

TECHNICAL MEMORANDUM

Date: May 31, 2016
To: Frank Dombrowski
From: Brian Hennings and Nate Keller
Subject: May 2016 Technical Memorandum
Results of High Purge Volume Vapor Sampling and Site Reconnaissance

Natural Resource Technology, Inc. (NRT) is providing Technical Memorandum (Tech Memo) for the former manufactured gas plant (MGP) site located at 337 Water Street in Appleton, Wisconsin (Figure 1). This Tech Memo includes results of high purge volume sub-slab vapor sampling and site reconnaissance to further evaluate the vapor intrusion (VI) pathway at the Fox River Mills apartment complex, specifically, apartment Building 415. This work was proposed in the December 2015 Tech Memo and discussed further at a “Technical Assistance” meeting with WDNR on January 14, 2016. All work was completed in accordance with that memo and meeting.

Background

Sub-slab soil gas screening samples were taken previously just below the concrete slab of the underground garage floor at each borehole location (SS-1 through SS-5, Figure 1). After each borehole was completed the intake of the ppb Rae was lowered into the core hole to screen for total VOCs. Locations SS-4 and SS-5 had readings of 21 and 1,090 ppbv respectively; no elevated PID readings were observed at any other locations and no odors were detected at any of the locations. Sub-slab screening samples were collected from each location and analyzed for BTEX and naphthalene, similar to previously collected soil gas locations (SV-1 through SV-4). Results did not exceed the Wisconsin Vapor Risk Screening Levels for sub-slab or shallow soil gas and there is ample oxygen for biodegradation of petroleum hydrocarbons. Following collection of the screening samples, the core holes were sealed with cement. These activities were documented in a technical memorandum submitted to the WDNR on December 28, 2015.

The results of all vapor sampling (exterior soil gas and sub-slab screening) suggest that soil vapors are not present in significant concentration to make the vapor intrusion (VI) pathway complete for residential or commercial occupants. However, the sub-slab screening samples were not collected in accordance with recommended procedures identified in WDNR guidance (RR-986 and RR-800) and the lowest level is a large structure that could require more than 5 sample locations for VI evaluation using sub-slab sample probes. For these reasons, high purge volume sampling was completed recently

(March 30, 2016) near the occupied apartments present on the same level as the parking garage to complete the evaluation of the VI pathway.

Sub-slab Vapor Investigation

High purge sampling was completed at location SS-1 and SS-5 to evaluate sub-slab soil gas beneath the parking garage and adjacent occupied spaces (Figure 1). A schematic of the equipment set up for high purge volume sampling is included in Figure 2. Samples were collected using the procedures proposed in the December 2015 Technical Memorandum as follows:

- The sealed core holes at locations SS-1 and SS-5 were reopened and observation ports (1/4-inch core holes through the slab) were drilled at varying distances (Table 1) from each location to take manometer readings and determine the radius of influence at each location during sampling.
- Communication testing observation points were monitored before vapor extraction during purging, and after sampling with a magnehelic gauge which monitors the amount of vacuum at that distance from the extraction point. In addition, the flow rate (feet per minute), vacuum (inches of water), total VOCs, percent oxygen, percent carbon dioxide and percent methane were monitored with real-time equipment at the extraction point during the extraction / sampling process. The real-time measurements are consistent with those shown in Table 1. During the purging phase at each location, a smoke test was performed to identify any leaks, or short circuiting of the sample probe.
- After purging, a six-liter Summa™ canister was used to collect soil vapors during an extraction period of approximately 30 minutes. The soil vapor samples were sent to STAT Analytical for analysis of benzene, toluene, ethylbenzene, xylenes and naphthalene by Method TO-15, in addition to carbon dioxide, oxygen and methane by Method EPA 3C.
- Following sampling, the sampling ports were abandoned with hydraulic cement.

The results of the vacuum monitoring and field measurements are included in Table 1. The analytical results are summarized in Table 2 and indicate that there are no WDNR sub-slab screening level exceedances. The radius of influence was calculated for both SS-1 (40ft) and SS-5 (43ft) with the following assumptions (Table 3):

- The fill area was approximately 1 foot thick and,
- The porosity of the fill was 30%

Based on the calculated radii, the area of vapor extraction during high purge volume sampling extends below the occupied space on the garage level (Figure 1). The radius of influence calculated at SS-1 is also supported by the presence of a measured vacuum at communication testing port SS-1B (approximately 35 feet from the extraction point). At location SS-5 no vacuum was measured in the communication ports and no leaks were detected with the smoke pen that would indicate short circuiting of the sample through the slab. The observed construction details of the building and the results of the recent reconnaissance (included below), provide evidence that the assumptions at SS-5 may underestimate the vapor transport parameters in the fill material (old foundation walls may create

preferential flow pathways), and as a result slightly overestimate the radius of influence. However, the measured flow rates, the absence of vacuum below the garage floor, and no visible leaks through the slab suggest sub-slab soil gas collected from SS-5 came from the direction of the occupied spaces. SS-5 is located adjacent to the occupied space, and even if the ROI is reduced by 50%, a significant portion of the radius remains below the occupied space.

Field measurements from the samples show that sufficient oxygen is present for the biodegradation of PVOCs and the analytical results indicate that there are no exceedances of WDNR Residential Vapor Risk Screening Levels in sub-slab samples or previously collected soil gas samples. Therefore no vapor intrusion risk exists at the site.

Site Reconnaissance

During the site visit to collect high purge volume sub-slab samples from SS-1 and SS-5, NRT investigated the crawlspace located beneath the boiler room and the occupied space east of the boiler room. The area was accessed by removing a section of drywall in the boiler room, and entering the crawlspace for visual inspection while continuously monitoring air quality for safety with a four -gas meter, and quality with a standard PID meter using a 10.6 eV lamp. Pertinent observations include:

- The water level in the crawlspace was notably higher than the water level observed during the previous inspection conducted in September, 2015. The depth to water from the bottom of the garage floor had decreased from 4-feet to 3.15-feet (water level rose approximately 0.8-feet). Surface water elevations above the hydroelectric unit measured at SG-3 also rose 0.7-feet between site visits increasing from 720.94 to 721.64 feet. Surface water elevations downstream of the hydroelectric unit measured at SG-4 rose 2.77 feet from 709.06 to 711.83 feet. These observations are consistent with those presented in the December 2015 tech memo that indicated the building is constructed with drains that route groundwater upstream of the hydroelectric unit beneath the garage floor and discharges it in the tail water of the hydroelectric unit.
- The archway through the east wall of the boiler room encountered during the September 2015 site visit (Photo Log, Photo 1) was visually inspected and it was determined that a large crawlspace was located on the other side of the wall. The crawlspace extends to the north and east below the occupied space east of the boiler room (Photo Log, Photo 2). The crawlspace construction was very similar to the crawlspace present beneath the boiler room and garage floor (Photo Log, Photo 3). The PID meter did not indicate any measureable concentrations of VOCs from the crawlspace and there was movement of air from the crawlspace beneath the occupied areas toward the boiler room crawlspace. The limits of the crawlspace below the occupied space could not be measured, but it appeared to be present below most of the footprint of the occupied space (Figure 1). Oxygen levels recorded by the four-gas meter were safely and consistently above 19%.

Based on site reconnaissance completed in September 2015 and March 2016, the lowest level of the building is constructed with both floating slabs above air filled crawlspace and slabs over granular backfill. Based on field measurements, the air in the crawlspaces and granular fill contains ample oxygen for degradation of VOCs. In addition, it appears that the air in the crawlspaces is connected with, and mixing with air in the garage and boiler room.

Conclusions

The results of the high purge sampling and site reconnaissance completed March 30, 2016 are summarized as follows:

- The calculated and measured radius of influence for SS-1 and the calculated radius of influence for SS-5 intersect and underlie the footprint of the neighboring spaces indicating sufficient volume was extracted to evaluate soil gas beneath the occupied spaces.
- The slab (floor of garage and occupied spaces) of the building is underlain by a combination of air-filled crawlspace and granular backfill,
- Concentrations of oxygen in granular backfill and crawlspaces are sufficient, such that any PVOC compounds would biodegrade, and
- PVOC concentrations in the high purge volume samples do not exceed the WDNR sub-slab residential Vapor Risk Screening Levels (VRSLs).

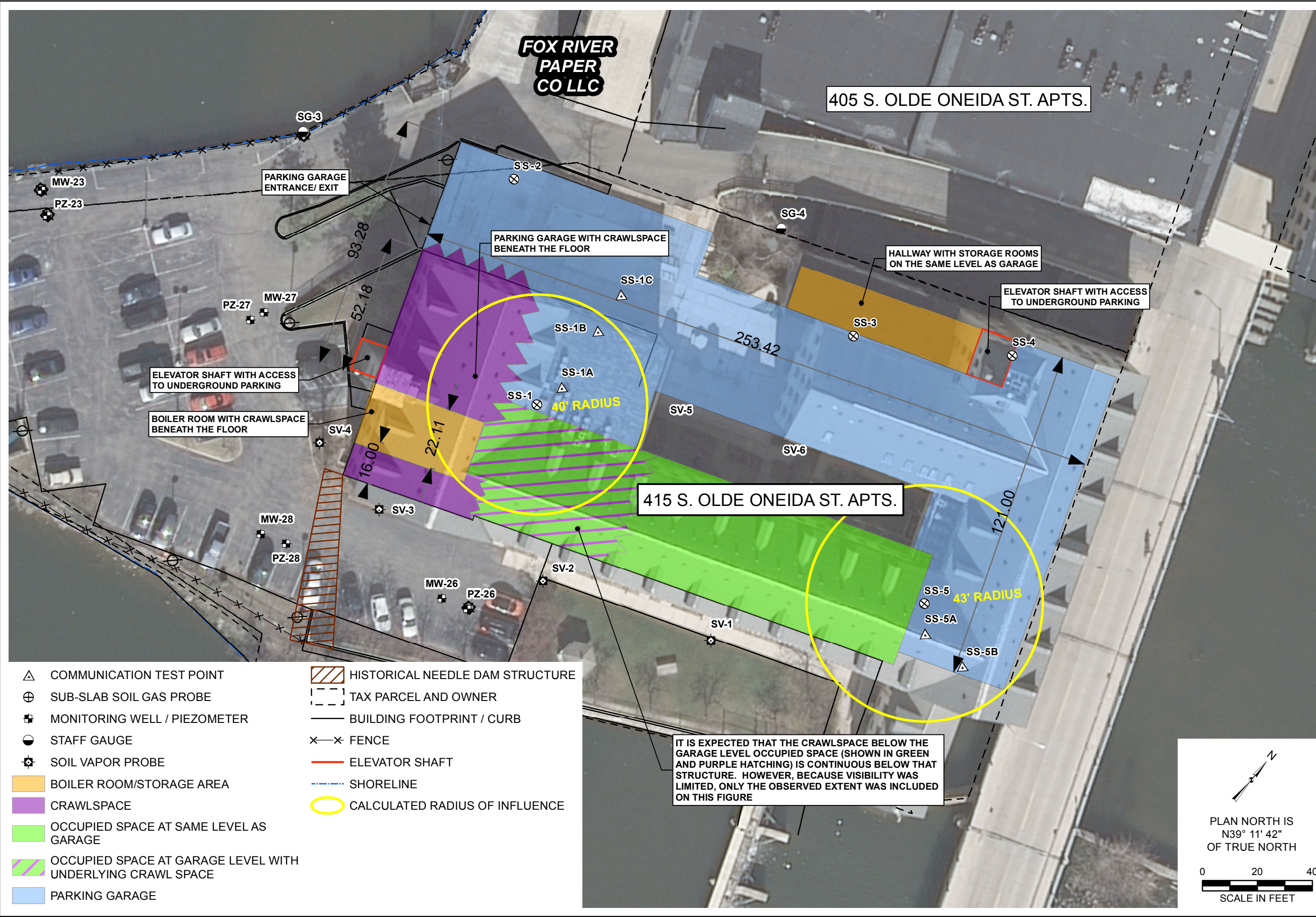
Based on these results and those provided in the December 2015 Technical Memorandum indicating that there are no exceedances of WDNR sub-slab or shallow soil gas VRSLs, the vapor intrusion pathway is incomplete for this off-site property.

Attachments

| | |
|--------------|---|
| Figure 1 | 415 S. Olde Oneida Street Apartment Building Features |
| Figure 2 | High Purge Volume Sub-Slab Sampling Schematic |
| Table 1 | Field Screening Results - High Purge Volume Sub-Slab Vapor Sampling |
| Table 2 | Summary of Soil Vapor Results |
| Table 3 | Calculation of Radius of Influence |
| Attachment 1 | Photo Log |
| Attachment 2 | Laboratory Reports |

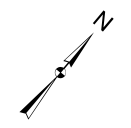
FIGURES

Y:\GIS\Projects\151508MMD\2016_TechMemo\Figure 1_415 S. Olde Oneida St. Apt Build Features.mxd Author: sstolz, Date/Time: 5/26/2016, 3:25:07 PM



- | | |
|--|-----------------------------------|
| △ COMMUNICATION TEST POINT | ▨ HISTORICAL NEEDLE DAM STRUCTURE |
| ⊕ SUB-SLAB SOIL GAS PROBE | - - - TAX PARCEL AND OWNER |
| ⊕ MONITORING WELL / PIEZOMETER | — BUILDING FOOTPRINT / CURB |
| ● STAFF GAUGE | ×-× FENCE |
| ⊙ SOIL VAPOR PROBE | — ELEVATOR SHAFT |
| ■ BOILER ROOM/STORAGE AREA | — SHORELINE |
| ■ CRAWLSPACE | ○ CALCULATED RADIUS OF INFLUENCE |
| ■ OCCUPIED SPACE AT SAME LEVEL AS GARAGE | |
| ■ OCCUPIED SPACE AT GARAGE LEVEL WITH UNDERLYING CRAWL SPACE | |
| ■ PARKING GARAGE | |

IT IS EXPECTED THAT THE CRAWLSPACE BELOW THE GARAGE LEVEL OCCUPIED SPACE (SHOWN IN GREEN AND PURPLE HATCHING) IS CONTINUOUS BELOW THAT STRUCTURE. HOWEVER, BECAUSE VISIBILITY WAS LIMITED, ONLY THE OBSERVED EXTENT WAS INCLUDED ON THIS FIGURE



PLAN NORTH IS
N39° 11' 42"
OF TRUE NORTH

SCALE IN FEET

DRAWN BY/DATE:
SDS 5/9/16
REVIEWED BY/DATE:
NRK 5/11/16
APPROVED BY/DATE:
BGH 5/25/16

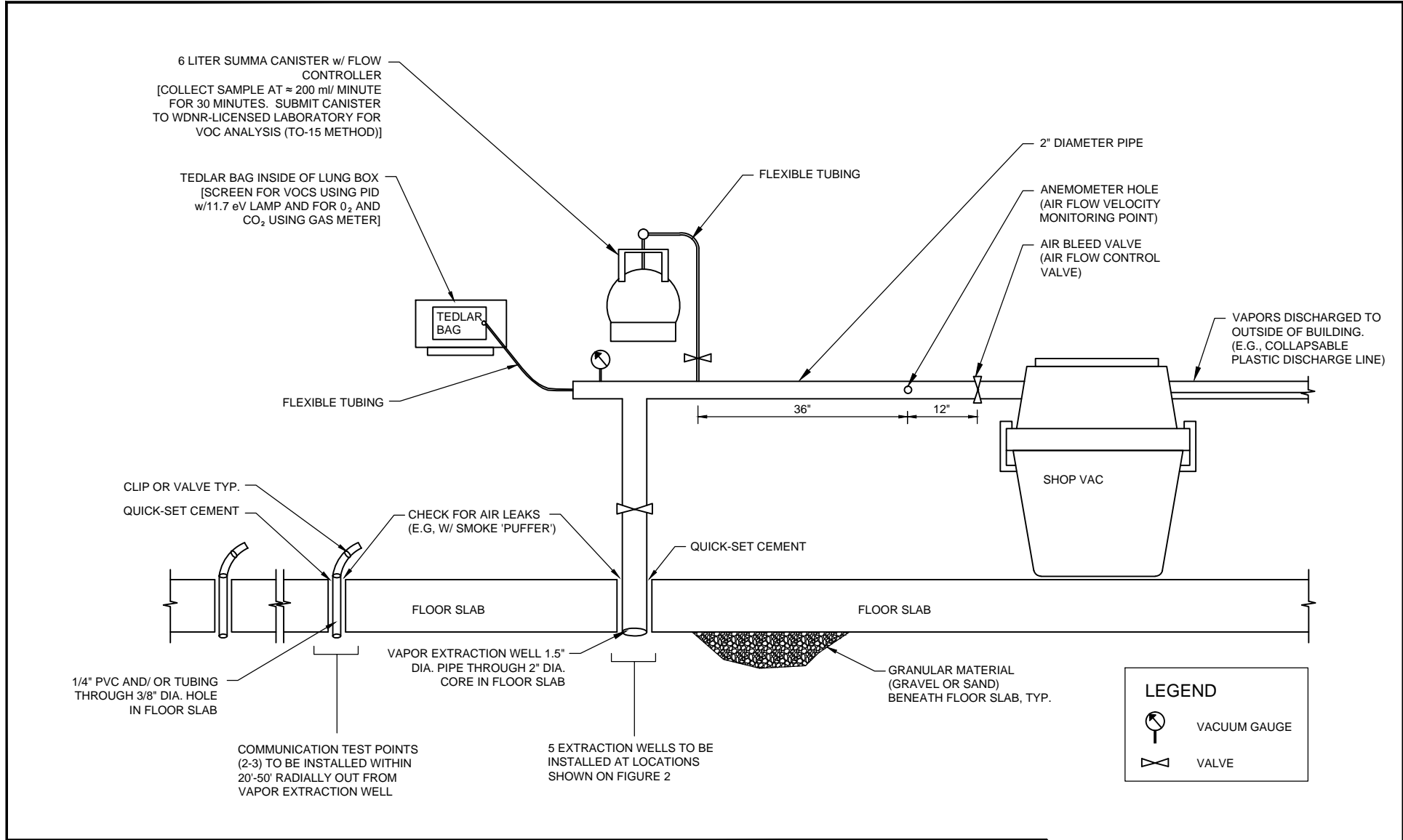
415 S. OLDE ONEIDA STREET APARTMENT BUILDING FEATURES

MAY 2016 TECHNICAL MEMORANDUM
FORMER APPLETON MANUFACTURED GAS PLANT (MGP) FACILITY
WE ENERGIES
APPLETON, WISCONSIN

PROJECT NO: 1508

FIGURE NO: 1





HIGH PURGE VOLUME SUB-SLAB VAPOR SAMPLING SCHEMATIC



PROJECT NO.

DRAWING NO.

FIGURE NO.
 Figure 2

DRAWN: DMD DATE: 07/28/14

CHK'D: .

DATE: .

APP'D: KQY DATE: 07/30/14

TABLES

Table 1. Field Screening Results - High Purge Volume Sub-Slab Vapor Sampling

Technical Memorandum- High Purge Volume Subslab Vapor Results
 We Energies, Appleton City (Coal Tar), aka Appleton MGP
 WDNR ERP Case #02-45-000042

| High Purge Volume Sub-Slab (HPV SS) Vapor Extraction Point | Date | Time | Elapsed Time (minutes) | Cumulated Volume Removed (cubic feet) | VOCs by PID (ppmv) | O ₂ (%) | CO ₂ (%) | Communication Test Point | Distance from HPV SS Vapor Extraction Point (ft) | Vacuum (in H ₂ O) |
|--|---------|-------|------------------------|---------------------------------------|--------------------|--------------------|-----------------------|--------------------------|--|------------------------------|
| SS-1 | | | | | | | | | | |
| Extraction Velocity: 1650 ft/min | 3/30/16 | 12:10 | | | 0.2 | 21.0 | 0.1 | SS-1A | 9.75 | -0.001, -0.001 |
| Extraction Vacuum: 27.2 in H ₂ O | | 12:51 | 41 | 1475 | 0.2 | 20.9 | 0.1 | SS-1B | 35.4 | -0.000, -0.001 |
| Extraction Flow Rate: 36.0 cfm | | | | | | | | SS-1C | 49.9 | -0.000, -0.000 |
| SS-2 | | | | | | | | | | |
| Extraction Velocity: 2150 ft/min | 3/30/16 | 13:47 | | | 0.2 | 21.0 | 0.0 | SS-5A | 10.7 | -0.000, -0.000 |
| Extraction Vacuum: 27.2 in H ₂ O | | 14:24 | 37 | 1735 | 0.2 | 21.0 | 0.0 | SS-5B | 24.7 | -0.000, -0.000 |
| Extraction Flow Rate: 46.9 cfm | | | | | | | | | | |
| | | | | | | | measured with GEM2000 | | [O=NRK, C=BGH 5/6/16] | |

Notes:

- | | |
|---|--|
| 1. VOCs - volatile organic compounds | 5. CO ₂ - carbon dioxide |
| 2. PID - photoionization detector with a 11.7 eV lamp | 6. ft/min - feet per minute |
| 3. ppmv - parts per million by volume | 7. in H ₂ O - inches of water |
| 4. O ₂ - oxygen | 8. cfm - cubic feet per minute |

Table 2. Summary of Soil Vapor Results

Technical Memorandum- High Purge Volume Subslab Vapor Results
 We Energies, Appleton City (Coal Tar), aka Appleton MGP
 WDNR ERP Case #02-45-000042

| Field Sample ID ^(b) | Sample Location | Screened Interval Depth (ft bgs) | Sample Date | Volatile Organic Compounds | | | | | Organics & Inorganics | | |
|--|-----------------|----------------------------------|-------------|------------------------------|-----------------------------------|--|------------------------------|-------------------------------------|------------------------|-----------------|----------------|
| | | | | Benzene (ug/m ³) | Ethylbenzene (ug/m ³) | Naphthalene (VOC) (ug/m ³) | Toluene (ug/m ³) | Xylenes, Total (ug/m ³) | Carbon Dioxide (mol %) | Methane (mol %) | Oxygen (mol %) |
| Residential Vapor Risk Screening Level (VRSL) for Sub-Slab and Shallow Soil Gas ^(a) | | | | 120 | 370 | 28 | 170,000 | 3,300 | NS | NS | NS |
| SS-1 | SS-1 | Subslab | 03/30/2016 | 0.13 J | 0.24 J | < 0.41 U | 0.46 J | 2.0 J | 0.09 | < 0.02 U | 17.4 |
| Dup-01 | DUP1 SS-1 | Subslab | 03/30/2016 | 0.22 J | 0.18 J | 0.64 J | 0.51 J | 1.5 J | 0.06 J | < 0.02 U | 17.5 |
| SS-5 | SS-5 | Subslab | 03/30/2016 | 0.34 J | 0.35 J | < 0.4 U | 2.0 | 2.6 J | 0.04 J | < 0.02 U | 17.5 |

[O:ECK 4/18/16, C:SGW 4/19/16]

Notes:

< = less than

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit

U = Concentration was not detected above the reported limit

NS = no standard

DUP = Duplicate quality control sample

ft bgs = feet below ground surface

mol % = mole percent

ug/m³ = micrograms per cubic meter

(a) Vapor Risk Screening Levels (VRSLs) based on December 2015 U.S.EPA Regional Screening Level Tables:

<http://dnr.wi.gov/topic/Brownfields/documents/vapor/vapor-quick.pdf>

(b) Field Sample ID shown as listed on the COC and in the Lab Report

Table 3. Radius of Influence Calculations

Technical Memorandum- High Purge Volume Subslab Vapor Results
We Energies, Appleton City (Coal Tar), aka Appleton MGP
WDNR ERP Case #02-45-000042

Equation:

$$r \text{ (feet)} = \left(\frac{V}{3.14 * h * \theta a} \right)^{0.5}$$

(Equation from McAlary)

where:

- | | | |
|---|---|---|
| r | = radius of vacuum influence (feet from HPV SS vapor extraction point) | |
| V | = volume of gas extracted | varied by HPV SS extraction point (see Table 1) |
| h | = vertical thickness of the granular fill layer | assumed 1 ft |
| θ | = average volumetric air filled porosity (cm ³ air/cm ³ soil = dimensionless) | assumed 30 % |

SS-1

- | | |
|---|-------------------|
| V | = 1475 cubic feet |
| r | = 40 feet |

SS-5

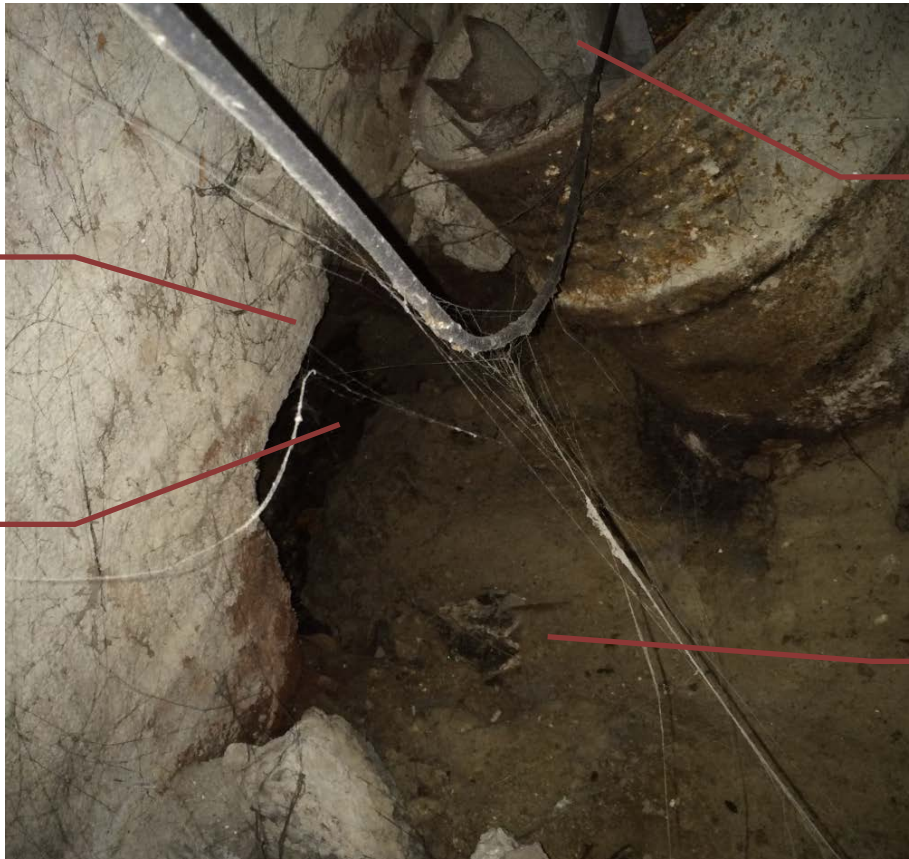
- | | |
|---|-------------------|
| V | = 1735 cubic feet |
| r | = 43 feet |

ATTACHMENT 1

PHOTO LOG

Archway with opening to the east

Water moving to the east is not visible in photo



Open drum containing debris

Ground is covered in debris but dry

Photo Number: 1

Date of Photo: September 2015

Description: Photo of archway through the east wall of the boiler room, originally provided as Photo 7 of the December 2015 VI Tech Memo

Creator: BGH



Note cross beams supporting the slab of the occupied space

Note standing water rather than a trickle

Photo Number: 2
Date of Photo: March 2016
Description: Photo looking east through the archway (Photo 1) below occupied units east of the boiler room
Creator: BGH



Note cross beams supporting the slab of the boiler room, similar to those beneath occupied space

Photo Number: 3

Date of Photo: March 2016

Description: Photo looking north beneath the boiler room slab and garage floor

Creator: BGH

ATTACHMENT 2
STAT LABORATORY REPORTS

STAT Analysis Corporation

2242 West Harrison St., Suite 200, Chicago, IL 60612-3766

Tel: (312) 733-0551 Fax: (312) 733-2386 STATinfo@STATAnalysis.com

Accreditations: IEPA ELAP 100445; ORELAP IL300001; AIHA-LAP, LLC 101160; NVLAP LabCode 101202-0

April 07, 2016

Natural Resource Technology, Inc.

415A S. 3rd Street

Milwaukee, WI 53204

Telephone: (414) 837-3607

Fax: (262) 523-9001

Analytical Report for STAT Work Order: 16040024 Revision 0

RE: 1508.1 / 23.1, Appleton MGP, Appleton, WI

Dear Brian Hennings:

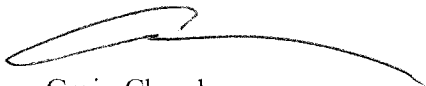
STAT Analysis received 3 samples for the referenced project on 4/1/2016 4:45:00 PM. The analytical results are presented in the following report.

All analyses were performed in accordance with the requirements of 35 IAC Part 186 / NELAC standards. Analyses were performed in accordance with methods as referenced on the analytical report. Those analytical results expressed on a dry weight basis are also noted on the analytical report.

All analyses were performed within established holding time criteria, and all Quality Control criteria met EPA or laboratory specifications except when noted in the Case Narrative or Analytical Report. If required, an estimate of uncertainty for the analyses can be provided. A listing of accredited methods/parameters can also be provided.

Thank you for the opportunity to serve you and I look forward to working with you in the future. If you have any questions regarding the enclosed materials, please contact me at (312) 733-0551.

Sincerely,



Craig Chawla

Project Manager

The information contained in this report and any attachments is confidential information intended only for the use of the individual or entities named above. The results of this report relate only to the samples tested. If you have received this report in error, please notify us immediately by phone. This report shall not be reproduced, except in its entirety, unless written approval has been obtained from the laboratory. This analytical report shall become property of the Customer upon payment in full. Otherwise, STAT will be under no obligation to support, defend or discuss the analytical report.

Client: Natural Resource Technology, Inc.
Project: 1508.1 / 23.1, Appleton MGP, Appleton, WI
Work Order: 16040024 Revision 0

Work Order Sample Summary

| Lab Sample ID | Client Sample ID | Tag Number | Collection Date | Date Received |
|----------------------|-------------------------|-------------------|------------------------|----------------------|
| 16040024-001A | SS-1 | | 3/30/2016 12:51:00 PM | 4/1/2016 |
| 16040024-002A | SS-5 | | 3/30/2016 2:24:00 PM | 4/1/2016 |
| 16040024-003A | Dup-01 | | 3/30/2016 | 4/1/2016 |

CLIENT: Natural Resource Technology, Inc.
Project: 1508.1 / 23.1, Appleton MGP, Appleton, WI
Work Order: 16040024 Revision 0

CASE NARRATIVE

TO-15 results that are reported in $\mu\text{g}/\text{m}^3$ are calculated based on a temperature of 25°C, atmospheric pressure of 760 mm Hg, and the molecular weight of the analyte.

STAT Analysis Corporation

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Tel: (312) 733-0551 Fax: (312) 733-2386 STATinfo@STATAnalysis.com

Accreditations: IEPA ELAP 100445; ORELAP IL300001; AIHA-LAP, LLC 101160; NVLAP LabCode 101202-0

Report Date: April 07, 2016

ANALYTICAL RESULTS

Print Date: April 07, 2016

CLIENT: Natural Resource Technology, Inc.
Work Order: 16040024 Revision 0
Project: 1508.1 / 23.1, Appleton MGP, Appleton, WI
Lab ID: 16040024-001A

Client Sample ID: SS-1
Tag Number:
Collection Date: 3/30/2016 12:51:00 PM
Matrix: AIR

| Analyses | Result | RL | MDL | Qualifier | Units | DF | Date Analyzed |
|---|--------|------------------|-------|----------------------------|-------|---------------------|---------------|
| Volatile Organic Compounds in Air by GC/MS | | TO-15 | | Prep Date: 4/4/2016 | | Analyst: VP | |
| Benzene | 0.13 | 0.87 | 0.062 | J | µg/m³ | 1 | 4/4/2016 |
| Ethylbenzene | 0.24 | 1.2 | 0.092 | J | µg/m³ | 1 | 4/4/2016 |
| Naphthalene | ND | 1.4 | 0.41 | | µg/m³ | 1 | 4/4/2016 |
| Toluene | 0.46 | 1.0 | 0.12 | J | µg/m³ | 1 | 4/4/2016 |
| Xylenes, Total | 2.0 | 3.5 | 0.25 | J | µg/m³ | 1 | 4/4/2016 |
| Landfill Gases by EPA Method 3c | | METHOD 3C | | Prep Date: | | Analyst: NLM | |
| Carbon Dioxide | 0.09 | 0.08 | 0.02 | | mol % | 2 | 4/4/2016 |
| Methane | ND | 0.10 | 0.02 | | mol % | 2 | 4/4/2016 |
| Oxygen | 17.4 | 0.80 | 0.02 | | mol % | 2 | 4/4/2016 |

| | | |
|--------------------|---|--|
| Qualifiers: | ND - Not Detected at the Reporting Limit | RL/MDL - Reporting Limit / Method Detection Limit for the analysis |
| | J - Analyte detected below reporting limit | S - Spike Recovery outside accepted recovery limits |
| | B - Analyte detected in the associated Method Blank | R - RPD outside accepted recovery limits |
| | HT - Sample received past holding time | E - Value above quantitation range |
| | * - Non-accredited parameter | H - Holding time exceeded |

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Accreditations: IEPA ELAP 100445; ORELAP IL300001; AIHA-LAP, LLC 101160; NVLAP LabCode 101202-0

Report Date: April 07, 2016

ANALYTICAL RESULTS

Print Date: April 07, 2016

CLIENT: Natural Resource Technology, Inc.
Work Order: 16040024 Revision 0
Project: 1508.1 / 23.1, Appleton MGP, Appleton, WI
Lab ID: 16040024-002A

Client Sample ID: SS-5
Tag Number:
Collection Date: 3/30/2016 2:24:00 PM
Matrix: AIR

| Analyses | Result | RL | MDL | Qualifier | Units | DF | Date Analyzed |
|---|--------|------------------|-------|----------------------------|-------|---------------------|---------------|
| Volatile Organic Compounds in Air by GC/MS | | TO-15 | | Prep Date: 4/4/2016 | | Analyst: VP | |
| Benzene | 0.34 | 0.86 | 0.062 | J | µg/m³ | 1 | 4/4/2016 |
| Ethylbenzene | 0.35 | 1.2 | 0.091 | J | µg/m³ | 1 | 4/4/2016 |
| Naphthalene | ND | 1.4 | 0.4 | | µg/m³ | 1 | 4/4/2016 |
| Toluene | 2.0 | 1.0 | 0.11 | | µg/m³ | 1 | 4/4/2016 |
| Xylenes, Total | 2.6 | 3.5 | 0.24 | J | µg/m³ | 1 | 4/4/2016 |
| Landfill Gases by EPA Method 3c | | METHOD 3C | | Prep Date: | | Analyst: NLM | |
| Carbon Dioxide | 0.04 | 0.08 | 0.02 | J | mol % | 2 | 4/4/2016 |
| Methane | ND | 0.10 | 0.02 | | mol % | 2 | 4/4/2016 |
| Oxygen | 17.5 | 0.80 | 0.02 | | mol % | 2 | 4/4/2016 |

| | | |
|--------------------|---|--|
| Qualifiers: | ND - Not Detected at the Reporting Limit | RL/MDL - Reporting Limit / Method Detection Limit for the analysis |
| | J - Analyte detected below reporting limit | S - Spike Recovery outside accepted recovery limits |
| | B - Analyte detected in the associated Method Blank | R - RPD outside accepted recovery limits |
| | HT - Sample received past holding time | E - Value above quantitation range |
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Accreditations: IEPA ELAP 100445; ORELAP IL300001; AIHA-LAP, LLC 101160; NVLAP LabCode 101202-0

Report Date: April 07, 2016

ANALYTICAL RESULTS

Print Date: April 07, 2016

CLIENT: Natural Resource Technology, Inc.
Work Order: 16040024 Revision 0
Project: 1508.1 / 23.1, Appleton MGP, Appleton, WI
Lab ID: 16040024-003A

Client Sample ID: Dup-01
Tag Number:
Collection Date: 3/30/2016
Matrix: AIR

| Analyses | Result | RL | MDL | Qualifier | Units | DF | Date Analyzed |
|---|--------|------------------|-------|----------------------------|-------|---------------------|---------------|
| Volatile Organic Compounds in Air by GC/MS | | TO-15 | | Prep Date: 4/4/2016 | | Analyst: VP | |
| Benzene | 0.22 | 0.86 | 0.062 | J | µg/m³ | 1 | 4/4/2016 |
| Ethylbenzene | 0.18 | 1.2 | 0.091 | J | µg/m³ | 1 | 4/4/2016 |
| Naphthalene | 0.64 | 1.4 | 0.4 | J | µg/m³ | 1 | 4/4/2016 |
| Toluene | 0.51 | 1.0 | 0.11 | J | µg/m³ | 1 | 4/4/2016 |
| Xylenes, Total | 1.5 | 3.5 | 0.24 | J | µg/m³ | 1 | 4/4/2016 |
| Landfill Gases by EPA Method 3c | | METHOD 3C | | Prep Date: | | Analyst: NLM | |
| Carbon Dioxide | 0.06 | 0.08 | 0.02 | J | mol % | 2 | 4/4/2016 |
| Methane | ND | 0.10 | 0.02 | | mol % | 2 | 4/4/2016 |
| Oxygen | 17.5 | 0.80 | 0.02 | | mol % | 2 | 4/4/2016 |

| | | |
|--------------------|---|--|
| Qualifiers: | ND - Not Detected at the Reporting Limit | RL/MDL - Reporting Limit / Method Detection Limit for the analysis |
| | J - Analyte detected below reporting limit | S - Spike Recovery outside accepted recovery limits |
| | B - Analyte detected in the associated Method Blank | R - RPD outside accepted recovery limits |
| | HT - Sample received past holding time | E - Value above quantitation range |
| | * - Non-accredited parameter | H - Holding time exceeded |

Sample Receipt Checklist

Client Name NRT

Work Order Number 16040024

Checklist completed by: Martin Jure 4/1/16
Signature Date

Date and Time Received: 4/1/2016 4:45:00 PM

Received by: MGK

Reviewed by: [Signature] 4/4/16
Initials Date

Matrix: _____ Carrier name STAT Analysis

- Shipping container/cooler in good condition? Yes No Not Present
- Custody seals intact on shipping container/cooler? Yes No Not Present
- Custody seals intact on sample bottles? Yes No Not Present
- Chain of custody present? Yes No
- Chain of custody signed when relinquished and received? Yes No
- Chain of custody agrees with sample labels/containers? Yes No
- Samples in proper container/bottle? Yes No
- Sample containers intact? Yes No
- Sufficient sample volume for indicated test? Yes No
- All samples received within holding time? Yes No
- Container or Temp Blank temperature in compliance? Yes No Temperature Ambient °C
- Water - VOA vials have zero headspace? No VOA vials submitted Yes No
- Water - Samples pH checked? Yes No Checked by: _____
- Water - Samples properly preserved? Yes No pH Adjusted? _____

Any No response must be detailed in the comments section below.

Comments: _____

Client / Person contacted: _____ Date contacted: _____ Contacted by: _____

Response: _____

CLIENT: Natural Resource Technology, Inc.
Work Order: 16040024
Project: 1508.1 / 23.1, Appleton MGP, Appleton, WI

ANALYTICAL QC SUMMARY REPORT

Air Toxics
BatchID: R119941

ANALYTICAL RUN SUMMARY

| SeqNo | Sample ID | Type | Test Code | Batch | DF | Date Analyzed |
|---------|------------------|------|-----------|---------|----|------------------|
| 3242355 | BFB040416-6 | TUNE | BFB | R119941 | 1 | 04/04/2016 14:32 |
| 3242359 | CCV040416-6 5.0 | CCV | TO_15A+ | R119941 | 1 | 04/04/2016 14:32 |
| 3242360 | C040116B | MBLK | TO_15A+ | R119941 | 1 | 04/04/2016 15:07 |
| 3242361 | MB040416-6 | MBLK | TO_15A+ | R119941 | 1 | 04/04/2016 15:42 |
| 3242835 | MB040416-6 | MBLK | TO_15UG+ | R119941 | 1 | 04/04/2016 15:42 |
| 3242362 | LCS040416-6 5.0 | LCS | TO_15A+ | R119941 | 1 | 04/04/2016 16:17 |
| 3242836 | LCS040416-6 5.0 | LCS | TO_15UG+ | R119941 | 1 | 04/04/2016 16:17 |
| 3242363 | LCSD040416-6 5.0 | LCSD | TO_15A+ | R119941 | 1 | 04/04/2016 16:52 |
| 3242837 | LCSD040416-6 5.0 | LCSD | TO_15UG+ | R119941 | 1 | 04/04/2016 16:52 |
| 3242817 | 16040024-001A | SAMP | TO_15A+ | 91117 | 1 | 04/04/2016 17:59 |
| 3242874 | 16040024-001A | SAMP | TO_15UG+ | 91117 | 1 | 04/04/2016 17:59 |
| 3242818 | 16040024-002A | SAMP | TO_15A+ | 91117 | 1 | 04/04/2016 18:32 |
| 3242875 | 16040024-002A | SAMP | TO_15UG+ | 91117 | 1 | 04/04/2016 18:32 |
| 3242819 | 16040024-003A | SAMP | TO_15A+ | 91117 | 1 | 04/04/2016 19:22 |
| 3242876 | 16040024-003A | SAMP | TO_15UG+ | 91117 | 1 | 04/04/2016 19:22 |
| 3242820 | 16040026-001A | SAMP | TO_15A+ | 91117 | 1 | 04/04/2016 19:56 |
| 3242877 | 16040026-001A | SAMP | TO_15UG+ | 91117 | 1 | 04/04/2016 19:56 |
| 3242821 | 16040026-002A | SAMP | TO_15A+ | 91117 | 1 | 04/04/2016 20:31 |
| 3242878 | 16040026-002A | SAMP | TO_15UG+ | 91117 | 1 | 04/04/2016 20:31 |
| 3242822 | 16040026-003A | SAMP | TO_15A+ | 91117 | 1 | 04/04/2016 21:06 |
| 3242879 | 16040026-003A | SAMP | TO_15UG+ | 91117 | 1 | 04/04/2016 21:06 |
| 3242823 | 16040027-001A | SAMP | TO_15A+ | 91117 | 1 | 04/04/2016 21:41 |
| 3242880 | 16040027-001A | SAMP | TO_15UG+ | 91117 | 1 | 04/04/2016 21:41 |
| 3242824 | 16040027-002A | SAMP | TO_15A+ | 91117 | 1 | 04/05/2016 08:43 |
| 3242881 | 16040027-002A | SAMP | TO_15UG+ | 91117 | 1 | 04/05/2016 08:43 |
| 3242825 | 16040027-003A | SAMP | TO_15A+ | 91117 | 1 | 04/05/2016 09:17 |
| 3242882 | 16040027-003A | SAMP | TO_15UG+ | 91117 | 1 | 04/05/2016 09:17 |
| 3242826 | 16040038-008A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 09:51 |
| 3242883 | 16040038-008A | SAMP | TO_15UG+ | 91089 | 1 | 04/05/2016 09:51 |
| 3242827 | 16040038-009A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 10:26 |
| 3242884 | 16040038-009A | SAMP | TO_15UG+ | 91089 | 1 | 04/05/2016 10:26 |
| 3242828 | 16040038-010A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 10:58 |
| 3242885 | 16040038-010A | SAMP | TO_15UG+ | 91089 | 1 | 04/05/2016 10:58 |
| 3242829 | 16040038-011A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 11:30 |
| 3242886 | 16040038-011A | SAMP | TO_15UG+ | 91089 | 1 | 04/05/2016 11:30 |
| 3242830 | 16040038-012A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 12:05 |
| 3242887 | 16040038-012A | SAMP | TO_15UG+ | 91089 | 1 | 04/05/2016 12:05 |
| 3242831 | 16040038-013A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 12:39 |
| 3242888 | 16040038-013A | SAMP | TO_15UG+ | 91089 | 1 | 04/05/2016 12:39 |
| 3242832 | 16040074-001A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 13:12 |
| 3242833 | 16040074-002A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 13:44 |
| 3242834 | 16040074-003A | SAMP | TO_15A+ | 91089 | 1 | 04/05/2016 14:19 |

QC SUMMARY

Qualifiers: ND - Not Detected at the Reporting Limit S - Spike Recovery outside accepted recovery limits B - Analyte detected in the associated Method Blank
 J - Analyte detected below quantitation limits R - RPD outside accepted recovery limits E - Value above quantitation range
 * - Non Accredited Parameter H/HT - Holding Time Exceeded

CLIENT: Natural Resource Technology, Inc.
Work Order: 16040024
Project: 1508.1 / 23.1, Appleton MGP, Appleton, WI

ANALYTICAL QC SUMMARY REPORT

Air Toxics
BatchID: R119941

| Sample ID: | Customer ID: | SampType: | Units: | TestNo: | Prep Date: | Analysis Date: | Run ID: | SeqNo: | | | |
|-------------------|--------------|-------------|--------------|--------------|------------|-----------------|----------------------|----------------|------|-----------|------|
| MB040416-6 | ZZZZZ | MBLK | µg/m³ | TO-15 | | 4/4/2016 | VOA-6_160404A | 3242835 | | | |
| Analyte | Result | PQL | SPK value | SPK Ref Val | % REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |

| | | | | | | | | | | | |
|----------------|---------|------|--|--|--|--|--|--|--|--|---|
| Benzene | 0.06389 | 0.64 | | | | | | | | | J |
| Ethylbenzene | ND | 0.87 | | | | | | | | | |
| Naphthalene | ND | 0.26 | | | | | | | | | |
| Toluene | ND | 0.75 | | | | | | | | | |
| Xylenes, Total | ND | 2.6 | | | | | | | | | |

| Sample ID: | Customer ID: | SampType: | Units: | TestNo: | Prep Date: | Analysis Date: | Run ID: | SeqNo: | | | |
|------------------------|--------------|------------|--------------|--------------|------------|-----------------|----------------------|----------------|------|-----------|------|
| LCS040416-6 5.0 | ZZZZZ | LCS | µg/m³ | TO-15 | | 4/4/2016 | VOA-6_160404A | 3242836 | | | |
| Analyte | Result | PQL | SPK value | SPK Ref Val | % REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |

| | | | | | | | | | | | |
|----------------|-------|------|-------|---------|------|----|-----|---|---|--|--|
| Benzene | 13.19 | 0.64 | 15.97 | 0.06389 | 82.2 | 70 | 130 | 0 | 0 | | |
| Ethylbenzene | 19.06 | 0.87 | 21.71 | 0 | 87.8 | 70 | 130 | 0 | 0 | | |
| Naphthalene | 24.01 | 0.26 | 26.21 | 0 | 91.6 | 70 | 130 | 0 | 0 | | |
| Toluene | 16.81 | 0.75 | 18.84 | 0 | 89.2 | 70 | 130 | 0 | 0 | | |
| Xylenes, Total | 56.4 | 2.6 | 65.13 | 0 | 86.6 | 70 | 130 | 0 | 0 | | |

| Sample ID: | Customer ID: | SampType: | Units: | TestNo: | Prep Date: | Analysis Date: | Run ID: | SeqNo: | | | |
|-------------------------|--------------|-------------|--------------|--------------|------------|-----------------|----------------------|----------------|------|-----------|------|
| LCSD040416-6 5.0 | ZZZZZ | LCSD | µg/m³ | TO-15 | | 4/4/2016 | VOA-6_160404A | 3242837 | | | |
| Analyte | Result | PQL | SPK value | SPK Ref Val | % REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |

| | | | | | | | | | | | |
|----------------|-------|------|-------|---------|------|----|-----|-------|-------|----|--|
| Benzene | 13.23 | 0.64 | 15.97 | 0.06389 | 82.4 | 70 | 130 | 13.19 | 0.242 | 25 | |
| Ethylbenzene | 19.15 | 0.87 | 21.71 | 0 | 88.2 | 70 | 130 | 19.06 | 0.455 | 25 | |
| Naphthalene | 23.96 | 0.26 | 26.21 | 0 | 91.4 | 70 | 130 | 24.01 | 0.219 | 25 | |
| Toluene | 16.84 | 0.75 | 18.84 | 0 | 89.4 | 70 | 130 | 16.81 | 0.224 | 25 | |
| Xylenes, Total | 57.31 | 2.6 | 65.13 | 0 | 88 | 70 | 130 | 56.4 | 1.60 | 25 | |

Qualifiers: ND - Not Detected at the Reporting Limit S - Spike Recovery outside accepted recovery limits B - Analyte detected in the associated Method Blank
 J - Analyte detected below quantitation limits R - RPD outside accepted recovery limits E - Value above quantitation range
 * - Non Accredited Parameter H/HT - Holding Time Exceeded

CLIENT: Natural Resource Technology, Inc.
 Work Order: 16040024
 Project: 1508.1 / 23.1, Appleton MGP, Appleton, WI

ANALYTICAL QC SUMMARY REPORT

Air Toxics
BatchID: R119871

ANALYTICAL RUN SUMMARY

| SeqNo | Sample ID | Type | Test Code | Batch | DF | Date Analyzed |
|---------|------------------|------|-----------|---------|----|------------------|
| 3240685 | CCV040416-3C L3 | CCV | EPA_3C | R119871 | 1 | 04/04/2016 11:53 |
| 3240705 | LCS040416-3C L3 | LCS | EPA_3C | R119871 | 2 | 04/04/2016 12:17 |
| 3240706 | MB040416-3C | MBLK | EPA_3C | R119871 | 2 | 04/04/2016 12:30 |
| 3240707 | 16040024-001A | SAMP | EPA_3C | R119871 | 2 | 04/04/2016 12:44 |
| 3240709 | 16040024-001A | DUP | EPA_3C | R119871 | 2 | 04/04/2016 13:03 |
| 3240710 | 16040024-002A | SAMP | EPA_3C | R119871 | 2 | 04/04/2016 13:21 |
| 3240711 | 16040024-002A | DUP | EPA_3C | R119871 | 2 | 04/04/2016 13:36 |
| 3240712 | 16040024-003A | SAMP | EPA_3C | R119871 | 2 | 04/04/2016 13:51 |
| 3240716 | 16040024-003A | DUP | EPA_3C | R119871 | 2 | 04/04/2016 14:10 |
| 3240719 | CCV040416C-3C L3 | CCV | EPA_3C | R119871 | 1 | 04/04/2016 14:26 |

QC SUMMARY

| Sample ID: | Customer ID: | SampType: | Units: | TestNo: | Prep Date: | Analysis Date: | Run ID: | SeqNo: | | | |
|--------------------|--------------|-------------|--------------|------------------|------------|-----------------|------------------------|----------------|------|-----------|------|
| MB040416-3C | ZZZZZ | MBLK | mol % | Method 3c | | 4/4/2016 | GC-TCD1_160404A | 3240706 | | | |
| Analyte | Result | PQL | SPK value | SPK Ref Val | % REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |

| | | | | | | | | | | | |
|----------------|----|--------|--|--|--|--|--|--|--|--|--|
| Carbon Dioxide | ND | 0.0800 | | | | | | | | | |
| Methane | ND | 0.100 | | | | | | | | | |
| Oxygen | ND | 0.800 | | | | | | | | | |

| Sample ID: | Customer ID: | SampType: | Units: | TestNo: | Prep Date: | Analysis Date: | Run ID: | SeqNo: | | | |
|------------------------|--------------|------------|--------------|------------------|------------|-----------------|------------------------|----------------|------|-----------|------|
| LCS040416-3C L3 | ZZZZZ | LCS | mol % | Method 3c | | 4/4/2016 | GC-TCD1_160404A | 3240705 | | | |
| Analyte | Result | PQL | SPK value | SPK Ref Val | % REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |

| | | | | | | | | | | | |
|----------------|-------|--------|-----|---|------|----|-----|---|---|--|--|
| Carbon Dioxide | 0.624 | 0.0800 | 0.6 | 0 | 104 | 80 | 120 | 0 | 0 | | |
| Methane | 0.976 | 0.100 | 1 | 0 | 97.6 | 80 | 120 | 0 | 0 | | |
| Oxygen | 0.812 | 0.800 | 0.8 | 0 | 102 | 80 | 120 | 0 | 0 | | |

| Sample ID: | Customer ID: | SampType: | Units: | TestNo: | Prep Date: | Analysis Date: | Run ID: | SeqNo: | | | |
|----------------------|--------------|------------|--------------|------------------|------------|-----------------|------------------------|----------------|------|-----------|------|
| 16040024-001A | SS-1 | DUP | mol % | Method 3c | | 4/4/2016 | GC-TCD1_160404A | 3240709 | | | |
| Analyte | Result | PQL | SPK value | SPK Ref Val | % REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |

| | | | | | | | | | | | |
|----------------|-------|--------|---|---|---|---|---|-------|-------|---|--|
| Carbon Dioxide | 0.09 | 0.0800 | 0 | 0 | 0 | 0 | 0 | 0.094 | 4.35 | 5 | |
| Methane | ND | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | |
| Oxygen | 17.46 | 0.800 | 0 | 0 | 0 | 0 | 0 | 17.39 | 0.379 | 5 | |

| Sample ID: | Customer ID: | SampType: | Units: | TestNo: | Prep Date: | Analysis Date: | Run ID: | SeqNo: | | | |
|----------------------|--------------|------------|--------------|------------------|------------|-----------------|------------------------|----------------|------|-----------|------|
| 16040024-002A | SS-5 | DUP | mol % | Method 3c | | 4/4/2016 | GC-TCD1_160404A | 3240711 | | | |
| Analyte | Result | PQL | SPK value | SPK Ref Val | % REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |

| | | | | | | | | | | | |
|----------------|-------|--------|---|---|---|---|---|-------|--------|---|---|
| Carbon Dioxide | 0.038 | 0.0800 | 0 | 0 | 0 | 0 | 0 | 0.036 | 0 | 5 | J |
| Methane | ND | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | |
| Oxygen | 17.53 | 0.800 | 0 | 0 | 0 | 0 | 0 | 17.54 | 0.0798 | 5 | |

| Sample ID: | Customer ID: | SampType: | Units: | TestNo: | Prep Date: | Analysis Date: | Run ID: | SeqNo: | | | |
|----------------------|---------------|------------|--------------|------------------|------------|-----------------|------------------------|----------------|------|-----------|------|
| 16040024-003A | Dup-01 | DUP | mol % | Method 3c | | 4/4/2016 | GC-TCD1_160404A | 3240716 | | | |
| Analyte | Result | PQL | SPK value | SPK Ref Val | % REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |

| | | | | | | | | | | | |
|----------------|-------|--------|---|---|---|---|---|-------|-------|---|---|
| Carbon Dioxide | 0.068 | 0.0800 | 0 | 0 | 0 | 0 | 0 | 0.064 | 0 | 5 | J |
| Methane | ND | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | |
| Oxygen | 17.56 | 0.800 | 0 | 0 | 0 | 0 | 0 | 17.5 | 0.377 | 5 | |

Qualifiers: ND - Not Detected at the Reporting Limit S - Spike Recovery outside accepted recovery limits B - Analyte detected in the associated Method Blank
 J - Analyte detected below quantitation limits R - RPD outside accepted recovery limits E - Value above quantitation range
 * - Non Accredited Parameter H/HT - Holding Time Exceeded