Professional Certification Page:

Work Plan for Expanded Off-Site Vapor Intrusion Sampling and Water Supply Well Documentation
Cintas Corporation
Former Salem Uniform Services Facility
4015 North Cherry Street
Winston-Salem, Forsyth County, North Carolina

NCDENR-DWM #NONCD0002438
March 3, 2014

"I certify that, to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete."

Mr. Jim Buckman
Director-Chemical and Environmental Engineering
Cintas Corporation

NOTARY PUBLIC ... STATE OF OHIO

NANCY FEDS
Notary Public, State of Ohio
My Commission Expires
May 3, 2014

Nancy Feds 3/4/14

S. Grant Watkins
Mr. S. Grant Watkins, P.G., RSM
Senior Program Director
AECOM North Carolina, Inc.

Wake County, North Carolina

I certify that the following person(s) personally appeared before me this day, each acknowledging to me that he or she signed the foregoing document: S. Grant Watkins

Date: March 3, 2014

Anna Maria Tate
(Official Signature of Notary)

Anna-Maria Tate
Notary Public

Anna-Maria Tate NOTARY PUBLIC My commission expires 8-21-18 Wake County, North Carolina

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March 3, 2014

Ms. Melanie Bartlett
North Carolina Department of Environment and Natural Resources
Division of Waste Management – Superfund Section
217 West Jones Street
Raleigh, North Carolina 27603

Subject: Work Plan For Expanded Off-Site Vapor Intrusion Sampling and Water Supply Well Documentation
Former Salem Uniform Services Facility (Cintas Corporation)
4015 North Cherry Street, Winston-Salem, NC
NCDENR-DWM #NONCD0002438

Dear Ms. Bartlett,

AECOM North Carolina, Inc. (AECOM), on behalf of Cintas Corporation (Cintas), submits this supplemental work plan for the ongoing remedial investigation (RI) at the former Salem Uniform facility site located at 4015 North Cherry Street, Winston-Salem, Forsyth County, North Carolina (the Site). Specifically this submittal provides a plan to expand the off-site vapor intrusion (VI) sampling program and to document the disposition of legacy water supply wells (WSWs) that exist on some of the residential properties near the Site.

Background

Cintas has completed most of the RI components and is currently preparing a comprehensive RI Report that will summarize historical and recent sampling results for soil, groundwater, surface water, soil gas, and air media. To date, Cintas has conducted VI sampling (soil gas and air samples) on-site and at one off-site property located south of the Site (450 McCanless Street). Historically, the owner of one property adjacent to the Site has refused access for VI sampling and two other property owners have not responded to multiple requests for access.

A meeting was held on October 7, 2013 between Cintas, AECOM and the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Waste Management (DWM) Superfund Section, Inactive Hazardous Sites Branch (IHSB) to discuss the status of the RI and transfer of the Site to the Central Region of IHSB. During the meeting, the NCDENR requested a work plan be developed to conduct VI sampling on additional off-site properties that have previously not been tested. The agency also requested an update on the disposition of legacy WSWs in the neighborhood since there were few responses to the original WSW survey mailing in 2003 and it is known that some properties have changed owners in recent years.

Subsequent to the October 2013 meeting, AECOM researched property ownership and contacted numerous additional property owners in the neighborhood south of the Site. Homes built prior to the mid-1950's were specifically targeted because municipal water supplies were first provided to this neighborhood circa 1954 and homes older than that time frame would most likely have an old WSW on the property. AECOM also obtained information from the property owners concerning the presence of crawlspaces, basements, or combinations of these structures that would make the house a potential candidate for VI air sampling.

Work Plan for Expanded Vapor Intrusion Sampling

The scope of the expanded VI sampling program is based in part on decisions made during our October 7, 2013 meeting and on scope clarifications provided during a subsequent teleconference with NCDENR (Ms. Melanie Bartlett) on January 21, 2014.

The sampling procedures will generally follow the requirements of the NCDENR *Supplemental Guidelines for the Evaluation of Structural Vapor Intrusion For Site Assessments and Remedial Actions Under the Inactive Hazardous Sites Branch-23 December 2013* (aka, NCDENR VI Guidance) and regulatory-accepted protocols and best practices. Earlier versions of the NCDENR VI Guidance were used as the basis for prior soil gas and air sampling events conducted from 2009-2011 during the ongoing RI. Crawlspace air sampling procedures described in the *Work Plan for Supplemental Sampling of On-Site Media and Off-Site Pore Water* (AECOM; March 4, 2011) will also be followed. The VI sampling rationale and methods are discussed in the following sections.

Sampling Rationale

From September 2009 through March 2011, Cintas conducted several soil gas and crawlspace air sampling events at the 450 McCanless Street residence located south of the Site property. During these sampling events, several chlorinated volatile organic compounds (VOCs) and several non-chlorinated hydrocarbon VOCs were detected in soil gas, crawlspace air and/or ambient background air. Results of each sampling event were submitted to the NCDENR and were collectively summarized in the *Interim Sampling Results and Remedial Investigation Work Plan Addendum No.1* (AECOM: March 2012).

Soil gas and crawlspace air sampling data from the 450 McCanless Street property were evaluated by a NCDENR-DWM toxicologist to determine potential VI exposure risks at this property. For each sampling event at this property, the NCDENR toxicologist determined that no unacceptable exposures were occurring and no active VI abatement measures were required. During the most recent sampling event in March 2011, ethylbenzene was the only VOC that exceeded the IHSB Residential Vapor Intrusion Screening Levels when the background ambient air VOC concentrations were subtracted from the detected crawlspace air VOC concentrations.

Although an off-site VI risk has not been identified to date based on prior testing, the NCDENR has requested Cintas to expand the VI testing to additional properties as a precautionary measure. During AECOM's January 21, 2014 discussions with the NCDENR, the agency concurred that the initial phase of expanded off-site VI testing can be limited to a subset of residential properties in the surrounding neighborhood since near-term sampling of all residences in this area is not feasible. The objective is to initially test approximately 25 percent of the residential structures that are located in close proximity to areas that have known or suspected VOC impacts in groundwater above their VI residential screening levels. Results of the initial, limited VI sampling will then be evaluated by NCDENR to determine if the VI study should be expanded to additional residences.

Figure 1 shows the locations of candidate residential properties that are known to have basements and/or crawlspaces that will be considered for VI sampling. This figure does not include any properties where the owners were contacted but they refused access nor does it include those properties where AECOM has been unable to contact the owner to date. Crawlspace and/or basement air samples will be collected at a maximum of 10 properties during the initial sampling event. Crawlspace samples will also be collected again at the 450 McCanless Street property.

Not all the candidate properties identified in Figure 1 will be sampled, but they will be held in reserve in case the access status changes at another property where sampling access is currently anticipated. Owners of several properties shown in Figure 1 have been contacted but they have not yet made a decision regarding access. The goal is to obtain a sample set with adequate coverage of the area bounded by North Cherry Street, Gossett Street, May Street, and McCanless Street. Meeting this goal, however, is dependent on property owner cooperation and access.

Proposed Vapor Intrusion Air Sampling Methods

The VI study will include collection of air samples from crawlspaces and basements of up to 10 residences in the neighborhoods south and southeast of the Site. Prior to collecting the air samples, the AECOM project manager and field team leader will meet with the owner and/or tenant of each property to inspect the sampling area and to discuss the sampling procedures. Any unusual structural conditions or storage of household chemicals in or near the sampling area will be noted and corrected prior to sampling.

Air samples will be collected with 6-liter Summa canisters equipped with either 8-hour or 24-hour flow controllers. The type of flow controller will depend upon the property owner's schedule and access restrictions. AECOM estimates that no more than five of the samples will be collected over a 24-hour period based on property owner's stated preferences. The remaining air samples will be collected over an 8-hour period due to anticipated property owner restrictions.

The Summa canisters used for crawlspace/basement air sampling will be individually certified as clean for VOCs by Method TO-15 Selective Ion Monitoring (SIM) analysis. Two background, ambient air samples will be collected during the crawlspace/basement air sampling event. The following Summa canister samples for the air sampling program are proposed:

- 11 basement and/or crawlspace air samples (including one duplicate) collected and analyzed for select VOCs by Method TO-15 SIM

- 2 ambient background air samples analyzed for select VOCs by Method TO-15 SIM

The analyte list for the air samples will be limited to those VOCs of interest, as known Site contaminants or their degradation products, which have been previously detected in off-site soil gas and in groundwater above their NCDENR VI screening levels (see **Table 1**). Based on the data in Table 1, the Method TO-15 SIM analyte list is sufficient to capture all but two of the VOCs of interest at the required detection limits for the initial phase of sampling described in this work plan. The VOCs chloroform and dichlorodifluoromethane (a.k.a. Freon 12) were detected in off-site groundwater but are not included on the TO-15 SIM analyte list. Chloroform was not detected in soil gas or crawlspace air samples at the 450 McCanless Street property and Freon 12 was below the NCDENR soil gas VI screening level. As a result, these VOCs are not proposed for analysis in the pending crawlspace air samples unless specifically required by the NCDENR. **Attachment A** includes the analyte lists and laboratory detection limits for the TO-15 SIMs analysis and the standard low level TO-15 analysis. If required by the NCDENR, chloroform and Freon 12 will be analyzed using the standard TO-15 analysis.

The VI field sampling program will be attempted during one two-day mobilization to the Site. This will require scheduling approval and coordination with each property owner for one concurrent VI sampling event, which may not be possible with each of the owners. A separate (second) trip to the Site may be necessary to complete the VI sampling at all of the targeted residences, to accommodate the owner's and/or occupant's schedules. If the VI air sampling is split into two

events, or it extends into a third day of sampling, one of the ambient background air samples will be collected at that time.

Water Supply Well Documentation

AECOM previously communicated with multiple property owners in the surrounding neighborhoods concerning legacy WSWs on their properties that pre-date the mid-1950's when municipal water supply was provided to this area. No owners or tenants claimed to use the WSWs for any purpose.

During the property visits to conduct the VI sampling, AECOM will conduct a cursory inspection of any WSW that is visible and easily accessible. We will make note of its location on the property and whether it has any surface pipes, plumbing or electrical connections that might indicate its potential for use. At NCDENR's direction, none of the WSWs will be sampled unless it is discovered the owner or tenant is currently using the groundwater from the WSW for any purpose.

Sampling Results Letter Report

Upon receiving the laboratory analytical data for the air samples, the results will be provided in a brief summary report to the NCDENR. The report will include a description of the sampling locations and methods used, including any deviations from the work plan that were required. The air sample analytical data will be compared to current NCDENR VI acceptable screening levels. The report will also include a section that summarizes the WSW locations and inspection results.

Schedule

A proposed schedule of field sampling activities is provided in the table below. The field work described in this Work Plan will tentatively begin the week of March 17, 2014. This proposed schedule is dependent on NCDENR approval of this Work Plan, property owner approvals and schedules, weather and other factors that could be outside of Cintas' direct control. The sampling event described in this work plan will constitute a winter or cold-weather seasonal event, as described in the NCDENR VI Guidance, based on the expected dates that sampling will occur.

Air samples submitted to the laboratory will be analyzed using a standard turnaround time, with a final laboratory report issued approximately 7 to 10 business days from receipt of the samples.

Expanded Off-Site VI Study Completion Schedule

Work Plan Task/Milestone	Estimated Start Date	Estimated Completion Date
Continue contacting property owners/ Complete off-site access discussions	January 2014 (ongoing)	Mid-March 2014
Meet with owners to inspect basement and crawlspace areas/ Inspect and document old water supply wells (if present)	March 19, 2014	March 21, 2014
Conduct VI basement & crawlspace air sampling	March 19, 2014	March 20, 2014
Prepare and submit Summary Report	Early-April 2014	Mid-April 2014

The NCDENR will be verbally notified if any significant changes to the proposed sampling plan develop prior to performing the sampling event. Modifications to the sampling program can be made as required with NCDENR approval, without submittal of a work plan addendum. Potential deviations from the scope of work described in this work plan will be explained in the final results report submitted to the NCDENR.

Please contact us at (919) 854-6200 or Mr. Jim Buckman (Cintas) at (513) 965-4932 if additional discussions of the Work Plan scope are required.

Sincerely,

Michael Dail, P.G.
Staff Geologist

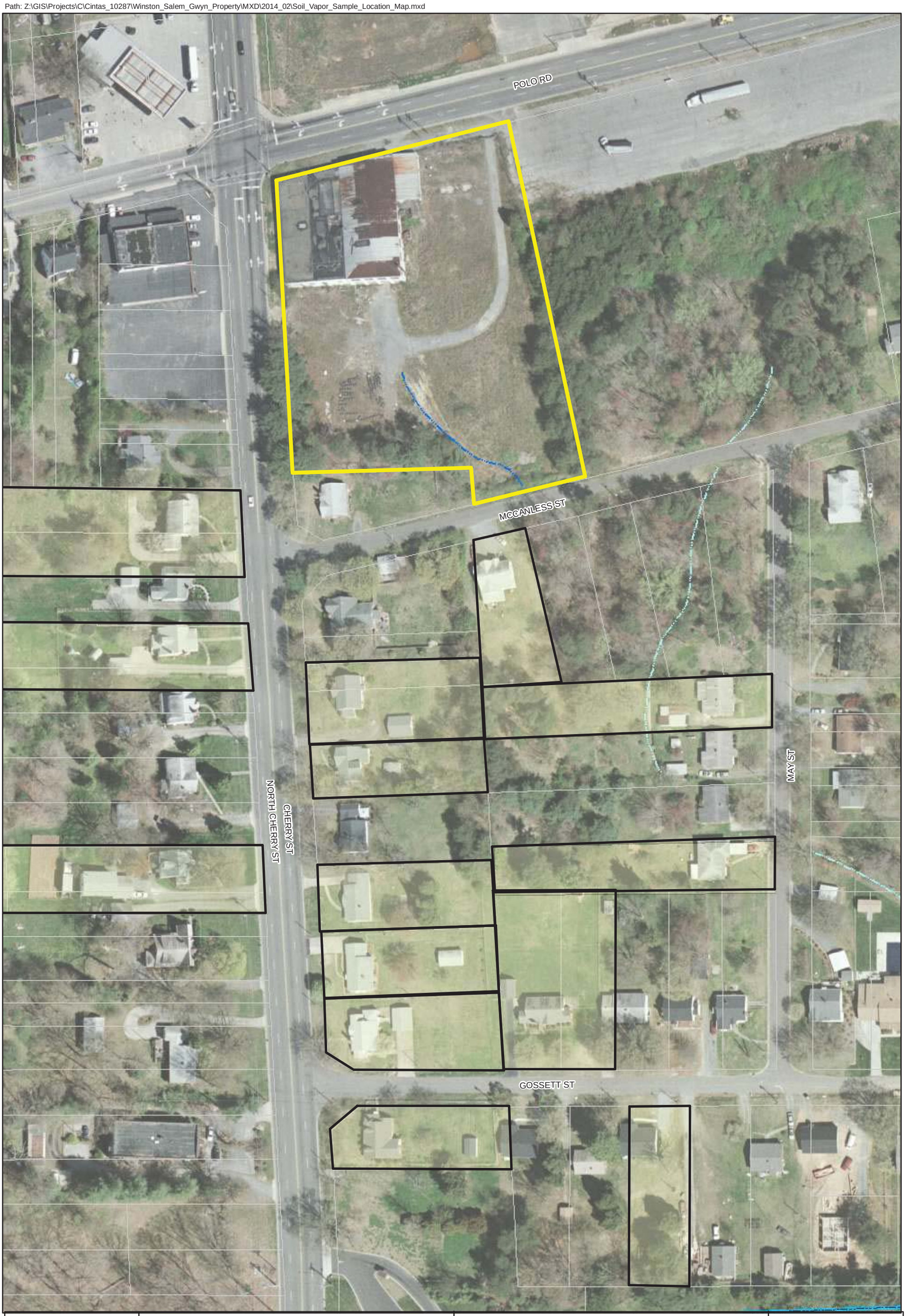
S. Grant Watkins, P.G., RSM
Senior Program Director

Attachments: Figure 1
Table 1
Attachment A

cc: Mr. Jim Buckman (Cintas)

Figure

Path: Z:\GIS\Projects\C\Cintas_10287\Winston_Salem_Gwyn_Property\MXD\2014_02\Soil_Vapor_Sample_Location_Map.mxd



Map Location

Legend

- Site Property Boundary
- Candidate Property for VI Sampling
- Surface Water Tributary (Perennial)
- Underground Storm water Piping System (Approximate)
- Parcel Boundary

N

Candidate Properties for Expanded Vapor Intrusion Sampling

Cintas (Former Salem Uniform)
4015 North Cherry Street
Winston-Salem, NC

Image Source: Forsyth County GIS Aerials

100 50 0 100 Feet

1 inch = 100 feet

March 2014

60138540.0100

Figure 1

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Table

Table 1
Detected Volatile Organic Compounds in Off-Site Soil Gas, Air and Groundwater Media
Former Salem Uniform Services Facility
4015 North Cherry Street, Winston-Salem, NC

VOCs Detected in Off-Site Crawlspace and Soil Gas (450 McCanless Street Property)	
***Crawlspace Air Samples**	****Soil Gas Samples**
1,2-Dichloroethane	1,2,4-Trimethylbenzene
Benzene	2-Butanone (Methyl Ethyl Ketone)
Ethylbenzene	Acetone
m,p-Xylene	Carbon Disulfide
o-Xylene	Ethanol
Tetrachloroethene	Ethylbenzene
Toluene	Freon 11
Trichloroethene	Freon 12 (Dichlorodifluoromethane)
Vinyl Chloride	m,p-Xylene
	o-Xylene
	Tetrachloroethene

**TO-15 SIMs analysis*

***TO-15 Full Scan (low level) analysis*

VOCs Detected in Off-Site Groundwater (McCanless Street Properties)	
VOCs Detected in Direct Push Groundwater Samples (450 McCanless)	**VOCs Detected in Off-site Wells MW-5i, MW-8i, and MW-16i/d**
1,1,1,2-Tetrachloroethane	Carbon tetrachloride
1,1,2-Trichloroethane	**Chloroform**
1,1-Dichloroethene	cis-1,2-Dichloroethene
1,2-Dibromoethane	Diisopropyl ether
1,2-Dichloroethane	Methylene Chloride
1,4-Dichlorobenzene	Methyl-tert-butyl ether
Benzene	**Tetrachloroethene**
Acetone	**Trichloroethene**
Chlorobenzene	
Chloroform	
cis-1,2-Dichloroethene	
Freon 12 (Dichlorodifluoromethane)	
Methyl-tert-butyl ether	
Naphthalene	
o-Xylene	
Tetrachloroethene	
Toluene	
trans-1,2-Dichloroethene	
Trichloroethene	
Vinyl chloride	

Results in bold and shaded block exceed the NCDENR vapor intrusion Residential screening level for soil gas or crawlspace air based on exposure risk of 10^{-6} and Total Hazard Quotient of 0.2, or the NCDENR vapor intrusion Residential screening level for groundwater (NCDENR, January 2014 VI screening tables).

Attachment A

eurofins | Air Toxics

Method : Modified TO-15 SIM (Sh)-Std 17

Compound	Rpt. Limit (ugm3)
Vinyl Chloride	0.026
1,1-Dichloroethene	0.040
1,1-Dichloroethane	0.081
cis-1,2-Dichloroethene	0.079
1,1,1-Trichloroethane	0.11
Benzene	0.16
1,2-Dichloroethane	0.081
Trichloroethene	0.11
Toluene	0.075
1,1,2-Trichloroethane	0.11
Tetrachloroethene	0.14
Ethyl Benzene	0.087
m,p-Xylene	0.17
o-Xylene	0.087
1,1,2,2-Tetrachloroethane	0.14
trans-1,2-Dichloroethene	0.40
Methyl tert-butyl ether	0.36

Surrogate	Method Limits
1,2-Dichloroethane-d4	70-130
Toluene-d8	70-130
4-Bromofluorobenzene	70-130

Reporting Limits cited do not take into account sample dilution due to canister pressurization.

eurofins | Air Toxics

Method : Modified TO-15-LL

Compound	Rpt. Limit (ugm3)
Freon 12	0.49
Freon 114	0.70
Chloromethane	0.21
Vinyl Chloride	0.26
1,3-Butadiene	0.22
Bromomethane	1.9
Chloroethane	1.3
Freon 11	0.56
Ethanol	0.94
Freon 113	0.77
1,1-Dichloroethene	0.40
Acetone	1.2
2-Propanol	1.2
Carbon Disulfide	1.6
3-Chloropropene	1.6
Methylene Chloride	0.69
Methyl tert-butyl ether	0.36
trans-1,2-Dichloroethene	0.40
Hexane	0.35
1,1-Dichloroethane	0.40
2-Butanone (Methyl Ethyl Ketone)	1.5
cis-1,2-Dichloroethene	0.40
Tetrahydrofuran	1.5
Chloroform	0.49
1,1,1-Trichloroethane	0.54
Cyclohexane	0.34
Carbon Tetrachloride	0.63
2,2,4-Trimethylpentane	2.3
Benzene	0.32
1,2-Dichloroethane	0.40
Heptane	0.41
Trichloroethene	0.54
1,2-Dichloropropane	0.46
1,4-Dioxane	0.36
Bromodichloromethane	0.67
cis-1,3-Dichloropropene	0.45
4-Methyl-2-pentanone	0.41
Toluene	0.38
trans-1,3-Dichloropropene	0.45
1,1,2-Trichloroethane	0.54
Tetrachloroethene	0.68
2-Hexanone	2.0

Reporting Limits cited do not take into account sample dilution due to canister pressurization.

Method : Modified TO-15-LL

Compound	Rpt. Limit (ugm3)
Dibromochloromethane	0.85
1,2-Dibromoethane (EDB)	0.77
Chlorobenzene	0.46
Ethyl Benzene	0.43
m,p-Xylene	0.43
o-Xylene	0.43
Styrene	0.42
Bromoform	1.0
Cumene	0.49
1,1,2,2-Tetrachloroethane	0.69
Propylbenzene	0.49
4-Ethyltoluene	0.49
1,3,5-Trimethylbenzene	0.49
1,2,4-Trimethylbenzene	0.49
1,3-Dichlorobenzene	0.60
1,4-Dichlorobenzene	0.60
alpha-Chlorotoluene	0.52
1,2-Dichlorobenzene	0.60
1,2,4-Trichlorobenzene	3.7
Hexachlorobutadiene	5.3

Surrogate	Method Limits
1,2-Dichloroethane-d4	70-130
Toluene-d8	70-130
4-Bromofluorobenzene	70-130

Reporting Limits cited do not take into account sample dilution due to canister pressurization.