-soil moisture content (i.e. dry, moist or saturated) observed during installation of the borings was documented.
- The bottom inch of the hole was filled with glass beads to decrease the likelihood of collecting particulate matter during sampling.
- One-quarter-inch stainless steel tubing was inserted within the glass beads in each borehole.
- Non-shrink grout was placed around the steel tubing to reduce the likelihood for the introduction of ambient air during sampling. Beeswax was also used as needed to further assist with borehole sealing.
- A cap/plug was installed flush with the floor to complete the installation and permit access for subsequent sampling efforts as necessary.
- Helium was used as a tracer gas to confirm the integrity of the sub-slab vapor probe seal. A gas trap using plastic sheeting was duct-taped to the floor over the bore hole. Teflon tubing was connected to the vapor probe outlet, threaded through the plastic and connected to a helium gas monitor. Tubing from a helium gas cylinder was placed beneath the plastic sheeting. When the sheet had visibly risen from the pressure supplied by the helium gas, the gas flow was shut off and the levels of helium were monitored for five minutes. If no helium was detected, the seal was considered satisfactory. If helium was detected, the seal was inspected and any cracks were sealed with beeswax and the seal retested until a satisfactory seal was confirmed.
- Approximately three sample volumes were purged prior to sample collection at the sub-slab probe sample locations.
- Samples were collected using clean and laboratory-certified six-liter Summa® canisters.
- Samples were collected over a period of approximately eight hours.
- Flow rates for purging and sample collection were approximately 11.5 milliliters per minute.
- Sample log sheets were prepared for each of the samples (**Appendix C**).

Prior to sampling, Delta coordinated with BCS personnel to ensure that the following conditions existed prior to the collection of samples.

- The heating/HVAC system was operated at normal indoor temperatures at least 24 hours prior to and during the sampling event in normal conditions and building occupancy conditions.
- Unnecessary building ventilation was avoided 24 hours prior to and during sampling.
- Maintenance activities were avoided prior to or during the sampling event (e.g. painting, vehicle maintenance, smoking in the building, etc.); however, some routine spray stenciling was conducted during the SVI survey.

Sample Analysis and Data Evaluation

All samples were analyzed in accordance with EPA Method TO-15. Severn Trent Laboratories (STL), Burlington, VT, a NYSDOH ELAP-certified laboratory, was retained by Delta to provide the canisters and perform the laboratory analyses.

Following receipt, the analytical data package was first checked for completeness and accuracy; and was validated by Mr. Donald Anné, a NYSDEC-approved data validation chemist. The analytical results were

determined to meet the project-specific criteria for data quality and data use. Following validation, a Data Usability Summary Report (DUSR) was prepared. The DUSR is presented in **Appendix D**. Analytical data summary reports are presented in **Appendix E**.

Analytical data for air samples were compared to existing NYSDOH indoor air guidance values and the applicable soil vapor/indoor air matrices.

RESULTS

PID Readings

As part of the Pre-Sampling Building Survey, PID readings were obtained at various locations throughout the facility. These results are noted in **Appendix B** and ranged from zero to 2.2 parts per million (ppm). No PID readings were detected in the office breakroom area, the warehouse desk area, laboratory areas, or the bulk receiving area. PID readings between zero and 0.8 ppm were noted at a deodorizer in the office/reception area, inside the flammables cabinet, and around the production area when spray paint was used for stenciling on drums/containers. PID readings up to 2.2 ppm were observed at the gas tank for a riding lawn mower located in the compressor area.

Odors

During the performance of the PID pre-screening and SVI sampling effort, odors were noted in the production area when spray stenciling was performed. Sample logs also indicated a "solvent"-like odor, which appeared to originate from a neighboring facility to the northwest (with a northwest prevailing wind).

Analytical Results

The results of the sampling effort are summarized in **Table 1**. Sample dilution was required to permit the analysis of the indoor air samples. The analytical results include the levels detected following dilution. The dilution factors applied are presented with the analytical data in **Appendix E.**

The results from the March 27, 2007 sample event indicated the following.

- Low concentrations of several VOCs, including dichlorodifluoromethane (1.8 ug/m^3), trichlorofluoromethane (0.9 ug/m^3), carbon tetrachloride (0.42 ug/m^3), benzene (0.24 ug/m^3), n-heptane (0.17 ug/m^3), toluene (1.0 ug/m^3), ethylbenzene (0.24 ug/m^3) and total xylenes (1.0 ug/m^3), were detected in the upwind air sample (OA-1).
- Between 16 and 23 VOCs were detected in the indoor air samples (IA-1 to IA-4) at concentrations ranging from 0.21 ug/m^3 to 750 ug/m^3.
- Of the VOCs detected in the indoor air samples (IA-1 to IA-4), between 7 and 15 VOCs were not detected in the corresponding sub slab samples, which indicates that the presence of those detected compounds is related to chemical usage onsite or from upwind air sources.
- Several VOCs were detected with marginally higher indoor air concentrations as compared to sub-slab concentrations. The presence of these compounds in the indoor air may be potentially attributable to in-plant activities (i.e., occasional spray painting/stenciling).
- Of the VOCs detected in the indoor air samples, carbon tetrachloride (CCl_4) was the only VOC detected that had notably higher concentrations (75 to 750 ug/m^3) as compared to concentrations detected at the corresponding sub-slab sample locations by approximately one order of magnitude. The source of the CCl_4 is unknown; however, it is believed to be associated with the current BCS operations because it is not a compound that has been historically identified in the site groundwater.
- Concentrations of TCE and PCE detected in all indoor air samples did not exceed the NYSDOH Indoor Air Guidelines of 5 and 100 ug/m^3, respectively.
- Between 8 and 16 VOCs were detected in the sub-slab air samples (SS-1 to SS-4) at concentrations ranging from 0.83 ug/m^3 to 1,000 ug/m^3.

- VOCs detected at relatively higher concentrations in the sub-slab, with respect to those detected in the indoor air samples, included chloroform, 1,1,1-TCA, TCE and PCE. All of these compounds have historically been detected in site groundwater.
- Several VOCs were detected in the sub-slab at marginally higher concentrations than detected in indoor air samples and included 1,1-dichloroethene, 1,2-dichloroethene, bromodichloromethane and dibromochloromethane. Several of these VOCs (1,1-DCE and 1,2-DCE) have historically been detected in site groundwater.

SUMMARY

Based upon the findings of the baseline SVI survey conducted on March 27, 2007, the following summary is provided.

- A possible association exists between the low concentrations of VOCs detected in the outdoor and indoor air samples.
- VOCs were detected in the indoor air samples at concentrations ranging from 0.21 ug/m^3 to 750 ug/m^3. Of the VOCs detected in the indoor air samples, between 7 and 15 were not detected in the corresponding sub slab samples, which indicates that the presence of these compounds is directly related to chemical usage within the building.
- CCl_4 was detected in indoor air samples at significantly higher concentrations than in sub-slab samples. The source of CCl_4 is unknown at this time; however, it is believed to be associated with the current BCS operations as it is not a compound that has been historically identified in the groundwater at the site.
- The concentrations of CCl_4 detected in indoor air samples are significantly below the OSHA Permissible Exposure Limit (PEL) of 62,920 ug/m^3.
- All indoor air sample results are below the available NYSDOH Air Guidelines for TCE and PCE; therefore, there does not appear to be an indoor air exposure issue at the Site.
- Several VOCs identified in the sub-slab and indoor air samples have been historically detected in site groundwater including chloroform, 1,1,1-TCA, TCE and PCE. The presence of these compounds in both the sub-slab and indoor air samples and lack of a known usage of these compounds within the building at this time indicates that a pathway is present between the sub-slab and indoor air.
- A review of the Draft NYSDOH Soil Vapor/Indoor Air Matrix for both TCE and PCE indicate that: mitigation is needed to minimize potential exposures associated with soil vapor intrusion as follows:
    - The TCE concentration in indoor air (0.37 ug/m^3 and subslab air (0.4 mg/m^3) at Location IA-3 result in the need for mitigation; and
    - The PCE concentration of 1,000 ug/m^3 (SS-3) result in the need for mitigation, even though indoor air at that location is less than 3 ug/m^3.
- The remaining SVI study areas are below mitigation and monitoring activities in comparison to the Matrix.

Proposed Mitigation

Based on the findings of the SVI and comparison to the Draft NYSDOH Soil Vapor/Indoor Air Matrices for both TCE and PCE, mitigation is recommended in the area proximal SS-3/IA-3. This area is the oldest portion of the building, no production, warehouse, or office activities occur in the area, and the area serves as an access point to the rear parking lot, there is minimal occupancy time. Additionally, this area is adjacent to the known groundwater impacts as illustrated on Figure 1. An Interim Remedial Measure (IRM) of enhanced reductive dechlorination (ERD) will be proposed to address these groundwater impacts at the site. The ERD will be achieved through the injection of a soybean oil emulsion into the groundwater which will decrease the vapor pressure of these compounds in the groundwater and limit their migration from the groundwater into the soil vapor and potentially the indoor air at levels above guidance. Annual monitoring during the heating season would be included as a part of the IRM to address potential concerns with indoor air quality. As noted in the Guidance, these screening matrices are generic in nature. Due to the low occupancy time associated with the area this approach is believed to be protective of the employees working in the facility.

Delta appreciates the opportunity to present this report. If you have any questions or comments concerning this submittal, feel free to contact the undersigned at (315) 445-0224 or by e-mail (mschumacher@deltaenv.com).

Sincerely,

DELTA ENVIRONMENTAL CONSULTANTS, INC.

Mark J. Schumacher
Project Manager

James F. Blasting, P.G.
Senior Consultant

cc: Kristin Colberg, HB Fuller ✓
Debbie McNaughton, NYSDOH

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DELTA

SOIL VAPOR INTRUSION SAMPLE LOG

Client Name: *HB Fuller*
Project Name: *Former Monarch Chemical SVI*
Project Number: *8E0702068P*
Sampler: _____
Date: March 27, 2007

SAMPLE INFORMATION

Sample ID: IA-4 Sample Location: NEAR NORTHEASTERN EXIT

Sample Type: [ ] Soil Gas [ ] Outdoor Air [ ] Near Slab [ ] Sub-Slab [X] Indoor

Sample Depth (ft. bgs): _____ Sample Height (ft): 50"

Sampler Type: [ ] Tedlar Bag [ ] Sorbent Tube [X] Stainless Steel Canister
[ ] Other (specify): _____

Canister Size (L): 6 Canister ID: 2889 Flow Controller ID: 2530
Flow Rate: _____

Analytical Method: [ ] TO-14 [ ] TO-15 [ ] Other (specify): _____

Laboratory: *Severn Trent Laboratories*

SAMPLING DATA

Date	Time	Activity	Comments/Data
3/27	10:00	Install Probe/Locate Sampler	
		Purge Probe	Method: _____ # of Purge Volumes _____
3/27	10:26	Start Sample	
		Start Vacuum & Flow Rate	-27
		Interim Vacuum & Flow Rate	
		Interim Vacuum & Flow Rate	
		Interim Vacuum & Flow Rate	
		Interim Vacuum & Flow Rate	
		Interim Vacuum & Flow Rate	
3/27	1825	End Sample	
		End Vacuum & Flow Rate	0"Hg.
		Duration of Sampling	
		Volume of Air Sampled	

DELTA

Was a tracer gas used? [ ] Yes [X] No If "yes," identify gas used: _____

	Temperature (°F)		Pressure (inches Hg)	
	Interior	Ambient	Interior	Ambient
Start				
Finish				

OBSERVATIONS:

Weather Conditions:

Was there any significant precipitation within 12 hours prior to (or during) the sampling event?
[ ] Yes [X] No If "yes," describe:

Describe the general weather conditions at the time of sampling:
Cool w/ light rain

Odors:

Was there any noticeable odors either prior to (or during) the sampling event? [ ] Yes [✓] No

If "yes," describe:

Other Activities:

Provide any other information that may be pertinent to the sampling event that may assist in the data interpretation process:

DELTA

SOIL VAPOR INTRUSION SAMPLE LOG

Client Name: *HB Fuller*
Project Name: *Former Monarch Chemical SVI*
Project Number: *8E0702068P*
Sampler: _____
Date: March 27, 2007

SAMPLE INFORMATION

Sample ID: SS-4 Sample Location: NEAR NORTHEASTERN EXIT

Sample Type: [ ] Soil Gas [ ] Outdoor Air [ ] Near Slab [X] Sub-Slab [ ] Indoor

Sample Depth (ft. bgs): 2" BELOW SLAB Sample Height (ft): _____

Sampler Type: [ ] Tedlar Bag [ ] Sorbent Tube [X] Stainless Steel Canister
[ ] Other (specify): _____

Canister Size (L): 6 Canister ID: 4437 Flow Controller ID: 2580
Flow Rate: _____

Analytical Method: [ ] TO-14 [ ] TO-15 [ ] Other (specify): _____

Laboratory: *Severn Trent Laboratories*

SAMPLING DATA

Date	Time	Activity	Comments/Data
3/27	10:00	Install Probe/Locate Sampler	
3/27	10:10	Purge Probe	Method: VACUUM PUMP # of Purge Volumes 3
3/27	10:26	Start Sample	
		Start Vacuum & Flow Rate	-30
		Interim Vacuum & Flow Rate	
		Interim Vacuum & Flow Rate	
		Interim Vacuum & Flow Rate	
		Interim Vacuum & Flow Rate	
		Interim Vacuum & Flow Rate	
3/27	1826	End Sample	
		End Vacuum & Flow Rate	-10" Hg.
		Duration of Sampling	
		Volume of Air Sampled	

DELTA

Was a tracer gas used? [X] Yes [ ] No If "yes," identify gas used: Helium

	Temperature (°F)		Pressure (inches Hg)	
	Interior	Ambient	Interior	Ambient
Start				
Finish				

OBSERVATIONS:

Weather Conditions:

Was there any significant precipitation within 12 hours prior to (or during) the sampling event?
[ ] Yes [X] No If "yes," describe:

Describe the general weather conditions at the time of sampling:
cool w/ light rain

Odors:

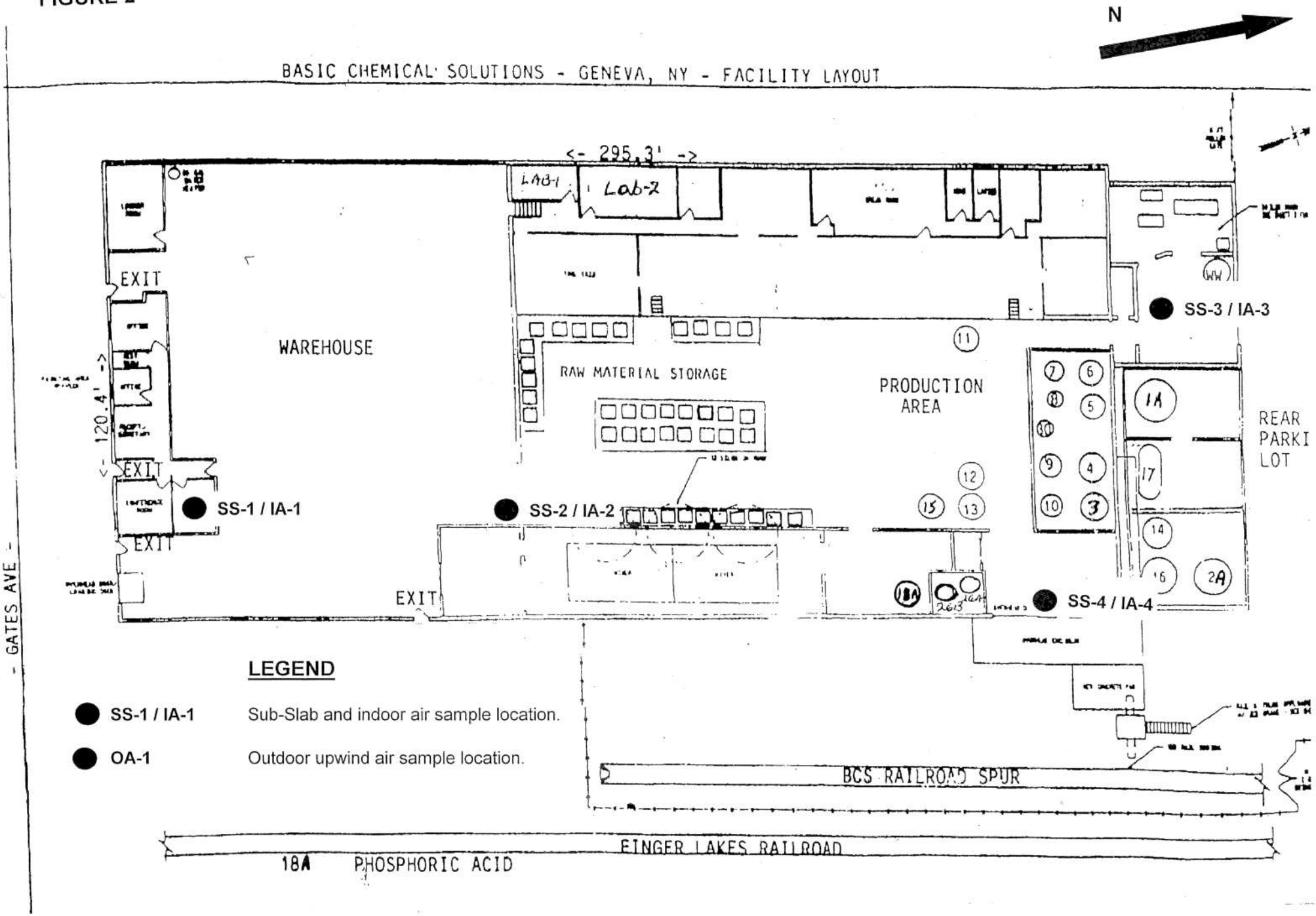
Was there any noticeable odors either prior to (or during) the sampling event? [ ] Yes [X] No

If "yes," describe:

Other Activities:

Provide any other information that may be pertinent to the sampling event that may assist in the data interpretation process:

FIGURE 2


N
BASIC CHEMICAL SOLUTIONS - GENEVA, NY - FACILITY LAYOUT
<- 295.3' ->
LAB-1
Lab-2
EXIT
WAREHOUSE
RAW MATERIAL STORAGE
PRODUCTION AREA
SS-3 / IA-3
<- 120.4' ->
EXIT
SS-1 / IA-1
SS-2 / IA-2
EXIT
EXIT
SS-4 / IA-4
REAR PARKI LOT
- GATES AVE -
LEGEND
SS-1 / IA-1 Sub-Slab and indoor air sample location.
OA-1 Outdoor upwind air sample location.
BCS RAILROAD SPUR
FINGER LAKES RAILROAD
18A PHOSPHORIC ACID