Risk Evaluation Report

Former Freedom Industries – Etowah River Terminal

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Prepared for:

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Executive Summary

This document presents a risk evaluation, including data assessment and conceptual site model (CSM) evaluation for the Former Freedom Industries – Etowah River Terminal in Charleston, West Virginia. The risk evaluation was completed following the West Virginia Department of Environmental Protection (WVDEP) rules, regulations, and guidelines outlined in the Title 60 Code of State Regulations, Series 3 Voluntary Remediation and Redevelopment Rule (referred to as the "Rule" in this report) [WVDEP 2017a] and the West Virginia Voluntary Remediation and Redevelopment Act (WV VRRA) Guidance Manual [WVDEP 2001].

The most recent De Minimis standards (effective June 1, 2017) [WVDEP 2017b] were utilized to screen the analytical data. This screening process was then used to determine constituents of concern (COC). Soil analytical data were screened against the WVDEP industrial soil, residential soil, and migration to groundwater De Minimis standards. Groundwater analytical data were screened against the WVDEP groundwater De Minimis standards and the USEPA commercial and residential Vapor Intrusion Screening Levels (VISLs) for groundwater. Sediment analytical data from sediment collected below the water line were conservatively screened against WVDEP industrial soil and residential soil De Minimis standards for evaluation of human health and USEPA Region III freshwater sediment Biological Technical Assistance Ground (BTAG) screening values for ecological receptors. Surface water analytical data were screened against WVDEP and USEPA water quality criteria for human health and aquatic life as well as USEPA Region III freshwater BTAG screening values. Collected surface runoff from the sumps on-site were screened against WVDEP groundwater De Minimis standards.

Based on the screened analytical data, there were direct contact COC retained in surface soil, subsurface soil, groundwater from monitoring wells, water samples from sumps, and estimated surface water concentrations calculated from groundwater concentrations using WVDEP-derived dilution factors. There were no direct contact COC retained in sediment or grab surface water samples from the Elk River or diversion trench. In addition, there were no vapor intrusion COC retained in groundwater.

Migration routes were retained based on the detection of constituents in a media and the potential for those constituents to migrate within the media or to another media. The retained migration routes included:

- On-site Surface Soil: volatilization of constituents to outdoor air, particulate emission of constituents to outdoor air, leaching of constituents from surface soil to subsurface soil and then to groundwater, and overland flow of constituents to surface water;

- On-site Subsurface Soil: volatilization of constituents to outdoor air, particulate emission of constituents to outdoor air (exposed during intrusive activities), and leaching of constituents from subsurface soil to groundwater;

- On-site Groundwater: migration of constituents from on-site groundwater to off-site surface water; and,

- Off-site Sediment: migration of adsorbed constituents on sediment below the water line to downriver locations.

Based on the current use and anticipated future use of the site, the most likely receptors were evaluated. The receptors evaluated in this report included the following:

- Current and Future On-Site Trespasser

- Future On-Site Facility Worker

- Future On-Site Indoor Worker

- Future On-Site Construction Worker/Utility Worker

- Current and Future Off-Site Recreational User

- Current and Future Ecological Receptors

Potential exposure pathways were evaluated for each of these receptors. Based on the receptor and exposure pathway analysis, there were no exposure pathways retained for a quantitative risk assessment for any of the receptors evaluated in this report. Exposure pathways were not retained because either there were no exceedances of applicable screening criteria (and therefore no COC retained), the exposure pathway was determined to be de minimis (e.g. an exposure pathway that is potentially complete, but unlikely to result in a risk/hazard index benchmark exceedance), or the exposure pathway will be made incomplete by means of an activity and use

limitation (AUL) which will be recorded in a land use covenant (LUC).

An ecological screening was completed for the site. The "Checklist to Determine the Applicable Ecological Standard", provided in Appendix C-2 of the WV VRRA Guidance Manual [WVDEP 2001], was used in the ecological screening process. The checklist follows the ecological De Minimis screening evaluation outlined in Section 9.5 of the Rule [WVDEP 2017a]. The ecological checklist, indicated "no further ecological evaluation is required" for the site. An evaluation of site conditions concluded that it is unlikely that the site would serve as a habitat for terrestrial species.

The groundwater to surface water evaluation for human health and ecological receptors were evaluated in two ways: one using measured grab surface water samples and one using modeled groundwater concentrations from monitoring wells located closest to the Elk River. There were no constituents detected in the grab surface water samples collected from the Elk River and, therefore, no COC retained in grab surface water samples. However, for those constituents that were not analyzed in grab surface water samples, modeled groundwater results were used instead. The maximum concentrations from groundwater monitoring wells located closest to the Elk River were divided by WVDEP-derived dilution factors to estimate surface water concentrations. These calculated surface water concentrations were then compared to applicable water quality criteria. There were 2 polycyclic aromatic hydrocarbons (PAHs) that slightly exceeded human health water quality criteria and 3 PAHs that slightly exceeded ecological water quality criteria. Although PAHs were not analyzed in grab surface water samples, PAHs tend to be less mobile than the constituents analyzed in the grab surface water samples (e.g. MCHM and PPH). Therefore, since the more mobile MCHM and PPH were not detected in the grab surface water samples, it is unlikely that the less mobile PAHs have migrated to the Elk River. In addition, the calculated surface water concentrations for PAHs are conservative and are likely to be overestimated. In conclusion, human health and ecological receptors were not evaluated further for exposure to constituents in surface water.

An LUC was previously prepared for the property which included several AULs. However, a new LUC will be prepared that will include updated AULs for the property based on this risk evaluation report. These AULs will be placed on the property to maintain incomplete exposure pathways for the receptors evaluated in this report. The AULs will be as follows:

- The property shall be restricted to commercial and industrial use only. The restriction will prohibit use of the property for any residential use, including schools, daycare centers, nursing homes, or any other use considered to be residential in nature.

- Extraction of groundwater at the site for any potable or non-potable use shall be prohibited.

- Excavation or other penetration of the soil on the property and management of any liquid in subsurface structures on the property shall be by a contractor who is qualified and knowledgeable about releases and exposure to contaminants known to exist at the property. The contractor will be required to perform the work in accordance with a site specific Health and Safety Plan developed by an LRS or similarly qualified individual. Alternately, a contractor working under the direct supervision of an LRS, or similarly qualified individual may be used.

- Any future building constructed on the property shall install a vapor barrier or vapor mitigation system unless adequate testing is completed in accordance with WVDEP standards and regulations to evaluate the vapor intrusion exposure pathway.

Note that if any of the exposure assumptions and/or assessment change in the future for this site, the results of this data assessment and conceptual site model report do not apply. The Mahfood Group LLC® is not responsible for the misinterpretation or misuse of this executive summary. It is recommended that the user of this data assessment and conceptual site model report read through the entire report.

1 Introduction

This risk evaluation presents an assessment of post-remediation analytical data and presents a conceptual site model (CSM) for human health and ecological receptors for the Former Freedom Industries – Etowah River Terminal (site) in Charleston, West Virginia. The site is currently entered into the West Virginia Voluntary Remediation Program (VRP) (VRP ID #15017). This report was prepared based on previous reports prepared by other consultants as well as additional information provided by the WVDEP.

This report was completed following the WVDEP rules, regulations, and guidelines outlined in the Title 60 Code of State Regulations, Series 3 Voluntary Remediation and Redevelopment Rule (i.e. the Rule) effective June 2017 [WVDEP 2017a] and the West Virginia Voluntary Remediation and Redevelopment Act Guidance Manual [WVDEP 2001]. In accordance with Section 9.1 of the Rule, each applicant who responds to a release of a contaminant at a site shall select and attain compliance with one or a combination of the following remediation standards in subdivision 9.1.a (i.e. de minimis risk-based standard, uniform risk-based standard, and/or site-specific risk-based standard for human health) and one or a combination of the remediation standards in subdivision 9.1.b (i.e. de minimis ecological screening evaluation, uniform ecological evaluation, and/or site-specific ecological risk-based standard for ecological receptors). This data assessment and CSM report was prepared to attain a combination of the de minimis risk-based standard and uniform risk-based standard for human health (as specified in Section 9.1.a.4 of the Rule) and a combination of de minimis ecological screening evaluation and uniform ecological evaluation (as specified in Section 9.1.b.4 of the Rule).

This report is organized into seven sections including this section (the Introduction). The subsequent sections include:

- Section 2: This section presents the location and description of the site, site history, site investigations, remedial actions, and groundwater use.
- Section 3: This section presents the analytical results and selection of constituents of concern.
- Section 4: This section presents the conceptual site model (CSM) for the site. The

site CSM consists of a hydrogeologic CSM, human health CSM, and an ecological screening.

- Section 5: This section presents the activity and use limitations that will be incorporated in a land use covenant.
- Section 6: This section presents an uncertainty analysis regarding the data assessment and CSM.
- Section 7: This section contains the references cited in this document.

Various tables, figures, and attachments are also presented as part of this document and are referenced where appropriate in the text.

2 Site Background and Setting

This section presents a description of the site location and site features, a history of the site, previous site investigations and remedial actions, and a discussion on groundwater use. Information from previous reports was used to prepare the following sections.

2.1 Site Location and Description

The Former Freedom Industries – Etowah River Terminal was a former liquid bulk storage and distribution facility providing chemicals primarily to the mining industry. The site is located at 1015 Barlow Drive in Charleston, Kanawha County, West Virginia 25311. The property is located at latitude 38° 22' 5.16" north and longitude 81° 36' 23.40" west at an elevation of approximately 617 feet above mean sea level. A site location map is shown as **Figure 1**.

The site is located north of the City of Charleston, WV and borders the Elk River to the west. The ground surface elevation rises steeply from the Elk River toward the site, then plateaus on the site, and continues to increase significantly off-site toward the east. The surface topography within the main portion of the site generally dips slightly to the north.

The site is currently vacant. Since the release of 4-methyl-1-cyclohexane methanol (MCHM) and propylene glycol phenyl ether (PPH) on January 9, 2014, bulk storage and distribution activities have ceased. All above ground storage tanks (ASTs) and associated piping have been removed between August and October 2014. The only structures that remain at the site are an office building and garage building located on the southern side of the site. The southern half of the site is covered primarily with asphalt and the northern half is covered primarily with gravel with some grassy/vegetated areas along the eastern and western sides of the site. There are underground utilities present at the site; however the depths of these utilities are unknown. The current land use of the site is commercial/industrial and will remain commercial/industrial in the future via a land use covenant, which is further discussed in Section 5.

This site is located in a mixed residential and commercial area. The site is bounded to the west/northwest by the Elk River. Along the eastern site boundary are railroad tracks and Barlow Drive. There is a diversion trench that runs parallel along Barlow Drive between

the road and the rail road tracks. The diversion trench was installed as a French drain type system with an impermeable geomembrane liner on the bottom and western side of the north-south portion of the trench. An undeveloped wooded area surrounds the northeast and east side of the site. Residential properties are located south of the site. The closest residence is approximately 75 feet from the southern boundary of the site.

2.2 Site History

The pre-1930 land use was agricultural. In 1930, development of the bulk petroleum storage facility began when Elk Refining Company (Elk) purchased 1.56-acres from Edith Bowers Bailey and Homer Bailey. In 1941, 1947, and 1948, Elk purchased additional property to expand the terminal. In 1950, warehouse/office and garage storage buildings were constructed. Elk merged with Pennzoil United, Inc. (now Pennzoil-Quaker State [PQS]) in 1970 and operated the terminal under that ownership.

In 2001, PQS sold the property to Etowah River Terminal, LLC when the use of the site changed from bulk petroleum storage to storage and distribution of freeze conditioning agents including ethylene glycol and calcium chloride solutions. In addition, coal-cleaning materials, including MCHM were stored and distributed from the site.

The site was entered into a Voluntary Remediation Agreement (VRA) on April 15, 2002. PQS completed environmental sampling under the Voluntary Remediation and Redevelopment Rule (VRRP) to investigate the extent of petroleum related constituents of concern. In October 2004, PQS completed a baseline human health and ecological risk assessment. In December 2004, the WVDEP issued a Certificate of Completion and land use covenant for the site.

On January 9, 2014, a release of 4-methyl-1-cyclohexane methanol (MCHM) and propylene glycol phenyl ether (PPH) occurred from Tank 396. The released material flowed onto the ground surface and into the adjacent Elk River. Bulk storage and distribution activities have ceased since the release. All ASTs and associated piping were removed between August and October 2014.

2.3 Previous Site Investigations

2.3.1 April 2015 Site Investigation Report

A Site Investigation Report was prepared in April 2015 by ARCADIS U.S., Inc. (ARCADIS). The report documents investigative activities between January 2014 and February 2015. The following is a summary of the investigative activities and sampling completed at the site that were documented in the April 2015 Site Investigation Report [ARCADIS 2015]:

- 28 soil samples were collected around of the base of and beneath the ASTs in May and July of 2014.
- Surface and subsurface soil samples were collected in September and October of 2014. A total of 83 surface soil samples (including field duplicate samples) and a total of 80 subsurface soil samples (including field duplicate samples) were collected (designated as "SS", "SB", and "MW").
- 7 soil samples were collected from the diversion trench.
- 10 groundwater wells (MW-3A and MW-8 through MW-13) were installed in October 2014.
- Groundwater samples were collected from groundwater monitoring wells MW-1 through MW-13 between February 2014 and February 2015.
- Groundwater elevation measurements were collected from groundwater monitoring wells MW-1 through MW-13 between August 2014 and February 2015.
- 80 water samples were collected from 4 sumps and the diversion trench between January and December 2014.
- 10 water samples were collected from storm water outfalls between April and September 2014.
- 3 sediment samples were collected in October 2014 from the Elk River: one located upstream at the northern end of the site, one located immediately adjacent to where the majority of the released chemical mixture entered the Elk River, and one located downstream of the barge dock. Sediment samples were collected

below the surface water.

- 3 surface water samples were collected in October 2014 from the Elk River: one located upstream at the northern end of the site, one located immediately adjacent to where the majority of the released chemical mixture entered the Elk River, and one located downstream of the barge dock. Surface water samples were collected from the top of the river surface.

2.3.2 October 2015 Interim Site Assessment Report – Revision No. 1

An Interim Site Assessment Report – Revision No. 1 was prepared in October 2015 by CORE Environmental Services, Inc. (CORE). The report documents investigative activities between August and September 2015. The following is a summary of the investigative activities and sampling completed at the site that were documented in the October 2015 Interim Site Assessment Report – Revision No. 1 [CORE 2015a]:

- An electromagnetic and ground penetrating radar geophysical survey was completed in August 2015.
- A total of 17 test pits were excavated between August and September 2015. The depth of each test pit ranged from 2 to 18 feet below ground surface.
- A total of 44 soil samples (including field duplicate samples) were collected from the test pits.
- A site survey was completed to survey the location of all pertinent site features.

2.3.3 November 2015 VRRP Interim Remedial Action Work Plan

A VRRP Interim Remedial Action Work Plan was prepared in November 2015 by CORE. The work plan presents the proposed excavation and sampling activities that were later implemented in December 2015 and January 2016. The following is a summary of the interim remedial action and sampling activities completed at the site that were proposed in the November 2015 VRRP Interim Remedial Action Work Plan [CORE 2015b]:

- According to the November 2015 report, soil with MCHM and PPH concentrations above laboratory detection limits was targeted for excavation. The excavation was divided into six areas: Area 1A, Area 1B, Area 2, Area 3, Area 4, and Area 5.

- Each excavation area was excavated to the following depths:
  - Area 1A: 0-1 ft-bgs
  - Area 1B: 0-10 ft-bgs
  - Area 2: 0-14 ft-bgs
  - Area 3: 0-14 ft-bgs
  - Area 4: 0-9 ft-bgs
  - Area 5: Test pit samples from this area did not contain concentrations of MCHM or PPH above the laboratory detection limits. Therefore, this area was not excavated according to information from the WVDEP (see **Attachment 1** for WVDEP correspondence)
- Sidewall and floor soil samples were collected during the excavation activities in each area.
  - 17 sidewall and 48 floor samples (including field duplicate samples) were collected in excavation Area 1A.
  - 24 sidewall and 19 floor samples (including field duplicate samples) were collected in excavation Area 1B.
  - 7 sidewall and 5 floor samples (including field duplicate samples) were collected in excavation Area 2.
  - 9 sidewall and 9 floor samples (including field duplicate samples) were collected in excavation Area 3.
  - 6 sidewall and 4 floor samples (including field duplicate samples) were collected in excavation Area 4.
- In Area 5, 3 test pits were completed. One soil sample was collected from each of the 3 test pits.
- All excavation areas were backfilled with clean soil. Therefore, all post-excavation soil samples that were collected from the sidewalls and floors of the excavation areas are subsurface soil samples (i.e. > 2 ft-bgs).

2.4 2016 and 2017 Supplemental Site Investigations

Additional site investigation activities were completed after the December 2015/January 2016 excavation activities. The supplemental analytical data were provided by WVDEP via email on November 9, 2017 (see **Attachment 1** for email correspondence from WVDEP). The following is a summary of the supplemental site investigation and sampling activities conducted in 2016 and 2017:

- 6 post-remediation surface soil samples (designated as "3 Grab" through "8 Grab") were collected in September 2017 from locations along the western site boundary, northern side of the site, and along the eastern site boundary. Storm water runoff that may have contained MCHM or PPH had been stored or managed in these areas. These samples were analyzed for MCHM, PPH, ethylene glycol, and propylene glycol.

- 4 post-remediation surface soil samples (designated as "PCB1 Grab" through "PCB4 Grab") were collected in October 2017 from locations clustered on the northern side of the site. A Phase I Environmental Assessment noted the presence of electrical transformers in this area. These samples were analyzed for polychlorinated biphenyls (PCBs) only.

- Post-remediation groundwater samples were collected in January and February 2016 from groundwater monitoring wells MW-1 through MW-13.

- 3 post-remediation sediment samples (designated as "SD-1 Grab" through "SD-3 Grab"), plus 1 field duplicate sample (i.e. "SD-4 Grab" which is a duplicate of SD-3), were collected in October 2017 from 3 separate locations along the riverbank of the Elk River. SD-1 Grab was collected at the northern upstream end of the site, SD-2 Grab was collected further downstream adjacent to the excavation areas, and SD-3 Grab was collected the furthest downstream at the southern end of the site.

- 2 post-remediation surface water samples (i.e. "1 Grab" and "2 Grab") were collected in September 2017 along the riverbank of the Elk River. 1 Grab was collected at the northern end of the site, and 2 Grab was collected at the southern

end of the site.

- 6 post-remediation surface water samples (i.e. "SW-1 Grab" through "SW-6 Grab"), plus 1 field duplicate sample (i.e. "SW-7 Grab" which is a duplicate of SW-4 Grab), were collected in October 2017 from 3 separate locations along the riverbank of the Elk River. SW-1 Grab and SW-2 Grab were collected at the northern upstream end of the site, SW-3 Grab and SW-4 Grab were collected further downstream adjacent to the excavation areas, and SW-5 Grab and SW-6 Grab were collected the furthest downstream at the southern end of the site. SW-1 Grab, SW-3 Grab, and SW-5 Grab were collected from the upper 6 inches of surface water while SW-2 Grab, SW-4 Grab, and SW-6 Grab were collected from the lower 6 inches of surface water.

- 1 post-remediation water sample and a field duplicate were collected from the diversion trench in February 2016.

- Post-remediation water samples were collected in January/February 2016 from four sumps (i.e. Sump 4, Sump 8, Sump 9, and Sump 10). Sump 4 and Sump 8 were located on the northern side of the site within Area 5. These sumps were backfilled with clean soil during the excavation activities and, therefore, no longer represent an exposure pathway. Sump 9 and Sump 10 are located on the southern side of the site; these sumps are not located within any excavation areas and remain in place.

2.5 Groundwater Use

According to WVDEP correspondence (see **Attachment 1**), a local potable use evaluation was previously completed by IT/Shaw during their assessment related to the previous VRP project. Based on their potable use evaluation, there are no water wells within 2 miles of the site. As a result, the Former Freedom Industries property and immediate surrounding properties are currently connected to a public water supply. Additionally, the current LUC prohibits extraction and use of groundwater from the site. Therefore, there are no current complete groundwater use exposure pathways for on-site receptors. The new land use covenant will also prohibit the use of groundwater for

potable purposes on the Former Freedom Industries property, which will eliminate potential future groundwater use exposure pathways for on-site receptors (see Section 5).

Groundwater predominantly flows west toward the adjacent Elk River. There were constituents detected in the most downgradient groundwater monitoring wells (located closest to the western property boundary). However, there were no detections of site-related constituents in surface water samples collected from the Elk River. In addition, based on a search of the WVDEP Water Resource Management Plan Mapping Tool (available on WVDEP's website), there are no groundwater or surface water intakes located within 0.5 miles of the site (see **Attachment 2**). The closest surface water intake is the WV American Water company surface water intake. However, this surface water intake is greater than 0.5 miles from the site. Therefore, current and future groundwater use exposure pathways were not retained for on-site or off-site receptors.

3 Analytical Results and Selection of Constituents of Concern

This section presents the analytical results for soil (**Tables 3-1 through 3-13**), groundwater (**Tables 3-14a through 3-16**), sediment (**Tables 3-17 through 3-18**), and surface water (**Tables 3-19a through 3-20c**). **Tables 3-1 through 3-20c** present comparisons of the data to applicable screening values to identify constituents of concern (COC) for the site. **Table 3-21** is an analytical sample summary table that presents a summary of the analytical parameters analyzed in each analytical sample, identifies soil samples that were removed or remain after the December 2015/January 2016 excavation activities, and identifies which samples were retained for use in the data assessment in this report.

According to Section 8.2.d of the Rule [WVDEP 2017a] and Section 2.4.1 in the WV VRRA Guidance Manual [WVDEP 2001], at least ten percent of the analytical data utilized in the data screening assessment shall be validated in accordance with standard EPA protocols. Based on information provided by WVDEP, these data validation requirements have been met. The January 2002 scenarios decision tree provided by the WVDEP (available at WVDEP's website: http://www.dep.wv.gov/dlr/oer/voluntarymain/Pages/default.aspx) was consulted for the screening of analytical data and selection of COC.

3.1 Analytical Data

3.1.1 Soil

Surface and subsurface soil samples from various site investigations were evaluated and compared to applicable screening criteria to select constituents of concern. All soil samples collected from previous investigation activities are presented in this report; however, only those soil samples that remain after the December 2015/January 2016 excavation activities were used to select COC. Soil samples were determined to be removed based on information provided by WVDEP, which included information regarding the depths of each excavation area and marked up chain of custody forms that indicated removed soil samples (see **Attachment 1**). This section presents the screened soil sample results and indicates which soil samples were removed and which soil samples remain after site excavation activities.

Soil samples were collected during various investigative phases between September 2014 and October 2017. **Table 3-1** and **Table 3-2** present the analytical results for the surface soil and subsurface soil samples, respectively, that were collected in 2014. **Table 3-3** presents the analytical results for the soil samples that were collected in 2014 beneath the ASTs. **Table 3-4** presents the analytical results for the soil samples that were collected in 2014 from the diversion trench located along the eastern site boundary. These 2014 soil sample results were originally presented in the April 2015 Site Investigation Report [ARCADIS 2015]. Any soil samples that were removed during the December 2015/January 2016 excavation activities are indicated as removed in the data tables by grey shading. **Figure 2** shows the locations of all 2014 soil borings. **Figure 3** shows the 2014 "SS" soil sample locations along with analytical results for MCHM and PPH. **Figure 4** shows the 2014 "SB" soil sample locations along with analytical results for MCHM and PPH. These three figures were originally presented in the April 2015 Site Investigation Report [ARCADIS 2015].

Tables 3-5a through 3-5c present the analytical results for the test pit soil samples that were collected in 2015. These 2015 soil sample results were originally presented in the October 2015 Interim Site Assessment Report – Revision No. 1 [CORE 2015a]. Any soil samples that were removed during the December 2015/January 2016 excavation activities are indicated as removed in the data tables by grey shading. **Figure 5** shows the locations of these 2015 test pit soil samples, which was taken from the November 2015 VRRP Interim Remedial Action Work Plan [CORE 2015b].

Tables 3-6, 3-7, 3-8, 3-9a, 3-9b, 3-10a, 3-10b, and 3-11 present the analytical results for the post-excavation soil samples that were collected in each excavation area (i.e. Area 1A, Area 1B, Area 2, Area 3, Area 4, and Area 5) during the December 2015/January 2016 excavation activities. These soil samples were collected from the sidewalls and floors of the excavation areas. **Figure 5** shows the approximate locations of the excavation areas. Any soil samples that were removed during the December 2015/January 2016 excavation activities are indicated as removed in the data tables by grey shading. The soil sample results in **Tables 3-6 through 3-11** were not documented in a previous report, but were provided by WVDEP in an email correspondence dated November 9, 2017 (see **Attachment 1**). **Figures 6, 7, 8, 9, and 10** show the locations of

the 2015/2016 post-excavation soil samples for Area 1A, 1B, 2, 3, and 4, respectively. These figures indicate which samples are sidewall samples and which are floor samples. These hand-drawn figures were provided by WVDEP on November 9, 2017 (see **Attachment 1**). **Figure 11** shows the locations of test pit soil samples TP-A, TP-B, and TP-C, which were collected in Area 5. This figure was originally taken from the August 2015 VRRP Interim Site Assessment Work Plan – Revision No. 1 [CORE 2015c] with markups provided by WVDEP on November 22, 2017 (see **Attachment 1**).

Table 3-12 and **Table 3-13** present the analytical results for the supplemental surface soil samples that were collected in 2017 (after the 2015/2016 excavation activities). **Figure 12** shows the supplemental soil samples that were collected in September 2017, and **Figure 13** shows the supplemental PCB soil samples that were collected in October 2017. The soil sample results in **Tables 3-12 and 3-13** were not documented in a previous report, but were provided by WVDEP in an email correspondence dated November 9, 2017 (see **Attachment 1**). **Figures 12 and 13** were also provided by WVDEP on November 9, 2017 (see **Attachment 1**).

Table 3-21 presents a summary of all soil sample locations and indicates the analytical parameters analyzed in each soil sample. This table also indicates which soil samples were removed and which soil samples remain after the December 2015/January 2016 excavation activities. Note that some soil samples are shown as being within an excavation area but are classified as a remaining sample; this is because the soil sample was collected at a depth below the bottom of the excavation and, therefore, was not removed.

The soil analytical data presented in **Tables 3-1 through 3-13** show a comparison of the data to residential soil, industrial soil, and migration to groundwater West Virginia De Minimis standards. The most recent De Minimis values were utilized (effective June 1, 2017) [WVDEP 2017b] to screen the analytical data. If WV De Minimis standards were not available, the June 2017 USEPA Regional Screening Levels (RSLs) [USEPA 2017a] were used if available. If neither WV De Minimis standards nor USEPA RSLs were available, then no comparison was made for that constituent.

There are no WV De Minimis standards or USEPA RSLs available for chloride. However, to screen chloride soil results, a screening value of 1,000 mg/kg was used, which was derived in a WVDEP memorandum dated November 16, 2011 [WVDEP 2011]. This soil chloride screening value was derived based on leaching to groundwater using the secondary maximum contaminant level (SMCL) of 250,000 ug/L as the target groundwater concentration.

There are no WV De Minimis standards or USEPA RSLs available for MCHM and PPH. In January 2016, uniform standards were calculated for these constituents. The supporting documentation presenting the procedure to calculate these uniform standards is included in **Attachment 3**. Based on letter correspondence from the WVDEP dated January 27, 2016 and February 5, 2016, these calculated uniform standards for MCHM and PPH were approved for use at the site. Therefore, MCHM and PPH soil analytical results were compared to the calculated uniform standards. Historical on-site land use is commercial/industrial and future land use will be restricted to commercial/industrial via a land use covenant (see Section 5). Therefore, only industrial soil and migration to groundwater uniform standards were calculated for MCHM and PPH (i.e. residential soil uniform standards were not calculated).

3.1.2 Groundwater

Groundwater monitoring well samples from various site investigations were collected between February 2014 and February 2016. However, only post-remediation groundwater samples that were collected after the December 2015/January 2016 excavation activities were included for data assessment in this report and used to select COC, which would best represent current site conditions. This section presents the screened post-remediation groundwater sample results from monitoring wells MW-1 through MW-13.

Tables 3-14a, 3-14b, and 3-14c present the analytical results for the post-remediation groundwater samples collected in January and February 2016 from monitoring wells MW-1 through MW-13. Also included in these tables are split sample groundwater results from MW-13. The laboratory reports for the split sample collected at MW-13 are included as **Attachment 4**. The groundwater sample results in **Tables 3-14a through 3-**

14c were not documented in a previous report, but were provided by WVDEP in an email correspondence dated November 9, 2017 (see **Attachment 1**). **Figure 5** shows the groundwater monitoring well sample locations, which was taken from the November 2015 VRRP Interim Remedial Action Work Plan [CORE 2015b]. **Table 3-21** presents a summary of all post-remediation groundwater sample locations and indicates the analytical parameters analyzed in each groundwater sample. As indicated in **Table 3-21**, all post-remediation groundwater sampling locations remain and were used to select COC in this report.

The groundwater analytical data were screened against the WV De Minimis groundwater standards. The most recent De Minimis values were utilized (effective June 1, 2017) [WVDEP 2017b] to screen the analytical data. If WV De Minimis standards were not available, June 2017 USEPA RSLs [USEPA 2017a] were used if available. If neither WV De Minimis standards nor USEPA RSLs were available, then no comparison was made for that constituent.

There are no WV De Minimis standards or USEPA RSLs available for MCHM and PPH. In January 2016, uniform standards were calculated for these constituents. The supporting documentation presenting the procedure to calculate these uniform standards is included in **Attachment 3**. Based on letter correspondence from the WVDEP dated January 27, 2016 and February 5, 2016, these calculated uniform standards for MCHM and PPH were approved for use at the site. Therefore, MCHM and PPH groundwater analytical results were compared to the calculated groundwater uniform standards.

Post-remediation groundwater analytical results were also compared to USEPA June 2017 Vapor Intrusion Screening Levels (VISLs) to evaluate the potential for vapor intrusion. **Table 3-15** presents the maximum concentrations from post-remediation groundwater samples (i.e. collected January/February 2016) from monitoring wells MW-1 through MW-13 and a comparison to residential and commercial USEPA VISL target groundwater concentrations. The residential VISL target groundwater concentrations are based on a target risk of $1x10^{-6}$ and target hazard quotient of 1. The commercial VISL target groundwater concentrations are based on a target risk of $1x10^{-5}$ and target hazard quotient of 1. A copy of the June 2017 USEPA VISL calculator Version 3.5 [USEPA 2017b] is included as **Attachment 5**. Note that only those constituents that have an

applicable USEPA VISL target groundwater concentration screening value are presented in **Table 3-15**.

Groundwater at the site predominantly flows to the west toward the Elk River. As a result, there is the potential for constituents in on-site groundwater to migrate to the surface water of the Elk River. Surface water samples were used as the primary media to evaluate groundwater to surface water migration. However, for those constituents that were not analyzed in surface water samples collected along the riverbank of the Elk River, post-remediation groundwater sample results from monitoring wells located along the western property boundary and closest to the Elk River were used to evaluate groundwater to surface water migration. The monitoring wells that are located closest to the Elk River are MW-3, MW-3A, MW-4, MW-5, MW-6, and MW-13. The maximum concentrations in post-remediation groundwater samples from these monitoring wells were used to estimate surface water concentrations by using calculated dilution factors provided by the WVDEP. See **Attachment 6** for the supporting documentation used to derive the human health and aquatic life dilution factors. **Table 3-16** presents the maximum groundwater concentrations from wells closest to the river, the calculated surface water concentrations based on dividing the maximum groundwater concentration by the applicable dilution factor, and a comparison of the calculated surface water concentrations to applicable WVDEP and USEPA water quality criteria. A discussion on the various water quality criteria used to screen analytical results is presented in Section 3.1.4.

3.1.3 Sediment

Sediment samples from various site investigations were evaluated and compared to applicable screening criteria to select constituents of concern. All sediment samples collected from previous investigation activities are presented in this report. Only those sediment samples that remain after the December 2015/January 2016 excavation activities were used to select COC. Sediment samples were determined to be removed or not removed based on information provided by WVDEP, which included the information regarding the lateral extent of each excavation area. All sediment samples were collected along the riverbank of the Elk River and outside of the site excavation areas. Therefore, all sediment samples remain at the site.

Table 3-17 presents the analytical results for the sediment samples that were collected in 2014. These 2014 sediment sample results were originally presented in the April 2015 Site Investigation Report [ARCADIS 2015]. **Figure 14** shows the 2014 sediment sample locations along with analytical results for MCHM and PPH. This figure was originally presented in the April 2015 Site Investigation Report [ARCADIS 2015]. The sediment samples were collected at 3 separate locations along the Elk River: one located upstream at the northern end of the site, one located immediately adjacent to where the majority of the released chemical mixture entered the Elk River, and one located downstream of the barge dock. Sediment samples were collected below the surface water.

Table 3-18 presents the analytical results for the supplemental sediment samples that were collected in 2017. **Figure 15** shows the locations of the 2017 sediment samples. The sediment sample results in **Table 3-18** were not documented in a previous report, but were provided by WVDEP in an email correspondence dated November 9, 2017 (see **Attachment 1**). **Figure 15** was also provided by WVDEP on November 9, 2017 (see **Attachment 1**). The sediment samples were collected at 3 separate locations along the Elk River. SD-1 Grab was collected at the northern upstream end of the site, SD-2 Grab was collected further downstream adjacent to the excavation areas, and SD-3 Grab was collected the furthest downstream at the southern end of the site. Sediment samples were collected below the surface water.

Table 3-21 presents a summary of all sediment sample locations and indicates the analytical parameters analyzed in each sediment sample. As indicated in **Table 3-21**, all sediment sampling locations remain and were used to select COC in this report.

Based on the fact that all sediment samples were collected below the water line in the Elk River, there are no applicable human health screening criteria that are appropriate to compare against the sediment analytical data. However, according to USEPA RAGS Part E [USEPA 2004], exposure to sediment below the water line for human receptors is considered de minimis because sediment that is below the water line will likely wash off the skin before the desorption of the constituents from the sediment particle and absorption of the constituents through the skin may occur. Nonetheless, as a conservative screening, sediment analytical results were compared to the residential soil and industrial soil WV De Minimis standards (or calculated uniform soil standards for MCHM and

PPH), and there were no exceedances as shown in **Tables 3-17 and 3-18**.

Sediment analytical results were also compared to USEPA Region III Biological Technical Assistance Group (BTAG) freshwater sediment screening values to evaluate ecological receptors. However, as shown in **Tables 3-17 and 3-18**, USEPA BTAG freshwater sediment screening values were not available for the constituents of potential concern analyzed in sediment samples.

3.1.4 Surface Water

Surface water samples were collected during various site investigations. Three different types of surface water samples were collected. The first type is surface water samples that were collected from 4 separate sumps on-site (i.e. Sump 4, Sump 8, Sump 9, and Sump 10). The second type is surface water samples that were collected from the diversion trench. The third type is surface water samples that were collected from the surface water of the Elk River.

Tables 3-19a, 3-19b, and 3-19c present the analytical results for surface water samples that were collected from Sump 4, Sump 8, Sump 9, and Sump 10. Sump 4 and Sump 8 were located on the northern side of the site within Area 5. These sumps were backfilled with clean soil during the December 2015/January 2016 excavation activities and, therefore, no longer represent an exposure pathway. Sump 9 and Sump 10 are located on the southern side of the site; these sumps are not located within any excavation areas and remain in place. Therefore, Sump 4 and Sump 8 are shaded grey in **Tables 3-19a, 3-19b, and 3-19c** to indicate that these locations are no longer exposed and, thus, were not used to select COC. Also included in these tables are split sample surface water results from Sump 8 and Sump 10. The laboratory reports for the split samples collected at Sump 8 and Sump 10 are included as **Attachment 4**. The sump surface water sample results in these tables were not documented in a previous report, but were provided by WVDEP in an email correspondence dated November 9, 2017 (see **Attachment 1**). **Figure 5** shows the locations of the sumps, which was taken from the November 2015 VRRP Interim Remedial Action Work Plan [CORE 2015b].

Based on information provided by the WVDEP (see Mahfood Group Question 11/14/17 in **Attachment 1**), none of the sumps discharged by gravity. While the sumps operated,

accumulated liquids were pumped to mobile storage tanks that were periodically emptied, and all liquids were disposed of off-site. Therefore, the surface water from the sumps are not expected to migrate to the Elk River. Note that the sump water samples were collected during conditions where the water accumulated within the corrugated pipe of the sump; however, because water is currently no longer pumped out of the sump, the contents of the remaining sumps (e.g. Sump 10) have over flowed and accumulated within the low-lying area. Based on this, the analytical results from the sumps were compared to the June 2017 groundwater WV De Minimis standards [WVDEP 2017b] rather than compared to surface water quality criteria.

Tables 3-20a, 3-20b, and 3-20c present the analytical results for surface water samples that were collected from the diversion trench. The diversion trench surface water sample results in these tables were not documented in a previous report, but were provided by WVDEP in an email correspondence dated November 9, 2017 (see **Attachment 1**). The exact location of the diversion trench surface water samples is unknown; however, they are believed to have been collected along the northeast side of the site based on a telephone conservation on November 16, 2017 between The Mahfood Group LLC® and WVDEP (personal communication between Lisa Poppelreiter and John Meeks, November 16, 2017).

Table 3-20a also presents the analytical results for surface water samples that were collected from along the riverbank of the Elk River. The Elk River surface water sample results in these tables were not documented in a previous report, but were provided by WVDEP in an email correspondence dated November 9, 2017 (see **Attachment 1**). **Figure 12** shows the locations of the Elk River surface water samples collected in September 2017, and **Figure 15** shows the locations of the Elk River surface water samples collected in October 2017. **Figures 12 and 15** were also provided by WVDEP on November 9, 2017 (see **Attachment 1**). The September 2017 surface water samples were collected at 2 separate locations along the Elk River. "1 Grab" was collected at the northern end of the site, and "2 Grab" was collected at the southern end of the site. The October 2017 surface water samples were collected at 3 separate locations along the Elk River. SW-1 Grab and SW-2 Grab were collected at the northern upstream end of the site, SW-3 Grab and SW-4 Grab were collected further downstream adjacent to the

excavation areas, and SW-5 Grab and SW-6 Grab were collected the furthest downstream at the southern end of the site. SW-1 Grab, SW-3 Grab, and SW-5 Grab were collected from the upper 6 inches of surface water while SW-2 Grab, SW-4 Grab, and SW-6 Grab were collected from the lower 6 inches of surface water.

The diversion trench and Elk River surface water samples were compared to WV and USEPA surface water quality criteria. **Tables 3-20a, 3-20b, and 3-20c** include a comparison against the WVDEP Title 47CSR2 water quality standards for human health (drinking water/fish consumption and fish consumption only) and for aquatic life (chronic values for warm water fisheries and trout waters). Note that for lead, water quality values are calculated based on hardness. A range of water hardness (i.e. 18 to 106 ppm) was used to calculate water quality criteria values for lead based on a 2016 Annual Water Quality Report from the West Virginia American Water Company that obtains its water supply from the Elk River Regional System. See **Attachment 7** for the 2016 Annual Water Quality Report.

Tables 3-20a, 3-20b, and 3-20c also include a comparison against the USEPA water quality standards for human health (consumption of water + organism and consumption of organism only) and for aquatic life (criteria continuous concentration and criteria maximum concentration). In addition, surface water analytical results in these tables were compared to USEPA Region III BTAG freshwater screening values.

Table 3-21 presents a summary of all surface water sample locations and indicates the analytical parameters analyzed in each surface water sample. As indicated in **Table 3-21**, all surface water sampling locations remain and were used to select COC in this report with the exception of surface water samples from Sump 4 and Sump 8 (which were backfilled with clean soil and no longer represent an exposure pathway).

3.2 Selection of Constituents of Concern

The selection of constituents of concern was conducted in accordance with Section 2.6 of the WV VRRA Guidance Manual [WVDEP 2001]. As stated in Section 2.6 of the WV VRRA Guidance Manual [WVDEP 2001], chemicals detected in at least one sample in a given medium at the site should be considered chemicals of potential concern (COPCs) and should be carried through the screening assessment unless there is a specific,

justifiable rationale for dropping the contaminant from the risk characterization. The final list of contaminants that exceed applicable criteria in the screening assessment is referred to as the constituents of concern (COC). Constituents of concern were selected for the direct contact ("direct contact COC") exposure pathways and vapor intrusion ("vapor intrusion COC") exposure pathways for the on-site and off-site receptors. The selection process was done using the analytical data and comparisons presented above in Section 3.1.

Typically a statistical summary of the analytical data is prepared, which includes the minimum and maximum detection limits, minimum and maximum concentrations, location of maximum concentrations, and frequency of detection for each constituent analyzed for in the analytical samples from each media. In addition, the maximum concentrations are typically compared to the De Minimis screening standards or other applicable screening criteria. However, given the complexity of the dataset, a more comprehensive analysis of the individual data points was completed. Constituents of concern were identified by comparing each sample location to an applicable criterion. Any constituent that exceeded an applicable screening criterion was retained as a COC. This was a conservative process to select COC because no COPCs were eliminated as a COC based on factors such as the frequency of detection, etc.

3.2.1 Direct Contact COC

Direct contact COC were selected based on the comparisons described above for soil, groundwater, sediment, and surface water. A summary of direct contact COC retained in each applicable media are shown in **Table 3-22**.

Human Health Screening:

- Soil: Any detected constituent that exceeded an industrial soil, residential soil, or migration to groundwater De Minimis standard in surface or subsurface soil samples that remain after the December 2015/January 2016 excavation activities was selected as a direct contact COC in surface and/or subsurface soil. As shown in **Table 3-22**, there were 7 direct contact COC retained in surface soil that exceeded migration to groundwater De Minimis standards only. Note that isopropyl alcohol did not have a WV migration to

groundwater De Minimis standard, but was compared to and exceeded the USEPA soil screening level protective of groundwater. There were 18 direct contact COC retained in subsurface soil. Eight exceeded a residential soil De Minimis standard and 18 exceeded a migration to groundwater De Minimis standard. Note that MCHM and PPH exceeded calculated uniform leaching standards (i.e. WV De Minimis standards are not available for MCHM and PPH).

- Groundwater: Any detected constituent that exceeded a groundwater De Minimis standard in post-remediation groundwater samples (i.e. collected in January/February 2016) from monitoring wells MW-1 through MW-13 was selected as a direct contact COC in groundwater. As shown in **Table 3-22**, there were 7 direct contact COC retained in groundwater.

- Sediment: Sediment samples were collected below the water and, therefore, there are no applicable human health screening criteria available to screen sediment analytical results. However, as a conservative screening assessment, the sediment analytical data were compared to industrial and residential soil De Minimis standards. Any detected constituent that exceeded an industrial soil or residential soil De Minimis standard in sediment samples was selected as a direct contact COC in sediment. As shown in **Table 3-22**, there were no direct contact COC retained in sediment.

- Surface Water – Sumps: Any detected constituent that exceeded a groundwater De Minimis standard in post-remediation surface water samples (i.e. collected in January/February 2016) from Sump 9 and Sump 10 was selected as a direct contact COC. Analytical results from Sump 4 and Sump 8 were not used to select direct contact COC because these sumps were backfilled with clean soil during site excavation activities and, therefore, no longer represent an exposure pathway. As shown in **Table 3-22**, there were 3 direct contact COC retained in surface water samples from Sump 9 and Sump 10.

- Surface Water – Diversion Trench and Elk River: Any detected constituent that exceeded an applicable WV or USEPA water quality standard for human health in post-remediation surface water samples from the diversion trench (i.e. collected February 2016) and from the Elk River (i.e. collected September 2017 and October 2017) was selected as a direct contact COC. As shown in **Table 3-22**, there were no direct contact COC retained in surface water.

- Surface Water – Calculated from Groundwater Using Dilution Factors: Any detected constituent that was not analyzed in measured surface water samples from the Elk River was evaluated using groundwater analytical results from monitoring wells located closest to the Elk River (i.e. MW-3, MW-3A, MW-4, MW-5, MW-6, and MW-13). The maximum detected groundwater concentrations from monitoring wells closest to the Elk River were divided by dilution factors (provided by WVDEP) in order to estimate surface water concentrations. These calculated surface water concentrations were then compared to applicable surface water quality criteria. Any detected constituent from the calculated surface water concentrations that exceeded an applicable WV or USEPA water quality standard for human health was selected as a direct contact COC. As shown in **Table 3-22**, there were 2 direct contact COC retained in calculated surface water concentrations.

Ecological Screening:

- Sediment: Any detected constituent that exceeded a USEPA Region III BTAG freshwater sediment screening value in sediment samples was selected as a direct contact COC in sediment. As shown in **Table 3-22**, there were no direct contact COC retained in sediment.

- Surface Water – Diversion Trench and Elk River: Any detected constituent that exceeded an applicable WV or USEPA water quality standard for aquatic life or USEPA Region III BTAG freshwater screening value in post-remediation surface water samples from the diversion trench (i.e. collected February 2016) and from the Elk River (i.e. collected September 2017 and

October 2017) was selected as a direct contact COC. As shown in **Table 3-22**, there were no direct contact COC retained in surface water.

- Surface Water – Calculated from Groundwater Using Dilution Factors: Any detected constituent that was not analyzed in measured surface water samples from the Elk River was evaluated using groundwater analytical results from monitoring wells located closest to the Elk River (i.e. MW-3, MW-3A, MW-4, MW-5, MW-6, and MW-13). The maximum detected groundwater concentrations from monitoring wells closest to the Elk River were divided by dilution factors (provided by WVDEP) in order to estimate surface water concentrations. These calculated surface water concentrations were then compared to applicable surface water quality criteria. Any detected constituent from the calculated surface water concentrations that exceeded an applicable WV or USEPA water quality standard for aquatic life or USEPA Region III BTAG freshwater screening value was selected as a direct contact COC. As shown in **Table 3-22**, there were 3 direct contact COC retained in calculated surface water concentrations.

3.2.2 Vapor Intrusion COC

Vapor intrusion COC were selected based on groundwater data comparisons described above. **Table 3-22** presents a summary of the vapor intrusion COC for groundwater.

- Groundwater: Any detected constituent that exceeded a USEPA VISL target groundwater screening value in post-remediation groundwater samples (i.e. collected in January/February 2016) from monitoring wells MW-1 through MW-13 was selected as a vapor intrusion COC in groundwater. As shown in **Table 3-22**, there were no vapor intrusion COC retained in groundwater.

4 Conceptual Site Model

This section presents the conceptual site model developed for the site and includes a hydrogeologic CSM, human health CSM, and an ecological screening assessment.

4.1 Geologic and Hydrogeologic Conceptual Site Model

The following presents the site's geologic and hydrogeologic conceptual site model.

4.1.1 Site Geology

Information on the site geology was obtained from the April 2015 Site Investigation Report [ARCADIS 2015]. Regional geological data indicates that surface soils in the area of the site consist of unconsolidated, poorly to well-drained, highly stratified sands, gravels and clayey silts. Surface soils at the site consist of fill material down to depths ranging from two to six feet below ground surface. Pennsylvanian-aged sedimentary rock underlies the unconsolidated sediments at the site consisting of stratified sequences of sandstone, limestone and shale. Depth to top of bedrock at the site ranges from 33 to 58 feet below ground surface. **Figure 16** shows a transect map for two geologic cross-sections. **Figures 17 and 18** present geologic cross-section A-A' and B-B', respectively, which were obtained from the November 2015 VRRP Interim Remedial Action Work Plan [CORE 2015b].

4.1.2 Site Hydrogeology

Information on the site hydrogeology was obtained from the April 2015 Site Investigation Report [ARCADIS 2015]. Analysis of groundwater elevation data across the site indicates that two separate flow regimes exist. Shallow groundwater flows through surficial, low-permeability soils, hydraulically driven by the steep gradient as the site topography drops off sharply toward the Elk River. Groundwater flow also occurs in the deeper, more permeable unconsolidated sediments; this deep aquifer is heavily influenced by the Elk River and is associated with regional groundwater flow. The general flow of groundwater across the site is from east to west, mimicking the surface topography. Potentiometric surface maps for the shallow and deep aquifers based on water elevations measured during the December 2014 and January 2015 gauging events are presented as **Figures 19 through 22**, which were obtained from the April 2015 Site Investigation

Report [ARCADIS 2015].

There were four sumps located on-site. Sump 4 and Sump 8 were located on the northern side of the site within Area 5. These sumps were backfilled with clean soil during the December 2015/January 2016 excavation activities and, therefore, no longer represent an exposure pathway. Sump 9 and Sump 10 are located on the southern side of the site; these sumps are not located within any excavation areas and remain in place. Based on information provided by the WVDEP (see Mahfood Group Question 11/14/17 in **Attachment 1**), none of the sumps discharged by gravity. While the sumps operated, accumulated liquids were pumped to mobile storage tanks that were periodically emptied, and all liquids were disposed of off-site. Therefore, the surface water from the sumps are not expected to migrate to the Elk River.

4.2 Human Health Conceptual Site Model

The CSM is a comprehensive view of the site that integrates the various components of the overall environmental setting, including: site geology, hydrogeology, and hydrology; the current distribution and migration of site-related constituents; and potential receptors (both current and future) that may contact site-related constituents through potential exposure pathways associated with various site activities.

The CSM process was completed in accordance with Section 2.2.4 of the WV VRRA Guidance Manual [WVDEP 2001] and Section 8.4.b.1 of the Rule [WVDEP 2017a].The overall CSM can be broken down into a hydrogeologic component (e.g., evaluation of transport pathways) and a human health and ecological component (e.g., evaluation of exposure pathways). The CSM identifies those potentially complete transport and exposure pathways which must be either eliminated by the implementation of engineering controls and/or institutional controls (e.g., land use covenants) or further evaluated in a site-specific risk assessment to determine whether site-specific risk benchmarks are met in accordance with Section 3.4.2 in the WV VRRA Guidance Manual [WVDEP 2001] and Section 9.4.a and 9.4.b in the Rule [WVDEP 2017a].

Potential constituent migration routes and potential receptors are assessed in this section in order to determine whether potentially complete exposure pathways exist at the site. As stated in Section 3.4.1.1 in the WV VRRA Guidance Manual [WVDEP 2001], an

exposure pathway is considered complete if all four of the following elements exist: 1) a potential source of COC; 2) a potential transport mechanism to an exposure medium (this is not needed if the source medium is the exposure medium); 3) contact between a potential receptor and the exposure medium; and, 4) an uptake mechanism associated with the potential receptor.

4.2.1 Potential Constituent Migration Routes

The most likely constituent migration routes were evaluated for soil and groundwater based on the detection of constituents in the media and the potential for those detected constituents to migrate within the media or to another media. The evaluation of migration routes are based on the detection of constituents and is independent of whether those constituents exceed applicable screening criteria or not. The rationales for retaining or not retaining each migration route for receptor-specific evaluation are presented in **Table 4-1**.

The potential constituent migration routes retained for receptor-specific evaluation include:

Surface Soil

- Volatilization of constituents from on-site surface soil to outdoor air;
- Particulate emission of entrained constituents from on-site surface soil to outdoor air;
- Leaching of constituents from on-site surface soil to subsurface soil and then to groundwater; and,
- Overland flow of constituents from on-site surface soil to surface water.

Subsurface Soil

- Volatilization of constituents from on-site subsurface soil to outdoor air;
- Particulate emission of entrained constituents from on-site subsurface soil (exposed during intrusive activities) to outdoor air; and,

- Leaching of constituents from on-site subsurface soil to groundwater.

Groundwater

- Migration of constituents in on-site groundwater to off-site surface water.

Sediment

- Migration of absorbed constituents on sediment below the water line to downriver locations.

Note that there were no migration routes retained for surface water because there were no constituents detected in surface water samples.

4.2.2 Potential Human Health Receptors and Exposure Pathways

This section identifies potential human health receptors and their associated exposure pathways. Potential receptors were selected to represent individuals who are most likely now or in the future to come into contact with COC in soil, groundwater, sediment, and surface water at the site. As part of the exposure pathway analysis, all reasonable potential exposure pathways have been assessed.

Based on the retained potential constituent migration routes, the following most likely receptors were evaluated:

- Current/Future On-Site Trespasser
- Future On-Site Facility Worker
- Future On-Site Indoor Worker
- Future On-Site Construction/Utility Worker
- Current/Future Off-Site Recreational User

Based on the potential receptors listed above, descriptions of the retained receptors are provided below. Exposure pathways were retained based on the potential sources of COC, migration potential of COC, and the activities of the receptor. **Figure 23** presents

the receptor CSM in flow chart form which presents a summary of the media and exposure pathways considered for each human health receptor and whether or not those pathways were retained.

On-Site Trespasser

The site is currently vacant. The only structures that remain at the site are an office building and garage building located on the southern side of the site. The southern half of the site is covered primarily with asphalt and the northern half is covered primarily with gravel with some grassy/vegetated areas along the eastern and western sides of the site. Trespassers are individuals who gain unauthorized access to the site. The site is located in a mixed commercial/residential area. This receptor is likely to be in the age range of 11 to less than 16 years.

This receptor is not expected to spend time indoors at the site (i.e. assumed outdoors only). Therefore, the inhalation of volatiles from groundwater to indoor air (via vapor intrusion) exposure pathway was not evaluated for this receptor. In addition, this receptor is not expected to perform intrusive activities. Therefore, incidental ingestion, dermal contact, and inhalation of particulates from subsurface soil exposure pathways and incidental ingestion and dermal contact with groundwater via intrusive activities exposure pathways are not applicable to this receptor.

There were surface soil samples collected at the site that remained after the December 2015/January 2016 excavation activities because the samples were located outside of the excavation areas. Some of these surface soil samples had exceedances of the migration to groundwater De Minimis standards (and one constituent exceeded a USEPA soil screening value protective of groundwater); therefore, these constituents were retained as direct contact COC. However, there were no exceedances of the industrial soil De Minimis standards or the WVDEP-approved calculated uniform soil standards for MCHM and PPH in surface soil samples. Based on the fact that surface soil samples only exceeded a leach-based migration to groundwater standard, surface soil exposure pathways (i.e. incidental ingestion, dermal contact, and inhalation of volatiles and particulates) were not retained for the trespasser.

Although the trespasser is not expected to be directly exposed to subsurface soil, there is still the potential for this receptor to be indirectly exposed to volatile constituents that migrate from subsurface soil to outdoor air without intrusive activities. There were subsurface soil samples remaining after the site excavation activities that exceeded the migration to groundwater De Minimis standards and residential soil De Minimis standards. In addition, MCHM and PPH exceeded the WVDEP-approved calculated uniform soil standards for the migration to groundwater in subsurface soil. Therefore, these constituents were retained as direct contact COC. However, there were no exceedances of the industrial soil De Minimis standards or the WVDEP-approved calculated uniform industrial soil standards for MCHM and PPH. The current land use of the site is nonresidential and will remain nonresidential in the future via a land use covenant (see Section 5). Based on the fact that subsurface soil samples did not exceed any industrial soil De Minimis standards or WVDEP-approved calculated uniform industrial soil standards for MCHM and PPH, the inhalation of volatiles from subsurface soil exposure pathway was not retained for the trespasser.

Post-remediation groundwater samples from monitoring wells were collected after the site excavation activities. There were no exceedances of the WVDEP-approved calculated uniform groundwater standards for MCHM and PPH in post-remediation groundwater samples, but there were exceedances of the groundwater De Minimis standards for other constituents, which were retained as direct contact COC. The only COC retained in groundwater were polycyclic aromatic hydrocarbons (PAHs). None of the PAHs are volatile constituents with the exception of naphthalene, which is classified as a volatile in WVDEP's most recent Chemical Property Database (dated June 2014) [WVDEP 2014]. Therefore, there is the potential for naphthalene to volatilize from unexposed groundwater to outdoor air without intrusive activities. However, the depth to groundwater on-site ranges from approximately 14.5 to 36 ft-bgs with an average depth of approximately 22 ft-bgs (based on groundwater monitoring well measurements presented in the April 2015 Site Investigation Report [ARADIS 2015]), which is an adequate distance between groundwater and ground surface to allow for attenuation of vapors migrating from the subsurface to outdoor air. In addition, the soil lithology at the site is primarily gravelly clay/sandy clay/silty clay, which would be a soil-like material that would allow for attenuation of vapors migrating from the subsurface to outdoor air.

Therefore, the inhalation of volatiles from groundwater to outdoor air exposure pathway was considered de minimis and was not retained for the trespasser.

There were direct contact COC retained in water samples from Sump 10. The COC retained include benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene. Sump 10 (which is located on the southern side of the site) is not located within any excavation areas and remains in place. Water collects within the sump via overland flow of surface runoff. The water within the sump is no longer being pumped. The sump is within a low-lying area. Currently, the sump has filled with surface runoff and the water is ponding on the ground surface within this low-lying area.

Based on this exposure scenario, dermal contact with water from this low-lying area around Sump 10 is possible for this receptor. Incidental ingestion of accumulated water in the area around Sump 10 is unlikely for this receptor and, therefore, was not evaluated. The retained PAHs are not classified as volatiles according to the WVDEP's most recent Chemical Property Database (dated June 2014) [WVDEP 2014]. Therefore, the inhalation of volatiles from water accumulated around the area of the sump does not apply to this exposure scenario.

The exposure scenario for dermal contact with water within and around Sump 10 was ultimately deemed de minimis and was not retained based on the following:

- Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in water within and around Sump 10 only slightly exceeded the WV groundwater De Minimis standards, which are conservative screening values based on domestic use of groundwater; however, the exposure scenario for the on-site trespasser is not a potable use scenario (i.e. no ingestion of groundwater).

- The USEPA tapwater RSL for these three PAHs is 0.25 ug/L based on the ingestion pathway. The concentrations of these PAHs in water within and around Sump 10 do not exceed the USEPA tapwater RSL, which is also a conservative screening value based on potable use of groundwater.

- According to USEPA RAGS-E [USEPA 2004], quantifying exposure and risk for dermal contact with water for benzo(a)anthracene, benzo(b)fluoranthene, and

indeno(1,2,3-cd)pyrene is not recommended because this exposure pathway associated with these constituents would be considered de minimis.

- The concentrations of PAHs observed in water within and around the sump are likely overestimated because this water is accumulated surface runoff which means that the measured PAH concentrations are biased higher due to constituent adsorption onto particles in the water.

Therefore, no exposure pathways were retained for sump water for the on-site trespasser.

A trespasser scenario was also considered for the diversion trench. However, there were no constituents detected in soil samples or surface water samples collected from the diversion trench. Therefore, no exposure pathways were retained for a trespasser in the diversion trench.

The Former Freedom Industries property and immediate surrounding area are currently connected to a public water supply. There are currently no potable wells on-site. Therefore, there are currently no complete groundwater use exposure pathways for on-site receptors. There is no local ordinance that prohibits the use of groundwater for potable purposes. However, a land use covenant will be prepared that will prohibit the use groundwater for potable purposes on the Former Freedom Industries property. Therefore, future groundwater use exposure pathways were not retained.

In summary, there are no exposure pathways retained for quantitative analysis for the current and future on-site trespasser. A summary of the exposure pathways considered for the on-site trespasser and whether or not those pathways were retained is shown in **Figure 23**.

On-Site Facility Worker

The site is currently vacant. The only structures that remain at the site are an office building and garage building located on the southern side of the site. The southern half of the site is covered primarily with asphalt and the northern half is covered primarily with gravel with some grassy/vegetated areas along the eastern and western sides of the site. The on-site facility worker is an individual who performs work activities outdoors.

Activities conducted by this receptor would be general property maintenance, which may include landscaping, cutting grass, or other activities to maintain the property. Since the site is currently vacant, a future on-site facility worker was evaluated.

Based on these activities, the on-site facility worker is expected to perform minimal intrusive activities (i.e. maximum excavation depth of 2 ft-bgs). Therefore, it is unlikely this receptor would come into direct contact with subsurface soil (i.e. 2 ft-bgs and greater) or groundwater (average depth to groundwater on-site is approximately 22 ft-bgs) during minimal intrusive activities. Therefore, incidental ingestion, dermal contact, and inhalation of particulates exposure pathways for subsurface soil, and incidental ingestion and dermal contact exposure pathways for groundwater (intrusive activities) are not applicable to this receptor. In addition, this receptor is expected to spend the majority of their time outdoors. Therefore, the inhalation of volatiles from groundwater to indoor air (via vapor intrusion) is not applicable for this receptor and was evaluated under the on-site indoor worker scenario.

There were surface soil samples collected at the site that remained after the December 2015/January 2016 excavation activities because the samples were located outside of the excavation areas. Some of these surface soil samples had exceedances of the migration to groundwater De Minimis standards (and one constituent exceeded a USEPA soil screening value protective of groundwater); therefore, these constituents were retained as direct contact COC. However, there were no exceedances of the industrial soil De Minimis standards or the WVDEP-approved calculated uniform soil standards for MCHM and PPH in surface soil samples. Based on the fact that surface soil samples only exceeded a leach-based migration to groundwater standard, surface soil exposure pathways (i.e. incidental ingestion, dermal contact, and inhalation of volatiles and particulates) were not retained for the on-site facility worker.

Although the on-site facility worker is not expected to be directly exposed to subsurface soil, there is still the potential for this receptor to be indirectly exposed to volatile constituents that migrate from subsurface soil to outdoor air. There were subsurface soil samples remaining after the site excavation activities that exceeded the migration to groundwater De Minimis standards and residential soil De Minimis standards. In addition, MCHM and PPH exceeded the WVDEP-approved calculated uniform soil

standards for the migration to groundwater in subsurface soil. Therefore, these constituents were retained as direct contact COC. However, there were no exceedances of the industrial soil De Minimis standards or the WVDEP-approved calculated uniform industrial soil standards for MCHM and PPH. The current land use of the site is nonresidential and will remain nonresidential in the future via a land use covenant (see Section 5). Based on the fact that subsurface soil samples did not exceed any industrial soil De Minimis standards or WVDEP-approved calculated uniform industrial soil standards for MCHM and PPH, the inhalation of volatiles from subsurface soil exposure pathway was not retained for the on-site facility worker.

Post-remediation groundwater samples from monitoring wells were collected after the site excavation activities. There were no exceedances of the WVDEP-approved calculated uniform groundwater standards for MCHM and PPH in post-remediation groundwater samples, but there were exceedances of the groundwater De Minimis standards for other constituents, which were retained as direct contact COC. The only COC retained in groundwater were PAHs. None of the PAHs are volatile constituents with the exception of naphthalene, which is classified as a volatile in WVDEP's most recent Chemical Property Database (dated June 2014). Therefore, there is the potential for naphthalene to volatilize from unexposed to outdoor air without intrusive activities. However, the depth to groundwater on-site ranges from approximately 14.5 to 36 ft-bgs with an average depth of approximately 22 ft-bgs (based on groundwater monitoring well measurements presented in the April 2015 Site Investigation Report [ARADIS 2015]), which is an adequate distance between groundwater and ground surface to allow for attenuation of vapors migrating from the subsurface to outdoor air. In addition, the soil lithology at the site is primarily gravelly clay/sandy clay/silty clay, which would be a soil-like material that would allow for attenuation of vapors migrating from the subsurface to outdoor air. Therefore, the inhalation of volatiles from groundwater to outdoor air exposure pathway was considered de minimis and was not retained for the on-site facility worker.

There were direct contact COC retained in water samples from Sump 10. The COC retained include benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene. Sump 10 (which is located on the southern side of the site) is not located within any

excavation areas and remains in place. Water collects within the sump via overland flow of surface runoff. The water within the sump is no longer being pumped. The sump is within a low-lying area. Currently, the sump has filled with surface runoff and the water is ponding on the ground surface within this low-lying area.

Based on this exposure scenario, dermal contact with water from this low-lying area around Sump 10 is possible for this receptor. Incidental ingestion of accumulated water in the area around Sump 10 is unlikely for this receptor and, therefore, was not evaluated. The retained PAHs are not classified as volatiles according to the WVDEP's most recent Chemical Property Database (dated June 2014) [WVDEP 2014]. Therefore, the inhalation of volatiles from water accumulated around the area of the sump does not apply to this exposure scenario.

The exposure scenario for dermal contact with water within and around Sump 10 was ultimately deemed de minimis and was not retained based on the following:

- Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in water within and around Sump 10 only slightly exceeded the WV groundwater De Minimis standards, which are conservative screening values based on domestic use of groundwater; however, the exposure scenario for the on-site facility worker is not a potable use scenario (i.e. no ingestion of groundwater).

- The USEPA tapwater RSL for these three PAHs is 0.25 ug/L based on the ingestion pathway. The concentrations of these PAHs in water within and around Sump 10 do not exceed the USEPA tapwater RSL, which is also a conservative screening value based on potable use of groundwater.

- According to USEPA RAGS-E [USEPA 2004], quantifying exposure and risk for dermal contact with water for benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene is not recommended because this exposure pathway associated with these constituents would be considered de minimis.

- The concentrations of PAHs observed in water within and around the sump are likely overestimated because this water is accumulated surface runoff which

means that the measured PAH concentrations are biased higher due to constituent adsorption onto particles in the water.

Therefore, no exposure pathways were retained for sump water for the on-site facility worker.

The Former Freedom Industries property and immediate surrounding area are currently connected to a public water supply. There are currently no potable wells on-site. Therefore, there are currently no complete groundwater use exposure pathways for on-site receptors. There is no local ordinance that prohibits the use of groundwater for potable purposes. However, a land use covenant will be prepared that will prohibit the use groundwater for potable purposes on the Former Freedom Industries property. Therefore, future groundwater use exposure pathways were not retained.

In summary, there are no exposure pathways retained for quantitative analysis for the future on-site facility worker. A summary of the exposure pathways considered for the on-site facility worker and whether or not those pathways were retained is provided in **Figure 23**.

On-Site Indoor Worker

The site is currently vacant. The only structures that remain at the site are an office building and garage building located on the southern side of the site. Therefore, a future on-site indoor worker was evaluated for the current on-site office building and a future on-site building. The on-site indoor worker is an individual who performs work activities indoors. The primary activity conducted by a future on-site indoor worker may be office work.

Based on the activities of this individual, this receptor is expected to spend the majority of their time indoors. Therefore, the outdoor direct contact soil exposure pathways (i.e. incidental ingestion, dermal contact, and the inhalation of particulates and volatiles to outdoor air from soil) and groundwater exposure pathways (i.e. incidental ingestion, dermal contact, and the inhalation of volatiles to outdoor air from groundwater) were not applicable for this receptor. However, there is the potential for this receptor to be

exposed to site-related constituents that volatilize to indoor air (via vapor intrusion) from groundwater.

To evaluate the vapor intrusion pathway for the current on-site office building and a future on-site building, groundwater analytical data were used. Post-remediation groundwater samples were compared to USEPA VISL target groundwater concentrations. There were no exceedances and, therefore, no vapor intrusion COC retained. Therefore, the inhalation of volatiles from groundwater to indoor air via vapor intrusion exposure pathway was not retained for a future on-site indoor worker in the current on-site office building or a future on-site building.

Note that there were volatile constituents detected in on-site surface soil and subsurface soil samples. USEPA indicates that the soil to indoor air pathway is not regarded as a pathway that has reliable certainty as compared to other media. Therefore, other media were relied upon to evaluate vapor intrusion (i.e. groundwater). However, the release was a surficial release and no shallow soil gas samples were collected on-site. Therefore, to address potential vapor intrusion associated with shallow soils for a future on-site building, an institutional control will be placed on the site (e.g. require installation of vapor barrier or mitigation system), which will make the shallow soil to indoor air vapor intrusion pathway incomplete for a future on-site indoor worker in a future building that may be constructed on-site (see Section 5).

The Former Freedom Industries property and immediate surrounding area are currently connected to a public water supply. There are currently no potable wells on-site. Therefore, there are currently no complete groundwater use exposure pathways for on-site receptors. There is no local ordinance that prohibits the use of groundwater for potable purposes. However, a land use covenant will be prepared that will prohibit the use groundwater for potable purposes on the Former Freedom Industries property. Therefore, future groundwater use exposure pathways were not retained.

In summary, there are no exposure pathways retained for quantitative analysis for the current and future on-site indoor worker. A summary of the exposure pathways considered for the on-site indoor worker and whether or not those pathways were retained is shown in **Figure 23**.

On-Site Construction Worker and Utility Worker

The on-site construction worker is an individual who would be involved in future construction and/or excavation activities on-site. In addition, the construction worker may be responsible for any major repairs to existing utility lines or the installation of a new line which may result in exposure lasting more than one day. The on-site utility worker is an individual who would be involved with repairing and maintaining utility lines on-site. The utility worker is not expected to be involved in the installation of new lines as this is assumed to be performed by a construction worker.

The depths of the underground utility lines on-site are unknown. It is assumed that these receptors could be involved in excavation activities to a maximum depth of approximately 10 ft-bgs based on the typical construction worker excavation depth presented in the April 2015 Site Investigation Report [ARCADIS 2015]. As a result, these receptors may come into direct contact with surface and subsurface soil to maximum depth of approximately 10 ft-bgs. Soil samples that remain after the December 2015/January 2016 excavation activities were used to select COC. There were surface soil samples that had exceedances of the migration to groundwater De Minimis standards. In addition, there were subsurface soil samples that had exceedances of the WVDEP-approved calculated uniform soil standards for the migration to groundwater for MCHM and PPH, as well as the migration to groundwater De Minimis standards and residential soil De Minimis standards for other constituents. These constituents were retained as direct contact COC. Note that the specific depths of some subsurface soil samples are unknown. Therefore, it was conservatively assumed that these subsurface soil samples are between 2 and 10 ft-bgs (i.e. the soil interval in which an on-site construction and utility worker are expected to be in direct contact). There were no exceedances of the industrial soil De Minimis standards or the WVDEP-approved calculated uniform industrial soil standards for MCHM and PPH in any surface soil or subsurface soil samples. Therefore, incidental ingestion, dermal contact, and inhalation of volatiles and particulates soil exposure pathways were not retained for these receptors.

The depth to groundwater on-site ranges from approximately 14.5 to 36 ft-bgs with an average depth of approximately 22 ft-bgs (based on groundwater monitoring well measurements presented in the April 2015 Site Investigation Report [ARADIS 2015]).

These receptors are expected to excavate to a maximum excavation depth of approximately 10 ft-bgs based on the typical construction worker excavation depth presented in the April 2015 Site Investigation Report [ARCADIS 2015]. Therefore, these receptors are not expected to be in direct contact with groundwater during intrusive activities. As a result, incidental ingestion and dermal contact groundwater exposure pathways were not retained. However, there is still the potential for these receptors to be exposed to volatile constituents in unexposed groundwater that migrate to trench air.

There were no exceedances of the WVDEP-approved calculated uniform groundwater standards for MCHM and PPH in post-remediation groundwater samples, but there were exceedances of the groundwater De Minimis standards for other constituents, which were retained as direct contact COC. The only COC retained in groundwater were PAHs. None of the PAHs are volatile constituents with the exception of naphthalene, which is classified as a volatile in WVDEP's most recent Chemical Property Database (dated June 2014). However, the depth to groundwater on-site ranges from approximately 14.5 to 36 ft-bgs with an average depth of approximately 22 ft-bgs (based on groundwater monitoring well measurements presented in the April 2015 Site Investigation Report [ARADIS 2015]), which is an adequate distance between groundwater and the bottom of trench to allow for attenuation of vapors migrating from the subsurface to trench air. In addition, the soil lithology at the site is primarily gravelly clay/sandy clay/silty clay, which would be a soil-like material that would allow for attenuation of vapors migrating from the subsurface to trench air. Therefore, the inhalation of volatiles from groundwater to trench air exposure pathway was considered de minimis and was not retained for the on-site construction worker and utility worker.

There were direct contact COC retained in water samples from Sump 10. The COC retained include benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene. Sump 10 (which is located on the southern side of the site) is not located within any excavation areas and remains in place. Water collects within the sump via overland flow of surface runoff. The water within the sump is no longer being pumped. The sump is within a low-lying area. Currently, the sump has filled with surface runoff and the water is ponding on the ground surface within this low-lying area.

Based on this exposure scenario, dermal contact with water from this low-lying area around Sump 10 is possible for these receptors. Incidental ingestion of accumulated water in the area around Sump 10 is unlikely for these receptors and, therefore, was not evaluated. The retained PAHs are not classified as volatiles according to the WVDEP's most recent Chemical Property Database (dated June 2014) [WVDEP 2014]. Therefore, the inhalation of volatiles from water accumulated around the area of the sump does not apply to this exposure scenario.

The exposure scenario for dermal contact with water within and around Sump 10 was ultimately deemed de minimis and was not retained based on the following:

- Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in water within and around Sump 10 only slightly exceeded the WV groundwater De Minimis standards, which are conservative screening values based on domestic use of groundwater; however, the exposure scenario for the on-site construction and utility worker is not a potable use scenario (i.e. no ingestion of groundwater).

- The USEPA tapwater RSL for these three PAHs is 0.25 ug/L based on the ingestion pathway. The concentrations of these PAHs in water within and around Sump 10 do not exceed the USEPA tapwater RSL, which is also a conservative screening value based on potable use of groundwater.

- According to USEPA RAGS-E [USEPA 2004], quantifying exposure and risk for dermal contact with water for benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene is not recommended because this exposure pathway associated with these constituents would be considered de minimis.

- The concentrations of PAHs observed in water within and around the sump are likely overestimated because this water is accumulated surface runoff which means that the measured PAH concentrations are biased higher due to constituent adsorption onto particles in the water.

Therefore, no exposure pathways were retained for sump water for the on-site construction worker and utility worker.

In summary, there were no exposure pathways retained for quantitative evaluation for the future on-site construction worker and on-site utility worker. A summary of the exposure pathways considered for the on-site construction worker and on-site utility worker and whether or not those pathways were retained is provided in **Figure 23**.

Off-Site Recreational User

This site is located in a mixed residential and commercial area. The Elk River is located adjacent to the west/northwest boundary of the site. The bank of the river is vegetated and slopes down from the site to the river. There is also a boat dock located along the river adjacent to the site. A recreational user may access the boat dock and river bank adjacent to the site. This receptor is likely to be in the age range of 11 to less than 16 years. Current and future off-site recreational users who visit the Elk River may wade, swim, or fish in the river. Therefore, exposures to sediment and surface water were evaluated for this receptor. The recreational user is expected to only spend time along the Elk River and is not expected to spend time on-site as this is represented by the trespasser.

Based on the fact that all sediment samples were collected below the water line in the Elk River, there are no applicable human health screening criteria that are appropriate to compare against the sediment analytical data. However, according to USEPA RAGS Part E [USEPA 2004], exposure to sediment below the water line for human receptors is considered de minimis because sediment that is below the water line will likely wash off the skin before the desorption of the constituents from the sediment particle and absorption of the constituents through the skin may occur. Nonetheless, as a conservative screening, sediment analytical results were compared to the residential soil and industrial soil WV De Minimis standards (or calculated uniform industrial soil standards for MCHM and PPH). There were no exceedances and, therefore, no direct contact COC retained in sediment. Therefore, incidental ingestion and dermal contact sediment exposure pathways were not retained for the off-site recreational user.

Grab surface water samples were collected in the Elk River adjacent to the site. These surface water samples were compared to applicable WVDEP and USEPA water quality

criteria. There were no constituents detected in the grab surface water samples from the Elk River and, therefore, no COC retained in Elk River surface water samples.

Groundwater at the site predominantly flows to the west toward the Elk River. As a result, there is the potential for constituents in on-site groundwater to migrate to the surface water of the Elk River. Surface water samples were used as the primary media to evaluate groundwater to surface water migration. However, for those constituents that were not analyzed in surface water samples collected along the riverbank of the Elk River, post-remediation groundwater sample results from monitoring wells located along the western property boundary and closest to the Elk River were used to evaluate groundwater to surface water migration. The monitoring wells that are located closest to the Elk River are MW-3, MW-3A, MW-4, MW-5, MW-6, and MW-13. The maximum concentrations in post-remediation groundwater samples from these monitoring wells were used to estimate surface water concentrations by using calculated dilution factors provided by the WVDEP. The calculated surface water concentrations were then compared to applicable WVDEP and USEPA water quality criteria for human health (see **Table 3-16**).

As shown in **Table 3-16**, none of the calculated surface water concentrations exceeded WVDEP or USEPA water quality criteria with the exception of benzo(a)pyrene and dibenzo(a,h)anthracene. The calculated surface water concentration for benzo(a)pyrene (i.e. 0.00076 ug/L) just slightly exceeded the USEPA human health water quality criteria for consumption of water and organism (i.e. 0.00012 ug/L) and for consumption of organism only (i.e. 0.00013 ug/L). The calculated surface water concentration for dibenzo(a,h)anthracene (i.e. 0.00081 ug/L) just slightly exceeded the USEPA human health water quality criteria for consumption of water and organism (i.e. 0.00012 ug/L) and for consumption of organism only (i.e. 0.00013 ug/L). However, neither of these constituents exceeded their applicable WVDEP human health water quality criteria for drinking water and fish consumption (i.e. 0.0038 ug/L) and for fish consumption only (i.e. 0.018 ug/L).

Furthermore, although PAHs were not analyzed in grab surface water samples, PAHs tend to be less mobile than the constituents analyzed in the grab surface water samples (e.g. MCHM and PPH). Therefore, since the more mobile MCHM and PPH were not

detected in the grab surface water samples, it is unlikely that the less mobile PAHs have migrated to the Elk River. In addition, the calculated surface water concentrations for PAHs are conservative and are likely to be overestimated. Based on this analysis, no surface water exposure pathways were retained for the recreational user based on calculated surface water concentrations.

In summary, there were no exposure pathways retained for quantitative evaluation for the current and future off-site recreational user. A summary of the exposure pathways considered for the off-site recreational user and whether or not those pathways were retained is provided in **Figure 23**.

4.3 Ecological Assessment Summary

In order to comply with Section 8.5 of the Rule [WVDEP 2017a], potential impacts to ecological receptors were evaluated. The "Checklist to Determine the Applicable Ecological Standard", provided in Appendix C-2 of the WV VRRA Guidance Manual [WVDEP 2001], was used in the ecological screening process. The checklist follows the ecological De Minimis screening evaluation outlined in Section 9.5 of the Rule [WVDEP 2017a]. In particular, Section 9.5.a of the Rule recommends that the following parameters should be considered when evaluating whether or not to perform an ecological risk assessment:

A. Evaluate whether a complete exposure pathway exists. If no complete exposure pathways exists because either the contamination is restricted in movement or there are no ecological receptors of concern, then no ecological risks exists (e.g. if the majority of the site is paved with roads and buildings, no pathway exists);

B. Some sites may be screened out and not require evaluation given their size, estimated risk to ecological receptors, or lack of valued ecological receptors, including threatened or endangered species;

C. Local conditions should be considered for assessing whether a site is degrading an aquatic environment. In cases where the site does not present an ecological risk over and above "local conditions" and further release of contaminants into the

aquatic environment has been stopped, there will not be a need for further evaluation;

D. Define what level of ecological resource is considered valued; and,

E. If for each contaminated media, harm is readily apparent and a condition of significant risk of harm to the site biota and habitats clearly exists, further ecological risk characterization would be redundant and is not required. The applicant can then proceed directly to the remedy evaluation.

The first step in determining whether a complete exposure pathway exists was performed using the "Checklist to Determine the Applicable Ecological Standard", which is presented in **Attachment 8**. As shown in the ecological checklist, "no further ecological evaluation is required" for the site. A description of the local conditions is presented below.

Local conditions:

- The site was a former liquid bulk storage and distribution facility providing chemicals primarily to the mining industry. After the release, the facility operations ceased and the ASTs were removed. Currently the site is vacant. The only structures that remain at the site are an office building and garage building located on the southern side of the site. The entire site has been developed. The southern half of the site is covered primarily with asphalt and the northern half is covered primarily with gravel with some grassy/vegetated areas along the eastern and western sides of the site. Based on the local conditions of the site, the property would not support viable ecological habitat. Therefore, terrestrial ecological receptors were not evaluated further.

- Groundwater on-site flows to the west toward the adjacent Elk River. Sediment samples were collected along the bank of the Elk River. The sediment samples collected in 2014 still remained after the December 2015/January 2016 excavation activities, and the sediment samples collected in 2017 were collected after the 2015/2016 site excavation activities. There were was only one estimated "J" value concentration of MCHM detected in SED-01 (collected in 2014). The other 2014

sediment samples had no detections of MCHM or PPH. There were a few detections of other constituents in the 2014 sediment samples (i.e. calcium, isopropyl alcohol, butyric acid, propionic acid, pyruvic acid, and chloride); however, there were no USEPA BTAG screening criteria available for these constituents. In addition, there were no detections of MCHM or PPH in the 2017 sediment samples. Sediment samples were compared to USEPA Region III freshwater BTAG sediment screening values, but no screening values were available for the constituents analyzed in sediment. However, based on the minimal detections of site-related constituents in 2014 sediment samples and no detections in 2017 sediment samples, ecological receptors were not evaluated further for exposure to constituents in sediment.

- Surface water samples were used as the primary media to evaluate groundwater to surface water migration. Post-remediation grab surface water samples were collected from the Elk River (i.e. collected after the December 2015/January 2016 excavation activities). There were no constituents detected in these post-remediation surface water samples. However, for those constituents that were not analyzed in surface water samples collected along the riverbank of the Elk River, post-remediation groundwater sample results from monitoring wells located along the western property boundary and closest to the Elk River (i.e. MW-3, MW-3A, MW-4, MW-5, MW-6, and MW-13) were used to evaluate groundwater to surface water migration.

  The maximum concentrations in post-remediation groundwater samples from these monitoring wells were used to estimate surface water concentrations by using calculated dilution factors provided by the WVDEP. The calculated surface water concentrations were then compared to applicable WVDEP and USEPA water quality criteria for aquatic life (see **Table 3-16**). As shown in **Table 3-16**, there were no WVDEP or USEPA water quality criteria for aquatic life available for the constituents shown in **Table 3-16** except for lead. The calculated surface water concentration for lead did not exceed applicable water quality criteria for aquatic life.

In addition, none of the calculated surface water concentrations exceeded USEPA Region III freshwater BTAG screening values with the exception of anthracene, benzo(a)anthracene, and benzo(a)pyrene. The calculated surface water concentration for anthracene (i.e. 0.027 ug/L) just slightly exceeded the USEPA Region III freshwater BTAG screening value (i.e. 0.012 ug/L). The calculated surface water concentration for benzo(a)anthracene (i.e. 0.025 ug/L) just slightly exceeded the USEPA Region III freshwater BTAG screening value (i.e. 0.018 ug/L). The calculated surface water concentration for benzo(a)pyrene (i.e. 0.025 ug/L) just slightly exceeded the USEPA Region III freshwater BTAG screening value (i.e. 0.015 ug/L). Although PAHs were not analyzed in grab surface water samples, PAHs tend to be less mobile than the constituents analyzed in the grab surface water samples (e.g. MCHM and PPH). Therefore, since the more mobile MCHM and PPH were not detected in the grab surface water samples, it is unlikely that the less mobile PAHs have migrated to the Elk River. In addition, the calculated surface water concentrations for PAHs are conservative and are likely to be overestimated. In conclusion, ecological receptors were not evaluated further for exposure to constituents in surface water.

It is unlikely that the site would serve as a habitat for terrestrial species. In addition, based on the data screening assessment, no further evaluation of surface water is warranted. Therefore, it can be concluded that there is no complete exposure pathway and the initial screening was adequate to determine that no substantial ecological risk exists. **Figure 23** presents the receptor CSM in flow chart form which presents a summary of the media and exposure pathways considered for ecological receptors and whether or not those pathways were retained.

5 Activity and Use Limitations

Based on the receptor and exposure pathway analysis presented in Section 4.2.2, a number of exposure pathways will be considered incomplete by means of implementing various activity and use limitations. An LUC was previously prepared for the property which included several AULs. However, a new LUC will be prepared that will include updated AULs for the property based on this risk evaluation report. The following is a summary of the AULs that will be required to maintain incomplete exposure pathways for the receptors discussed in Section 4.2.2:

- The property shall be restricted to commercial and industrial use only. The restriction will prohibit use of the property for any residential use, including schools, daycare centers, nursing homes, or any other use considered to be residential in nature. **This AUL will eliminate a hypothetical future on-site resident and their potential exposures to soil or groundwater via direct contact and vapor intrusion exposure pathways.**

- Extraction of groundwater at the site for any potable or non-potable use shall be prohibited. **This AUL will eliminate the ingestion, dermal contact, and inhalation of volatiles from groundwater via potable use exposure pathways for all on-site receptors.**

- Excavation or other penetration of the soil on the property and management of any liquid in subsurface structures on the property shall be by a contractor who is qualified and knowledgeable about releases and exposure to contaminants known to exist at the property. The contractor will be required to perform the work in accordance with a site specific Health and Safety Plan developed by an LRS or similarly qualified individual. Alternately, a contractor working under the direct supervision of an LRS, or similarly qualified individual may be used. Although surface and subsurface soil exposure pathways were not retained for an on-site construction worker and utility worker based on the previous site investigation activities, this restriction shall be included as an AUL to be protective of other areas on the property that did not have analytical samples collected (e.g. soil beneath an existing building). **This AUL will eliminate the incidental**

ingestion, dermal contact, and inhalation of volatiles and/or particulates from soil during intrusive activities for an on-site construction worker or utility worker, and potential direct contact to material within the sump for an on-site construction worker, utility worker, or facility worker.

- Any future building constructed on the property shall install a vapor barrier or vapor mitigation system unless adequate testing is completed in accordance with WVDEP standards and regulations to evaluate the vapor intrusion exposure pathway. **This AUL will eliminate the inhalation of volatiles from the subsurface and groundwater to indoor air via vapor intrusion for a future on-site indoor worker in a future on-site building that is constructed on the property.**

The activity and use limitations listed above shall be memorialized in a land use covenant.

6 Uncertainty Analysis

The risk evaluation process presented in this document uses a considerable number of conservative assumptions to ensure that potential risks are not underestimated. During the process, uncertainty and variability are inherent in the estimation of risks based on specific variables such as COC and receptors and exposure pathways. A qualitative review is presented in this section describing some of the variables as applicable to the data assessment and CSM process, which overall result in a high degree of confidence that potential site-related risks are not underestimated.

6.1 Identification of COC

Identification of COC relies, in part, on the information provided by the sampling and analytical program. Uncertainty in this regard is reduced as much as possible by the following appropriate sample collection, handling, and analytical procedures and by intentionally sampling on a bias to ensure worst-case samples are collected and potential site-related risk estimates are not underestimated. Additionally, quality assurance sampling and analysis protocols are followed to obtain characterization data that is as representative, precise, and accurate as possible to be used for risk assessment purposes. Conservative screening criteria were used in the comparison of sediment analytical results for evaluation of human health. Based on the fact that all sediment samples were collected below the water line in the Elk River, there are no applicable human health screening criteria that are appropriate to compare against the sediment analytical data. However, as a conservative screening, sediment analytical results were compared to the residential soil and industrial soil WV De Minimis standards (or calculated uniform soil standards for MCHM and PPH), and there were no exceedances. Therefore, the screening process for selection of COC in sediment for human health was a conservative assessment.

The maximum concentrations in post-remediation groundwater samples from monitoring wells located closest to the Elk River were used to estimate surface water concentrations by using calculated dilution factors provided by the WVDEP. These calculated surface water concentrations were then compared to applicable WVDEP and USEPA water quality criteria for aquatic life. The only constituents that slightly exceeded applicable

water quality criteria in calculated surface water concentrations were a few PAHs. The calculated surface water concentrations for PAHs are conservative and are likely to be overestimated. For example, maximum groundwater concentrations rather than an upper confidence level (UCL) on the mean concentration were used to calculate surface water concentrations. In addition, conservative assumptions were used to derive the dilution factors. For example, the entire length of the site was used as the plume width, which is a conservative assumption.

To aid in the selection of COC, typically a statistical summary of the analytical data is prepared, which includes the minimum and maximum detection limits, minimum and maximum concentrations, location of maximum concentrations, and frequency of detection for each constituent analyzed for in the analytical samples from each media. The maximum concentrations are then typically compared to the De Minimis screening standards or other applicable screening criteria. However, given the complexity of the dataset, a more comprehensive analysis of the individual data points was completed. Constituents of concern were identified by comparing each sample location to an applicable criterion. Any constituent that exceeded an applicable screening criterion was retained as a COC. This was a conservative process to select COC because no COPCs were eliminated as a COC based on factors such as the frequency of detection, etc.

6.2 Receptors and Exposure Pathways

Defining the probable current and future land use of the site carries with it some degree of uncertainty. Evaluating and understanding this uncertainty is important during the selection of potential receptors and exposure pathways. For this evaluation, the potential receptors and exposure pathways were based on current site conditions (nonresidential) and the assumption that the site will continue to be used for nonresidential use, limiting the uncertainty associated with these parameters.

An on-site trespasser scenario was evaluated for the on-site property. There were COC retained in surface soil that exceeded migration to groundwater De Minimis standards, and there were volatile COC retained in subsurface soil that exceeded residential soil De Minimis standards and migration to groundwater De Minimis standards (and WVDEP-approved calculated uniform leaching soil standards for MCHM and PPH). However,

there were no COC in soil that exceeded industrial soil screening standards (i.e. De Minimis standards or calculated uniform standards for MCHM and PPH). Therefore, no soil exposure pathways were retained for the on-site trespasser. Industrial soil standards were used to determine if soil exposure pathways would be retained or not for the trespasser because the trespasser exposure scenario would have a lesser exposure than a commercial/industrial receptor. For example, the trespasser is likely to spend less time at the site than a commercial facility worker (e.g. the trespasser would likely spend 2 hours/day at the site for 5 years while a commercial/industrial worker is assumed to spend 8 hours/day at the site for 25 years.) Therefore, using the industrial soil screening standards to evaluate a trespasser is a conservative analysis.

It is assumed that the on-site construction worker and on-site utility worker could be involved in excavation activities to a maximum depth of approximately 10 ft-bgs based on the typical construction worker excavation depth presented in the April 2015 Site Investigation Report [ARCADIS 2015]. As a result, these receptors may come into direct contact with surface and subsurface soil to maximum depth of approximately 10 ft-bgs. The specific depths of some subsurface soil samples are unknown. Therefore, it was conservatively assumed that these subsurface soil samples are between 2 and 10 ft-bgs (i.e. the soil interval in which an on-site construction and utility worker are expected to be in direct contact). This is a conservative assumption because some subsurface soil samples may potentially be greater than 10 ft-bgs, which is greater than the maximum excavation depth for these receptors. Therefore, the subsurface soil exposure pathway analysis for these receptors may be overestimated.

6.3 Uncertainty Analysis Conclusion

The risk evaluation employed multiple conservative assumptions, which, when combined, produce an additive conservative effect throughout the process, resulting in an overestimation of the potential risk. As a result of the uncertainties described above, this report should not be construed as presenting absolute risks or hazards. Rather, it is a conservative analysis intended to indicate the potential for adverse impacts to occur based on reasonable maximum exposure that is well above the average but still within the range of possible exposures.

Statement of Limitations

This document is prepared solely for the Former Freedom Industries – Etowah River Terminal located at 1015 Barlow Drive in Charleston, Kanawha County, West Virginia. This report was prepared based on the information supplied by WVDEP. The results of the risk evaluation presented in this report apply to the existing and reasonably foreseeable site conditions at the time of this evaluation. This evaluation is based only on the current site conditions from the historic on-site release(s) defined by the analytical data and does not assess potential future releases. Changes in the conditions of the property may occur with time due to natural processes or works of man at the site or on adjacent properties. Changes in applicable standards and toxicity criteria may also occur as a result of legislation or the broadening of knowledge. As a result, if any of the exposure assumptions and/or assessments change in the future for this site, the results of this evaluation do not apply. The Mahfood Group LLC® is not responsible for the misinterpretation or misuse of this report.

7 References

ARCADIS 2015. Site Investigation Report. Freedom Industries – Etowah River Terminal. Prepared for Freedom Industries. Prepared by ARCADIS U.S., Inc. April 30, 2015.

CORE 2015a. Interim Site Assessment Report – Revision No. 1. Freedom Industries – Etowah River Terminal. Prepared for Freedom Industries, Inc. Prepared by CORE Environmental Services, Inc. October 2015.

CORE 2015b. VRRP Interim Remedial Action Work Plan. Freedom Industries – Etowah River Terminal. Prepared for Freedom Industries, Inc. Prepared by CORE Environmental Services, Inc. November 2015.

CORE 2015c. VRRP Interim Site Assessment Work Plan – Revision No. 1. Freedom Industries – Etowah River Terminal. Prepared for Freedom Industries, Inc. Prepared by CORE Environmental Services, Inc. August 25, 2015.

USEPA 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation, EPA/540/R/99/005, OSWER 9285.7-02EP, July 2004.

USEPA 2017a. Regional Screening Table User's Guide. U.S. Environmental Protection Agency. June 2017.

USEPA 2017b. Vapor Intrusion Screening Level (VISL) Calculator Version 3.5. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation, June 2017.

WVDEP 2001. West Virginia Voluntary Remediation and Redevelopment Act Guidance Manual, Version 2.1, West Virginia Division of Environmental Protection, March 2001.

WVDEP 2011. Derivation of de minimis concentrations for chloride in soil at DOH sites. West Virginia Department of Environmental Protection. November 16, 2011.

WVDEP 2014. WVDEP-Approved Chemical Specific Data. June 5, 2014.

WVDEP 2017a. Voluntary Remediation and Redevelopment Rule. Title 60, Legislative Rule, Department of Environmental Protection, Secretary's Office, Series 3, Effective June 1, 2017.

WVDEP 2017b. Table 60-3B, De Minimis Table. Effective June 1, 2017.

Tables

Table 3-1
2014 Surface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	ARC-SS-01 ARC-SS-01-09/05/14 0-1 9/5/2014	ARC-SS-02 ARC-SS-02-09/05/14 0-1 9/5/2014	ARC-SS-03 ARC-SS-03-9/16/14 0-1 9/16/2014	ARC-SS-04 ARC-SS-04-9/16/14 0-1 9/16/2014	ARC-SS-05 ARC-SS-05-9/16/14 0-1 9/16/2014	ARC-SS-06 ARC-SS-06-09/04/14 0-1 9/4/2014	ARC-SS-07 ARC-SS-07-09/04/14 0-1 9/4/2014	ARC-SS-08 ARC-SS-08-09/04/14 0-1 9/4/2014	ARC-SS-09 ARC-SS-09-09/04/14 0-1 9/4/2014	ARC-SS-12 ARC-SS-12-09/05/14 0-1 9/5/2014	MW-3A MW-3A (0-1) (10-14-2014) 0-1 10/14/2014
Chemical	**Units**														
SVOCs															
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 2100 U	< 400 U	< 2200 U	< 4100 U	400,000	< 400 U	< 390 U	< 410 U	< 390 U	< 380 U	< 390 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 2100 U	< 400 U	4,700	9,700	< 170000 U	37 J	64 J	< 410 U	< 390 U	< 380 U	< 390 U
VOCs															
Benzene	ug/kg	1,200	57,000	2.6	< 6.0 U	< 6.0 U	< 6.3 U	210 J	41 J	0.57 J	< 5.9 U	0.40 J	< 6.0 U	< 5.6 U	NA
Ethylbenzene	ug/kg	6,200	280,000	780	0.64 J	< 6.0 U	0.47 J	59 J	140 J	< 6.0 U	< 5.9 U	< 5.9 U	< 6.0 U	< 5.6 U	NA
Methyl-tert-butylether	ug/kg	50,000	2,300,000	3.2	< 6.0 U	< 6.0 U	< 6.3 U	< 280 U	< 320 U	< 6.0 U	< 5.9 U	< 5.9 U	0.78 J	< 5.6 U	NA
Toluene	ug/kg	820,000	820,000	690	< 6.0 U	< 6.0 U	0.37 J	340	68 J	< 6.0 U	< 5.9 U	< 5.9 U	< 6.0 U	< 5.6 U	NA
Total Xylenes	ug/kg	260,000	260,000	9,900	< 12 U	< 12 U	6.6 J	510 J	330 J	< 12 U	< 12 U	12	< 12 U	3.0 J	NA
Metals															
Lead	mg/kg	400	1,000	14	17	24	160	31	32	13 J	12 J	78 J	11 J	130	NA
TPH															
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	160	49	740	1200	1200	< 20 U	< 20 U	12 J	< 20 U	< 190 U	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 13 U	< 12 U	< 13 U	< 12 U	180	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	6000	< 120 U	17000	71000	17000	< 120 U	< 120 U	550	80 J	< 110 U	NA
Isopropyl alcohol [2]	mg/kg	560	2,400	0.0084	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	2.6 J
Methanol	mg/kg	110,000	110,000	4.1	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 13 U	< 12 U	< 13 U	< 12 U	250	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	28	67	170 J	140 J	99 J	< 20 U	< 20 U	< 20 U	< 20 U	370	NA
Miscellaneous															
Acetaldehyde	mg/kg	12	370	0.00052	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 1.2 U
Acetic acid	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 11 U
Butyric Acid	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 11 U
Formaldehyde	mg/kg	18	790	0.000087	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 1.2 U
Formic Acid	mg/kg	31	130	0.00013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 11 U
Lactic acid	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 11 U
Propionic Acid	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 11 U
Pyruvic Acid	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 11 U
Chloride [3]	mg/kg	Nav	Nav	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
VOCs: volatile organic compounds
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
B - compound was found in blank sample
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] SB-20 (2-3) and SB-20 (2-3) CS2 are subsurface soil samples.
[2] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
[3] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, the calculated WVDEP leach-based screening value for chloride was used to screen chloride analytical results in soil.

Table 3-1
2014 Surface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	MW-8 MW-8 (0-1) (10-07-2014) 0-1 10/7/2014	MW-9 MW-9 (0-1) (10-08-2014) 0-1 10/8/2014	MW-10 MW-10 (0-1) (10-07-2014) 0-1 10/7/2014	MW-11 MW-11 (0-1) (10-08-2014) 0-1 10/8/2014	MW-12 MW-12 (0-1) (10-13-2014) 0-1 10/13/2014	MW-13 MW-13 (0-1) (10-14-2014) 0-1 10/14/2014	SB-1 SB-1 (0-1) 0-1 9/30/2014	SB-2 SB-2 (0-1) 0-1 9/30/2014	SB-3 SB-3 (0-1) 0-1 10/23/2014	SB-3 DUP-13 0-1 10/23/2014 SB-3 (0-1)	SB-4 SB-4 (0-1) 0-1 9/30/2014	SB-5 SB-5 (0-1) 0-1 9/30/2014	SB-6 SB-6 (0-1) 0-1 10/1/2014	SB-7 SB-7 (0-1) (10-02-2014) 0-1 10/2/2014	SB-8 DUP-02 0-1 10/1/2014 SB-8 (0-1)	SB-8 SB-8 (0-1) 0-1 10/1/2014	SB-9 SB-9 (0-1) 0-1 10/1/2014	SB-10 SB-10 (0-1) (10-02-2014) 0-1 10/2/2014
Chemical	**Units**																					
SVOCs																						
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 440 U	< 840 U	< 1800 U	< 390 U	< 1800 U	< 420 U	< 380 U	< 720 U	710 J	1900 J	< 410 U	< 2000 U	< 400 U	< 400 U	< 410 U	< 410 U	< 2000 U	< 410 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 440 U	< 840 U	< 1800 U	< 390 U	< 1800 U	< 420 U	< 380 U	< 720 U	580 J	350 J	< 410 U	< 2000 U	< 400 U	< 400 U	< 410 U	< 410 U	< 2000 U	< 410 U
VOCs																						
Benzene	ug/kg	1,200	57,000	2.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	ug/kg	6,200	280,000	780	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butylether	ug/kg	50,000	2,300,000	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	ug/kg	820,000	820,000	690	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	ug/kg	260,000	260,000	9,900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																						
Lead	mg/kg	400	1,000	14	NA	NA	NA	NA	NA	NA	NA	NA	55	66	NA	NA	NA	NA	NA	NA	NA	NA
TPH																						
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U	< 13 U	< 11 U	< 11 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U	< 13 U	< 11 U	< 11 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U	< 13 U	< 11 U	< 11 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [2]	mg/kg	560	2,400	0.0084	7.3 J	2.5 J	7.1 J	< 12 U	13	18	< 11 U	< 11 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U
Methanol	mg/kg	110,000	110,000	4.1	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U	< 13 U	< 11 U	< 11 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U	< 13 U	< 11 U	< 11 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U	< 13 U	< 11 U	< 11 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Miscellaneous																						
Acetaldehyde	mg/kg	12	370	0.00052	0.53 J	0.36 J	< 1.1 U	< 1.2 U	< 1.1 U	< 1.3 U	0.53 J	< 1.1 U	< 1.3 U	< 1.2 U	< 1.2 U	< 1.2 U	< 1.2 U	< 1.2 U	1.4	1.2	< 1.2 U	< 1.2 U
Acetic acid	mg/kg	Nav	Nav	Nav	< 11 U	< 12 U	3.8 J	< 10 U	9.5 J	< 11 U	< 10 U	< 9.4 U	< 12 U	< 11 U	< 12 U	17	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 12 U
Butyric Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 12 U	< 10 U	< 10 U	30	25	< 10 U	< 9.4 U	< 12 U	< 11 U	< 12 U	< 10 U	43	< 11 U	150 J	300 J	< 11 U	< 12 U
Formaldehyde	mg/kg	18	790	0.000087	0.54 J	< 1.3 U	0.60 J	< 1.2 U	< 1.1 U	< 1.3 U	0.53 J	< 1.1 U	7.9	9.8	6.1	0.42 J	< 1.2 U	2.6	0.70 J	0.60 J	< 1.2 U	4.2
Formic Acid	mg/kg	31	130	0.00013	< 11 U	< 12 U	< 10 U	< 10 U	4.0 J	< 11 U	< 10 U	< 9.4 U	< 12 U	< 11 U	< 12 U	< 10 U	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 12 U
Lactic acid	mg/kg	Nav	Nav	Nav	< 11 U	< 12 U	< 10 U	< 10 U	< 10 U	< 11 U	< 10 U	< 9.4 U	4.1 J	< 11 U	< 12 U	< 10 U	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 12 U
Propionic Acid	mg/kg	Nav	Nav	Nav	17	13	69	< 10 U	< 10 U	< 11 U	200	68	530	490	110	84	10000	25	4800	10000	7300	< 12 U
Pyruvic Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 12 U	< 10 U	< 10 U	< 10 U	< 11 U	< 10 U	< 9.4 U	180	58	< 12 U	< 10 U	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 12 U
Chloride [3]	mg/kg	Nav	Nav	1,000	2.2 JB	1.3 JB	13 B	0.94 JB	12	410	5.6 J	6.8 J	52	51	31	20	1.7 J	6.9 J	1.7 J	1.9 J	1.9 J	15

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
VOCs: volatile organic compounds
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
B - compound was found in blank sample
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] SB-20 (2-3) and SB-20 (2-3) CS2 are subsurface soil samples.
[2] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
[3] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, the calculated WVDEP leach-based screening value for chloride was used to screen chloride analytical results in soil.

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2014 Surface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	SB-11 SB-11 (0-1) (10-02-2014) 0-1 10/2/2014	SB-12 SB-12 (0-1) (10-02-2014) 0-1 10/2/2014	SB-13 SB-13 (0-1) (10-08-2014) 0-1 10/8/2014	SB-14 SB-14 (0-1) (10-08-2014) 0-1 10/8/2014	SB-16 SB-16 (0-1) (10-02-2014) 0-1 10/2/2014	SB-17 SB-17 (0-1) 0-1 10/1/2014	SB-18 SB-18 (0-1) 0-1 10/1/2014	SB-19 SB-19 (0-1) 0-1 10/1/2014	SB-20 SB-20 (0-1) 0-1 10/1/2014	SB-20 [1] SB-20 (CS) (2-3) 2-3 10/28/2014	SB-20 [1] SB-20 (2-3) CS2 (12-04-2014) 2-3 12/4/2014	SB-21 SB-21 (0-1) (10-02-2014) 0-1 10/2/2014	SB-22 SB-22 (0-1) (10-02-2014) 0-1 10/2/2014	SB-23 SB-23 (0-1) (10-02-2014) 0-1 10/2/2014
Chemical	**Units**																	
SVOCs																		
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 400 U	< 400 U	< 410 U	< 420 U	< 480 U	< 420 U	< 400 U	< 1000 U	4,800,000	15,000,000	100 J	< 400 U	< 430 U	1,100,000
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 400 U	< 400 U	< 410 U	< 420 U	< 480 U	< 420 U	< 400 U	< 1000 U	< 1700000 U	< 9100000 U	< 2200 U	< 400 U	< 430 U	< 830000 U
VOCs																		
Benzene	ug/kg	1,200	57,000	2.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	ug/kg	6,200	280,000	780	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butylether	ug/kg	50,000	2,300,000	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	ug/kg	820,000	820,000	690	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	ug/kg	260,000	260,000	9,900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
Lead	mg/kg	400	1,000	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	38 B	NA	NA	NA
TPH																		
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 12 U	< 12 U	< 13 U	< 13 U	< 15 U	< 13 U	< 12 U	< 12 U	< 13 U	< 14 U	< 13 U	< 12 U	< 13 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 12 U	< 12 U	< 13 U	< 13 U	< 15 U	< 13 U	< 12 U	< 12 U	< 13 U	< 14 U	< 13 U	< 12 U	< 13 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 12 U	< 12 U	< 13 U	< 13 U	< 15 U	< 13 U	< 12 U	< 12 U	600	3,400	< 13 U	< 12 U	< 13 U	210
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [2]	mg/kg	560	2,400	0.0084	< 12 U	< 12 U	7.2 J	14	18	2.5 J	< 12 U	< 12 U	< 13 U	< 14 U	< 13 U	< 12 U	< 13 U	< 12 U
Methanol	mg/kg	110,000	110,000	4.1	< 12 U	< 12 U	< 13 U	< 13 U	92	< 13 U	< 12 U	< 12 U	20	120	< 13 U	< 12 U	< 13 U	20
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 12 U	< 12 U	< 13 U	< 13 U	< 15 U	< 13 U	< 12 U	< 12 U	< 13 U	< 14 U	< 13 U	< 12 U	< 13 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 12 U	< 12 U	< 13 U	< 13 U	< 15 U	< 13 U	< 12 U	< 12 U	730	4,100	< 13 U	< 12 U	< 13 U	240
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Miscellaneous																		
Acetaldehyde	mg/kg	12	370	0.00052	< 1.2 U	< 1.2 U	< 1.2 U	< 1.3 U	< 1.4 U	1.3	< 1.2 U	< 1.2 U	0.58 J	< 1.3 U	0.68 J	1.7	< 1.3 U	< 1.2 U
Acetic acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 54 U	< 11 U	< 12 U	< 120 U	< 13 U	< 11 U	< 12 U	19
Butyric Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 54 U	560	< 12 U	< 120 U	< 13 U	< 11 U	< 12 U	< 11 U
Formaldehyde	mg/kg	18	790	0.000087	2.5	2.1	< 1.2 U	< 1.3 U	< 1.4 U	0.65 J	< 1.2 U	5.0	1.1 J	0.66 J	< 1.3 U	0.46 J	11	0.52 J
Formic Acid	mg/kg	31	130	0.00013	< 11 U	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 54 U	160 J	< 12 U	< 120 U	< 13 U	< 11 U	< 12 U	< 11 U
Lactic acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 54 U	< 11 U	< 12 U	< 120 U	< 13 U	< 11 U	< 12 U	< 11 U
Propionic Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	4.1 J	< 11 U	< 12 U	72 J	< 54 U	14000	1100	< 120 U	< 13 U	220	< 12 U	< 11 U
Pyruvic Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 11 U	< 11 U	< 12 U	< 11 U	< 54 U	< 540 U	< 12 U	< 120 U	< 13 U	< 11 U	< 12 U	< 11 U
Chloride [3]	mg/kg	Nav	Nav	1,000	490	80	6.4 JB	1.8 JB	5.1 JB	2.7 J	1.2 J	2.1 J	340	350	2.5 J	1.5 J	93	130

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
VOCs: volatile organic compounds
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
B - compound was found in blank sample
U - compound is below laboratory detection limits
* = Not calculated
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= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] SB-20 (2-3) and SB-20 (2-3) CS2 are subsurface soil samples.
[2] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
[3] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, the calculated WVDEP leach-based screening value for chloride was used to screen chloride analytical results in soil.

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Chemical	**Units**																			
SVOCs																				
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	2,900	220,000	160,000	700 J	800,000	1,400,000	< 2000 U	< 3700 U	< 410 U	< 420 U	< 2000 U	< 1500 U	< 820 U	< 380 U	< 390 U	< 400 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	630 J	< 100000 U	< 79000 U	< 930 U	< 400000 U	< 1000000 U	< 2000 U	< 3700 U	< 410 U	< 420 U	< 2000 U	< 1500 U	< 820 U	< 380 U	< 390 U	< 400 U
VOCs																				
Benzene	ug/kg	1,200	57,000	2.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	ug/kg	6,200	280,000	780	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butylether	ug/kg	50,000	2,300,000	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	ug/kg	820,000	820,000	690	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	ug/kg	260,000	260,000	9,900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																				
Lead	mg/kg	400	1,000	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH																				
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 13 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 12 U	< 11 U	< 13 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 13 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 12 U	< 11 U	< 13 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 13 U	320	260	< 11 U	370	240	< 12 U	< 11 U	< 13 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [2]	mg/kg	560	2,400	0.0084	< 13 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	3.8 J	< 11 U	< 13 U	< 13 U	< 12 U	4.2 J	8.5 J	< 12 U	< 12 U	< 12 U
Methanol	mg/kg	110,000	110,000	4.1	< 13 U	< 12 U	< 12 U	< 11 U	29	< 13 U	< 12 U	< 11 U	< 13 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 13 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 12 U	< 11 U	< 13 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 13 U	380	310	< 11 U	440	300	< 12 U	< 11 U	< 13 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Miscellaneous																				
Acetaldehyde	mg/kg	12	370	0.00052	< 1.3 U	< 1.2 U	< 1.2 U	< 1.1 U	0.38 J	0.49 J	0.53 J	< 1.1 U	< 1.2 U	< 1.3 U	0.35 J	< 1.2 U	0.47 J	< 1.2 U	< 1.2 U	0.58 J
Acetic acid	mg/kg	Nav	Nav	Nav	< 11 U	< 12 U	< 10 U	< 10 U	460	53	< 11 U	< 11 U	< 11 U	< 13 U	< 12 U	< 11 U	< 12 U	< 11 U	< 12 U	< 11 U
Butyric Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 12 U	4.6 J	< 10 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U	< 13 U	< 12 U	< 11 U	< 12 U	< 11 U	< 12 U	< 11 U
Formaldehyde	mg/kg	18	790	0.000087	1.2 J	0.45 J	1.2	< 1.1 U	5.8	2.1	5.1	3.0	< 1.2 U	9.4	1.2	3.8	< 1.2 U	7.8 H	9.8	< 1.2 U
Formic Acid	mg/kg	31	130	0.00013	< 11 U	< 12 U	< 10 U	< 10 U	70 J	< 12 U	< 11 U	< 11 U	< 11 U	< 13 U	< 12 U	< 11 U	< 12 U	< 11 U	3.1 J	< 11 U
Lactic acid	mg/kg	Nav	Nav	Nav	< 11 U	< 12 U	< 10 U	< 10 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U	< 13 U	< 12 U	< 11 U	< 12 U	< 11 U	< 12 U	< 11 U
Propionic Acid	mg/kg	Nav	Nav	Nav	< 11 U	2000	250	500	3200	120	4.6 J	11	370	< 13 U	230	640	560	490	120	540
Pyruvic Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 12 U	< 10 U	< 10 U	64 J	< 12 U	< 11 U	< 11 U	< 11 U	< 13 U	< 12 U	< 11 U	< 12 U	< 11 U	< 12 U	< 11 U
Chloride [3]	mg/kg	Nav	Nav	1,000	420 B	83	57	2.4 J	200	120 B	27	31	4.3 J	7.1 J	3.6 J	2.7 J	19	1.4 J	7.2 J	65

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
VOCs: volatile organic compounds
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
B - compound was found in blank sample
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

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= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] SB-20 (2-3) and SB-20 (2-3) CS2 are subsurface soil samples.
[2] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
[3] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, the calculated WVDEP leach-based screening value for chloride was used to screen chloride analytical results in soil.

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Chemical	**Units**																
SVOCs																	
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 860 U	< 420 U	< 420 U	< 1800 U	490,000	< 1700 U	< 400 U	< 440 U	< 1800 U	4,100	< 7200 U	< 7300 U	< 1500 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 860 U	< 420 U	< 420 U	< 1800 U	< 260000 U	< 1700 U	< 400 U	< 440 U	< 1800 U	270 J	< 7200 U	< 7300 U	< 1500 U
VOCs																	
Benzene	ug/kg	1,200	57,000	2.6	NA	NA	NA	NA	NA	NA	NA	NA	88 J	1.3 J	< 240 U	12 J	< 280 U
Ethylbenzene	ug/kg	6,200	280,000	780	NA	NA	NA	NA	NA	NA	NA	NA	160 J	< 5.0 U	350	68 J	390
Methyl-tert-butylether	ug/kg	50,000	2,300,000	3.2	NA	NA	NA	NA	NA	NA	NA	NA	< 410 U	< 5.0 U	< 240 U	< 220 U	< 280 U
Toluene	ug/kg	820,000	820,000	690	NA	NA	NA	NA	NA	NA	NA	NA	310 J	0.99 J	36 J	61 J	26 J
Total Xylenes	ug/kg	260,000	260,000	9,900	NA	NA	NA	NA	NA	NA	NA	NA	830	< 10 U	3500	270 J	2400
Metals																	
Lead	mg/kg	400	1,000	14	NA	NA	NA	NA	15	38	13 B	18 B	71 B	190 B	130 B	130 B	59 B
TPH																	
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 13 U	< 13 U	< 13 U	< 14 U	4.6 J	< 13 U	< 12 U	< 14 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 13 U	< 13 U	< 13 U	< 14 U	< 13 U	< 13 U	< 12 U	< 14 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 13 U	< 13 U	< 13 U	< 14 U	3,100	< 13 U	< 12 U	< 14 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	< 100 U	< 120 U	< 110 U	190	< 110 U
Isopropyl alcohol [2]	mg/kg	560	2,400	0.0084	< 13 U	< 13 U	< 13 U	< 14 U	< 13 U	< 13 U	< 12 U	< 14 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U
Methanol	mg/kg	110,000	110,000	4.1	< 13 U	< 13 U	< 13 U	< 14 U	290	< 13 U	< 12 U	< 14 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 13 U	< 13 U	< 13 U	< 14 U	< 13 U	< 13 U	< 12 U	< 14 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 13 U	< 13 U	< 13 U	< 14 U	4,100	< 13 U	< 12 U	< 14 U	< 11 U	< 12 U	< 11 U	< 11 U	< 11 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Miscellaneous																	
Acetaldehyde	mg/kg	12	370	0.00052	< 1.3 U	< 1.3 U	< 1.3 U	< 1.4 U	< 1.2 U	< 1.3 U	< 1.2 U	1.2 J	< 1.0 U	< 1.2 U	< 1.1 U	< 1.1 U	< 1.1 U
Acetic acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 11 U	< 13 U	< 11 U	8.0 J	< 11 U	< 11 U	< 9.5 U	< 11 U	< 10 U	< 9.1 U	< 9.7 U
Butyric Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 11 U	< 13 U	< 11 U	< 12 U	< 11 U	< 11 U	< 9.5 U	< 11 U	7.9 J	< 9.1 U	32
Formaldehyde	mg/kg	18	790	0.000087	< 1.3 U	< 1.3 U	< 1.3 U	< 1.4 U	< 1.2 U	2.7	11	< 1.4 U	< 1.0 U	< 1.2 U	4.7	3.1	5.0
Formic Acid	mg/kg	31	130	0.00013	< 11 U	< 11 U	< 11 U	< 13 U	5.4 J	5.9 J	< 11 U	< 11 U	< 9.5 U	< 11 U	< 10 U	< 9.1 U	< 9.7 U
Lactic acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 11 U	< 13 U	< 11 U	< 12 U	< 11 U	< 11 U	< 9.5 U	< 11 U	< 10 U	< 9.1 U	< 9.7 U
Propionic Acid	mg/kg	Nav	Nav	Nav	460	77	5.0 JB	< 13 U	< 11 U	< 12 U	< 11 U	< 11 U	470	520	460	400	270
Pyruvic Acid	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 11 U	< 13 U	< 11 U	< 12 U	< 11 U	< 11 U	10	< 11 U	< 10 U	< 9.1 U	< 9.7 U
Chloride [3]	mg/kg	Nav	Nav	1,000	5.7 J	15 B	< 13 U	11 J	490	6.0 J	6.1 J	21	24	51	300	110	8.4 J

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
VOCs: volatile organic compounds
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
B - compound was found in blank sample
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] SB-20 (2-3) and SB-20 (2-3) CS2 are subsurface soil samples.
[2] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
[3] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, the calculated WVDEP leach-based screening value for chloride was used to screen chloride analytical results in soil.

Table 3-1
2014 Surface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	SS-16 SS-16 (10-06-2014) 0-1 10/6/2014	SS-17-DEEP SS-17-DEEP (0-1) 0-1 9/30/2014	SS-18 SS-18 (0-1) (10-02-2014) 0-1 10/3/2014	SS-19-DEEP SS-19-DEEP (0-1) 0-1 9/30/2014	SS-20-DEEP SS-20-DEEP (0-1) 0-1 9/30/2014	SS-21 SS-21 (0-1) (10-02-2014) 0-1 10/3/2014	SS-22 SS-22 (10-06-2014) 0-1 10/6/2014	SS-23 SS-23 (10-07-2014) 0-1 10/7/2014	SS-24 SS-24 (10-07-2014) 0-1 10/7/2014	SS-25 SS-25 (10-06-2014) 0-1 10/6/2014	SS-26 SS-26 (10-06-2014) 0-1 10/6/2014	SS-27 SS-27 (0-1) (10-02-2014) 0-1 10/3/2014	SS-28 SS-28 (10-06-2014) 0-1 10/6/2014
Chemical	**Units**																
SVOCs																	
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 3600 U	< 1500 U	< 410 U	< 360 U	< 1400 U	< 380 U	< 400 U	< 410 U	< 490 U	< 490 U	580 J	< 400 U	< 390 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 3600 U	< 1500 U	< 410 U	< 360 U	< 1400 U	< 380 U	< 400 U	< 410 U	< 490 U	< 490 U	< 1900 U	< 400 U	< 390 U
VOCs																	
Benzene	ug/kg	1,200	57,000	2.6	1.4 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	ug/kg	6,200	280,000	780	2.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butylether	ug/kg	50,000	2,300,000	3.2	< 4.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	ug/kg	820,000	820,000	690	5.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	ug/kg	260,000	260,000	9,900	9.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																	
Lead	mg/kg	400	1,000	14	49 B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH																	
2-Methyl-1-propanol (Isobutanol]	mg/kg	10,000	10,000	0.34	< 11 U	< 11 U	< 12 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 15 U	< 15 U	< 12 U	< 12 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 12 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 15 U	< 15 U	< 12 U	< 12 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 11 U	< 11 U	< 12 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 15 U	< 15 U	< 12 U	< 12 U	< 12 U
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [2]	mg/kg	560	2,400	0.0084	< 11 U	< 11 U	< 12 U	< 11 U	< 11 U	< 12 U	< 12 U	7.3 J	< 15 U	11 J	< 12 U	< 12 U	3.2 J
Methanol	mg/kg	110,000	110,000	4.1	< 11 U	< 11 U	< 12 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 15 U	< 15 U	< 12 U	< 12 U	< 12 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 12 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 15 U	< 15 U	< 12 U	< 12 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 11 U	< 11 U	< 12 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 15 U	< 15 U	< 12 U	< 12 U	< 12 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Miscellaneous																	
Acetaldehyde	mg/kg	12	370	0.00052	< 1.1 U	0.38 J	< 1.2 U	< 1.1 U	0.35 J	< 1.1 U	< 1.2 U	0.46 J	< 1.4 U	< 1.5 U	< 1.2 U	< 1.2 U	< 1.2 U
Acetic acid	mg/kg	Nav	Nav	Nav	< 10 U	< 10 U	< 11 U	< 11 U	< 9.5 U	< 10 U	< 12 U	< 12 U	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U
Butyric Acid	mg/kg	Nav	Nav	Nav	6.2 J	< 10 U	< 11 U	< 11 U	15	< 10 U	4.8 J	< 12 U	< 13 U	< 13 U	29	< 12 U	< 11 U
Formaldehyde	mg/kg	18	790	0.000087	< 1.1 U	0.45 J	2.0	0.93 J	0.44 J	5.5	< 1.2 U	< 1.2 U	< 1.4 U	< 1.5 U	< 1.2 U	< 1.2 U	< 1.2 U
Formic Acid	mg/kg	31	130	0.00013	< 10 U	< 10 U	< 11 U	< 11 U	< 9.5 U	2.6 J	< 12 U	< 12 U	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U
Lactic acid	mg/kg	Nav	Nav	Nav	< 10 U	< 10 U	< 11 U	< 11 U	< 9.5 U	< 10 U	< 12 U	< 12 U	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U
Propionic Acid	mg/kg	Nav	Nav	Nav	350	61	130	34	380	< 10 U	500	100	20	5.7 J	120	390	500
Pyruvic Acid	mg/kg	Nav	Nav	Nav	< 10 U	< 10 U	< 11 U	< 11 U	< 9.5 U	< 10 U	< 12 U	< 12 U	< 13 U	< 13 U	< 11 U	< 12 U	< 11 U
Chloride [3]	mg/kg	Nav	Nav	1,000	8.9 J	14	5.8 JB	25	3.9 J	56 B	3.3 J	1.8 JB	6.7 JB	24	14	22 B	2.1 J

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
VOCs: volatile organic compounds
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
B - compound was found in blank sample
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* = Not calculated
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= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] SB-20 (2-3) and SB-20 (2-3) CS2 are subsurface soil samples.
[2] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
[3] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, the calculated WVDEP leach-based screening value for chloride was used to screen chloride analytical results in soil.

Table 3-2
2014 Subsurface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	MW-3A MW-3A (6-8) (10-14-2014) 6-8 10/14/2014	MW-3A DUP-09 (10-14-2014) 12-14 10/14/2014 MW-3A (12-14) (10-14-2014)	MW-3A MW-3A (12-14) (10-14-2014) 12-14 10/14/2014	MW-8 MW-8 (12-14) (10-07-2014) 12-14 10/7/2014	MW-8 MW-8 (36-38) (10-07-2014) 36-38 10/7/2014	MW-9 MW-9 (12-14) (10-08-2014) 12-14 10/8/2014	MW-9 MW-9 (22-24) (10-08-2014) 22-24 10/8/2014	MW-10 MW-10 (20-22) (10-07-2014) 20-22 10/7/2014
Chemical	**Units**											
SVOCs												
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 4200 U	< 1600 U	< 1500 U	< 410 U	< 380 U	< 410 U	< 420 U	< 370 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 4200 U	< 1600 U	< 1500 U	< 410 U	< 380 U	< 410 U	< 420 U	< 370 U
TPH												
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 13 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 11 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA
Diesel C10-C28	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 13 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 11 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 13 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 11 U
Formic Acid	mg/kg	31	130	0.00013	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [1]	mg/kg	560	2,400	0.0084	< 13 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 11 U
Methanol	mg/kg	110,000	110,000	4.1	< 13 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 11 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 13 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 11 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 13 U	< 12 U	< 12 U	< 12 U	< 11 U	< 12 U	< 13 U	< 11 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

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= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 3-2
2014 Subsurface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	MW-10 MW-10 (34-36) (10-07-2014) 34-36 10/7/2014	MW-11 MW-11 (8-10) (10-08-2014) 8-10 10/8/2014	MW-11 MW-11 (38-40) (10-08-2014) 38-40 10/8/2014	MW-12 MW-12 (10-12) (10-13-2014) 10-12 10/13/2014	MW-12 MW-12 (34-36) (10-13-2014) 34-36 10/13/2014	MW-13 MW-13 (12-14) (10-14-2014) 12-14 10/14/2014	MW-13 MW-13 (18-20) (10-14-2014) 18-20 10/14/2014	MW-13 DUP-08 (10-14-2014) 18-20 10/14/2014 MW-13 (18-20) (10-14-2014)	SB-1 SB-1 (16-18) 16-18 9/30/2014	SB-1 SB-1 (24-26) 24-26 9/30/2014	SB-2 SB-2 (16-18) 16-18 9/30/2014
Chemical	**Units**														
SVOCs															
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 370 U	< 370 U	< 380 U	< 410 U	< 380 U	21,000	< 370 U	< 370 U	< 420 U	< 440 U	< 400 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 370 U	< 370 U	< 380 U	< 410 U	< 380 U	< 8700 U	< 370 U	< 370 U	< 420 U	< 440 U	< 400 U
TPH															
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 11 U	< 11 U	< 12 U	< 13 U	< 12 U	< 13 U	< 11 U	< 11 U	< 13 U	< 13 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel C10-C28	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 12 U	< 13 U	< 12 U	< 13 U	< 11 U	< 11 U	< 13 U	< 13 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 11 U	< 11 U	< 12 U	< 13 U	< 12 U	17	< 11 U	< 11 U	< 13 U	< 13 U	< 12 U
Formic Acid	mg/kg	31	130	0.00013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [1]	mg/kg	560	2,400	0.0084	< 11 U	< 11 U	< 12 U	< 13 U	< 12 U	< 13 U	< 11 U	< 11 U	< 13 U	< 13 U	< 12 U
Methanol	mg/kg	110,000	110,000	4.1	< 11 U	< 11 U	< 12 U	< 13 U	< 12 U	< 13 U	< 11 U	< 11 U	< 13 U	< 13 U	< 12 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 11 U	< 11 U	< 12 U	< 13 U	< 12 U	< 13 U	< 11 U	< 11 U	< 13 U	< 13 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 11 U	< 11 U	< 12 U	< 13 U	< 12 U	26	< 11 U	< 11 U	< 13 U	< 13 U	< 12 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

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= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 3-2
2014 Subsurface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	SB-2 SB-2 (18-20) 18-20 9/30/2014	SB-4 SB-4 (12-14) 12-14 9/30/2014	SB-4 SB-4 (22-24) 22-24 9/30/2014	SB-5 SB-5 (12-14) 12-14 9/30/2014	SB-6 SB-6 (8-10) 8-10 10/1/2014	SB-7 SB-7 (10-12) (10-02-2014) 10-12 10/2/2014	SB-7 DUP-07 (10-02-2014) 10-12 10/2/2014 SB-7 (10-12) (10-02-2014)	SB-8 SB-8 (8-10) 8-10 10/1/2014	SB-9 SB-9 (8-10) 8-10 10/1/2014	SB-10 SB-10 (10-12) (10-02-2014) 10-12 10/2/2014	SB-11 SB-11 (8-10) (10-02-2014) 8-10 10/2/2014	SB-12 SB-12 (8-10) (10-02-2014) 8-10 10/2/2014	SB-17 SB-17 (8-10) 8-10 10/1/2014	SB-18 SB-18 (8-10) 8-10 10/1/2014	SB-19 SB-19 (8-10) 8-10 10/1/2014
Chemical	**Units**																		
SVOCs																			
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 400 U	< 2000 U	< 370 U	< 490 U	< 400 U	< 390 U	< 400 U	< 410 U	< 400 U	< 410 U	< 410 U	< 400 U	< 400 U	< 410 U	< 400 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 400 U	< 2000 U	< 370 U	< 490 U	< 400 U	< 390 U	< 400 U	< 410 U	< 400 U	100 J	< 410 U	< 400 U	< 400 U	< 410 U	< 400 U
TPH																			
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 12 U	< 12 U	< 11 U	< 15 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel C10-C28	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 12 U	< 12 U	< 11 U	< 15 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 12 U	< 12 U	< 11 U	< 15 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Formic Acid	mg/kg	31	130	0.00013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [1]	mg/kg	560	2,400	0.0084	< 12 U	< 12 U	< 11 U	< 15 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Methanol	mg/kg	110,000	110,000	4.1	< 12 U	< 12 U	< 11 U	< 15 U	< 12 U	2.7 J	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 12 U	< 12 U	< 11 U	< 15 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 12 U	< 12 U	< 11 U	< 15 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 3-2
2014 Subsurface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	SB-20 SB-20 (10-12) 10-12 10/1/2014	SB-20 SB-20 (12-14) 12-14 10/1/2014	SB-21 SB-21 (8-10) (10-02-2014) 8-10 10/2/2014	SB-22 SB-22 (10-12) (10-02-2014) 10-12 10/2/2014	SB-23 SB-23 (10-12) (10-02-2014) 10-12 10/2/2014	SB-24 SB-24 (10-12) 10-12 10/1/2014	SB-24 SB-24 (14-16) 14-16 10/1/2014	SB-25 SB-25 (10-12) (10-02-2014) 10-12 10/2/2014	SB-26 SB-26 (8-10) 8-10 10/1/2014	SB-26 SB-26 (14-16) 14-16 10/1/2014	SB-27 SB-27 (6-8) 6-8 10/1/2014	SB-27 SB-27 (14-16) 14-16 10/1/2014	SB-28 SB-28 (12-14) (10-02-2014) 12-14 10/2/2014
Chemical	**Units**																
SVOCs																	
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 410 U	< 410 U	< 410 U	< 400 U	5,200	< 400 U	< 420 U	< 400 U	3,700	< 400 U	< 410 U	< 410 U	< 410 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 410 U	< 410 U	< 410 U	< 400 U	< 4100 U	< 400 U	< 420 U	< 400 U	< 2700 U	< 400 U	< 410 U	< 410 U	< 410 U
TPH																	
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel C10-C28	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	12 J	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 12 U	< 13 U	< 12 U	< 12 U	71	22	500	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Formic Acid	mg/kg	31	130	0.00013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [1]	mg/kg	560	2,400	0.0084	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Methanol	mg/kg	110,000	110,000	4.1	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 12 U	< 13 U	< 12 U	< 12 U	89	< 12 U	< 13 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U	< 12 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 3-2
2014 Subsurface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	SB-29 SB-29 (10-12) (10-02-2014) 10-12 10/2/2014	SB-29 DUP-04 (10-02-2014) 10-12 10/2/2014 SB-29 (10-12) (10-02-2014)	SB-31 SB-31 (8-10) (10-02-2014) 8-10 10/2/2014	SB-32 SB-32 (12-14) (10-02-2014) 12-14 10/2/2014	SB-33 SB-33 (10-12) 10-12 10/1/2014	SB-34 SB-34 (12-14) 12-14 10/1/2014	SB-36 SB-36 (12-14) (10-02-2014) 12-14 10/2/2014	SB-36 DUP-06 (10-02-2014) 12-14 10/2/2014 SB-36 (12-14) (10-02-2014)	SB-37 SB-37 (8-10) (10-02-2014) 8-10 10/2/2014	SB-38 SB-38 (12-14) (10-02-2014) 12-14 10/2/2014	SB-38 DUP-05 (10-02-2014) 12-14 10/2/2014 SB-38 (12-14) (10-02-2014)
Chemical	**Units**														
SVOCs															
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 410 U	< 410 U	< 400 U	< 420 U	< 410 U	< 400 U	< 1700 U	< 410 U	< 420 U	5,800	< 420 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 410 U	< 410 U	< 400 U	< 420 U	< 410 U	< 400 U	< 1700 U	< 410 U	< 420 U	< 4000 U	< 420 U
TPH															
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel C10-C28	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U	6.7 J	6.6 J
Formic Acid	mg/kg	31	130	0.00013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [1]	mg/kg	560	2,400	0.0084	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U
Methanol	mg/kg	110,000	110,000	4.1	46	20	< 12 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	53
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U	< 12 U	< 13 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	< 12 U	< 12 U	< 12 U	< 13 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U	4.9 J	4.4 J
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits
* = Not calculated
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= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 3-2
2014 Subsurface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	SB-43 SB-43 (6-8) (10-15-2014) 6-8 10/15/2014	SB-43 SB-43 (22-24) (10-15-2014) 22-24 10/15/2014	SB-43 DUP-10 (10-15-2014) 22-24 10/15/2014 SB-43 (22-24) (10-15-2014)	SB-44 SB-44 (10-12) (10-15-2014) 10-12 10/15/2014	SB-44 DUP-11 (10-15-2014) 18-20 10/15/2014 SB-44 (18-20) (10-15-2014)	SB-44 SB-44 (18-20) (10-15-2014) 18-20 10/15/2014	SB-45 SB-45(12-14) (10-16-2014) 12-14 10/16/2014	SB-45 SB-45(14-16) (10-16-2014) 14-16 10/16/2014	SB-45 DUP-12 (10-16-2014) 14-16 10/16/2014 SB-45(14-16) (10-16-2014)	SS-17-DEEP SS-17-DEEP (12-14) 12-14 9/30/2014
Chemical	**Units**													
SVOCs														
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	20,000	< 1900 U	< 1900 U	< 1600 U	< 3800 U	< 1600 U	440	< 370 U	< 370 U	< 400 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	660 J	< 1900 U	< 1900 U	< 1600 U	< 3800 U	< 1600 U	< 380 U	< 370 U	< 370 U	< 400 U
TPH														
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	0.34	< 13 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 11 U	< 12 U
Diesel (C10-C20)	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel C10-C28	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	Nav	Nav	Nav	< 13 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 11 U	< 12 U
Ethylene Glycol	mg/kg	130,000	1,000,000	8.1	5.0 J	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 11 U	< 12 U
Formic Acid	mg/kg	31	130	0.00013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [1]	mg/kg	560	2,400	0.0084	< 13 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 11 U	< 12 U
Methanol	mg/kg	110,000	110,000	4.1	< 13 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 11 U	< 12 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 13 U	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 11 U	< 12 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	81	4.8 J	< 11 U	< 11 U	< 12 U	< 12 U	< 12 U	< 12 U	< 11 U	< 11 U	< 12 U
TPH C20-C34	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

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= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 3-2
2014 Subsurface Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected Parent Sample ID		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	SS-17-DEEP SS-17-DEEP (36-38) 36-38 9/30/2014	SS-19-DEEP SS-19-DEEP (36-38) 36-38 9/30/2014	SS-19-DEEP SS-19-DEEP (4-6) 4-6 9/30/2014	SS-20-DEEP SS-20-DEEP (14-16) 14-16 9/30/2014	SS-20-DEEP SS-20-DEEP (36-38) 36-38 9/30/2014	SS-21 DUP-08 (10-02-2014) 14-16 10/3/2014 SS-21 DEEP (14-16) (10-02-2014)	SS-21 SS-21 DEEP (14-16) (10-02-2014) 14-16 10/3/2014	SS-21 SS-21 DEEP (4-6) (10-02-2014) 4-6 10/3/2014	SS-27 SS-27 DEEP (10-12) (10-02-2014) 10-12 10/3/2014	SS-27 SS-27 DEEP (16-18) (10-02-2014) 16-18 10/3/2014
Chemical	**Units**													
SVOCs														
4-Methyl-1-cyclohexane methanol	ug/kg	*	**8,810,000**	**840**	< 360 U	< 340 U	< 410 U	< 1000 U	< 350 U	< 390 U	< 390 U	< 2200 U	< 400 U	< 410 U
Propylene glycol phenyl ether	ug/kg	*	**13,200,000**	**1,130**	< 360 U	< 340 U	< 410 U	< 1000 U	< 350 U	< 390 U	< 390 U	< 2200 U	< 400 U	< 410 U
TPH														
2-Methyl-1-propanol (Isobutanol)	mg/kg	**10,000**	**10,000**	**0.34**	< 11 U	< 10 U	< 12 U	< 12 U	< 11 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U
Diesel (C10-C20)	mg/kg	**Nav**	**Nav**	**Nav**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel C10-C28	mg/kg	**Nav**	**Nav**	**Nav**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	mg/kg	**Nav**	**Nav**	**Nav**	< 11 U	< 10 U	< 12 U	< 12 U	< 11 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U
Ethylene Glycol	mg/kg	**130,000**	**1,000,000**	**8.1**	< 11 U	< 10 U	< 12 U	< 12 U	< 11 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U
Formic Acid	mg/kg	**31**	**130**	**0.00013**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline C6-C10	ug/kg	**Nav**	**Nav**	**Nav**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropyl alcohol [1]	mg/kg	**560**	**2,400**	**0.0084**	< 11 U	< 10 U	< 12 U	< 12 U	< 11 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U
Methanol	mg/kg	**110,000**	**110,000**	**4.1**	< 11 U	< 10 U	< 12 U	< 12 U	< 11 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U
N-Propyl Alcohol	mg/kg	**Nav**	**Nav**	**Nav**	< 11 U	< 10 U	< 12 U	< 12 U	< 11 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U
Propylene Glycol	mg/kg	**1,000,000**	**1,000,000**	**81**	< 11 U	< 10 U	< 12 U	< 12 U	< 11 U	< 12 U	< 12 U	< 13 U	< 12 U	< 13 U
TPH C20-C34	mg/kg	**Nav**	**Nav**	**Nav**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits
* = Not calculated
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= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 3-3
2014 Sub Tank Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

	Location ID Sample ID Date Collected	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	T395C T395-C-2-3-051414(S) 5/14/2014	T395C T395-C-3-4-051414(S) 5/14/2014	T395D T395-D-2-3-051514(S) 5/15/2014	T396A T396-A-3-4-051514(S) 5/15/2014	T396C T396-C-3-4-051514(S) 5/15/2014	T396D-INT T396-D-INT.3-4-051514(S) 5/15/2014	T396F T396-F-0.1-1-051514(S) 5/15/2014	T397B T397-B-0-1-051414(S) 5/14/2014	Tank 399 TANK 399 SAND (7-16-2014) 7/16/2014	TB-395 TB-395 (7-30-2014) 7/30/2014	TB-396 TB-396 (7-29-2014) 7/29/2014
Chemical	**Units**														
SVOCs															
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	< 420 UH < 420 U	< 410 UH < 410 U	2,800 H 1,100	17,000 H 17,000	1,400 H 1,700	< 4200 UH < 4200 U	87,000 H 120,000	180,000	< 360 U	1,500 J	1,800,000
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	< 420 U < 420 UH	< 410 U < 410 UH	< 840 U < 1700 UH	< 5400 U < 8600 UH	< 1700 U < 860 UH	< 4200 U < 4200 UH	< 42000 U < 41000 UH	< 83000 U	NA	940 J	< 1100000 U
PCBs															
Aroclor 1016	ug/kg	5,500	160,000	21	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
Aroclor 1221	ug/kg	260	19,000	0.13	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
Aroclor 1232	ug/kg	220	14,000	0.13	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
Aroclor 1242	ug/kg	310	26,000	1.2	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
Aroclor 1248	ug/kg	310	27,000	1.2	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
Aroclor 1254	ug/kg	320	28,000	2.1	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
Aroclor 1260	ug/kg	330	30,000	5.5	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
Aroclor 1262	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
Aroclor 1268	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	< 37 U	NA	NA
TPH															
Diesel C10-C28	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	8.4 J	NA	NA
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	< 110 U	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
PCBs: polychlorinated biphenyls
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits

= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-3
2014 Sub Tank Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

	Location ID Sample ID Date Collected	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater**	TB-397 TB-397 (7-29-2014) 7/29/2014	TK395A TK395A (0-0.5) 5/14/2014	TK395B TK395B (0.5-1.1) 5/14/2014	TK395B TK395B (0-0.1) 5/14/2014	TK395B TK395B (1.1-2.1) 5/14/2014	TK395B TK395B (2.1-3.1) 5/14/2014	TK395B TK395B (3.1-4.1) 5/14/2014	TK396 TK396 (0.7-1.2) 5/14/2014	TK396 TK396 (0-0.2) 5/14/2014	TK396 TK396 (1.2-2.2) 5/14/2014	TK396 TK396 (2.9-3.2) 5/14/2014	TK396 TK396 (3.2-4.2) 5/14/2014	TK397 TK397 (0.9-1.1) 5/14/2014	TK397 TK397 (0-0.1) 5/14/2014	TK397 TK397 (1.1-2.1) 5/14/2014	TK397 TK397 (2.1-3.1) 5/14/2014	TK397 TK397 (3.1-4.1) 5/14/2014
Chemical	**Units**																				
SVOCs																					
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	840	22,000	1,900,000 H 8,600,000	< 430 UH < 1100 U	2,300 H 6,400	< 410 UH 460	490 H < 430 U	< 420 UH < 1700 U	480,000 H 500,000	2,000,000 H 1,800,000	2,300 H 7,700	19,000 H 68,000	26,000 H 45,000	< 1800 UH < 1800 U	5,100 H 11,000	< 8400 U < 2100 UH	< 1700 UH < 1800 U	< 1100 UH < 4300 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	1,130	1,600 J	< 4300000 U < 1100000 UH	3,300 1,300 H	< 4,500 U 2,100 H	< 410 U < 410 UH	< 430 U < 430 UH	< 1700 U < 420 UH	< 210000 U < 210000 UH	< 900000 U < 910000 UH	< 4100 U < 1600 UH	< 41000 U < 8200 UH	22,000 < 11,000 UH	4,300 4,600 H	6,500 6,600 H	< 8400 U < 2100 UH	< 1800 U < 1700 UH	< 4300 U < 1100 UH
PCBs																					
Aroclor 1016	ug/kg	5,500	160,000	21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1221	ug/kg	260	19,000	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1232	ug/kg	220	14,000	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	ug/kg	310	26,000	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1248	ug/kg	310	27,000	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	ug/kg	320	28,000	2.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	ug/kg	330	30,000	5.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1262	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1268	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH																					
Diesel C10-C28	mg/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline C6-C10	ug/kg	Nav	Nav	Nav	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
PCBs: polychlorinated biphenyls
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
Nav - not available
NA - not analyzed
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits

= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-4
2014 Diversion Trench Soil Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

	Location ID **Sample ID** **Date Collected**	**Calculated Uniform Standard Screening Value for Residential Soil**	**Calculated Uniform Standard Screening Value for Industrial Soil**	**Calculated Uniform Standard Screening Value for Migration to Groundwater**	**DiversionTrenchSoil** **DIVERSION TRENCH SOIL 1** **11/11/2014**	**DiversionTrenchSoil** **DIVERSION TRENCH SOIL 2** **11/13/2014**	**DiversionTrenchSoil** **DIVERSION TRENCH SOIL 2 (11-13-2014)** **11/13/2014**	**DiversionTrenchSoil** **DIVERSION TRENCH SOIL 3** **11/13/2014**	**DiversionTrenchSoil** **DIVERSION TRENCH SOIL 3 (11-13-2014)** **11/13/2014**	**DiversionTrenchSoil** **DIVERSION TRENCH SOIL 4** **11/13/2014**	**DiversionTrenchSoil** **DIVERSION TRENCH SOIL 4 (11-13-2014)** **11/13/2014**
Chemical	**Units**										
SVOCs											
4-Methyl-1-cyclohexane methanol	ug/kg	*	**8,810,000**	**840**	< 370 U	< 400 U	< 400 U	< 380 U	< 380 U	< 400 U	< 400 U
Propylene glycol phenyl ether	ug/kg	*	**13,200,000**	**1,130**	< 370 U	< 400 U	< 400 U	< 380 U	< 380 U	< 400 U	< 400 U

Notes:
ug/kg: micrograms per kilogram
SVOCs: semivolatile organic compounds
* = Not calculated
Depths and exact location of samples were not recorded. Trench depth is from approximately 5 to 7 feet below grade.
U - compound is below laboratory detection limits

= Exceeds Calculated Uniform Standard Screening Value for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value for Migration to Groundwater
Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-5a
2015 Test Pit Soil Analytical Results - MCHM, PPH, Propylene Glycols, Glycols, and Alcohols
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Sample Depth (feet bgs)	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)	Butyric Acid (ug/kg)	Ethyl Alcohol (ug/kg)	Ethylene glycol (ug/kg)	Isobutanol (ug/kg)	Isopropyl Alcohol (ug/kg) [2]	Methanol (ug/kg)	n-Butyl Alcohol (ug/kg)	n-Propanol (ug/kg)	Propylene glycol (ug/kg)	t-Butyl Alcohol (ug/kg)
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil (ug/kg)**			*****	*****	**Nav**	**Nav**	**130,000,000**	**10,000,000**	**560,000**	**110,000,000**	**4,700,000**	**Nav**	**1,000,000,000**	**1,400,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil (ug/kg)**			**8,810,000**	**13,200,000**	**Nav**	**Nav**	**1,000,000,000**	**10,000,000**	**2,400,000**	**110,000,000**	**7,600,000**	**Nav**	**1,000,000,000**	**42,000,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater (ug/kg)**			**840**	**1,130**	**Nav**	**Nav**	**8,100**	**340**	**8.4**	**4,100**	**110**	**Nav**	**81,000**	**74**
TP-1 2'-4'	8/26/2015	2 - 4	U (<110)	U (<63)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FD-1 (TP-1 2'-4')	8/26/2015	2 - 4	U (<99)	U (<58)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-1 4'-5.5'	8/26/2015	4 -5.5	U (<97)	U (<57)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-2 6'-8'	8/26/2015	6 - 8	**3,400**	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-2 10'-12'	8/26/2015	10 - 12	U (<100)	U (<59)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-3 0'-2' West End	8/27/2015	0 - 2	**24,000**	**1,300**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FD-5 (TP-3 0'-2' West End)	8/27/2015	0 - 2	390	840	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-3 2'-4' [1]	8/27/2015	2 - 4	U (<110)	U (<63)	U (<1600)	U (<310)	U (<4800)	U (<560)	U (<260)	U (<620)	U (<940)	U (<650)	U (<4200)	U (<740)
TP-3 2'-4'	8/27/2015	2 - 4	U (<110)	U (<65)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-3 4'-6'	8/27/2015	4 - 6	U (<100)	U (<62)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-3 6'-8'	8/27/2015	6 - 8	U (<110)	U (<64)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FD-4 (TP-3 6'-8')	8/27/2015	6 - 8	730	70 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-4 4'-6' [1]	8/27/2015	4 - 6	U (<90)	U (<53)	U (<1200)	U (<230)	U (<3600)	U (<410)	U (<190)	U (<460)	U (<700)	U (<480)	U (<3100)	U (<550)
TP-4 4'-6'	8/27/2015	4 - 6	U (<89)	U (<53)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-5 4'-6'	8/27/2015	4 - 6	U (<89)	U (<53)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-6 0'-2'	8/27/2015	0 - 2	U (<93)	U (<55)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-7 2'-4'	8/27/2015	2 - 4	U (<100)	U (<62)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-8 4'-6'	8/27/2015	4 - 6	U (<99)	U (<59)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FD-3 (TP-8 4'-6')	8/27/2015	4 - 6	U (<100)	U (<60)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-9 8'-10' [1]	8/26/2015	8 - 10	**3,400**	630	8300 J	U (<290)	U (<4500)	U (<510)	U (<240)	U (<570)	U (<870)	U (<600)	U (<3900)	U (<680)
TP-9 8'-10'	8/26/2015	8 - 10	**2,600**	**1,300**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FD-2 (TP-9 8'-10')	8/26/2015	8 - 10	**1,200**	430	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-10 2'-4' [1]	8/26/2015	2 - 4	U (<97)	U (<57)	U (<1400)	U (<270)	U (<4200)	U (<480)	U (<220)	U (<540)	U (<820)	U (<560)	U (<3600)	U (<640)
TP-10 2'-4'	8/26/2015	2 - 4	U (<99)	U (<58)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-10 10'-12'	8/26/2015	10 - 12	U (<91)	U (<54)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-11 2'-4'	8/26/2015	2 - 4	U (<100)	U (<62)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-11 4'-6'	8/26/2015	4 - 6	U (<100)	U (<61)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-12 0'-2'	8/26/2015	0 - 2	U (<100)	U (<60)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-12 4'-6'	8/26/2015	4 - 6	U (<100)	U (<59)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-13 2'-4'	8/26/2015	2 - 4	U (<100)	U (<61)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-13 10'-12'	8/26/2015	10 - 12	U (<100)	U (<59)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-14 2'-4' [1]	9/1/2015	2 - 4	U (<100)	U (<61)	U (<1500)	U (<300)	U (<4600)	U (<530)	U (<250)	U (<590)	U (<900)	U (<620)	U (<4000)	U (<710)
TP-14 2'-4'	9/1/2015	2 - 4	U (<100)	U (<60)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FD-6 (TP-14 16'-17')	9/1/2015	16 - 17	U (<100)	U (<60)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-14 16'-18'	9/1/2015	16 - 18	U (<100)	U (<59)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-15 4'-6'	9/1/2015	4 - 6	U (<100)	U (<60)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-15 14'-16'	9/1/2015	14 - 16	U (<100)	U (<60)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-16 4'-6'	9/1/2015	4 - 6	**1,700**	U (<59)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FD-7 (TP-16 4'-6')	9/1/2015	4 - 6	**2,600**	U (<60)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-16 12'-14'	9/1/2015	12 - 14	U (<100)	U (<60)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-16 16'-18'	9/1/2015	16 - 18	U (<100)	U (<59)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-17 10'-12' [1]	9/1/2015	10 - 12	U (<98)	U (<58)	U (<1400)	U (<280)	U (<4300)	U (<500)	U (<230)	U (<550)	U (<840)	U (<580)	U (<3700)	U (<660)
TP-17 10'-12'	9/1/2015	10 - 12	U (<99)	U (<59)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP-17 14'-16'	9/1/2015	14 - 16	U (<98)	U (<58)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[1] Sample collected in 32 ounce unpreserved jar. MCHM and PPH concentrations used for comparison with samples collected in 4 ounce jar and only analyzed for MCHM and PPH
[2] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
Organic Compounds were analyzed via EPA Method 8015M.
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
Nav - Not available
NA = Not Analyzed
ug/kg = micrograms per kilogram
bgs = below ground surface
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater
Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-5b
2015 Test Pit Soil Analytical Results - BTEX, MTBE, Volatile Fatty Acids, Aldehydes, and Lead
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Sample Depth (feet bgs)	Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Total xylenes (ug/kg)	Methyl tert-butyl ether (ug/kg)	Total BTEX (ug/kg)	Acetic Acid (ug/kg)	Formic Acid (ug/kg)	Lactic Acid (ug/kg)	Acetaldehyde (ug/kg)	Formaldehyde (ug/kg)	Lead (ug/kg)
WVDEP De Minimis Standard for Residential Soil (ug/kg)*			**1,200**	**820,000**	**6,200**	**260,000**	**50,000**	**Nav**	**Nav**	**31,000**	**Nav**	**12,000**	**18,000**	**400,000**
WVDEP De Minimis Standard for Industrial Soil (ug/kg)*			**57,000**	**820,000**	**280,000**	**260,000**	**2,300,000**	**Nav**	**Nav**	**130,000**	**Nav**	**370,000**	**790,000**	**1,000,000**
WVDEP De Minimis Standard for Migration to Groundwater (ug/kg)*			**2.6**	**690**	**780**	**9,900**	**3.2**	**Nav**	**Nav**	**0.13**	**Nav**	**0.52**	**0.087**	**14,000**
TP-3 2'-4'	8/27/2015	2 - 4	U (<16)	44	U (<15)	U (<47)	U (<17)	44	U (<7300)	U (<4300)	U (<7700)	U (<1200)	4,400	**42,000**
TP-4 4'-6'	8/27/2015	4 - 6	**62**	680	100	900	U (<17)	1,742	U (<5400)	U (<3200)	U (<5700)	U (<930)	U (<450)	**22,000**
TP-9 8'-10'	8/26/2015	8 - 10	U (<15)	U (<14)	U (<14)	U (<44)	U (<16)	U (<87)	U (<6800)	U (<4000)	U (<7100)	**2,700**	**12,000**	**16,000**
TP-10 2'-4'	8/26/2015	2 - 4	**20 J**	76	U (<13)	200	U (<15)	296 J	U (<6400)	U (<3700)	U (<6700)	**1,500 J**	**5,800**	**25,000**
TP-14 2'-4'	9/1/2015	2 - 4	U (<15)	U (<14)	U (<14)	200	U (<16)	U (<87)	U (<7000)	U (<4100)	U (<7400)	**1,500 J**	**4,800**	**21,000**
TP-17 10'-12'	9/1/2015	10 - 12	**29 J**	U (<14)	53	433	U (<15)	515 J	U (<6500)	U (<3800)	U (<6900)	U (<1000)	U (<500)	**17,000**

Benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl-tert butyl ether (MTBE) were analyzed via EPA Method 8260B.
Acids were analyzed via EPA Method 8300M.
Carbonyl Compounds were analyzed via EPA Method 8315A.
Metals were analyzed via EPA Method 6020A.
( ) = Method Detection Limit (MDL)
Nav - Not available
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
U = Analyzed but not detected above the method detection limit (MDL).
* = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
ug/kg = micrograms per kilogram
bgs = below ground surface
= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds June 2017 De Minimis Standards for Residential Soil
= Exceeds June 2017 De Minimis Standards for Industrial Soil
= Exceeds June 2017 De Minimis Standards for Migration to Groundwater

Table 3-5c
2015 Test Pit Soil Analytical Results - PAHs
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Sample Depth (feet bgs)	Acenaphthene (ug/kg)	Acenaphthylene (ug/kg)	Anthracene (ug/kg)	Benzo(a)anthracene (ug/kg)	Benzo(a)pyrene (ug/kg)	Benzo(b)fluoranthene (ug/kg)	Benzo(g,h,i)perylene (ug/kg)	Benzo(k)fluoranthene (ug/kg)	Chrysene (ug/kg)	Dibenz(a,h)anthracene (ug/kg)	Fluoranthene (ug/kg)	Fluorene (ug/kg)	Indeno(1,2,3-cd) pyrene (ug/kg)	Naphthalene (ug/kg)	Phenanthrene (ug/kg)	Pyrene (ug/kg)
WVDEP De Minimis Standard for Residential Soil (ug/kg)*			**4,100,000**	**4,200,000**	**23,000,000**	**210**	**16**	**160**	**1,800,000**	**1,600**	**16,000**	**16**	**2,400,000**	**2,900,000**	**160**	**4,100**	**23,000,000**	**2,300,000**
WVDEP De Minimis Standard for Industrial Soil (ug/kg)*			**70,000,000**	**80,000,000**	**700,000,000**	**88,000**	**4,300**	**43,000**	**33,000,000**	**430,000**	**4,300,000**	**4,300**	**44,000,000**	**62,000,000**	**43,000**	**180,000**	**700,000,000**	**66,000,000**
WVDEP De Minimis Standard for Migration to Groundwater (ug/kg)*			**2,500**	**3,300**	**58,000**	**4.2**	**230**	**41**	**2,300,000**	**400**	**1,200**	**13**	**89,000**	**2,700**	**130**	**0.54**	**200,000**	**8,600**
TP-3 2'-4'	8/27/2015	2 - 4	U (<3.2)	U (<2.6)	U (<4.2)	**24**	**33**	**54**	29	18	33	U (<2.8)	42	U (<4.8)	26	**94**	86	25
TP-4 4'-6'	8/27/2015	4 - 6	U (<2.7)	34	U (<3.5)	**120**	**110**	**210**	150	54	160	U (<2.4)	190	U (<4.1)	84	**680**	620	200
TP-9 8'-10'	8/26/2015	8 - 10	U (<3.1)	U (<2.5)	U (<4.0)	U (<5.0)	U (<1.7)	U (<2.8)	U (<3.6)	U (<5.1)	U (<6.9)	U (<2.7)	U (<5.0)	U (<4.6)	U (<5.1)	U (<2.1)	U (<4.5)	U (<6.2)
TP-10 2'-4'	8/26/2015	2 - 4	U (<2.9)	U (<2.4)	U (<3.8)	**11**	12	17	9.8	5.9 J	11	U (<2.6)	24	U (<4.4)	11	U (<2.0)	29	U (<5.9)
TP-14 2'-4'	9/1/2015	2 - 4	U (<3.1)	U (<2.5)	U (<3.9)	U (<4.9)	U (<1.7)	U (<2.8)	U (<3.6)	U (<5.1)	U (<6.9)	U (<2.7)	U (<5.0)	U (<4.5)	U (<5.1)	U (<2.1)	U (<4.5)	U (<6.2)
TP-17 10'-12'	9/1/2015	10 - 12	U (<2.9)	U (<2.4)	U (<3.8)	**27**	U (<1.7)	31	U (<3.4)	13	18	U (<2.6)	100	U (<4.4)	U (<4.9)	**41**	110	58

Polycyclic Aromatic Hydrocarbons (PAHs) were analyzed via EPA Method 8270D
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
U = Analyzed but not detected above the method detection limit (MDL).
Nav - Not available
* = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
ug/kg = micrograms per kilogram
bgs = below ground surface
= Shaded soil sample location indicates that the soil sample location has been removed during excavation activities.
= Exceeds June 2017 De Minimis Standards for Residential Soil
= Exceeds June 2017 De Minimis Standards for Industrial Soil
= Exceeds June 2017 De Minimis Standards for Migration to Groundwater

Table 3-6
2015/2016 Confirmatory Soil Analytical Results - Area 1A
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)
Calculated Uniform Standard Screening Value for Residential Soil (ug/kg)		*****	*****
Calculated Uniform Standard Screening Value for Industrial Soil (ug/kg)		**8,810,000**	**13,200,000**
Calculated Uniform Standard Screening Value for Migration to Groundwater (ug/kg)		**840**	**1,130**
1A-Wall-01 Grab	12/11/2015	U (<97)	U (<57)
1A-Wall-02 Grab	12/11/2015	U (<100)	U (<60)
1A-Wall-03 Grab	12/11/2015	U (<99)	U (<59)
1A-Wall-04 Grab	12/11/2015	U (<100)	U (<60)
1A-Wall-05 Grab	12/11/2015	U (<99)	U (<59)
1A-Wall-06 Grab	12/11/2015	U (<99)	U (<59)
1A-Wall-07 Grab	12/11/2015	U (<100)	U (<59)
1A-Wall-08 Grab	12/11/2015	U (<100)	U (<60)
1A-Wall-09 Grab	12/11/2015	U (<110)	U (<63)
1A-Wall-10 Grab	12/11/2015	U (<100)	380
1A-Wall-FD-1 Grab (Duplicate of 1A-Wall-10 Grab)	12/11/2015	U (<100)	370
1A-Wall-10A Grab	12/16/2015	U (<100)	U (<60)
1A-Wall-11 Grab	12/11/2015	U (<110)	U (<65)
1A-Wall-12 Grab	12/11/2015	U (<110)	U (<64)
1A-Wall-13 Grab	12/11/2015	U (<99)	U (<59)
1A-Wall-14 Grab	12/11/2015	U (<100)	U (<60)
1A-Wall-15 Grab	12/16/2015	U (<100)	U (<59)
1A-Floor-01 Grab	12/11/2015	U (<98)	U (<58)
1A-Floor-02 Grab	12/11/2015	U (<96)	U (<57)
1A-Floor-03 Grab	12/11/2015	U (<96)	U (<57)

Table 3-6
2015/2016 Confirmatory Soil Analytical Results - Area 1A
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)
Calculated Uniform Standard Screening Value for Residential Soil (ug/kg)		*****	*****
Calculated Uniform Standard Screening Value for Industrial Soil (ug/kg)		**8,810,000**	**13,200,000**
Calculated Uniform Standard Screening Value for Migration to Groundwater (ug/kg)		**840**	**1,130**
1A-Floor-04 Grab	12/11/2015	U (<100)	U (<60)
1A-Floor-FD-2 Grab (Duplicate of 1A-Floor-04 Grab)	12/11/2015	U (<100)	U (<59)
1A-Floor-05 Grab	12/11/2015	U (<98)	U (<58)
1A-Floor-06 Grab	12/11/2015	U (<100)	U (<61)
1A-Floor-07 Grab	12/16/2015	U (<110)	U (<63)
1A-Floor-08 Grab	12/16/2015	U (<100)	U (<62)
1A-Floor-09 Grab	12/16/2015	U (<100)	U (<61)
1A-Floor-10 Grab	12/16/2015	U (<100)	U (<59)
1A-Floor-11 Grab	12/16/2015	U (<99)	U (<59)
1A-Floor-12 Grab	12/16/2015	U (<91)	U (<54)
1A-Floor-101 Grab (Duplicate of 1A-Floor-12 Grab)	12/16/2015	U (<94)	U (<56)
1A-Floor-13 Grab	12/16/2015	U (<100)	U (<60)
1A-Floor-14 Grab	12/16/2015	U (<100)	U (<61)
1A-Floor-15 Grab	12/16/2015	U (<99)	U (<59)
1A-Floor-16 Grab	12/16/2015	U (<100)	U (<60)
1A-Floor-17 Grab	12/16/2015	U (<100)	94 J
1A-Floor-17A Grab	12/29/2015	U (<100)	U (<60)
1A-Floor-101A Grab (Duplicate of 1A-Floor-17A Grab)	12/29/2015	U (<100)	U (<61)
1A-Floor-18 Grab	12/16/2015	U (<99)	100 J
1A-Floor-18A Grab	12/29/2015	U (<100)	U (<61)

Table 3-6
2015/2016 Confirmatory Soil Analytical Results - Area 1A
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)
Calculated Uniform Standard Screening Value for Residential Soil (ug/kg)		*****	*****
Calculated Uniform Standard Screening Value for Industrial Soil (ug/kg)		**8,810,000**	**13,200,000**
Calculated Uniform Standard Screening Value for Migration to Groundwater (ug/kg)		**840**	**1,130**
1A-Floor-19 Grab	12/16/2015	U (<94)	86 J
1A-Floor-19A Grab	12/29/2015	U (<99)	U (<59)
1A-Floor-20 Grab	12/16/2015	U (<100)	U (<59)
1A-Floor-21 Grab	12/17/2015	U (<1,100)	U (<630)
1A-Floor-22 Grab	12/17/2015	U (<1,100)	U (<630)
1A-Floor-23 Grab	12/17/2015	U (<100)	170 J
1A-Floor-23A Grab	12/29/2015	U (<100)	U (<59)
1A-Floor-24 Grab	12/17/2015	U (<100)	U (<61)
1A-Floor-25 Grab	12/17/2015	U (<1,000)	U (<620)
1A-Floor-26 Grab	12/17/2015	U (<1,000)	U (<610)
1A-Floor-27 Grab	12/17/2015	U (<1,100)	U (<620)
1A-Floor-28 Grab	12/17/2015	U (<1,100)	U (<630)
1A-Floor-29 Grab	12/17/2015	U (<100)	U (<61)
1A-Floor-30 Grab	12/17/2015	U (<1,000)	U (<620)
1A-Floor-103 Grab (Duplicate of 1A-Floor-30 Grab)	12/17/2015	U (<1,000)	U (<620)
1A-Floor-31 Grab	12/17/2015	U (<100)	U (<60)
1A-Floor-32 Grab	12/18/2015	U (<100)	U (<62)
1A-Floor-33 Grab	12/18/2015	U (<1,000)	U (<600)
1A-Floor-34 Grab	12/18/2015	**39,000**	U (<580)
1A-Floor-34A Grab	12/30/2015	U (<100)	U (<60)

Table 3-6
2015/2016 Confirmatory Soil Analytical Results - Area 1A
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Former Freedom Industries
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Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)
Calculated Uniform Standard Screening Value for Residential Soil (ug/kg)		*****	*****
Calculated Uniform Standard Screening Value for Industrial Soil (ug/kg)		**8,810,000**	**13,200,000**
Calculated Uniform Standard Screening Value for Migration to Groundwater (ug/kg)		**840**	**1,130**
1A-Floor-35 Grab	12/18/2015	**5,600**	U (<590)
1A-Floor-35A Grab	12/30/2015	U (<100)	U (<60)
1A-Floor-36 Grab	12/18/2015	**72,000**	**2,100**
1A-Floor-105 Grab (Duplicate of 1A-Floor-36 Grab)	12/18/2015	**130,000**	**4,900**
1A-Floor-36A Grab	1/5/2016	U (<100)	1,000

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
* = Not calculated
ug/kg = micrograms per kilogram
Note: Shaded soil sample locations were over-excavated and resampled.
= Exceeds Calculated Uniform Standard Screening Value for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value for Migration to Groundwater
Note: Calculated Uniform Standard Screening values for MCHM and PPH were developed in January 2016.

Table 3-7
2015/2016 Confirmatory Soil Analytical Rsults - Area 1B
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)
Calculated Uniform Standard Screening Value for Residential Soil (ug/kg)		*****	*****
Calculated Uniform Standard Screening Value for Industrial Soil (ug/kg)		**8,810,000**	**13,200,000**
Calculated Uniform Standard Screening Value for Migration to Groundwater (ug/kg)		**840**	**1,130**
1B-Wall-01	12/8/2015	U (<100)	U (<60)
1B-Wall-01 Grab	12/14/2015	U (<100)	U (<61)
1B-Wall-02 Grab	12/14/2015	U (<110)	U (<62)
1B-Wall-03 Grab	12/14/2015	U (<110)	U (<63)
1B-Wall-04 Grab	12/17/2015	U (<100)	U (<59)
1B-Wall-04A Composite	12/31/2015	U (<200)	U (<120)
1B-Wall-05 Grab	12/17/2015	U (<100)	U (<60)
1B-Wall-102 Grab (Duplicate of 1B-Wall-05 Grab)	12/17/2015	U (<1,000)	U (<600)
1B-Wall-05A Grab	12/31/2015	U (<100)	U (<62)
1B-Wall-106 Grab (Duplicate of 1B-Wall-05A Grab)	12/31/2015	U (<100)	U (<61)
1B-Wall-06 Grab	12/30/2015	U (<100)	U (<60)
1B-Wall-07 Grab	12/30/2015	U (<96)	U (<57)
1B-Wall-08 Grab	1/6/2016	**2,800**	**1,800**
1B-Wall-09 Grab	1/6/2016	U (<96)	U (<57)
1B-Wall-10 Grab	1/6/2016	U (<100)	U (<59)
1B-Wall-11 Grab	1/6/2016	U (<95)	U (<56)
1B-Wall-12 Grab	1/6/2016	**7,500**	U (<58)
1B-Wall-107 Grab (Duplicate of 1B-Wall-12 Grab)	1/6/2016	**2,900**	U (<60)
1B-Wall-13 Grab	1/6/2016	740	U (<58)
1B-Wall-14 Grab	1/6/2016	U (<100)	U (<61)
1B-Wall-15 Grab	1/6/2016	U (<100)	U (<60)
1B-Wall-16 Grab	1/6/2016	U (<100)	U (<59)
1B-Wall-17 Grab	1/7/2016	U (<99)	U (<59)
1B-Wall-108 Grab (Duplicate of 1B-Wall-17 Grab)	1/7/2016	U (<98)	U (<58)

Table 3-7
2015/2016 Confirmatory Soil Analytical Rsults - Area 1B
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)
Calculated Uniform Standard Screening Value for Residential Soil (ug/kg)		*****	*****
Calculated Uniform Standard Screening Value for Industrial Soil (ug/kg)		**8,810,000**	**13,200,000**
Calculated Uniform Standard Screening Value for Migration to Groundwater (ug/kg)		**840**	**1,130**
1B-Floor-01 Grab	12/18/2015	U (<100)	U (<61)
1B-Floor-02 Grab	12/18/2015	500	U (<61)
1B-Floor-02A Grab	1/6/2016	320	U (<59)
1B-Floor-03 Grab	12/18/2015	160 J	U (<58)
1B-Floor-03A Grab	1/6/2016	350	U (<58)
1B-Floor-04 Grab	12/18/2015	U (<100)	U (<59)
1B-Floor-05 Grab	12/18/2015	U (<97)	U (<57)
1B-Floor-06 Grab	12/18/2015	U (<99)	U (<59)
1B-Floor-07 Grab	12/18/2015	U (<99)	U (<59)
1B-Floor-08 Grab	12/18/2015	U (<99)	U (<59)
1B Floor-104 Grab (Duplicate of 1B-Floor-08 Grab)	12/18/2015	160 J	U (<58)
1B-Floor-09 Grab	12/18/2015	U (<100)	220
1B-Floor-09A Grab	1/6/2016	U (<100)	U (<59)
1B-Floor-10 Grab	1/6/2016	**14,000**	U (<58)
1B-Floor-11 Grab	1/6/2016	U (<99)	U (<59)
1B-Floor-12 Grab	1/6/2016	U (<96)	U (<57)
1B-Floor-13 Grab	1/6/2016	U (<99)	U (<58)
1B-Floor-14 Grab	1/6/2016	U (<110)	U (<64)
1B-Floor-15 Grab	1/7/2016	U (<100)	U (<60)

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
* = Not calculated
ug/kg = micrograms per kilogram
Note: Shaded soil sample locations were over-excavated and resampled.
= Exceeds Calculated Uniform Standard Screening Value for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value for Migration to Groundwater
Note: Calculated Uniform Standard Screening values for MCHM and PPH were developed in January 2016.

Table 3-8
2016 Confirmatory Soil Analytical Rsults - Area 2
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)
Calculated Uniform Standard Screening Value for Residential Soil (ug/kg)		*****	*****
Calculated Uniform Standard Screening Value for Industrial Soil (ug/kg)		**8,810,000**	**13,200,000**
Calculated Uniform Standard Screening Value for Migration to Groundwater (ug/kg)		**840**	**1,130**
2-Wall-01 Grab	1/5/2016	**4,500**	U (<59)
2-Wall-02 Grab	1/4/2016	U (<100)	U (<59)
2-Wall-03 Grab	1/4/2016	U (<150)	U (<90)
2-Wall-04 Grab	1/4/2016	U (<160)	U (<92)
2-Wall-05 Grab	1/5/2016	U (<100)	U (<60)
2-Wall-06 Grab	1/5/2016	U (<97)	U (<58)
2-Wall-07 Grab	1/5/2016	U (<99)	U (<59)
2-Floor-01 Grab	1/4/2016	U (<160)	U (<92)
2-Floor-02 Grab	1/4/2016	U (<150)	U (<91)
2-Floor-03 Grab	1/4/2016	U (<150)	U (<86)
2-Floor-04 Grab	1/5/2016	U (<99)	U (<59)
2-Floor-05 Grab	1/5/2016	U (<99)	U (<59)

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
* = Not calculated
ug/kg = micrograms per kilogram
Note: Shaded soil sample locations were over-excavated and resampled.
= Exceeds Calculated Uniform Standard Screening Value for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value for Migration to Groundwater
Note: Calculated Uniform Standard Screening values for MCHM and PPH were developed in January 2016.

Table 3-9a
2016 Confirmatory Soil Analytical Results - Area 3 - MCHM, PPH, and BTEX
Risk Evaluation Report
Former Freedom Industries
Charleseton, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)	Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Total Xylenes (ug/kg)
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil (ug/kg)**		*****	*****	**1,200**	**820,000**	**6,200**	**260,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil (ug/kg)**		**8,810,000**	**13,200,000**	**57,000**	**820,000**	**280,000**	**260,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater (ug/kg)**		**840**	**1,130**	**2.6**	**690**	**780**	**9,900**
3-Wall-01	1/15/2016	U (<98)	U (<58)	U (<8.2)	U (<12)	U (<8.4)	U (<28)
3-Wall-02	1/15/2016	U (<95)	U (<56)	U (<7.9)	U (<12)	U (<8.2)	U (<27)
3-Wall-03	1/15/2016	U (<100)	U (<60)	U (<8.8)	U (<13)	U (<9.1)	U (<30)
3-Wall-04	1/15/2016	U (<99)	U (<59)	U (<8.3)	U (<12)	U (<8.6)	U (<28)
3-Wall-05	1/15/2016	U (<100)	U (<59)	U (<8.3)	U (<12)	U (<8.6)	U (<28)
3-Wall-06	1/15/2016	U (<92)	U (<54)	**130**	180	68	510
3-Wall-07	1/15/2016	U (<100)	U (<62)	**74**	U (<14)	U (<10)	37 J
3-Wall-08	1/15/2016	U (<99)	U (<59)	**12,000**	**5,700**	**61,000**	**49,000**
3-Wall-09	1/15/2016	U (<96)	U (<57)	U (<8.1)	U (<12)	U (<8.3)	U (<28)
3-Floor-01	1/15/2016	U (<120)	U (<69)	**78**	U (<15)	160	430
3-Floor-109 (Duplicate of 3-Floor-01)	1/15/2016	U (<110)	U (<63)	**71**	U (<13)	190	430
3-Floor-02	1/15/2016	U (<110)	U (<66)	**79**	69	130	370
3-Floor-03	1/15/2016	U (<98)	U (<58)	U (<8.3)	U (<12)	48	160
3-Floor-04	1/15/2016	U (<99)	U (<59)	U (<8.3)	U (<12)	U (<8.6)	U (<29)
3-Floor-05	1/15/2016	U (<97)	U (<57)	U (<8.2)	U (<12)	U (<8.5)	U (<28)
3-Floor-06	1/15/2016	U (<100)	U (<60)	**72**	120	200	490
3-Floor-07	1/15/2016	U (<100)	U (<61)	**1,000**	510	**2,500**	3,200
3-Floor-08	1/15/2016	U (<100)	U (<60)	**760**	63	**1,400**	1,400

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
ug/kg = micrograms per kilogram
Note: Shaded soil sample locations were over-excavated and resampled.
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Migration to Groundwater
Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-9b
2016 Confirmatory Soil Analytiucal Results - Area 3 - PAHs
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Acenaphthene (ug/kg)	Acenaphthylene (ug/kg)	Anthracene (ug/kg)	Benzo(a)anthracene (ug/kg)	Benzo(a)pyrene (ug/kg)	Benzo(b)fluoranthene (ug/kg)	Benzo(g,h,i)perylene (ug/kg)	Benzo(k)fluoranthene (ug/kg)	Chrysene (ug/kg)	Dibenz(a,h)anthracene (ug/kg)	Fluoranthene (ug/kg)	Fluorene (ug/kg)	Indeno(1,2,3-cd) pyrene (ug/kg)	Napththalene (ug/kg)	Phenanthrene (ug/kg)	Pyrene (ug/kg)
WVDEP De Minimis Standard for Residential Soil (ug/kg)**		**4,100,000**	**4,200,000**	**23,000,000**	**210**	**16**	**160**	**1,800,000**	**1,600**	**16,000**	**16**	**2,400,000**	**2,900,000**	**160**	**4,100**	**23,000,000**	**2,300,000**
WVDEP De Minimis Standard for Industrial Soil (ug/kg)**		**70,000,000**	**80,000,000**	**700,000,000**	**88,000**	**4,300**	**43,000**	**33,000,000**	**430,000**	**4,300,000**	**4,300**	**44,000,000**	**62,000,000**	**43,000**	**180,000**	**700,000,000**	**66,000,000**
WVDEP De Minimis Standard for Migration to Groundwater (ug/kg)**		**2,500**	**3,300**	**58,000**	**4.2**	**230**	**41**	**2,300,000**	**400**	**1,200**	**13**	**89,000**	**2,700**	**130**	**0.54**	**200,000**	**8,600**
3-Wall-01	1/15/2016	U (<3.0)	U (<2.4)	U (<3.9)	U (<4.8)	U (<1.7)	U (<2.7)	U (<3.5)	U (<5.0)	U (<6.7)	U (<2.6)	U (<4.9)	U (<4.4)	U (<5.0)	U (<2.1)	13	U (<6.0)
3-Wall-02	1/15/2016	U (<2.9)	U (<2.4)	U (<3.7)	U (<4.7)	U (<1.6)	U (<2.6)	U (<3.4)	U (<4.8)	U (<6.5)	U (<2.5)	U (<4.7)	U (<4.3)	U (<4.8)	U (<2.0)	U (<4.3)	U (<5.9)
3-Wall-03	1/15/2016	U (<3.1)	U (<2.5)	U (<4.0)	**9**	U (<1.7)	U (<2.8)	U (<3.6)	U (<5.1)	7.4 J	U (<2.7)	7.0 J	5.8 J	U (<5.1)	**160**	45	9.0
3-Wall-04	1/15/2016	U (<3.0)	U (<2.5)	5.2 J	**17**	9.6	25	U (<3.5)	9.2	12	U (<2.6)	33	38	7.2 J	**120**	45	27
3-Wall-05	1/15/2016	U (<3.0)	U (<2.5)	U (<3.9)	U (<4.9)	U (<1.7)	U (<2.8)	U (<3.5)	U (<5.1)	U (<6.8)	U (<2.6)	U (<5.0)	U (<4.5)	U (<5.1)	**27**	9.3	U (<6.1)
3-Wall-06	1/15/2016	7.1 J	15	27	**110**	**120**	**270**	77	120	170	**23**	200	14	67	**180**	180	180
3-Wall-07	1/15/2016	U (<3.2)	U (<2.6)	U (<4.1)	**18**	U (<1.8)	U (<2.9)	U (<3.7)	U (<5.3)	U (<7.1)	U (<2.8)	7.6 J	110	U (<5.3)	**350**	100	13
3-Wall-08	1/15/2016	U (<3.0)	U (<2.5)	U (<3.9)	**16**	14	25	7.6 J	12	16	U (<2.6)	26	18	8.8	**430**	37	28
3-Wall-09	1/15/2016	U (<2.9)	U (<2.4)	U (<3.8)	U (<4.7)	U (<1.6)	U (<2.6)	U (<3.4)	U (<4.9)	U (<6.6)	U (<2.5)	11	32	U (<4.9)	U (<2.0)	31	11
3-Floor-01	1/15/2016	54	U (<2.9)	79	**56**	**60**	**100**	31	44	69	8.1 J	230	95	41	**550**	470	160
3-Floor-109 (Duplicate of 3-Floor-01)	1/15/2016	82	U (<2.6)	140	**120**	**100**	**170**	42	61	140	7.3 J	450	150	34	**710**	570	340
3-Floor-02	1/15/2016	85	U (<2.8)	70	**86**	**62**	**110**	29	56	94	6.8 J	230	96	29	**280**	340	190
3-Floor-03	1/15/2016	76	U (<2.5)	U (<3.9)	U (<4.8)	U (<1.7)	U (<2.7)	U (<3.5)	U (<5.0)	U (<6.7)	U (<2.6)	9.6	64	U (<5.0)	**280**	39	15
3-Floor-04	1/15/2016	U (<3.0)	U (<2.5)	U (<3.9)	**8**	U (<1.7)	U (<2.7)	U (<3.5)	U (<5.0)	U (<6.8)	U (<2.6)	10	U (<4.5)	U (<5.0)	**5.6 J**	12	9.7
3-Floor-05	1/15/2016	U (<2.9)	U (<2.4)	U (<3.8)	**7**	U (<1.7)	U (<2.7)	U (<3.4)	U (<4.9)	U (<6.6)	U (<2.6)	9.0	U (<4.4)	U (<4.9)	U (<2.0)	5.9 J	6.3 J
3-Floor-06	1/15/2016	690	U (<2.5)	890	**730**	**520**	**960**	240	**440**	770	**58**	2,500	1,300	**250**	**850**	4,700	2,300
3-Floor-07	1/15/2016	U (<3.1)	U (<2.6)	U (<4.1)	**20**	15	28	5.5 J	8.0 J	15	U (<2.7)	42	120	12	**770**	170	49
3-Floor-08	1/15/2016	35	45	U (<4.0)	U (<5.0)	U (<1.7)	U (<2.8)	U (<3.6)	U (<5.2)	U (<7.0)	U (<2.7)	16	41	U (<5.2)	**910**	32	41

Polycyclic aromatic hydrocarbons (PAHs) were analyzed via EPA Method 8270D.
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
* = Not applicable, not regulated by the West Virginia Department of Environmental Protection (WVDEP).
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
ug/kg = micrograms per kilogram
= Exceeds WVDEP June 2017 De Minimis Standards for Residential Soil
= Exceeds WVDEP June 2017 De Minimis Standards for Industrial Soil
= Exceeds WVDEP June 2017 De Minimis Standards for Migration to Groundwater

Table 3-10a
2016 Confirmatory Soil Analytical Results - Area 4 - MCHM, PPH, and BTEX
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)	Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Total Xylenes (ug/kg)
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil (ug/kg)**		*****	*****	**1,200**	**820,000**	**6,200**	**260,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil (ug/kg)**		**8,810,000**	**13,200,000**	**57,000**	**820,000**	**280,000**	**260,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater (ug/kg)**		**840**	**1,130**	**2.6**	**690**	**780**	**9,900**
4-Wall-01	1/15/2016	U (<100)	U (<61)	U (<8.6)	U (<13)	U (<8.9)	U (<29)
4-Wall-02	1/15/2016	U (<100)	U (<62)	U (<8.8)	U (<13)	U (<9.1)	44 J
4-Wall-03	1/15/2016	U (<130)	U (<76)	U (<17)	200	U (<18)	U (<59)
4-Wall-110 (Duplicate of 4-Wall-03)	1/15/2016	U (<130)	U (<79)	U (<11)	68	U (<12)	43 J
4-Wall-04	1/15/2016	U (<100)	U (<61)	U (<9.9)	23 J	U (<10)	45 J
4-Wall-05	1/15/2016	U (<94)	U (<56)	U (<8.2)	16 J	U (<8.5)	42 J
4-Floor-01	1/15/2016	**5,900**	440	U (<8.1)	U (<12)	U (<8.4)	U (<28)
4-Floor-02	1/15/2016	U (<120)	U (<70)	**180**	170	**1,700**	1,000
4-Floor-111 (Duplicate of 4-Wall-02)	1/15/2016	U (<160)	U (<97)	**200**	170	**1,600**	1,000
4-Floor-03	1/15/2016	U (<120)	U (<72)	**32 J**	140	33 J	260

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
ug/kg = micrograms per kilogram
Note: Shaded soil sample locations were over-excavated and resampled.
= Exceeds Calculated Uniform Standard Screening Value or June 2017De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017De Minimis Standards for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017De Minimis Standards for Migration to Groundwater
Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-10b
2016 Confirmatory Soil Analytical Results - Area 4 - PAHs
Risk Evaluation Report
Former Freedom Indiustries
Charleston, West Virginia

Sample ID	Sample Date	Acenaphthene (ug/kg)	Acenaphthylene (ug/kg)	Anthracene (ug/kg)	Benzo(a)anthracene (ug/kg)	Benzo(a)pyrene (ug/kg)	Benzo(b)fluoranthene (ug/kg)	Benzo(g,h,i)perylene (ug/kg)	Benzo(k)fluoranthene (ug/kg)	Chrysene (ug/kg)	Dibenz(a,h)anthracene (ug/kg)	Fluoranthene (ug/kg)	Fluorene (ug/kg)	Indeno(1,2,3-cd) pyrene (ug/kg)	Napththalene (ug/kg)	Phenanthrene (ug/kg)	Pyrene (ug/kg)
WVDEP De Minimis Standard for Residential Soil (ug/kg)**		**4,100,000**	**4,200,000**	**23,000,000**	**210**	**16**	**160**	**1,800,000**	**1,600**	**16,000**	**16**	**2,400,000**	**2,900,000**	**160**	**4,100**	**23,000,000**	**2,300,000**
WVDEP De Minimis Standard for Industrial Soil (ug/kg)**		**70,000,000**	**80,000,000**	**700,000,000**	**88,000**	**4,300**	**43,000**	**33,000,000**	**430,000**	**4,300,000**	**4,300**	**44,000,000**	**62,000,000**	**43,000**	**180,000**	**700,000,000**	**66,000,000**
WVDEP De Minimis Standard for Migration to Groundwater (ug/kg)**		**2,500**	**3,300**	**58,000**	**4.2**	**230**	**41**	**2,300,000**	**400**	**1,200**	**13**	**89,000**	**2,700**	**130**	**0.54**	**200,000**	**8,600**
4-Wall-01	1/15/2016	61	U (<2.6)	18	U (<5.1)	U (<1.8)	U (<2.8)	U (<3.6)	U (<5.2)	U (<7.0)	U (<2.7)	U (<5.1)	45	U (<5.2)	U (<2.2)	31	U (<6.3)
4-Wall-02	1/15/2016	U (<3.2)	U (<2.6)	7.2 J	**15**	10	32	6.8 J	15	28	U (<2.8)	29	U (<4.7)	U (<5.3)	**22**	35	26
4-Wall-03	1/15/2016	U (<3.9)	U (<3.2)	11	**40**	**34**	**74**	23	25	53	U (<3.4)	69	11	24	**170**	120	65
4-Wall-110 (Duplicate of 4-Wall-03)	1/15/2016	U (<4.1)	U (<3.4)	23	**100**	**99**	**150**	54	77	120	**17**	220	10 J	53	**150**	160	190
4-Wall-04	1/15/2016	U (<3.1)	U (<2.6)	6.7 J	**22**	15	32	15	17	37	U (<2.7)	42	U (<4.6)	12	**27**	49	42
4-Wall-05	1/15/2016	U (<2.9)	U (<2.4)	U (<3.7)	U (<4.6)	U (<1.6)	U (<2.6)	U (<3.3)	U (<4.8)	U (<6.5)	U (<2.5)	8.0	U (<4.3)	U (<4.8)	U (<2.0)	21	8.0
4-Floor-01	1/15/2016	52	U (<2.4)	14	U (<4.7)	U (<1.6)	U (<2.6)	U (<3.4)	U (<4.9)	U (<6.6)	U (<2.5)	6.6 J	79	U (<4.9)	**82**	140	13
4-Floor-02	1/15/2016	U (<3.6)	U (<3.0)	50	**54**	**61**	**110**	39	52	95	12	130	260	43	**3,600**	450	180
4-Floor-111 (Duplicate of 4-Wall-02)	1/15/2016	U (<5.0)	U (<4.1)	170	**66**	**78**	**180**	72	88	140	**15**	180	450	73	**4,300**	710	260
4-Floor-03	1/15/2016	U (<3.7)	U (<3.0)	150	**130**	**130**	**300**	95	140	220	**22**	280	350	73	**1,000**	790	330

Polycyclic aromatic hydrocarbons (PAHs) were analyzed via EPA Method 8270D.

U = Analyzed but not detected above the method detection limit (MDL).

( ) = Method Detection Limit (MDL)

J = Analyte is present at an estimated concentration between the MDL and Report Limit.

* = Not applicable, not regulated by the West Virginia Department of Environmental Protection (WVDEP).

** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)

ug/kg = micrograms per kilogram

= Exceeds WVDEP June 2017 De Minimis Standards for Residential Soil

= Exceeds WVDEP June 2017 De Minimis Standards for Industrial Soil

= Exceeds WVDEP June 2017 De Minimis Standards for Migration to Groundwater

Table 3-11
2016 Confirmatory Soil Analytical Results - Area 5 Test Pits
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)
Calculated Uniform Standard Screening Value for Residential Soil (ug/kg)		*****	*****
Calculated Uniform Standard Screening Value for Industrial Soil (ug/kg)		**8,810,000**	**13,200,000**
Calculated Uniform Standard Screening Value for Migration to Groundwater (ug/kg)		**840**	**1,130**
TP-A	1/14/2016	U (<96)	U (<57)
TP-B	1/14/2016	U (<97)	U (<57)
TP-C	1/14/2016	U (<98)	U (<58)

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.

U = Analyzed but not detected above the method detection limit (MDL).

( ) = Method Detection Limit (MDL)

* = Not calculated

ug/kg = micrograms per kilogram

= Exceeds Calculated Uniform Standard Screening Value for Residential Soil

= Exceeds Calculated Uniform Standard Screening Value for Industrial Soil

= Exceeds Calculated Uniform Standard Screening Value for Migration to Groundwater

Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-12
2017 Soil Analytical Results - Supplemental Site Investigation - MCHM, PPH, Ethylene Glycol, and Propylene Glycol
Risk Evaluation Report
Former Freedom Industries
Charleston, WV

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)	Ethylene glycol (ug/kg)	Propylene glycol (ug/kg)
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil (ug/kg)**		*	*	**130,000,000**	**1,000,000,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil (ug/kg)**		**8,810,000**	**13,200,000**	**1,000,000,000**	**1,000,000,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Migration to Groundwater (ug/kg)**		**840**	**1,130**	**8,100**	**81,000**
3 Grab	9/8/2017	U (<100)	U (<60)	U (<1300)	U (<1300)
4 Grab	9/8/2017	U (<120)	U (<72)	U (<1800)	U (<1800)
5 Grab	9/8/2017	U (<1100)	U (<660)	U (<1700)	U (<1700)
6 Grab	9/8/2017	U (<110)	U (<66)	U (<1600)	U (<1600)
7 Grab	9/8/2017	U (<120)	U (<70)	U (<1800)	U (<1800)
8 Grab	9/8/2017	U (<120)	U (<71)	U (<1800)	U (<1800)

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil and Migration to Groundwater Standards (Effective 06/01/17)
ug/kg = micrograms per kilogram
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standard for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standard for Industrial Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standaed for Migration to Groundwater
Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-13
2017 Soil Analytical Results - Supplemental Site Investigation - Polychlorinated Biphenyls (PCB's)
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Arochlor 1016 (ug/kg)	Arochlor 1221 (ug/kg)	Arochlor 1232 (ug/kg)	Arochlor 1242 (ug/kg)	Arochlor 1248 (ug/kg)	Arochlor 1254 (ug/kg)	Arochlor 1260 (ug/kg)
WVDEP De Minimis Standard for Residential Soil (ug/kg)**		**5,500**	**260**	**220**	**310**	**310**	**320**	**330**
WVDEP De Minimis Standard for Industrial Soil (ug/kg)**		**160,000**	**19,000**	**14,000**	**26,000**	**27,000**	**28,000**	**30,000**
WVDEP De Minimis Standard for Migration to Groundwater (ug/kg)**		**21**	**0.13**	**0.13**	**1.2**	**1.2**	**2.1**	**5.5**
PCB1 Grab	10/30/2017	U (<27)	U (<27)	U (<27)	U (<27)	U (<27)	U (<22)	U (<22)
PCB2 Grab	10/30/2017	U (<27)	U (<27)	U (<27)	U (<27)	**110**	U (<22)	U (<22)
PCB3 Grab	10/30/2017	U (<27)	U (<27)	U (<27)	U (<27)	**43**	U (<22)	U (<22)
PCB4 Grab	10/30/2017	U (<26)	U (<26)	U (<26)	U (<26)	U (<26)	U (<21)	U (<21)

PCB's were analyzed by EPA Method SW 8082
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
** = WVDEP De Minimis Residential and Industrial Soil and Migration to Groundwater Standards (Effective 06/01/17)
ug/kg = micrograms per kilogram
= Exceeds June 2017 De Minimis Standard for Residential Soil
= Exceeds June 2017 De Minimis Standard for Industrial Soil
= Exceeds June 2017 De Minimis Standaed for Migration to Groundwater

Table 3-14a
2016 Groundwater Analytical Results - MCHM, PPH, Organic Compounds, Acids, Carbonyl Compounds, Lead
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

				Organic Compunds														Acids			Carbonyl Compounds		
Sample ID	**Sample Date**	**4-Methyl-1-cyclohexanemethanol (ug/l)**	**Propylene glycol phenyl ether (ug/l)**	**Butyric Acid (ug/L)**	**Diethylene Glycol (ug/L)**	**Dipropylene Glycol (ug/L)**	**Ethyl Alcohol (ug/L)**	**Ethylene glycol (ug/L)**	**Isobutanol (ug/L)**	**Isopropyl alcohol (ug/L)**	**Methanol (ug/L)**	**n-Butyl alcohol (ug/L)**	**n-Propanol (ug/L)**	**Propylene glycol (ug/L)**	**t-Butyl alochol (ug/L)**	**Triethylene Glycol**	**Acetic Acid (ug/L)**	**Formic Acid (ug/L)**	**Lactic Acid (ug/L)**	**Acetaldehyde (ug/L)**	**Formaldehyde (ug/L)**	**Lead (ug/L)**
WVDEP De Minimis Standard for Groundwater (ug/l)		**156**	**235**	*****	*****	*****	*****	**40,000**	**1,700**	**41*****	**20,000**	**530**	*****	**400,000**	**360**	**4,000*****	*****	**0.63**	*****	**2.6**	**0.43**	**15**
MW-1	1/27/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
MW-2	1/27/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.15 J
MW-3	1/28/2016	U (<2.7)	NA	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	NA	NA	NA
MW-3A	1/20/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
Dup-3 (Duplicate of MW-3A)	1/20/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.12 J
MW-4	1/19/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	1.5 J
MW-5	1/28/2016	NA	NA	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	NA	NA	NA
MW-6	1/19/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	4.2 J
Dup-2 (Duplicate of MW-6)	1/19/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	3.9 J
MW-7	1/27/2016	U (<2.7)	U (<3.6)	5,700 J	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
MW-8	1/27/2016	U(<3.0)	U(<4.0)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
Dup-5 (Duplicate of MW-8)	1/27/2016	U(<3.0)	U(<4.0)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.15 J
MW-8S	1/26/2016	U (<2.7)	U (<3.6)	2,100 J	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	NA	NA	NA
MW-9	1/26/2016	U (<2.7)	U (<3.6)	11,000 J	NA	NA	U(<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.1
Dup-4 (Duplicate of MW-9)	1/26/2016	U (<2.7)	U (<3.6)	600 J	NA	NA	U(<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.17
MW-10	1/18/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
Dup-1 (Duplicate of MW-10)	1/18/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
MW-11	1/28/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	NA	NA	NA
MW-12	1/19/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	38 J	0.18 J
MW-13	1/20/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
MW-13	2/1/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
MW-13 (Split)	2/1/2016	U (<6.0) **	U (<6.0) **	NA	U (<9,840)	U (<8,570)	U (<100)	U (<6,010)	NA	U (<50)	U (<5,000)	NA	U (<50)	U (<8,000)	U (<50)	U (<12,400)	NA	NA	NA	NA	NA	U (<0.20)

Notes:
4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
Organic Compounds were analyzed via EPA Method 8015M AND 8270.
Acids were analyzed via EPA Method 8300M.
Carbonyl Compounds were analyzed via EPA Method 8315A.
Lead was analyzed via EPA Method 6020A.
( ) = Method Detection Limit (MDL)
U = Analyzed but not detected above the method detection limit.
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
* = Not applicable, not regulated by the West Virginia Department of Environmental Protection (WVDEP).
** = MDL was not available for these constituents. Therefore, the PQL was used.
*** = WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
ug/L = micrograms per liter
NA = Not Analyzed
Note: MW-3 PPH, carbonyl compounds, and lead were not analyzed (NA) due to insufficient sample volume.
Note: MW-5 MCHM, PPH, carbonyl compounds, and lead were not analyzed (NA) due to insufficient sample volume.
Note: MW-8S and MW-11 carbonyl compounds and lead were not analyzed (NA) due to insufficient sample volume.
Shading indicates concentration above the current WVDEP (June 2017) De Minimis Standard for Groundwater.
Note: Calculated Uniform Standard Screening Levels for MCHM and PPH were developed in January 2016.

Table 3-14b
2016 Groundwater Analytical Results - PAHs
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Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Acenaphthene (ug/L)	Acenaphthylene (ug/L)	Anthracene (ug/L)	Benzo(a)anthracene (ug/L)	Benzo(a)pyrene (ug/L)	Benzo(b)fluoranthene (ug/L)	Benzo(g,h,i)perylene (ug/L)	Benzo(k)fluoranthene (ug/L)	Chrysene (ug/L)	Dibenzo(a,h)anthracene (ug/L)	Fluoranthene (ug/L)	Fluorene (ug/L)	Indeno(1,2,3-cd) pyrene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Pyrene (ug/L)
WVDEP De Minimis Standards for Groundwater		**240**	**320**	**1,800**	**0.012**	**0.2**	**0.034**	**600**	**0.34**	**3.4**	**0.0034**	**800**	**150**	**0.034**	**0.17**	**6,000**	**79**
MW-1	1/27/2016	U (<0.0058)	U (<0.0072)	U (<0.0047)	**0.016 J**	0.073	**0.068**	0.027 J	0.045	U (<0.007)	U (<0.0029)	0.0093 J	U (<0.0052)	**0.066**	0.046	0.012 J	0.0096 J
MW-2	1/27/2016	0.0054 J	0.0071 J	0.0067 J	**0.02 J**	0.067	**0.072**	0.029 J	0.042	0.0092 J	U (<0.0024)	0.018 J	U (<0.0043)	**0.06**	0.011 J	0.014 J	0.018 J
MW-3	1/28/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3A	1/20/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
Dup-3 (Duplicate for MW-3A)	1/20/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
MW-4	1/19/2016	U (<0.0048)	U (<0.0060)	0.0098 J	**0.027**	0.069	**0.081**	0.033 J	0.049	0.026	U (<0.0024)	0.048	U (<0.0043)	**0.065**	U (<0.0062)	0.033 J	0.032
MW-5	1/28/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-6	1/19/2016	1.1	1.2	1.6	**1.5**	**1.5**	**1.5**	1.7	**1.5**	1.7	**1.6**	1.6	1.3	**1.6**	**0.95**	1.4	1.5
Dup-2 (Duplicate to MW-6)	1/19/2016	0.054	U (<0.0060)	0.014 J	U(<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	0.012 J	0.038	U(<0.0034)	0.10	0.043	0.010 J
MW-7	1/27/2016	U (<0.0048)	U (<0.0060)	0.0045 J	**0.014 J**	0.062	**0.057**	0.023 J	0.036	0.009 J	U (<0.0024)	0.014 J	U (<0.0043)	**0.054**	0.076	0.028 J	0.015 J
MW-8	1/27/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	0.082	0.011 J	0.0039 J
Dup-5 (Duplicate of MW-8)	1/27/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	0.004 J	0.0063 J	U (<0.0034)	0.067	0.019 J	0.0048 J
MW-8S	1/26/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-9	1/26/2016	U (<0.0048)	U (<0.0060)	0.0052 J	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	0.0066 J	0.0092 J	U (<0.0034)	0.10	0.019 J	0.0069 J
Dup-4 (Duplicate of MW-9)	1/26/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	0.0051 J	0.0085 J	U (<0.0034)	0.11	0.015 J	0.0057 J
MW-10	1/18/2016	U (<0.0048)	U (<0.0060)	0.0094 J	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	0.014 J	U (<0.0043)	U (<0.0034)	0.044	0.020 J	0.011 J
Dup-1 (Duplicate for MW-10)	1/18/2016	0.065	U (<0.0060)	0.011 J	**0.018 J**	0.066	**0.059**	0.030 J	0.039	0.0099 J	**0.039**	0.016 J	0.044	**0.062**	**0.22**	0.041	0.013 J
MW-11	1/28/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-12	1/19/2016	U (<0.0096)	0.012	U (<0.0078)	U (<0.0090)	U (<0.0064)	U (<0.0042)	U (<0.028)	U (<0.0052)	U (<0.012)	U (<0.0048)	U (<0.0068)	U (<0.0086)	U (<0.0068)	U (<0.012)	U (<0.019)	U (<0.0074)
MW-13	1/20/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
MW-13	2/1/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
MW-13 (Split)	2/1/2016	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)

Polycyclic Aromatic Hydrocarbons (PAHs) were analyzed via EPA Method 8270D SIM.
( ) = Method Detection Limit (MDL)
U = Analyzed but not detected above the method detection limit.
J = Analyte is present at an estimated concentration between the MDL and Report Limi
ug/L = micrograms per liter
NA = Not Analyzed
Note: MW-3, MW-5, MW-8S, and MW-11 PAHs not analyzed (NA) due to insufficient sample volume.
Shading indicates concentration above the current WVDEP (June 2017) De Minimis Standard for Groundwater.

Table 3-14c
2016 Groundwater Analytical Results - BTEX and MTBE
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Sample ID	Sample Date	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylene (ug/L)	MTBE (ug/L)
WVDEP De Minimis Standards for Groundwater		**5**	**1,000**	**700**	**10,000**	**14**
MW-1	1/27/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-2	1/27/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-3	1/28/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-3A	1/20/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Dup-3 (Duplicate of MW-3A)	1/20/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-4	1/19/2016	0.53 J	0.87 J	U(<0.22)	2.3 J	U (<0.12)
MW-5	1/28/2016	0.65 J	0.4 J	2.2	1.4 J	U (<0.12)
MW-6	1/19/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Dup-2 (Duplicate of MW-6)	1/19/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-7	1/27/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-8	1/27/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Dup-5 (Duplicate of MW-8)	1/27/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-8S	1/26/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-9	1/26/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Dup-4 (Duplicate of MW-9)	1/26/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-10	1/18/2016	U (<0.25)	U(<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Dup-1 (Duplicate of MW-10)	1/18/2016	U (<0.25)	U(<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-11	1/28/2016	U (<0.25)	U(<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-12	1/19/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-13	1/20/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-13	2/1/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
MW-13 (Split)	2/1/2016	U (<0.50)	U (<0.50)	U (<0.50)	U (<1.50)	U (<2.50)

Benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tert-butyl ether (MTBE) were analyzed via EPA Method 8260B.

( ) = Method Detection Limit (MDL)

U = Analyzed but not detected above the method detection limit.

J = Analyte is present at an estimated concentration between the MDL and Report Limit.

ug/L = micrograms per liter

Shading indicates concentration above the current WVDEP (June 2017) De Minimis Standard for Groundwater.

Table 3-15
Maximum Groundwater Concentrations and Comparison to Vapor Intrusion Screening Criteria
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Constituent [1]	Maximum Groundwater Concentration (ug/L) [2]	Maximum Groundwater Concentration Location	Maximum Groundwater Concentration Sampling Date	USEPA Residential VISL (ug/L) [3]	USEPA Commerical VISL [4]	Maximum Concentration Exceeds Residential VISL (Yes or No)	Maximum Concentration Exceeds Commerical VISL (Yes or No)
Benzene	0.65 J	MW-5	1/28/2016	1.6	69	No	No
Ethylbenzene	2.2	MW-5	1/28/2016	3.5	150	No	No
Toluene	0.87 J	MW-4	1/19/2016	19,000	81,000	No	No
Total Xylenes	2.3 J	MW-4	1/19/2016	380	1,600	No	No
MTBE	ND	---	---	450	20,000	No	No
Naphthalene	0.95	MW-6	1/19/2016	4.6	200	No	No
Formic Acid	ND	---	---	46,000	190,000	No	No
Acetaldehyde	ND	---	---	470	14,000	No	No
Formaldehyde	38 J	MW-12	1/19/2016	16,000	680,000	No	No
Methanol	ND	---	---	110,000,000	470,000,000	No	No
Isopropyl Alcohol	ND	---	---	630,000	2,600,000	No	No

Notes:
ug/L - micrograms per liter
J - analyte is present at an estimated concentration between the MDL and Report Limit
ND - not detected
MTBE - Methyl tert-Butyl Ether
USEPA - United States Environmental Protection Agency
VISL - Vapor Intusion Screening Level
[1] This table only presents the constituents that have an applicable USEPA VISL target groundwater screening value.
[2] Maximum concentrations were selected from post-remediation samples (i.e. Jan/Feb 2016) from groundwater monitoring wells MW-1 through MW-13.
[3] Indicates the applicable USEPA residential VISL target groundwater concentration based on a target risk of 1.0 $x10^{-6}$, target HQ of 1.0, and temperature of 25°C, June 2017.
[4] Indicates the applicable USEPA commerical VISL target groundwater concentration based on a target risk of 1.0 $x10^{-5}$, target HQ of 1.0, and temperature of 25°C, June 2017.

Table 3-16
Maximum Groundwater Concentrations Used to Estimate Surface Water Concentrations Using Dilution Factors
Risk Evaluation Report
Former Freedom Industries
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Constituent [1]	Maximum Concentration (ug/L) [2]	Maximum Concentration Location	Maximum Concentration Sampling Date	Human Health [3]		Human Health Screening Criteria [4]							
						WVDEP		USEPA					
				Dilution Factor (unitless)	Surface Water Concentration (ug/L)	Fish Consumption (ug/L)	Drinking Water and Fish Consumption (ug/L)	Consumption of Water + Organism	Consumption of Organism Only	Exceeds WVDEP Fish Consumption Screening Value (Yes or No)	Exceeds WVDEP Drinking Water and Fish Consumption Screening Value (Yes or No)	Exceeds USEPA Consumption of Water and Organism Screening Value (Yes or No)	Exceeds USEPA Consumption or Organism Only Screening Value (Yes or No)
VOCs													
Benzene	0.65 J	MW-5	1/28/2016	1,978	0.00033	51	0.66	0.58 - 2.1 [6]	0.58 - 2.1 [6]	No	No	No	No
Ethylbenzene	2.2	MW-5	1/28/2016	1,978	0.00111	29,000	3100	68	130	No	No	No	No
Toluene	0.87 J	MW-4	1/19/2016	1,978	0.00044	200,000	6800	57	520	No	No	No	No
Total Xylenes	2.3 J	MW-4	1/19/2016	1,978	0.00116	Nav	Nav	Nav	Nav	No	No	No	No
PAHs													
Acenaphthene	1.1	MW-6	1/19/2016	1,978	0.00056	990	670	70	90	No	No	No	No
Acenaphthylene	1.2	MW-6	1/19/2016	1,978	0.00061	Nav	Nav	Nav	Nav	No	No	No	No
Anthracene	1.6	MW-6	1/19/2016	1,978	0.00081	40,000	8,300	300	400	No	No	No	No
Benzo(a)anthrancene	1.5	MW-6	1/19/2016	1,978	0.00076	0.018	0.0038	0.0012	0.0013	No	No	No	No
Benzo(a)pyrene	1.5	MW-6	1/19/2016	1,978	0.00076	0.018	0.0038	0.00012	0.00013	No	No	**Yes**	**Yes**
Benzo(b)fluoranthene	1.5	MW-6	1/19/2016	1,978	0.00076	0.018	0.0038	0.0012	0.0013	No	No	No	No
Benzo(g,h,i)perylene	1.7	MW-6	1/19/2016	1,978	0.00086	Nav	Nav	Nav	Nav	No	No	No	No
Benzo(k)fluoranthene	1.5	MW-6	1/19/2016	1,978	0.00076	0.018	0.0038	0.012	0.013	No	No	No	No
Chrysene	1.7	MW-6	1/19/2016	1,978	0.00086	0.018	0.0038	0.12	0.13	No	No	No	No
Dibenzo(a,h)anthracene	1.6	MW-6	1/19/2016	1,978	0.00081	0.018	0.0038	0.00012	0.00013	No	No	**Yes**	**Yes**
Fluoranthene	1.6	MW-6	1/19/2016	1,978	0.00081	370	300	20	30	No	No	No	No
Fluorene	1.3	MW-6	1/19/2016	1,978	0.00066	5300	1100	50	70	No	No	No	No
Indeno(1,2,3-cd)pyrene	1.6	MW-6	1/19/2016	1,978	0.00081	0.018	0.0038	0.0012	0.0013	No	No	No	No
Naphthalene	0.95	MW-6	1/19/2016	1,978	0.00048	Nav	Nav	Nav	Nav	No	No	No	No
Phenanthrene	1.4	MW-6	1/19/2016	1,978	0.00071	Nav	Nav	Nav	Nav	No	No	No	No
Pyrene	1.5	MW-6	1/19/2016	1,978	0.00076	4000	830	20	30	No	No	No	No
Metals													
Lead	4.2 J	MW-6	1/19/2016	1,978	0.00212	Nav	50	Nav	Nav	No	No	No	No

Notes on last page

Table 3-16
Maximum Groundwater Concentrations Used to Estimate Surface Water Concentrations Using Dilution Factors
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Constituent [1]	Maximum Concentration (ug/L) [2]	Maximum Concentration Location	Maximum Concentration Sampling Date	Ecological [3]		Ecological Screening Criteria [5]									
						WVDEP		USEPA			Exceeds WVDEP Warm Water Fishery Screening Value (Yes or No)	Exceeds WVDEP Trout Waters Screening Value (Yes or No)	Exceeds USEPA Region III Freshwater BTAG Value (Yes or No)	Exceeds USEPA Aquatic Life Water Quality Criteria - CCC (Yes or No)	Exceeds USEPA Aquatic Life Water Quality Criteria - CMC (Yes or No)
				Dilution Factor (unitless)	Surface Water Concentration (ug/L)	Chronic Aquatic Life for Warm Water Fishery (ug/L)	Chronic Aquatic Life for Trout Waters (ug/L)	Region III Freshwater BTAG (ug/L)	Aquatic Life Water Quality Criteria - CCC (ug/L)	Aquatic Life Water Quality Criteria - CMC (ug/L)					
VOCs															
Benzene	0.65 J	MW-5	1/28/2016	59.34	0.011	Nav	Nav	370	Nav	Nav	No	No	No	No	No
Ethylbenzene	2.2	MW-5	1/28/2016	59.34	0.037	Nav	Nav	90	Nav	Nav	No	No	No	No	No
Toluene	0.87 J	MW-4	1/19/2016	59.34	0.015	Nav	Nav	2	Nav	Nav	No	No	No	No	No
Total Xylenes	2.3 J	MW-4	1/19/2016	59.34	0.039	Nav	Nav	13	Nav	Nav	No	No	No	No	No
PAHs															
Acenaphthene	1.1	MW-6	1/19/2016	59.34	0.019	Nav	Nav	5.8	Nav	Nav	No	No	No	No	No
Acenaphthylene	1.2	MW-6	1/19/2016	59.34	0.020	Nav	Nav	Nav	Nav	Nav	No	No	No	No	No
Anthracene	1.6	MW-6	1/19/2016	59.34	0.027	Nav	Nav	0.012	Nav	Nav	No	No	**Yes**	No	No
Benzo(a)anthrancene	1.5	MW-6	1/19/2016	59.34	0.025	Nav	Nav	0.018	Nav	Nav	No	No	**Yes**	No	No
Benzo(a)pyrene	1.5	MW-6	1/19/2016	59.34	0.025	Nav	Nav	0.015	Nav	Nav	No	No	**Yes**	No	No
Benzo(b)fluoranthene	1.5	MW-6	1/19/2016	59.34	0.025	Nav	Nav	Nav	Nav	Nav	No	No	No	No	No
Benzo(g,h,i)perylene	1.7	MW-6	1/19/2016	59.34	0.029	Nav	Nav	Nav	Nav	Nav	No	No	No	No	No
Benzo(k)fluoranthene	1.5	MW-6	1/19/2016	59.34	0.025	Nav	Nav	Nav	Nav	Nav	No	No	No	No	No
Chrysene	1.7	MW-6	1/19/2016	59.34	0.029	Nav	Nav	Nav	Nav	Nav	No	No	No	No	No
Dibenzo(a,h)anthracene	1.6	MW-6	1/19/2016	59.34	0.027	Nav	Nav	Nav	Nav	Nav	No	No	No	No	No
Fluoranthene	1.6	MW-6	1/19/2016	59.34	0.027	Nav	Nav	0.04	Nav	Nav	No	No	No	No	No
Fluorene	1.3	MW-6	1/19/2016	59.34	0.022	Nav	Nav	3.0	Nav	Nav	No	No	No	No	No
Indeno(1,2,3-cd)pyrene	1.6	MW-6	1/19/2016	59.34	0.027	Nav	Nav	Nav	Nav	Nav	No	No	No	No	No
Naphthalene	0.95	MW-6	1/19/2016	59.34	0.016	Nav	Nav	1.1	Nav	Nav	No	No	No	No	No
Phenanthrene	1.4	MW-6	1/19/2016	59.34	0.024	Nav	Nav	0.4	Nav	Nav	No	No	No	No	No
Pyrene	1.5	MW-6	1/19/2016	59.34	0.025	Nav	Nav	0.025	Nav	Nav	No	No	No	No	No
Metals															
Lead	4.2 J	MW-6	1/19/2016	59.34	0.071	0.373 - 2700 [7]	0.373 - 2700 [7]	2.5	Nav	Nav	No	No	No	No	No

Notes on last page

Table 3-16
Maximum Groundwater Concentrations Used to Estimate Surface Water Concentrations Using Dilution Factors
Risk Evaluation Report
Former Freedom Industries
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Notes:

ug/L - micrograms per liter

Nav - not available

[1] Only detected constituents in post-remediation groundwater samples (i.e. collected after the Dec 2015/Jan 2016 excavation activities) that were not analzyed for in grab surface water samples from the Elk River are shown in this table.

[2] Post-remediation groundwater samples (i.e. collected after site excavation activities) from groundwater monitoring wells located along the western property boundary and closest to the Elk River (i.e. MW-3, MW-3A, MW-4, MW-5, MW-6, and MW-13) were used to select maximum concentrations.

[3] To derive a human health or ecological surface water concentration, the maximum groundwater concentration was divided by the applicable dilution factor for human health (i.e.1,978) or ecological (i.e. 59.34).

[4] Applicable WVDEP and USEPA water quality criteria for human health were compared to the calculated human health surface water concentrations.

[5] Applicable WVDEP and USEPA water quality criteria for aquatic life and USEPA BTAG screening values were compared to the calculated ecological surface water concentrations.

[6] USEPA presents a range of values for benzene based on a lower (1.5E-02 mg/kg-day) and upper (5.5E-02 mg/kg-day) cancer slope factor for benzene.

[7] The WVDEP aquatic life water quality screening values for lead was calculated based on a range of hardness (18 - 100 ppm).

Table 3-17
2014 Sediment Analytical Results
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Location ID Sample ID Depth (FT BGS) Date Collected		Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil**	Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil**	USEPA Region 3 Freshwater Sediment BTAGs	SED-01 SED-01 (10-07-2014) 0-1 10/7/2014	SED-02 SED-02 (10-07-2014) 0-1 10/7/2014	SED-03 SED-03 (10-08-2014) 0-1 10/8/2014
Chemical	**Units**						
SVOCs							
4-Methyl-1-cyclohexane methanol	ug/kg	*	8,810,000	Nav	360 J	< 570 U	< 490 U
Propylene glycol phenyl ether	ug/kg	*	13,200,000	Nav	< 480 U	< 570 U	< 490 U
Metals							
Calcium	mg/kg	Nav	Nav	Nav	2400	2500	2000
TPH							
2-Methyl-1-propanol (Isobutanol)	mg/kg	10,000	10,000	Nav	< 14 U	< 17 U	< 15 U
Ethanol	mg/kg	Nav	Nav	Nav	< 14 U	< 17 U	< 15 U
Ethylene Glycol	mg/kg	130,000	1,000,000	Nav	< 14 U	< 17 U	< 15 U
Isopropyl alcohol [1]	mg/kg	560	2,400	Nav	< 14 U	4.5 J	7.5 J
Methanol	mg/kg	110,000	110,000	Nav	< 14 U	< 17 U	< 15 U
N-Propyl Alcohol	mg/kg	Nav	Nav	Nav	< 14 U	< 17 U	< 15 U
Propylene Glycol	mg/kg	1,000,000	1,000,000	Nav	< 14 U	< 17 U	< 15 U
Miscellaneous							
Acetaldehyde	mg/kg	12	370	Nav	< 1.4 U	< 1.7 U	< 1.5 U
Acetic acid	mg/kg	Nav	Nav	Nav	< 13 U	< 17 U	< 13 U
Butyric Acid	mg/kg	Nav	Nav	Nav	14	10 J	< 13 U
Formaldehyde	mg/kg	18	790	Nav	< 1.4 U	< 1.7 U	< 1.5 U
Formic Acid	mg/kg	31	130	Nav	< 13 U	< 17 U	< 13 U
Lactic acid	mg/kg	Nav	Nav	Nav	< 13 U	< 17 U	< 13 U
Propionic Acid	mg/kg	Nav	Nav	Nav	85	290	< 13 U
Pyruvic Acid	mg/kg	Nav	Nav	Nav	< 13 U	< 17 U	5.9 J
Chloride	mg/kg	Nav	Nav	Nav	5.6 JB	10 JB	73 B

Notes:
mg/kg: milligrams per kilogram
ug/kg: micrograms per kilogram
TPH: Total Petroleum Hydrocarbons
SVOCs: semivolatile organic compounds
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil Standard. (Effective 06/01/17)
J - estimated concentration; below laboratory detection limit and above method detection limit
U - compound is below laboratory detection limits
B - compound was found in blank and sample
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Residential Soil
= Exceeds Calculated Uniform Standard Screening Value or June 2017 De Minimis Standards for Industrial Soil
= Exceeds USEPA Region 3 Freshwater Sediment BTAGs
Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.
[1] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 3-18
2017 Sediment Analytical Results - Supplemental Site Investigation
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	4-Methyl-1-cyclohexanemethanol (ug/kg)	Propylene glycol phenyl ether (ug/kg)	Ethylene glycol (ug/kg)	Propylene glycol (ug/kg)
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Residential Soil (ug/kg)**		*	*	**130,000,000**	**1,000,000,000**
Calculated Uniform Standard Screening Value (see note below) or De Minimis Standard for Industrial Soil (ug/kg)**		**8,810,000**	**13,200,000**	**1,000,000,000**	**1,000,000,000**
USEPA Region 3 Freshwater Sediment BTAGs		**Nav**	**Nav**	**Nav**	**Nav**
SD-1 Grab	10/3/2017	U (<550)	U (<330)	U (<1700)	U (<1700)
SD-2 Grab	10/3/2017	U (<580)	U (<340)	U (<1600)	U (<1600)
SD-3 Grab	10/3/2017	U (<120)	U (<74)	U (<1800)	U (<1800)
SD-4 Grab (Duplicate of SD-3)	10/3/2017	U (<130)	U (<75)	U (<1800)	U (<1800)

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method SW8270.
Ethylene glycol and Propylene glycol were analyzed via EPA Method SW8015M
U = Analyzed but not detected above the method detection limit (MDL).
( ) = Method Detection Limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
ug/kg = micrograms per kilogram
Nav - Not available
* = Not calculated
** = WVDEP De Minimis Residential and Industrial Soil and Migration to Groundwater Standards (Effective 06/01/17)
= Exceeds June 2017 De Minimis Standard for Residential Soil
= Exceeds June 2017 De Minimis Standard for Industrial Soil
= Exceeds the USEPA Region 3 Freshwater Sediment BTAGs
Note: Calculated Uniform Standard Screening Values for MCHM and PPH were developed in January 2016.

Table 3-19a
2016 Sump Water Analytical Results - MCHM, PPH, Organic Compounds, Acids, Carbonyl Compounds, and Lead
Risk Evaluation Report
Former Freedom Industries
Charleston, WV

				Organic Compunds													Acids			Carbonyl Compounds		
Sample ID	**Sample Date**	**4-Methyl-1-cyclohexanemethanol (ug/l)**	**Propylene glycol phenyl ether (ug/l)**	**Butyric Acid (ug/L)**	**Diethylene Glycol (ug/L)**	**Dipropylene Glycol (ug/L)**	**Ethyl Alcohol (ug/L)**	**Ethylene glycol (ug/L)**	**Isobutanol (ug/L)**	**Isopropyl alcohol (ug/L)**	**Methanol (ug/L)**	**n-Butyl alcohol (ug/L)**	**n-Propanol (ug/L)**	**Propylene glycol (ug/L)**	**t-Butyl alochol (ug/L)**	**Triethylene Glycol (ug/L)**	**Acetic Acid (ug/L)**	**Formic Acid (ug/L)**	**Lactic Acid (ug/L)**	**Acetaldehyde (ug/L)**	**Formaldehyde (ug/L)**	**Lead (ug/L)**
WVDEP De Minimis Standard for Groundwater (ug/l)		**156**	**235**	*****	*****	*****	*****	**40,000**	**1,700**	**41****	**20,000**	**530**	*****	**400,000**	**360**	**4,000*****	*****	**0.63**	*****	**2.6**	**0.43**	**15**
Sump-4	1/27/2016	14	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.68 J
Sump-8	1/28/2016	73	3.9 J	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	2.2 J
Sump-8	2/1/2016	**1200**	25	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	**26 J**	2.6 J
Sump-8 (Split)	1/28/2016	121	10.8	NA	U (<9,840)	U (<8,570)	U (<100)	U (<6,010)	NA	U (<50)	U (<5,000)	NA	U (<50)	U (<8,000)	U (<50)	U (<12,400)	NA	NA	NA	NA	NA	2.6
Sump-9	1/26/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
Sump-10	1/20/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.76 J
Sump-10	1/28/2016	U (<2.7)	U (<3.6)	12 J	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.0013 J
Sump-10	2/1/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.20 J
Sump-10 (Split)	2/1/2016	U (<6.0) ***	U (<6.0) ***	NA	U (<9,840)	U (<8,570)	U (<100)	U (<6,010)	NA	U (<50)	U (<5,000)	NA	U (<50)	U (<8,000)	U (<50)	U (<12,400)	NA	NA	NA	NA	NA	0.20 J
Dup-6 (Duplicate of Sump-10)	1/28/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	0.0012 J

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
Organic Compounds were analyzed via EPA Method 8015M AND 8270.
Acids were analyzed via EPA Method 8300M.
Carbonyl Compounds were analyzed via EPA Method 8315A.
Lead was analyzed via EPA Method 6020A.
( ) = Method Detection Limit (MDL)
U = Analyzed but not detected above the method detection limit.
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
ug/L = micrograms per liter
NA = not analyzed
* = Not applicable, not regulated by the West Virginia Department of Environmental Protection (WVDEP).
** = WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.
*** = MDL was not available for these constituents. Therefore, the PQL was used.
Shading indicates that these sumps were backfilled with soil that was placed over the excavation areas.
Shading indicates concentration above the current WVDEP (June 2017) De Minimis Standard for Groundwater.
Note: Calculated Uniform Standard Screening Levels for MCHM and PPH were developed in January 2016.

Table 3-19b
2016 Sump Water Analytical Results - PAHs
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Acenaphthene (ug/L)	Acenaphthylene (ug/L)	Anthracene (ug/L)	Benzo(a)anthracene (ug/L)	Benzo(a)pyrene (ug/L)	Benzo(b)fluoranthene (ug/L)	Benzo(g,h,i)perylene (ug/L)	Benzo(k)fluoranthene (ug/L)	Chrysene (ug/L)	Dibenzo(a,h)anthracene (ug/L)	Fluoranthene (ug/L)	Fluorene (ug/L)	Indeno(1,2,3-cd) pyrene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Pyrene (ug/L)
WVDEP De Minimis Standards for Groundwater		**240**	**320**	**1,800**	**0.012**	**0.2**	**0.034**	**600**	**0.34**	**3.4**	**0.0034**	**800**	**150**	**0.034**	**0.17**	**6,000**	**79**
Sump-4	1/27/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
Sump-8	1/28/2016	0.026	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	0.011 J	0.033	U (<0.0034)	0.019 J	U (<0.0097)	0.0093 J
Sump-8	2/1/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
Sump-8 (Split)	1/28/2016	0.072 J	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	0.072 J	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)
Sump-9	1/26/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
Sump-10	1/20/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	0.025	U (<0.0097)	U (<0.0037)
Sump-10	1/28/2016	U (<0.0048)	U (<0.0060)	0.0044 J	**0.018 J**	0.063	**0.061**	0.023 J	0.037	0.0083 J	U (<0.0024)	0.016 J	U (<0.0043)	**0.055**	U (<0.0062)	0.015 J	0.019 J
Sump-10	2/1/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
Sump-10 (Split)	2/1/2016	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)	U (<0.060)
Dup-6 (Duplicate of Sump-10)	1/28/2016	0.0053 J	U (<0.0060)	0.0067 J	**0.02 J**	0.065	**0.065**	0.026 J	0.038	0.01 J	U (<0.0024)	0.022 J	U (<0.0043)	**0.057**	U (<0.0062)	0.018 J	0.025 J

Polycyclic Aromatic Hydrocarbons (PAHs) were analyzed via EPA Method 8270D SIM.
( ) = Method Detection Limit (MDL)
U = Analyzed but not detected above the method detection limit.
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
ug/L = micrograms per liter
Shading indicates that these sumps were backfilled with soil that was placed over the excavation areas.
Shading indicates concentration above the current WVDEP (June 2017) De Minimis Standard for Groundwater.

Table 3-19c
2016 Sump Water Analytical Results - BTEX and MTBE
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Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylene (ug/L)	MTBE (ug/L)
WVDEP De Minimis Standards for Groundwater		**5**	**1,000**	**700**	**10,000**	**14**
Sump-4	1/27/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Sump-8	1/28/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Sump-8	2/1/2016	0.57 J	0.22 J	0.47 J	1.2 J	U (<0.12)
Sump-8 (Split)	1/28/2016	U (<0.500)	U (<0.500)	U (<0.500)	U (<1.50)	U (<2.50)
Sump-9	1/26/2016	U (<0.25)	4.9	U (<0.22)	U (<0.62)	U (<0.12)
Sump-10	1/20/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Sump-10	1/28/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Sump-10	2/1/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Sum-10 (Split)	2/1/2016	U (<0.500)	U (<0.500)	U (<0.500)	U (<1.50)	U (<2.50)
Dup-6 (Duplicate of Sump-10)	1/28/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)

Benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tert-butyl ether (MTBE) were analyzed via EPA Method 8260B.
( ) = Method Detection Limit (MDL)
U = Analyzed but not detected above the method detection limit.
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
ug/L = micrograms per liter
Shading indicates that these sumps were backfilled with soil that was placed over the excavation areas.
Shading indicates concentration above the current WVDEP (June 2017) De Minimis Standard for Groundwater.

Table 3-20a
2016/2017 Surface Water Analytical Results - MCHM, PPH, Organic Compounds, Acids, Carbonyl Compounds, and Lead
Risk Evaluation Report
Former Freedom Industries
Charleston, WV

				Organic Compunds													Acids			Carbonyl Compounds		
Sample ID	**Sample Date**	**4-Methyl-1-cyclohexanemethanol (ug/l)**	**Propylene glycol phenyl ether (ug/l)**	**Butyric Acid (ug/L)**	**Diethylene Glycol (ug/L)**	**Dipropylene Glycol (ug/L)**	**Ethyl Alcohol (ug/L)**	**Ethylene glycol (ug/L)**	**Isobutanol (ug/L)**	**Isopropyl alcohol (ug/L)**	**Methanol (ug/L)**	**n-Butyl alcohol (ug/L)**	**n-Propanol (ug/L)**	**Propylene glycol (ug/L)**	**t-Butyl alochol (ug/L)**	**Triethylene Glycol (ug/L)**	**Acetic Acid (ug/L)**	**Formic Acid (ug/L)**	**Lactic Acid (ug/L)**	**Acetaldehyde (ug/L)**	**Formaldehyde (ug/L)**	**Lead (ug/L)**
WVDEP Water Quality Standard - Human Health - Fish Consumption (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
WVDEP Water Quality Standard - Human Health - Drinking Water and Fish Consumption (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**50**
WVDEP Water Quality Standard - Chronic Aquatic Life for Warm Water Fishery (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**0.373 - 2700 [1]**
WVDEP Water Quality Standard - Chronic Aquatic Life for Trout Waters (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**0.373 - 2700 [1]**
USEPA Freshwater BTAG Values (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**192,000**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**2.5 [2]**
USEPA Human Health Water Quality Criteria for the Consumption of Water + Organism (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
USEPA Human Health Water Quality Criteria for the Consumption of Organism only (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
USEPA Aquatic Life Water Quality Criteria for CCC		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
USEPA Aquatic Life Water Quality Criteria for CMC		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
Diversion Trench	2/1/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
Dup-7 (Duplicate of Diversion Trench)	2/1/2016	U (<2.7)	U (<3.6)	U (<2,700)	NA	NA	U (<250)	U (<670)	U (<560)	U (<440)	U (<800)	U (<440)	U (<390)	U (<1,100)	U (<320)	NA	U (<1,600)	U (<4,400)	U (<1,500)	U (<40)	U (<26)	U (<0.10)
1 Grab	9/8/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA
2 Grab	9/8/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA
SW-1 Grab	10/3/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA
SW-2-33 Grab	10/3/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA
SW-3 Grab	10/3/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA
SW-4 Grab	10/3/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA
SW-5 Grab	10/3/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA
SW-6 Grab	10/3/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA
SW-7 Grab (Duplicate of SW-4)	10/3/2017	U (<2.7)	U (<3.6)	NA	NA	NA	NA	U (<1200)	NA	NA	NA	NA	NA	U (<1,300)	NA	NA	NA	NA	NA	NA	NA	NA

4-Methyl-1-cyclohexanemethanol (MCHM) and Propylene glycol phenyl ether (PPH) were analyzed via EPA Method 8270.
Organic Compounds were analyzed via EPA Method 8015M AND 8270.
Acids were analyzed via EPA Method 8300M.
Carbonyl Compounds were analyzed via EPA Method 8315A.
Lead was analyzed via EPA Method 6020A.
( ) = Method Detection Limit (MDL)
U = Analyzed but not detected above the method detection limit.
J = Analyte is present at an estimated concentration between the MDL and Report Limit.
ug/L = micrograms per liter
Nav- not available
NA = not analyzed
* = MDL was not available for these constituents. Therefore, the PQL was used.
[1] The WVDEP aquatic life water quality screening values for lead was calculated based on a range of hardness (18 - 100 ppm).
[2] The USEPA freshwater BTAG value for lead is based on a hardness of 100.
Shading indicates concentration above the current WVDEP Water Quality Standard.
Shading indicates concentration above the current USEPA Region 3 Freshwater BTAGs
Shading indicates concentratin above the current USEPA Human Health Water Quality Criteria for consumption of water + organism and organism only
Shading indicates concentration above the current USEPA Freshwater Water Quality Criteria for aquatic life for either continuous concentration criteria (CCC) or maximum concentration
Note: Calculated Uniform Standard Screening Levels for MCHM and PPH were developed in January 2016.

Table 3-20b
2016 Surface Water Analytical Results - PAHs
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Acenaphthene (ug/L)	Acenaphthylene (ug/L)	Anthracene (ug/L)	Benzo(a)anthracene (ug/L)	Benzo(a)pyrene (ug/L)	Benzo(b)fluoranthene (ug/L)	Benzo(g,h,i)perylene (ug/L)	Benzo(k)fluoranthene (ug/L)	Chrysene (ug/L)	Dibenzo(a,h)anthracene (ug/L)	Fluoranthene (ug/L)	Fluorene (ug/L)	Indeno(1,2,3-cd) pyrene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Pyrene (ug/L)
WVDEP Water Quality Standard - Human Health - Fish Consumption (ug/l)		**990**	**Nav**	**40,000**	**0.018**	**0.018**	**0.018**	**Nav**	**0.018**	**0.018**	**0.018**	**370**	**5,300**	**0.018**	**Nav**	**Nav**	**4,000**
WVDEP Water Quality Standard - Human Health - Drinking Water and Fish Consumption (ug/l)		**670**	**Nav**	**8,300**	**0.0038**	**0.0038**	**0.0038**	**Nav**	**0.0038**	**0.0038**	**0.0038**	**300**	**1,100**	**0.0038**	**Nav**	**Nav**	**830**
WVDEP Water Quality Standard - Chronic Aquatic Life for Warm Water Fishery (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
WVDEP Water Quality Standard - Chronic Aquatic Life for Trout Waters (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
USEPA Freshwater BTAG Values (ug/l)		**5.8**	**Nav**	**0.012**	**0.018**	**0.015**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**0.04**	**3.0**	**Nav**	**1.1**	**0.4**	**0.025**
USEPA Human Health Water Quality Criteria for the Consumption of Water + Organism (ug/l)		**70**	**Nav**	**300**	**0.0012**	**0.00012**	**0.0012**	**Nav**	**0.012**	**0.12**	**0.00012**	**20**	**50**	**0.0012**	**Nav**	**Nav**	**20**
USEPA Human Health Water Quality Criteria for the Consumption of Organism only (ug/l)		**90**	**Nav**	**400**	**0.0013**	**0.00013**	**0.0013**	**Nav**	**0.013**	**0.13**	**0.00013**	**30**	**70**	**0.0013**	**Nav**	**Nav**	**30**
USEPA Freshwater Water Quality Critieria for Aquatic Life - CMC (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
USEPA Freshwater Water Quality Critieria for Aquatic Life - CCC (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
Diversion Trench	2/1/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)
Dup-7 (Duplicate of Diversion Trench)	2/1/2016	U (<0.0048)	U (<0.0060)	U (<0.0039)	U (<0.0045)	U (<0.0032)	U (<0.0021)	U (<0.014)	U (<0.0026)	U (<0.0058)	U (<0.0024)	U (<0.0034)	U (<0.0043)	U (<0.0034)	U (<0.0062)	U (<0.0097)	U (<0.0037)

Polycyclic Aromatic Hydrocarbons (PAHs) were analyzed via EPA Method 8270D SIM.
( ) = Method Detection Limit (MDL)
U = Analyzed but not detected above the method detection limit.
Nav - not available
ug/L = micrograms per liter
Shading indicates concentration above the current WVDEP Water Quality Standard.
Shading indicates concentration above the current USEPA Region 3 Freshwater BTAGs
Shading indicates concentratin above the current USEPA Human Health Water Quality Criteria for consumption of water + organism and organism only
Shading indicates concentration above the current USEPA Freshwater Water Quality Criteria for aquatic life for either continuous concentration criteria (CCC) or maximum concentration criteria (CMC).

Table 3-20c
2016 Surface Water Analytical Results - BTEX and MTBE
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample ID	Sample Date	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylene (ug/L)	MTBE (ug/L)
WVDEP Water Quality Standard - Human Health - Fish Consumption (ug/l)		**51**	**200,000**	**29,000**	**Nav**	**Nav**
WVDEP Water Quality Standard - Human Health - Drinking Water and Fish Consumption (ug/l)		**0.66**	**6,800**	**3,100**	**Nav**	**Nav**
WVDEP Water Quality Standard - Chronic Aquatic Life for Warm Water Fishery (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
WVDEP Water Quality Standard - Chronic Aquatic Life for Trout Waters (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
USEPA Freshwater BTAG Values (ug/l)		**370**	**2**	**90**	**13**	**11,070**
USEPA Human Health Water Quality Criteria for the Consumption of Water + Organism (ug/l)		**0.58-2.1 [1]**	**57**	**68**	**Nav**	**Nav**
USEPA Human Health Water Quality Criteria for the Consumption of Organism only (ug/l)		**16-58 [1]**	**520**	**130**	**Nav**	**Nav**
USEPA Freshwater Water Quality Critieria for Aquatic Life - CMC (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
USEPA Freshwater Water Quality Critieria for Aquatic Life - CCC (ug/l)		**Nav**	**Nav**	**Nav**	**Nav**	**Nav**
Diversion Trench	2/1/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)
Dup-7 (Duplicate of Diversion Trench)	2/1/2016	U (<0.25)	U (<0.20)	U (<0.22)	U (<0.62)	U (<0.12)

Benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tert-butyl ether (MTBE) were analyzed via EPA Method 8260B.

( ) = Method Detection Limit (MDL)

U = Analyzed but not detected above the method detection limit.

ug/L = micrograms per liter

Nav - Not available

[1] USEPA presents a range of values for benzene based on a lower (1.5E-02 mg/kg-day) and upper (5.5E-02 mg/kg-day) cancer slope factor for benzene.

Shading indicates concentration above the current WVDEP Water Quality Standard.

Shading indicates concentration above the current USEPA Region 3 Freshwater BTAGs

Shading indicates concentration above the current USEPA Human Health Water Quality Criteria for consumption of water + organism and organism only

Shading indicates concentration above the current USEPA Freshwater Water Quality Criteria for aquatic life for either continuous concentration criteria (CCC) or maximum concentration criteria (CMC).

Table 3-21
Analytical Sample Summary
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Pre-Remediation Soil from April 2015 Site Investigation Report																														
Surface Soil																														
ARC-SS-01	0-1'	9/5/2014	X	X	X									X	X		X	X		X	X							Remains	Yes	outside excavation area
ARC-SS-02	0-1'	9/5/2014	X	X	X									X	X		X	X		X	X							Removed	**No**	within excavation area
ARC-SS-03	0-1'	9/16/2014	X	X	X									X	X		X	X		X	X							Removed	**No**	within excavation area
ARC-SS-04	0-1'	9/16/2014	X	X	X									X	X		X	X		X	X							Removed	**No**	within excavation area
ARC-SS-05	0-1'	9/16/2014	X	X	X									X	X		X	X		X	X							Removed	**No**	within excavation area
ARC-SS-06	0-1'	9/4/2014	X	X	X									X	X		X	X		X	X							Removed	**No**	within excavation area
ARC-SS-07	0-1'	9/4/2014	X	X	X									X	X		X	X		X	X							Removed	**No**	within excavation area
ARC-SS-08	0-1'	9/4/2014	X	X	X									X	X		X	X		X	X							Remains	Yes	outside excavation area
ARC-SS-09	0-1'	9/4/2014	X	X	X									X	X		X	X		X	X							Remains	Yes	outside excavation area
ARC-SS-12	0-1'	9/5/2014	X	X	X									X	X		X	X		X	X							Removed	**No**	outside excavation area
MW-3A	0-1'	10/14/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
MW-8	0-1'	10/7/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
MW-9	0-1'	10/8/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
MW-10	0-1'	10/7/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
MW-11	0-1'	10/8/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
MW-12	0-1'	10/13/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
MW-13	0-1'	10/14/2014	X	X								X	X				X					X	X					Remains	Yes	within excavation area
SB-01	0-1'	9/30/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
SB-02	0-1'	9/30/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
SB-03	0-1'	10/23/2014	X	X								X	X	X			X					X	X					Removed	**No**	within excavation area
SB-03 DUP	0-1'	10/23/2014	X	X								X	X	X			X					X	X					Removed	**No**	within excavation area
SB-04	0-1'	9/30/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
SB-05	0-1'	9/30/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-06	0-1'	10/1/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-07	0-1'	10/2/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-08	0-1'	10/1/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-08 DUP	0-1'	10/1/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-09	0-1'	10/1/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-10	0-1'	10/2/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-11	0-1'	10/2/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
SB-12	0-1'	10/2/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
SB-13	0-1'	10/8/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
SB-14	0-1'	10/8/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
SB-16	0-1'	10/2/2014	X	X								X	X				X					X	X					Remains	Yes	outside excavation area
SB-17	0-1'	10/1/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-18	0-1'	10/1/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-19	0-1'	10/1/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-20	0-1'	10/1/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-21	0-1'	10/2/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-22	0-1'	10/2/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-23	0-1'	10/2/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area
SB-23 CS	0-1'	10/8/2014	X	X								X	X				X					X	X					Removed	**No**	within excavation area

Table 3-21
Analytical Sample Summary
Risk Evaluation Report
Former Freedom Industries
Charleston, West Virginia

Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Pre-Remediation Soil from April 2015 Site Investigation Report (continued)																														
Surface Soil (continued)																														
SB-24	0-1'	10/1/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-24 DUP	0-1'	10/1/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-25	0-1'	10/2/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-26	0-1'	10/1/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-26 CS	0-1'	10/8/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-27	0-1'	10/1/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-27 DUP	0-1'	10/1/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-28	0-1'	10/2/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-29	0-1'	10/2/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-31	0-1'	10/2/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-32	0-1'	10/2/2014	X	X								X	X				X					X	X						Remains	Yes	outside excavation area
SB-33	0-1'	10/1/2014	X	X								X	X				X					X	X						Remains	Yes	outside excavation area
SB-34	0-1'	10/1/2014	X	X								X	X				X					X	X						Remains	Yes	outside excavation area
SB-36	0-1'	10/2/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-37	0-1'	10/2/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-38	0-1'	10/2/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-40	0-1'	10/8/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-41	0-1'	10/9/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-42	0-1'	10/9/2014	X	X								X	X				X					X	X						Removed	**No**	within excavation area
SB-43	0-1'	10/15/2014	X	X								X	X	X			X					X	X						Removed	**No**	within excavation area
SB-44	0-1'	10/15/2014	X	X								X	X	X			X					X	X						Removed	**No**	within excavation area
SB-45	0-1'	10/16/2014	X	X								X	X	X			X					X	X						Removed	**No**	within excavation area
SB-46	0-1'	10/16/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-10	0-1'	10/6/2014	X	X	X							X	X	X	X		X			X		X	X						Removed	**No**	within excavation area
SS-11	0-1'	10/6/2014	X	X	X							X	X	X	X		X			X		X	X						Removed	**No**	within excavation area
SS-13	0-1'	10/6/2014	X	X	X							X	X	X	X		X			X		X	X						Remains	Yes	outside excavation area
SS-14	0-1'	10/6/2014	X	X	X							X	X	X	X		X			X		X	X						Remains	Yes	outside excavation area
SS-15	0-1'	10/6/2014	X	X	X							X	X	X	X		X			X		X	X						Remains	Yes	outside excavation area
SS-16	0-1'	10/6/2014	X	X	X							X	X	X	X		X			X		X	X						Remains	Yes	outside excavation area
SS-17-DEEP	0-1'	9/30/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-18	0-1'	10/3/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-19-DEEP	0-1'	9/30/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-20-DEEP	0-1'	9/30/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-21	0-1'	10/3/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-22	0-1'	10/6/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-23	0-1'	10/7/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-24	0-1'	10/7/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-25	0-1'	10/6/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-26	0-1'	10/6/2014	X	X								X	X	X			X					X	X						Removed	**No**	within excavation area
SS-27	0-1'	10/3/2014	X	X								X	X	X			X					X	X						Remains	Yes	outside excavation area
SS-28	0-1'	10/6/2014	X	X								X	X	X			X					X	X						Removed	**No**	within excavation area

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Analytical Sample Summary
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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Pre-Remediation Soil from April 2015 Site Investigation Report (continued)																														
Subsurface Soil																														
MW-3A	6-8'	10/14/2014	X	X													X											Remains	Yes	outside excavation area
MW-3A	12-14'	10/14/2014	X	X													X											Remains	Yes	outside excavation area
MW-3A DUP	12-14'	10/14/2014	X	X													X											Remains	Yes	outside excavation area
MW-8	12-14'	10/7/2014	X	X													X											Remains	Yes	outside excavation area
MW-8	36-38'	10/7/2014	X	X													X											Remains	Yes	outside excavation area
MW-9	12-14'	10/8/2014	X	X													X											Remains	Yes	outside excavation area
MW-9	22-24'	10/8/2014	X	X													X											Remains	Yes	outside excavation area
MW-10	20-22'	10/7/2014	X	X													X											Remains	Yes	outside excavation area
MW-10	34-36'	10/7/2014	X	X													X											Remains	Yes	outside excavation area
MW-11	8-10'	10/8/2014	X	X													X											Remains	Yes	outside excavation area
MW-11	38-40'	10/8/2014	X	X													X											Remains	Yes	outside excavation area
MW-12	10-12'	10/13/2014	X	X													X											Remains	Yes	outside excavation area
MW-12	34-36'	10/13/2014	X	X													X											Remains	Yes	outside excavation area
MW-13	12-14'	10/14/2014	X	X													X											Remains	Yes	within excavation area
MW-13	18-20'	10/14/2014	X	X													X											Remains	Yes	within excavation area
MW-13 DUP	18-20'	10/14/2014	X	X													X											Remains	Yes	within excavation area
SB-1	16-18'	9/30/2014	X	X													X											Remains	Yes	outside excavation area
SB-1	24-26'	9/30/2014	X	X													X											Remains	Yes	outside excavation area
SB-2	16-18'	9/30/2014	X	X													X											Remains	Yes	outside excavation area
SB-2	18-20'	9/30/2014	X	X													X											Remains	Yes	outside excavation area
SB-4	12-14'	9/30/2014	X	X													X											Remains	Yes	outside excavation area
SB-4	22-24'	9/30/2014	X	X													X											Remains	Yes	outside excavation area
SB-5	12-14'	9/30/2014	X	X													X											Removed	**No**	within excavation area
SB-6	8-10'	10/1/2014	X	X													X											Removed	**No**	within excavation area
SB-7	10-12'	10/2/2014	X	X													X											Remains	Yes	within excavation area
SB-7 DUP	10-12'	10/2/2014	X	X													X											Remains	Yes	within excavation area
SB-8	8-10'	10/1/2014	X	X													X											Remains	Yes	within excavation area
SB-9	8-10'	10/1/2014	X	X													X											Remains	Yes	within excavation area
SB-10	10-12'	10/2/2014	X	X													X											Remains	Yes	within excavation area
SB-11	8-10'	10/2/2014	X	X													X											Remains	Yes	outside excavation area
SB-12	8-10'	10/2/2014	X	X													X											Remains	Yes	outside excavation area
SB-17	8-10'	10/1/2014	X	X													X											Remains	Yes	within excavation area
SB-18	8-10'	10/1/2014	X	X													X											Removed	**No**	within excavation area
SB-19	8-10'	10/1/2014	X	X													X											Removed	**No**	within excavation area
SB-20	2-3'	10/28/2014	X	X							X	X					X					X	X					Removed	**No**	within excavation area
SB-20 CS2	2-3'	12/4/2014	X	X							X	X	X				X					X	X					Removed	**No**	within excavation area
SB-20	10-12'	10/1/2014	X	X													X											Removed	**No**	within excavation area
SB-20	12-14'	10/1/2014	X	X													X											Removed	**No**	within excavation area
SB-21	8-10'	10/2/2014	X	X													X											Remains	Yes	within excavation area

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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Pre-Remediation Soil from April 2015 Site Investigation Report (continued)																														
Subsurface Soil (continued)																														
SB-22	10-12'	10/2/2014	X	X													X												Remains	Yes	within excavation area
SB-23	10-12'	10/2/2014	X	X													X												Remains	Yes	within excavation area
SB-24	10-12'	10/1/2014	X	X													X												Removed	**No**	within excavation area
SB-24	14-16'	10/1/2014	X	X													X												Removed	**No**	within excavation area
SB-25	10-12'	10/2/2014	X	X													X												Remains	Yes	within excavation area
SB-26	8-10'	10/1/2014	X	X													X												Removed	**No**	within excavation area
SB-26	14-16'	10/1/2014	X	X													X												Remains	Yes	within excavation area
SB-27	6-8'	10/1/2014	X	X													X												Removed	**No**	within excavation area
SB-27	14-16'	10/1/2014	X	X													X												Remains	Yes	within excavation area
SB-28	12-14'	10/2/2014	X	X													X												Remains	Yes	within excavation area
SB-29	10-12'	10/2/2014	X	X													X												Remains	Yes	within excavation area
SB-29 DUP	10-12'	10/2/2014	X	X													X												Remains	Yes	within excavation area
SB-31	8-10'	10/2/2014	X	X													X												Removed	**No**	within excavation area
SB-32	12-14'	10/2/2014	X	X													X												Remains	Yes	outside excavation area
SB-33	10-12'	10/1/2014	X	X													X												Remains	Yes	outside excavation area
SB-34	12-14'	10/1/2014	X	X													X												Remains	Yes	outside excavation area
SB-36	12-14'	10/2/2014	X	X													X												Remains	Yes	within excavation area
SB-36 DUP	12-14'	10/2/2014	X	X													X												Remains	Yes	within excavation area
SB-37	8-10'	10/2/2014	X	X													X												Removed	**No**	within excavation area
SB-38	12-14'	10/2/2014	X	X													X												Removed	**No**	within excavation area
SB-38 DUP	12-14'	10/2/2014	X	X													X												Removed	**No**	within excavation area
SB-43	6-8'	10/15/2014	X	X													X												Removed	**No**	within excavation area
SB-43	22-24'	10/15/2014	X	X													X												Remains	Yes	within excavation area
SB-43 DUP	22-24'	10/15/2014	X	X													X												Remains	Yes	within excavation area
SB-44	10-12'	10/15/2014	X	X													X												Removed	**No**	within excavation area
SB-44	18-20'	10/15/2014	X	X													X												Remains	Yes	within excavation area
SB-44 DUP	18-20'	10/15/2014	X	X													X												Remains	Yes	within excavation area
SB-45	12-14'	10/16/2014	X	X													X												Removed	**No**	within excavation area
SB-45	14-16'	10/16/2014	X	X													X												Removed	**No**	within excavation area
SB-45 DUP	14-16'	10/16/2014	X	X													X												Removed	**No**	within excavation area
SS-17-DEEP	12-14'	9/30/2014	X	X													X												Remains	Yes	outside excavation area
SS-17-DEEP	36-38'	9/30/2014	X	X													X												Remains	Yes	outside excavation area
SS-19-DEEP	4-6'	9/30/2014	X	X													X												Remains	Yes	outside excavation area
SS-19-DEEP	36-38'	9/30/2014	X	X													X												Remains	Yes	outside excavation area
SS-20-DEEP	14-16'	9/30/2014	X	X													X												Remains	Yes	outside excavation area
SS-20-DEEP	36-38'	9/30/2014	X	X													X												Remains	Yes	outside excavation area
SS-21	4-6'	10/3/2014	X	X													X												Remains	Yes	outside excavation area
SS-21	14-16'	10/3/2014	X	X													X												Remains	Yes	outside excavation area
SS-21 DUP	14-16'	10/3/2014	X	X													X												Remains	Yes	outside excavation area
SS-27	10-12'	10/3/2014	X	X													X												Remains	Yes	outside excavation area
SS-27	16-18'	10/3/2014	X	X													X												Remains	Yes	outside excavation area

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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																										Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Pre-Remediation Soil from April 2015 Site Investigation Report (continued)																															
T395-C-2-3-051414(S)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
T395-C-3-4-051414(S)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
T395-D-2-3-051514(S)	beneath AST	5/15/2014	X	X																									Removed	**No**	within excavation area
T396-A-3-4-051514(S)	beneath AST	5/15/2014	X	X																									Removed	**No**	within excavation area
T396-C-3-4-051514(S)	beneath AST	5/15/2014	X	X																									Removed	**No**	within excavation area
T396-D-INT.3-4-051514(S)	beneath AST	5/15/2014	X	X																									Removed	**No**	within excavation area
T396-F-0.1-1-051514(S)	beneath AST	5/15/2014	X	X																									Removed	**No**	within excavation area
T397-B-0-1-051414(S)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TANK 399 SAND (7-16-2014)	beneath AST	7/16/2014	X							X									X	X									Removed	**No**	within excavation area
TB-395 (7-30-2014)	beneath AST	7/30/2014	X	X																									Removed	**No**	within excavation area
TB-396 (7-29-2014)	beneath AST	7/29/2014	X	X																									Removed	**No**	within excavation area
TB-397 (7-29-2014)	beneath AST	7/29/2014	X	X																									Removed	**No**	within excavation area
TK395A (0-0.5)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK395B (0.5-1.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK395B (0-0.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK395B (1.1-2.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK395B (2.1-3.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK395B (3.1-4.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK396 (0.7-1.2)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK396 (0-0.2)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK396 (1.2-2.2)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK396 (2.9-3.2)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK396 (3.2-4.2)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK397 (0.9-1.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK397 (0-0.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK397 (1.1-2.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK397 (2.1-3.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
TK397 (3.1-4.1)	beneath AST	5/14/2014	X	X																									Removed	**No**	within excavation area
Diversion Trench Soil 1	unknown [8]	11/11/2014	X	X																									Remains	Yes	outside excavation area
Diversion Trench Soil 2	unknown [8]	11/13/2014	X	X																									Remains	Yes	outside excavation area
Diversion Trench Soil 2 (11-13-2014)	unknown [8]	11/13/2014	X	X																									Remains	Yes	outside excavation area
Diversion Trench Soil 3	unknown [8]	11/13/2014	X	X																									Remains	Yes	outside excavation area
Diversion Trench Soil 3 (11-13-2014)	unknown [8]	11/13/2014	X	X																									Remains	Yes	outside excavation area
Diversion Trench Soil 4	unknown [8]	11/13/2014	X	X																									Remains	Yes	outside excavation area
Diversion Trench Soil 4 (11-13-2014)	unknown [8]	11/13/2014	X	X																									Remains	Yes	outside excavation area

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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																										Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Pre-Remediation Soil from Oct 2015 Interim Site Assessment Report Revision 1																															
TP-1 2'-4'	2 - 4	8/26/2015	X	X																									Removed	**No**	within excavation area
FD-1 (TP-1 2'-4')	2 - 4	8/26/2015	X	X																									Removed	**No**	within excavation area
TP-1 4'-5.5'	4 -5.5	8/26/2015	X	X																									Removed	**No**	within excavation area
TP-2 6'-8'	6 - 8	8/26/2015	X	X																									Removed	**No**	within excavation area
TP-2 10'-12'	10 - 12	8/26/2015	X	X																									Remains	Yes	within excavation area
TP-3 0'-2' West End	0 - 2	8/27/2015	X	X																									Removed	**No**	within excavation area
FD-5 (TP-3 0'-2' West End)	0 - 2	8/27/2015	X	X																									Removed	**No**	within excavation area
TP-3 2'-4' [9]	2 - 4	8/27/2015	X	X	X	X					X	X	X	X	X														Remains	Yes	within excavation area
TP-3 2'-4'	2 - 4	8/27/2015	X	X																									Remains	Yes	within excavation area
TP-3 4'-6'	4 - 6	8/27/2015	X	X																									Remains	Yes	within excavation area
TP-3 6'-8'	6 - 8	8/27/2015	X	X																									Remains	Yes	within excavation area
FD-4 (TP-3 6'-8')	6 - 8	8/27/2015	X	X																									Remains	Yes	within excavation area
TP-4 4'-6' [9]	4 - 6	8/27/2015	X	X	X	X					X	X	X	X	X														Remains	Yes	outside excavation area
TP-4 4'-6'	4 - 6	8/27/2015	X	X																									Remains	Yes	outside excavation area
TP-5 4'-6'	4 - 6	8/27/2015	X	X																									Remains	Yes	outside excavation area
TP-6 0'-2'	0 - 2	8/27/2015	X	X																									Remains	Yes	outside excavation area
TP-7 2'-4'	2 - 4	8/27/2015	X	X																									Remains	Yes	within excavation area
TP-8 4'-6'	4 - 6	8/27/2015	X	X																									Remains	Yes	within excavation area
FD-3 (TP-8 4'-6')	4 - 6	8/27/2015	X	X																									Remains	Yes	within excavation area
TP-9 8'-10' [9]	8 - 10	8/26/2015	X	X	X	X					X	X	X	X	X														Removed	**No**	within excavation area
TP-9 8'-10'	8 - 10	8/26/2015	X	X																									Removed	**No**	within excavation area
FD-2 (TP-9 8'-10')	8 - 10	8/26/2015	X	X																									Removed	**No**	within excavation area
TP-10 2'-4' [9]	2 - 4	8/26/2015	X	X	X	X					X	X	X	X	X														Removed	**No**	within excavation area
TP-10 2'-4'	2 - 4	8/26/2015	X	X																									Removed	**No**	within excavation area
TP-10 10'-12'	10 - 12	8/26/2015	X	X																									Removed	**No**	within excavation area
TP-11 2'-4'	2 - 4	8/26/2015	X	X																									Removed	**No**	within excavation area
TP-11 4'-6'	4 - 6	8/26/2015	X	X																									Removed	**No**	within excavation area
TP-12 0'-2'	0 - 2	8/26/2015	X	X																									Remains	Yes	outside excavation area
TP-12 4'-6'	4 - 6	8/26/2015	X	X																									Remains	Yes	outside excavation area
TP-13 2'-4'	2 - 4	8/26/2015	X	X																									Remains	Yes	outside excavation area
TP-13 10'-12'	10 - 12	8/26/2015	X	X																									Remains	Yes	outside excavation area
TP-14 2'-4' [9]	2 - 4	1/9/2015	X	X	X	X					X	X	X	X	X														Removed	**No**	within excavation area
TP-14 2'-4'	2 - 4	1/9/2015	X	X																									Removed	**No**	within excavation area
FD-6 (TP-14 16'-17')	16 - 17	9/1/2015	X	X																									Remains	Yes	within excavation area
TP-14 16'-18'	16 - 18	9/1/2015	X	X																									Remains	Yes	within excavation area
TP-15 4'-6'	4 - 6	9/1/2015	X	X																									Remains	Yes	within excavation area
TP-15 14'-16'	14 - 16	9/1/2015	X	X																									Remains	Yes	within excavation area
TP-16 4'-6'	4 - 6	1/9/2015	X	X																									Removed	**No**	within excavation area
FD-7 (TP-16 4'-6')	4 - 6	1/9/2015	X	X																									Removed	**No**	within excavation area
TP-16 12'-14'	12 - 14	9/1/2015	X	X																									Remains	Yes	within excavation area
TP-16 16'-18'	16 - 18	9/1/2015	X	X																									Remains	Yes	within excavation area
TP-17 10'-12' [9]	10 - 12	9/1/2015	X	X	X	X					X	X	X	X	X														Remains	Yes	within excavation area
TP-17 10'-12'	10 - 12	9/1/2015	X	X																									Remains	Yes	within excavation area
TP-17 14'-16'	14 - 16	9/1/2015	X	X																									Remains	Yes	within excavation area

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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Excavation Area 1A (excavation depth 0-1 ft)																														
Post-Excavation Subsurface Soil																														
1A-Wall-01 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-02 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-03 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-04 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-05 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-06 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-07 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-08 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-09 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-10 Grab	> 2' [7]	12/11/2015	X	X																								Removed	**No**	
1A-Wall-FD-1 Grab (Duplicate of 1A-Wall-10 Grab)	> 2' [7]	12/11/2015	X	X																								Removed	**No**	
1A-Wall-10A Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Wall-11 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-12 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-13 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-14 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Wall-15 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-01 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Floor-02 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Floor-03 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Floor-04 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Floor-FD-2 Grab (Duplicate of 1A-Floor-04 Grab)	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Floor-05 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Floor-06 Grab	> 2' [7]	12/11/2015	X	X																								Remains	Yes	
1A-Floor-07 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-08 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-09 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	

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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Excavation Area 1A (excavation depth 0-1 ft) (continued)																														
Post-Excavation Subsurface Soil (continued)																														
1A-Floor-10 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-11 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-12 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-101 Grab (Duplicate of 1A-Floor-12 Grab)	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-13 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-14 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-15 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-16 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-17 Grab	> 2' [7]	12/16/2015	X	X																								Removed	**No**	
1A-Floor-17A Grab	> 2' [7]	12/29/2015	X	X																								Remains	Yes	
1A-Floor-101A Grab (Duplicate of 1A-Floor-17A Grab)	> 2' [7]	12/29/2015	X	X																								Remains	Yes	
1A-Floor-18 Grab	> 2' [7]	12/16/2015	X	X																								Removed	**No**	
1A-Floor-18A Grab	> 2' [7]	12/29/2015	X	X																								Remains	Yes	
1A-Floor-19 Grab	> 2' [7]	12/16/2015	X	X																								Removed	**No**	
1A-Floor-19A Grab	> 2' [7]	12/29/2015	X	X																								Remains	Yes	
1A-Floor-20 Grab	> 2' [7]	12/16/2015	X	X																								Remains	Yes	
1A-Floor-21 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-22 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-23 Grab	> 2' [7]	12/17/2015	X	X																								Removed	**No**	
1A-Floor-23A Grab	> 2' [7]	12/29/2015	X	X																								Remains	Yes	
1A-Floor-24 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-25 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-26 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-27 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-28 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-29 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-30 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-103 Grab (Duplicate of 1A-Floor-30 Grab)	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-31 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1A-Floor-32 Grab	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1A-Floor-33 Grab	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1A-Floor-34 Grab	> 2' [7]	12/18/2015	X	X																								Removed	**No**	
1A-Floor-34A Grab	> 2' [7]	12/30/2015	X	X																								Remains	Yes	
1A-Floor-35 Grab	> 2' [7]	12/18/2015	X	X																								Removed	**No**	
1A-Floor-35A Grab	> 2' [7]	12/30/2015	X	X																								Remains	Yes	
1A-Floor-36 Grab	> 2' [7]	12/18/2015	X	X																								Removed	**No**	
1A-Floor-105 Grab (Duplicate of 1A-Floor-36 Grab)	> 2' [7]	12/18/2015	X	X																								Removed	**No**	
1A-Floor-36A Grab	> 2' [7]	1/5/2016	X	X																								Remains	Yes	

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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Excavation Area 1B (excavation depth 0-10 ft)																														
Post-Excavation Subsurface Soil																														
1B-Wall-01	> 2' [7]	12/8/2015	X	X																								Remains	Yes	
1B-Wall-01 Grab	> 2' [7]	12/14/2015	X	X																								Remains	Yes	
1B-Wall-02 Grab	> 2' [7]	12/14/2015	X	X																								Remains	Yes	
1B-Wall-03 Grab	> 2' [7]	12/14/2015	X	X																								Remains	Yes	
1B-Wall-04 Grab	> 2' [7]	12/17/2015	X	X																								Remains	Yes	
1B-Wall-04A Composite	> 2' [7]	12/31/2015	X	X																								Remains	Yes	
1B-Wall-05 Grab	> 2' [7]	12/17/2015	X	X																								Removed	**No**	
1B-Wall-102 Grab (Duplicate of 1B-Wall-05 Grab)	> 2' [7]	12/17/2015	X	X																								Removed	**No**	
1B-Wall-05A Grab	> 2' [7]	12/31/2015	X	X																								Remains	Yes	
1B-Wall-106 Grab (Duplicate of 1B-Wall-05A Grab)	> 2' [7]	12/31/2015	X	X																								Remains	Yes	
1B-Wall-06 Grab	> 2' [7]	12/30/2015	X	X																								Remains	Yes	
1B-Wall-07 Grab	> 2' [7]	12/30/2015	X	X																								Remains	Yes	
1B-Wall-08 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-09 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-10 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-11 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-12 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-107 Grab (Duplicate of 1B-Wall-12 Grab)	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-13 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-14 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-15 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-16 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Wall-17 Grab	> 2' [7]	1/7/2016	X	X																								Remains	Yes	
1B-Wall-108 Grab (Duplicate of 1B-Wall-17 Grab)	> 2' [7]	1/7/2016	X	X																								Remains	Yes	
1B-Floor-01 Grab	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1B-Floor-02 Grab	> 2' [7]	12/18/2015	X	X																								Removed	**No**	
1B-Floor-02A Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Floor-03 Grab	> 2' [7]	12/18/2015	X	X																								Removed	**No**	
1B-Floor-03A Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Floor-04 Grab	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1B-Floor-05 Grab	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1B-Floor-06 Grab	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1B-Floor-07 Grab	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1B-Floor-08 Grab	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1B Floor-104 Grab (Duplicate of 1B-Floor-08 Grab)	> 2' [7]	12/18/2015	X	X																								Remains	Yes	
1B-Floor-09 Grab	> 2' [7]	12/18/2015	X	X																								Removed	**No**	
1B-Floor-09A Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Floor-10 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Floor-11 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Floor-12 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Floor-13 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Floor-14 Grab	> 2' [7]	1/6/2016	X	X																								Remains	Yes	
1B-Floor-15 Grab	> 2' [7]	1/7/2016	X	X																								Remains	Yes	

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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Excavation Area 2 (excavation depth 0-14 ft)																														
Post-Excavation Subsurface Soil																														
2-Wall-01 Grab	> 2' [7]	1/5/2016	X	X																								Remains	Yes	
2-Wall-02 Grab	> 2' [7]	1/4/2016	X	X																								Remains	Yes	
2-Wall-03 Grab	> 2' [7]	1/4/2016	X	X																								Remains	Yes	
2-Wall-04 Grab	> 2' [7]	1/4/2016	X	X																								Remains	Yes	
2-Wall-05 Grab	> 2' [7]	1/5/2016	X	X																								Remains	Yes	
2-Wall-06 Grab	> 2' [7]	1/5/2016	X	X																								Remains	Yes	
2-Wall-07 Grab	> 2' [7]	1/5/2016	X	X																								Remains	Yes	
2-Floor-01 Grab	> 2' [7]	1/4/2016	X	X																								Remains	Yes	
2-Floor-02 Grab	> 2' [7]	1/4/2016	X	X																								Remains	Yes	
2-Floor-03 Grab	> 2' [7]	1/4/2016	X	X																								Remains	Yes	
2-Floor-04 Grab	> 2' [7]	1/5/2016	X	X																								Remains	Yes	
2-Floor-05 Grab	> 2' [7]	1/5/2016	X	X																								Remains	Yes	
Excavation Area 3 (excavation depth 0-14 ft)																														
Post-Excavation Subsurface Soil																														
3-Wall-01	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Wall-02	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Wall-03	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Wall-04	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Wall-05	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Wall-06	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Wall-07	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Wall-08	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Wall-09	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-01	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-109 (Duplicate of 3-Floor-01)	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-02	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-03	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-04	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-05	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-06	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-07	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
3-Floor-08	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	

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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																									Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Excavation Area 4 (excavation depth 0-9 ft)																														
Post-Excavation Subsurface Soil																														
4-Wall-01	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Wall-02	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Wall-03	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Wall-110 (Duplicate of 4-Wall-03)	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Wall-04	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Wall-05	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Floor-01	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Floor-02	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Floor-111 (Duplicate of 4-Wall-02)	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
4-Floor-03	> 2' [7]	1/15/2016	X	X	X	X																						Remains	Yes	
Area 5 (not excavated)																														
Post-Excavation Subsurface Soil																														
TP-A	> 2' [7]	1/14/2016	X	X																								Remains	Yes	
TP-B	> 2' [7]	1/14/2016	X	X																								Remains	Yes	
TP-C	> 2' [7]	1/14/2016	X	X																								Remains	Yes	
Post-Excavation Supplemental Soil Locations																														
Surface Soil																														
3 Grab	< 2'	9/8/2017	X	X				X	X																			Remains	Yes	
4 Grab	< 2'	9/8/2017	X	X				X	X																			Remains	Yes	
5 Grab	< 2'	9/8/2017	X	X				X	X																			Remains	Yes	
6 Grab	< 2'	9/8/2017	X	X				X	X																			Remains	Yes	
7 Grab	< 2'	9/8/2017	X	X				X	X																			Remains	Yes	
8 Grab	< 2'	9/8/2017	X	X				X	X																			Remains	Yes	
PCB1 Grab	< 2'	10/30/2017								X																		Remains	Yes	
PCB2 Grab	< 2'	10/30/2017								X																		Remains	Yes	
PCB3 Grab	< 2'	10/30/2017								X																		Remains	Yes	
PCB4 Grab	< 2'	10/30/2017								X																		Remains	Yes	

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			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Groundwater																															
MW-1	---	1/27/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-2	---	1/27/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-3	---	1/28/2016	X		X						X	X			X														Remains	Yes	
MW-3A	---	1/20/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Dup-3 (Duplicate of MW-3A)	---	1/20/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-4	---	1/19/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-5	---	1/28/2016			X						X	X			X														Remains	Yes	
MW-6	---	1/19/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Dup-2 (Duplicate of MW-6)	---	1/19/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-7	---	1/27/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-8	---	1/27/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Dup-5 (Duplicate of MW-8)	---	1/27/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-8S	---	1/26/2016	X	X	X						X	X			X														Remains	Yes	
MW-9	---	1/26/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Dup-4 (Duplicate of MW-9)	---	1/26/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-10	---	1/18/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Dup-1 (Duplicate of MW-10)	---	1/18/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-11	---	1/28/2016	X	X	X						X	X			X														Remains	Yes	
MW-12	---	1/19/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-13	---	1/20/2016; 2/1/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
MW-13 Split Sample	---	2/1/2016	X	X	X	X	X							X	X									X	X	X	X	X	Remains	Yes	
Sediment																															
SED-1	0-1'	10/7/2014	X	X								X	X			X	X					X	X						Remains	Yes	
SED-2	0-1'	10/7/2014	X	X								X	X			X	X					X	X						Remains	Yes	
SED-3	0-1'	10/8/2014	X	X								X	X			X	X					X	X						Remains	Yes	
SD-1 Grab	0-0.5'	10/3/2017	X	X				X	X																				Remains	Yes	
SD-2 Grab	0-0.5'	10/3/2017	X	X				X	X																				Remains	Yes	
SD-3 Grab	0-0.5'	10/3/2017	X	X				X	X																				Remains	Yes	
SD-4 Grab (Duplicate of SD-3)	0-0.5'	10/3/2017	X	X				X	X																				Remains	Yes	

Table 3-21
Analytical Sample Summary
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Sample Name	Sample Depth (ft-bgs)	Sample Date(s)	Analytical Parameters																										Sample Removed or Remains?	Sample Locations Retained for Risk Evaluation? (Yes or No)	Comments
			MCHM	PPH	BTEX	PAHs	Glycols[1]	Ethylene glycol	Propylene gycol	PCBs	Organic Compounds[2]	Acids[3]	Carbonyl Compounds[4]	Lead	MTBE	Calcium	TPH Compounds[5]	Diesel (C10-C20)	Diesel (C10-C28)	Gasoline (C6-C10)	TPH (C20-C34)	Other Acids[6]	Chloride	Methanol	1-Propanol	tert-Butyl alcohol	Ethanol	2-Propanol			
Surface Water																															
Diversion Trench	---	2/1/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Dup-7 (Duplicate of Diversion Trench)	---	2/1/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Sump-4	---	1/27/2016	X	X	X	X					X	X	X	X	X														Remains	**No**	This sump was backfilled with clean soil that was placed over the excavation areas and thus no longer represent an exposure pathway.
Sump-8	---	1/28/2016; 2/1/2016	X	X	X	X					X	X	X	X	X														Remains	**No**	This sump was backfilled with clean soil that was placed over the excavation areas and thus no longer represent an exposure pathway.
Sump-8 Split Sample	---	1/28/2016	X	X	X	X	X							X	X									X	X	X	X	X	Remains	**No**	This sump was backfilled with clean soil that was placed over the excavation areas and thus no longer represent an exposure pathway.
Sump-9	---	1/26/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Sump-10	---	1/20/2016; 1/28/2016; 2/1/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
Sump-10 Split Sample	---	2/1/2016	X	X	X	X	X							X	X									X	X	X	X	X	Remains	Yes	
Dup-6 (Duplicate of Sump-10)	---	1/28/2016	X	X	X	X					X	X	X	X	X														Remains	Yes	
1 Grab	---	9/8/2017	X	X				X	X																				Remains	Yes	
2 Grab	---	9/8/2017	X	X				X	X																				Remains	Yes	
SW-1 Grab	upper 6" of surface water	10/3/2017	X	X				X	X																				Remains	Yes	
SW-2-33 Grab	lower 6" of surface water	10/3/2017	X	X				X	X																				Remains	Yes	
SW-3 Grab	upper 6" of surface water	10/3/2017	X	X				X	X																				Remains	Yes	
SW-4 Grab	lower 6" of surface water	10/3/2017	X	X				X	X																				Remains	Yes	
SW-5 Grab	upper 6" of surface water	10/3/2017	X	X				X	X																				Remains	Yes	
SW-6 Grab	lower 6" of surface water	10/3/2017	X	X				X	X																				Remains	Yes	
SW-7 Grab (Duplicate of SW-4)	lower 6" of surface water	10/3/2017	X	X				X	X																				Remains	Yes	

Notes:

BTEX - benzene, toluene, ethylbenzene, and total xylenes
ft-bgs - feet below ground surface
MCHM - 4-Methyl-1-cyclohexanemethanol
MTBE - methyl tert-butyl ether
PAHs - polycyclic aromatic hydrocarbons
PCBs - polychlorinated biphenyls
PPH - Propylene glycol phenyl ether
TPH - total petroleum hydrocarbons

[1] The constituent-specific list of glycols analyzed for in these samples is Diethylene Glycol, Dipropylene Glycol, Monoethylene Glycol, Propylene Glycol, and Triethylene Glycol.
[2] The constituent-specific list of organic compounds analyzed for in these samples is Butyric Acid, Ethyl Alcohol, Ethylene glycol, Isobutanol, Isopropyl alcohol, Methanol, n-Butyl alcohol, n-Propanol, Propylene glycol, and t-Butyl alochol.
[3] The constituent-specific list of acids analyzed for in these samples is Acetic Acid, Formic Acid, and Lactic Acid.
[4] The constituent-specific list of carbonyl compounds analyzed for in these samples is Acetaldehyde and Formaldehyde.
[5] The constituent-specific list of TPH compounds analyzed for in these samples is 2-Methyl-1-propanol, Ethanol, Ethylene Glycol, Isopropyl alcohol, Methanol, N-Propyl alcohol, and Propylene Glycol.
[6] The constituent-specific list of other acids analyzed for in these samples is Butyric Acid, Propionic Acid, and Pyruvic Acid.
[7] Depths of these soil samples are unknown. However, these soil samples are assumed to be subsurface soil samples (i.e. > 2 ft-bgs) because these sample locations were backfilled with soil cover placed over the excavation areas.
[8] Depths and exact location of the Diversion Trench Soil samples were not recorded. Trench depth is from approximately 5 to 7 feet below grade.
[9] Sample collected in 32 ounce unpreserved jar. MCHM and PPH concentrations used for comparison with samples collected in 4 ounce jar and only analyzed for MCHM and PPH.
Shaded samples were removed.

Table 3-22
Summary of Constituents of Concern
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Constituent of Potential Concern (COPC)		Direct Contact												Vapor Intrusion
		On-Site												On-Site
		Surface Soil [1]	Subsurface Soil [2]	Groundwater[3]	Groundwater to Surface Water		Sediment		Surface Water					Groundwater
									Sumps	Diversion Trench		Elk River		
		< 2 ft-bgs	> 2 ft-bgs	Overburden	Human Health [4]	Ecological [5]	Human Health [6]	Ecological [7]	Human Health [8]	Human Health [9]	Ecological [10]	Human Health [9]	Ecological [10]	Overburden [11]
Volatile Organic Compounds (mg/kg)														
Benzene	71-43-2	MG	RES, MG	---	---	---	---	---	---	---	---	---	---	---
Toluene	108-88-3	---	MG	---	---	---	---	---	---	---	---	---	---	---
Ethylbenzene	100-41-4	---	RES, MG	---	---	---	---	---	---	---	---	---	---	---
Xylenes (total)	1330-20-7	---	MG	---	---	---	---	---	---	---	---	---	---	---
Methyl tert-butyl ether (MTBE)	1634-04-4	---	---	---	---	---	---	---	---	---	---	---	---	---
Total Petroleum Hydrocarbons (TPH) (mg/kg)														
Diesel (C10-C20)	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Diesel (C10-C28)	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Gasoline (C6-C10)	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TPH (C20-C34)	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Semivolatile Organic Compounds (mg/kg)														
4-Methyl-1-cyclohexane methanol (MCHM) [12]	34885-03-5	---	MG	---	---	---	---	---	---	---	---	---	---	---
Propylene glycol phenyl ether (PPH) [12]	770-35-4	---	MG	---	---	---	---	---	---	---	---	---	---	---
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Acenaphthene	82-32-9	---	---	---	---	---	---	---	---	---	---	---	---	---
Acenaphthylene	208-96-8	---	---	---	---	---	---	---	---	---	---	---	---	---
Anthracene	120-12-7	---	---	---	---	BTAG	---	---	---	---	---	---	---	---
Benzo(a)anthracene	56-55-3	---	RES, MG	GW	---	BTAG	---	---	GW	---	---	---	---	---
Benzo(a)pyrene	50-32-8	---	RES, MG	GW	HH	BTAG	---	---	---	---	---	---	---	---
Benzo(b)fluoranthene	205-99-2	---	RES, MG	GW	---	---	---	---	GW	---	---	---	---	---
Benzo(g,h,i)perylene	191-24-2	---	---	---	---	---	---	---	---	---	---	---	---	---
Benzo(k)fluoranthene	207-08-9	---	MG	GW	---	---	---	---	---	---	---	---	---	---
Chrysene	218-01-9	---	---	---	---	---	---	---	---	---	---	---	---	---
Dibenzo(a,h)anthracene	57-70-3	---	RES, MG	GW	HH	---	---	---	---	---	---	---	---	---
Fluoranthene	206-44-0	---	---	---	---	---	---	---	---	---	---	---	---	---
Fluorene	86-73-7	---	---	---	---	---	---	---	---	---	---	---	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	---	RES, MG	GW	---	---	---	---	GW	---	---	---	---	---
Naphthalene	91-20-3	---	RES, MG	GW	---	---	---	---	---	---	---	---	---	---
Phenanthrene	85-01-8	---	---	---	---	---	---	---	---	---	---	---	---	---
Pyrene	129-00-0	---	---	---	---	---	---	---	---	---	---	---	---	---
Metals (mg/kg)														
Lead	7439-92-1	MG	MG	---	---	---	---	---	---	---	---	---	---	---

Table 3-22
Summary of Constituents of Concern
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Constituent of Potential Concern (COPC)		Direct Contact												Vapor Intrusion
		On-Site												On-Site
		Surface Soil [1]	Subsurface Soil [2]	Groundwater[3]	Groundwater to Surface Water		Sediment		Surface Water					Groundwater
									Sumps	Diversion Trench		Elk River		
		< 2 ft-bgs	> 2 ft-bgs	Overburden	Human Health [4]	Ecological [5]	Human Health [6]	Ecological [7]	Human Health [8]	Human Health [9]	Ecological [10]	Human Health [9]	Ecological [10]	Overburden [11]
Glycols (mg/kg)														
Diethylene Glycol	111-46-6	---	---	---	---	---	---	---	---	---	---	---	---	---
Dipropylene Glycol	25265-71-8	---	---	---	---	---	---	---	---	---	---	---	---	---
Monoethylene Glycol (Ethylene Glycol)	107-21-1	---	MG	---	---	---	---	---	---	---	---	---	---	---
Propylene Glycol	57-55-6	---	MG	---	---	---	---	---	---	---	---	---	---	---
Triethylene Glycol	112-27-6	---	---	---	---	---	---	---	---	---	---	---	---	---
Polychlorinated Biphenyls (PCBs) (mg/kg)														
Aroclor 1016	12674-11-2	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor 1221	11104-28-2	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor 1232	11141-16-5	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor 1242	53469-21-9	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor 1248	12672-29-6	---	MG	---	---	---	---	---	---	---	---	---	---	---
Aroclor 1254	11097-69-1	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor 1260	11096-82-5	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor 1262	37324-23-5	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor 1268	11100-14-4	---	---	---	---	---	---	---	---	---	---	---	---	---
Acids (mg/kg)														
Acetic Acid	64-19-7	---	---	---	---	---	---	---	---	---	---	---	---	---
Formic Acid	64-18-6	MG	---	---	---	---	---	---	---	---	---	---	---	---
Lactic Acid	50-21-5	---	---	---	---	---	---	---	---	---	---	---	---	---
Butyric Acid	107-92-6	---	---	---	---	---	---	---	---	---	---	---	---	---
Propionic Acid	79-09-4	---	---	---	---	---	---	---	---	---	---	---	---	---
Pyruvic Acid	127-17-3	---	---	---	---	---	---	---	---	---	---	---	---	---
Carbonyl Compounds (mg/kg)														
Acetaldehyde	75-07-0	MG	---	---	---	---	---	---	---	---	---	---	---	---
Formaldehyde	50-00-0	MG	---	---	---	---	---	---	---	---	---	---	---	---
Organic Compounds (mg/kg)														
Ethyl Alcohol (Ethanol)	64-17-5	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Methyl-1-propanol (Isobutanol)	78-83-1	---	---	---	---	---	---	---	---	---	---	---	---	---
Methanol	67-56-1	MG	MG	---	---	---	---	---	---	---	---	---	---	---
n-Butyl Alcohol	71-36-3	---	---	---	---	---	---	---	---	---	---	---	---	---
n-Propanol (1-Propanol) (n-Propyl alcohol)	71-23-8	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Propanol (Isopropyl Alcohol) [13]	67-63-0	SSL	---	---	---	---	---	---	---	---	---	---	---	---
t-Butyl Alcohol	75-65-0	---	---	---	---	---	---	---	---	---	---	---	---	---

Table 3-22
Summary of Constituents of Concern
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Constituent of Potential Concern (COPC)	Direct Contact												Vapor Intrusion
	On-Site												On-Site
	Surface Soil [1]	Subsurface Soil [2]	Groundwater[3]	Groundwater to Surface Water		Sediment		Surface Water					Groundwater
								Sumps	Diversion Trench		Elk River		
	< 2 ft-bgs	> 2 ft-bgs	Overburden	Human Health [4]	Ecological [5]	Human Health [6]	Ecological [7]	Human Health [8]	Human Health [9]	Ecological [10]	Human Health [9]	Ecological [10]	Overburden [11]
Inorganic Compounds (mg/kg)													
Calcium 7440-70-2	---	---	---	---	---	---	---	---	---	---	---	---	---
Chloride 16887-00-6	---	---	---	---	---	---	---	---	---	---	---	---	---

Notes:

"---" indicates either constituent was not retained as a COC for the identified medium or the constituent was not analyzed in any samples in the media.

ft-bgs - feet below ground surface

RES - site-related constituent exceeds the applicable WVDEP residential soil de minimis screening value, June 2017

MG - site-related constituent exceeds the applicable WVDEP migration to groundwater de minimis screening value, June 2017, or WVDEP-approved calculated uniform standard for MCHM and PPH.

GW - site-related constituent exceeds the applicable WVDEP groundwater de minimis screening value, June 2017

SSL - site-related constituent exceeds the applicable USEPA risk-based soil screening level (SSL) protective of groundwater, June 2017

HH - site-related constituent exceeds the applicable USEPA human health water quality critieria for the consumption of water and organism and/or consumption of organism only.

BTAG - site-related constituent exceeds the applicable USEPA Region III Freshwater BTAG screening value, July 2006

[1] Any site-related constituent in remaining surface soil samples (i.e. not removed during excavation activities) that exceeded a WVDEP industrial soil, residential soil, or migration to groundwater de minimis screening value was retained as a direct contact COC in surface soil.

[2] Any site-related constituent in remaining subsurface soil samples (i.e. not removed during excavation activities) that exceeded a WVDEP industrial soil, residential soil, or migration to groundwater de minimis screening value was retained as a direct contact COC in subsurface soil.

[3] Any site-related constituent in post-remediation groundwater samples (i.e. collected after excavation activities) that exceeded a WVDEP groundwater de minimis screening value was retained as a direct contact COC in groundwater.

[4] Any site-related constituent in a calculated human health surface water concentration (i.e. maximum groundwater concentration divided by a dilution factor) that exceeded a either WVDEP human health water quality criteria (fish consumption only or drinking water and fish consumption) or USEPA human health water quality criteria (consumption of water and organism or consumption of organism only) was retained as a direct contact human health COIC for the groundwater to surface water evaluation.

[5] Any site-related constituent in a calculated ecological surface water concentration (i.e. maximum groundwater concentration divided by a dilution factor) that exceeded a either WVDEP aquatic life water quality criteria (chronic warm water fishery or chronic trout waters), USEPA Region III freshwater BTAG screening values, or USEPA aquatic life water quality criteria (continuous criteria or maximum concentration) was retained as a direct contact ecological COC for the groundwater to surface water evaluation.

[6] There were no site-related constituents in remaining sediment samples (i.e. not removed during excavation activities) that exceeded a WVDEP industrial soil or residential soil de minimis screening value. Therefore, no direct contact human health COC were retained in sediment.

[7] There were no site-related constituents in remaining sediment samples (i.e. not removed during excavation activities) that exceeded a USEPA Region III Freshwater sediment BTAG screening value. Therefore, no ecological COC were retained in sediment.

[8] Any site-related constituents in post-remediation surface water samples (i.e. collected after excavation activities) from sump samples (i.e. Sump 9 and Sump 10) that exceeded a WVDEP groundwater de minimis screening value was retained as a direct contact human health COC in surface water samples collected from the sumps. Sump 4 and Sump 8 were not included in the selection of COC because these sumps were backfilled with soil cover and are no longer exposed.

[9] There were no site-related constituents in post-remediation surface water samples (i.e. collected after excavation activities) from the diversion trench or the Elk River that exceeded a WVDEP human health water quality standard (i.e. fish consumption and drinking water or fish consumption only) or USEPA human health water quality criteria (consumption of water and organism or consumption of organism only). Therefore, no human health COC were retained in surface water samples collected from the diversion trench and Elk River.

[10] There were no site-related constituents in post-remediation surface water samples (i.e. collected after excavation activities) collected from the diversion trench or the Elk River that exceeded WVDEP chronic aquatic life water quality criteria (i.e. warm water fishery or trout water), USEPA Region III freshwater BTAG screening values, or USEPA aquatic life water quality criteria (continuous concentration criteria or maximum concentration criteria). Therefore, no ecological COC were retained in surface water samples collected from the diversion trench and Elk River.

[11] There were no site-related constituents in post-remediation groundwater samples (i.e. collected after excavation activities) that exceeded a USEPA residential or commercial VISL target groundwater concentration. Therefore, no vapor intrusion COC were retained in groundwater.

[12] WVDEP June 2017 De Minimis Standards are not available for MCHM and PPH. Therefore, WVDEP-approved calculated uniform standards were used to screen MCHM and PPH analytical results.

[13] WVDEP June 2017 De Minimis Standards are not available for this constituent. Therefore, June 2017 USEPA Regional Screening Levels (RSLs) were used instead to screen the analytical results.

Table 4-1
Potential Constituent Migration Routes
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On-Site or Off-Site	Media	Constituent Migration Route (Transport Mechanism)	Description	Retained/ Not Retained	Rationale
On-Site	**Surface Soil**	Surface Soil to Outdoor Air (Volatilization)	Volatilization of constituents from on-site surface soil to outdoor air	**Retained**	The release was a surficial release of a chemical mixture containing MCHM and PPH from an above ground storage tank (AST). All ASTs and associated piping have been removed from the site since the release. The only structures that remain at the site are an office building and garage building located on the southern side of the site. The southern half of the site is covered primarily with asphalt and the northern half is covered primarily with gravel with some grassy/vegetated areas along the eastern and western sides of the site. Surface soil samples were collected during 2014, 2015, and 2017 investigation activities. There were volatile and non-volatile constituents detected in on-site surface soil samples that remain after the December 2015/January 2016 excavation activities. Therefore, the volatilization of constituents from surface soil to outdoor air, particulate emission of entrained constituents from surface soil to outdoor air, and leaching of constituents from surface soil to subsurface soil then to groundwater migration routes were retained.
		Surface Soil to Outdoor Air (Particulate Emission)	Particulate emission of entrained constituents from on-site surface soil to outdoor air		
		Surface Soil to Subsurface Soil to Groundwater	Leaching of constituents from on-site surface soil to subsurface soil and then to groundwater		
		Surface Soil to Indoor Air (Volatilization)	Volatilization of constituents from on-site surface soil to soil gas and subsequent seepage of soil gas into a building (indoor air)	Not Retained	The only structures that remain at the site are an office building and garage building located on the southern side of the site. However, there is also the potential for future buildings to be constructed on-site. Surface soil samples were collected during 2014, 2015, and 2017 investigation activities. Surface soil samples SS-17, SS-20, and SS-27 are located adjacent to the current office building. However, volatile constituents (i.e. BTEX and MTBE) were not analyzed in these surface soil samples. There were volatile constituents detected in other 2014 surface soil samples such as SS-15 and SS-16, which were collected within the footprint of the southern-most ASTs (AST 404 and 405) and still remain because they were outside the area of the December 2015/January 2016 excavation areas. However, these surface soil samples are located over 30 feet away from the current office building. Therefore, it is unlikely that volatile constituents from SS-15 and SS-16 would migrate to the office building. In addition, although a future building could be placed over the surface soil samples with detections of volatile constituents, future vapor intrusion into future on-site buildings will be addressed with a land use covenant. Furthermore, USEPA indicates that the soil to indoor air pathway is not regarded as a pathway that has reliable certainty as compared to other media. Therefore, the volatilization of constituents from surface soil to indoor air migration route was not retained.
		Surface Soil to Surface Water	Overland flow of constituents from on-site surface soil to surface water	**Retained**	The southern half of the site is covered primarily with asphalt and the northern half is covered primarily with gravel with some grassy/vegetated areas along the eastern and western sides of the site. The site topography slopes down to the west toward the adjacent Elk River. Surface soil samples were collected during 2014, 2015, and 2017 investigation activities. There were constituents detected in on-site surface soil samples that remain after the December 2015/January 2016 excavation activities. There is the potential for constituents in surface soil to migrate to the surface water of the Elk River via overland flow. Therefore, the migration of constituents from surface soil to surface water via overland flow was retained.
On-Site	**Subsurface Soil**	Subsurface Soil to Outdoor Air (Volatilization)	Volatilization of constituents from on-site subsurface soil to outdoor air	**Retained**	The southern half of the site is covered primarily with asphalt and the northern half is covered primarily with gravel with some grassy/vegetated areas along the eastern and western sides of the site. There is the potential for subsurface soil to have been affected by the surficial release via leaching from surface soil to subsurface soil. Subsurface soil samples were collected during 2014, 2015, and 2016 investigation activities. There were volatile and non-volatile constituents detected in on-site subsurface soil samples that remain after the December 2015/January 2016 excavation activities. Therefore, the volatilization of constituents from subsurface soil to outdoor air, volatilization of constituents from subsurface soil to indoor air, particulate emission of entrained constituents from subsurface soil to outdoor air (during intrusive activities), and leaching of constituents from subsurface soil to groundwater migration routes were retained.
		Subsurface Soil to Outdoor Air (Particulate Emission via Intrusive Activities)	Particulate emission of entrained constituents from on-site subsurface soil (exposed during intrusive activities) to outdoor air		
		Subsurface Soil to Groundwater	Leaching of constituents from on-site subsurface soil to groundwater		
		Subsurface Soil to Indoor Air (Volatilization)	Volatilization of constituents from on-site subsurface soil to soil gas and subsequent seepage of soil gas into a building (indoor air)	Not Retained	The only structures that remain at the site are an office building and garage building located on the southern side of the site. However, there is also the potential for future buildings to be constructed on-site. Suburface soil samples were collected during 2014, 2015, and 2016 investigation activities. There were no subsurface soil samples collected near the current office building. There were volatile constituents detected in some 2015 and 2016 subsurface soil samples that still remain after the December 2015/January 2016 excavation activities. Although a future building could be placed over the subsurface soil samples with detections of volatile constituents, future vapor intrusion into future on-site buildings will be addressed with a land use covenant. Furthermore, USEPA indicates that the soil to indoor air pathway is not regarded as a pathway that has reliable certainty as compared to other media. Therefore, the volatilization of constituents from subsurface soil to indoor air migration route was not retained.

Table 4-1
Potential Constituent Migration Routes
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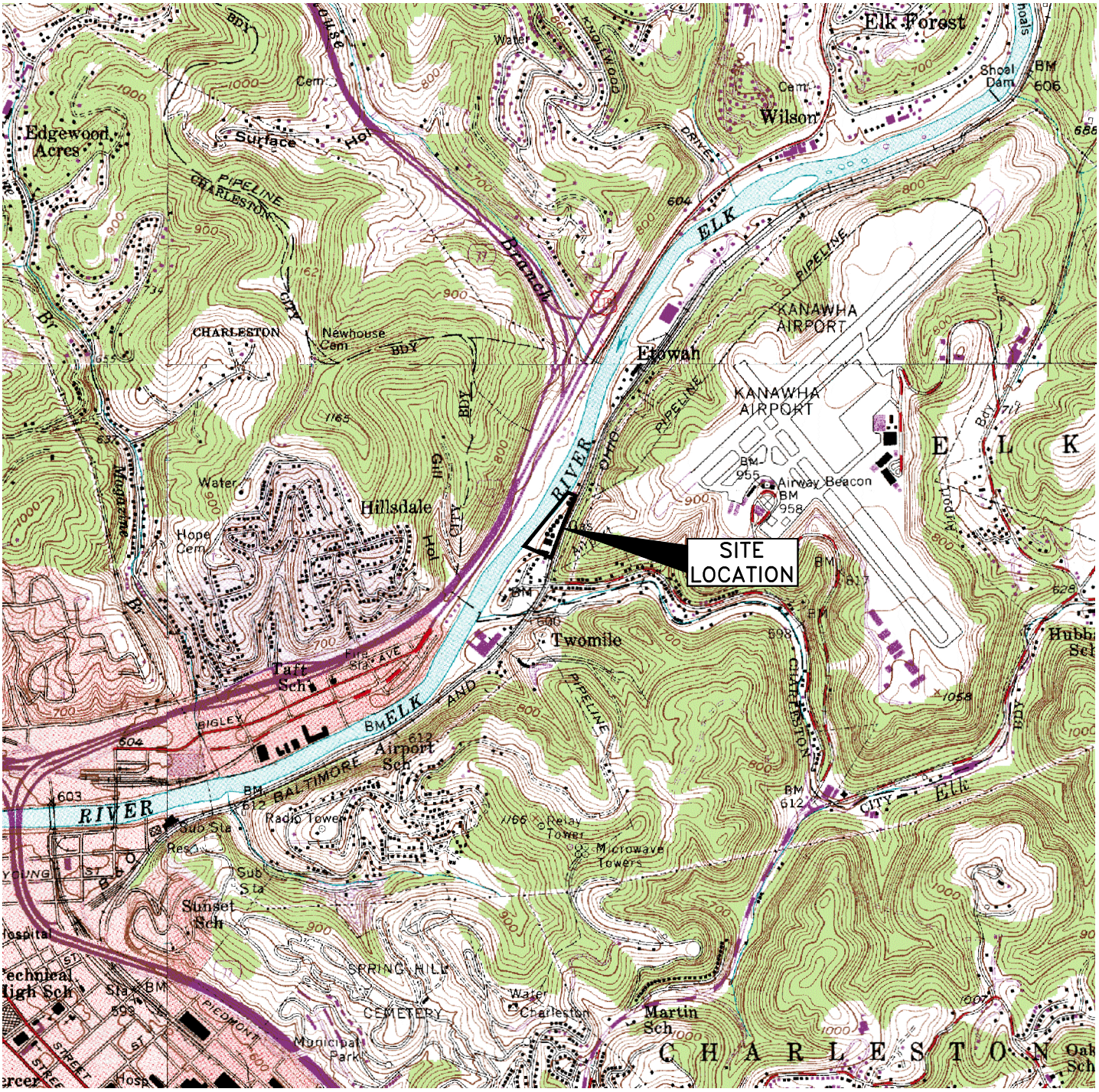
On-Site or Off-Site	Media	Constituent Migration Route (Transport Mechanism)	Description	Retained/ Not Retained	Rationale
On-Site	**Groundwater**	Groundwater to Outdoor Air /Trench Air (Volatilization)	Volatilization of constituents from on-site groundwater to outdoor air/trench air	Not Retained	The southern half of the site is covered primarily with asphalt and the northern half is covered primarily with gravel with some grassy/vegetated areas along the eastern and western sides of the site. The only structures that remain at the site are an office building and garage building located on the southern side of the site. However, there is also the potential for future buildings to be constructed on-site. There is the potential for groundwater to have been affected by the surficial release via leaching from surface soil to subsurface soil and then to groundwater. Post-remediation groundwater samples were collected in 2016 after the December 2015/January 2016 excavation activities. There were volatile constituents detected in these post-remediation groundwater samples. However, the depth to groundwater on-site ranges from approximately 14.5 to 36 ft-bgs with an average depth of approximately 22 ft-bgs, which is an adequate distance between groundwater and ground surface to allow for attenuation of vapors migrating from the subsurface to outdoor air or indoor air. In addition, the soil lithology at the site is primarily gravelly clay/sandy clay/silty clay, which would be a soil-like material that would allow for attenuation of vapors migrating from the subsurface to outdoor air or indoor air. Therefore, the volatilization of constituents from groundwater to outdoor air and indoor air migration routes are considered de minimis and were not retained.
		Groundwater to Indoor Air (Volatilization)	Volatilization of constituents from on-site groundwater to soil gas and subsequent seepage of soil gas into a building (indoor air)		
		On-Site Groundwater to Off-Site Groundwater	Migration of constituents in on-site groundwater to off-site groundwater	Not Retained	On-site groundwater predominantly flows to the west toward the adjacent Elk River. On-site monitoring wells located closest to the western property boundary (i.e. MW-3, MW-3A, MW-4, MW-5, MW-6, and MW-13) had detections of site-related constituents in post-remediation groundwater samples. However, constituents in on-site groundwater would migrate directly to the adjacent surface water of the Elk River rather than off-site groundwater. Therefore, this migration route was not retained.
		On-Site Groundwater to Off-Site Surface Water	Migration of constituents in on-site groundwater to off-site surface water	**Retained**	On-site groundwater predominantly flows to the west toward the adjacent Elk River. On-site monitoring wells located closest to the western property boundary (i.e. MW-3, MW-3A, MW-4, MW-5, MW-6, and MW-13) had detections of site-related constituents in post-remediation groundwater samples. The potential exists for constituents in on-site groundwater to migrate to the adjacent surface water of the Elk River. Therefore, this migration route was retained.
Off-Site	**Surface Water**	Adjacent Surface Water in Elk River to Downriver Locations and Adjacent Diversion Trench Surface Water to Downstream Locations	Migration of constituents in adjacent surface water in the Elk River to downriver locations and in adjacent diversion trench surface water to downstream locations	Not Retained	The Elk River is located directly adjacent to the site's western property boundary. Grab surface water samples were collected from the surface water of the Elk River in September and October 2017 from 3 separate locations: one upstream on the north side of the site, one adjacent to the area where the release occurred, and one downstream on the south side of the site. There were no site-related constiuents detected in these surface water samples. Therefore, this migration route was not retained for the Elk River. In addition, there were no site-related constituents detected in surface water samples collected from the diversion trench located along the northeast side of the site. Therefore, this migration route was not retained for the diversion trench.
Off-Site	**Sediment**	Adjacent Sediment to Downriver Locations	Migration of adsorbed constituents on sediment below the water line to downriver locations	**Retained**	Sediment samples were collected in October 2014 and October 2017. There was only one estimated "J" value concentration of MCHM detected in SED-01 (collected in 2014). The other 2014 sediment samples had no detections of MCHM or PPH. In addition, there were no detections of MCHM or PPH in the 2017 sediment samples. The only other constituents detected in the 2014 sediment samples were calcium, isopropyl alcohol, butyric acid, propionic acid, pyruvic acid, and chloride. The sediment sample locations have the potential to be moved downstream by high energy surface water flow. Therefore, this migration route was retained.

Figures



SCALE 1:24 000

1 1/2 0 1

SCALE IN MILE

1000 0 1000 2000 3000 4000 5000 6000 7000

SCALE IN FEET

WEST VIRGINIA QUADRANGLE LOCATION

REFERENCE: USGS 7.5 MINUTE QUADRANGLE; EAST CHARLESTON, WEST VIRGINIA 1958, PHOTO REVISED 1971 AND 1976

FREEDOM INDUSTRIES

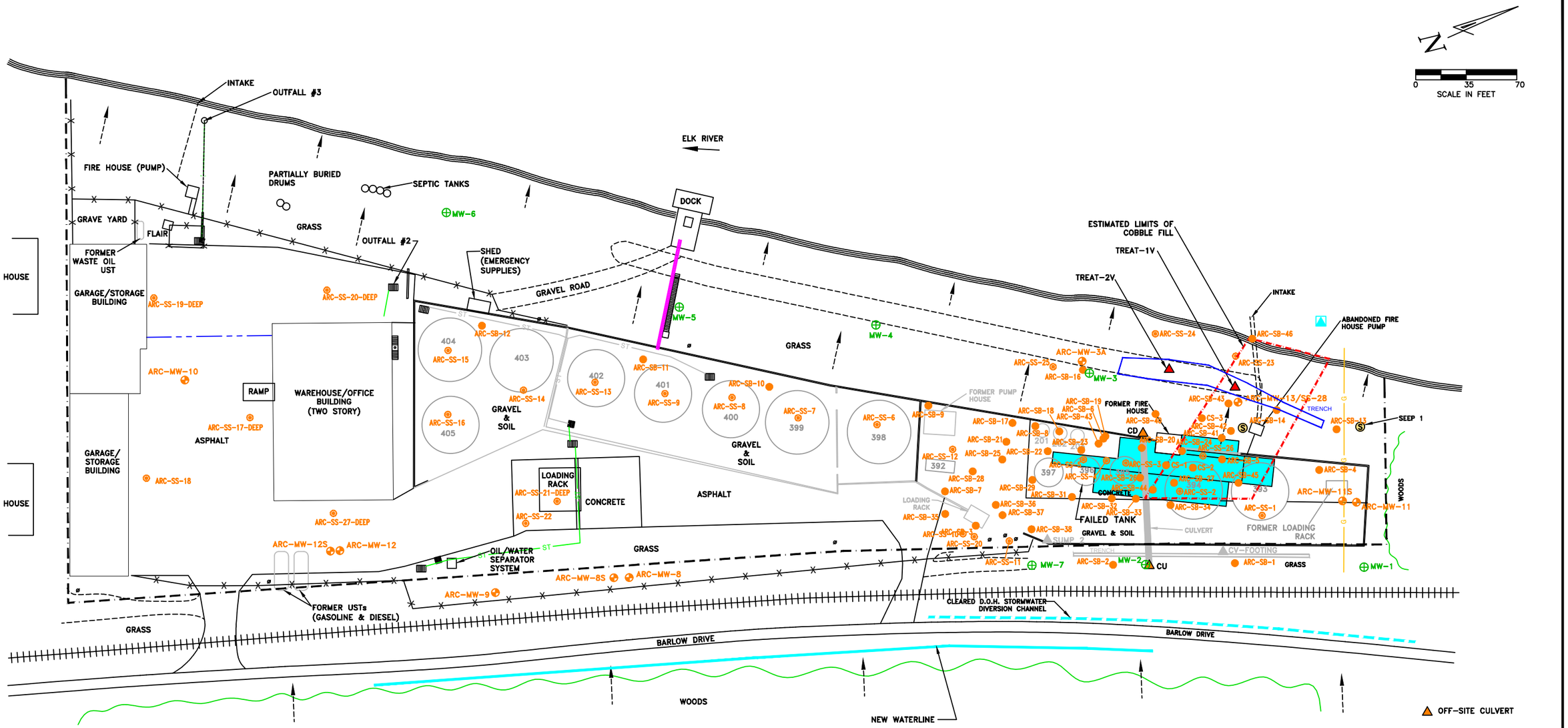
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

SITE LOCATION MAP

ARCADIS

Figure 1

Source: April 2015 Site Investigation Report



LEGEND

- EXISTING WELL
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- MW MONITORING WELL
- SB DEEP SOIL BORING
- SS SURFACE SOIL SAMPLE
- SURFACE WATER SAMPLE
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST STORM SEWER LINE
- G NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

NOTE: FORMER SITE FEATURE SHOWN IN GRAY

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

Source: April 2015 Site Investigation Report

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

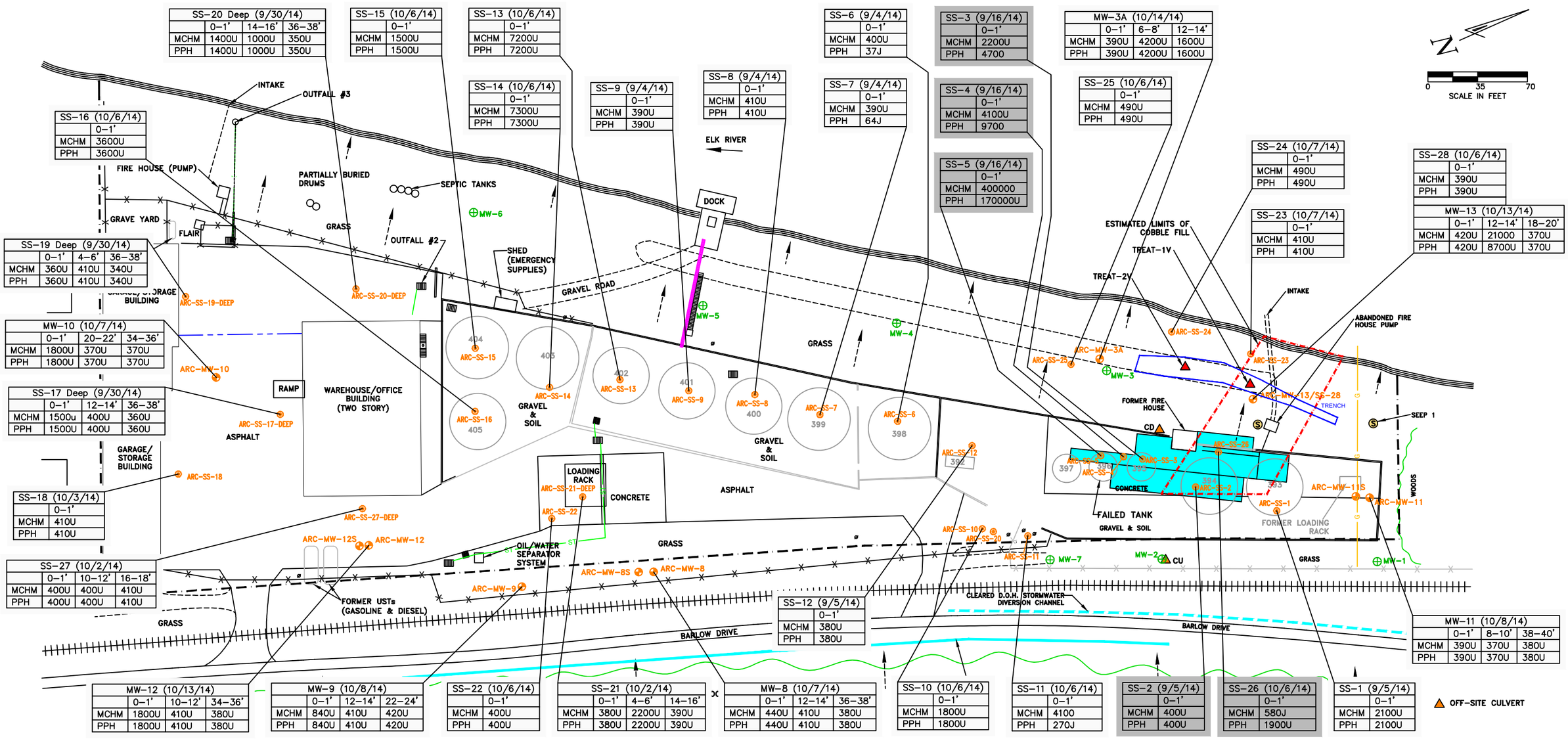
OH003003.0001

Site Map with 2014 Soil and Groundwater Sampling Locations

ARCADIS

FIGURE
2

CITY:(Columbus Oh) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Manzo) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\Columbus-OH\ACT\OH003003 - FREEDOM INDUSTRIES\00010003\OH3003-1-3-2015-01.dwg LAYOUT: FIG 3 SM - ALL-SAMPLES SAVED: 4/29/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 1:59 PM BY: SMITH, BOB
XREFS:



SS-20 Deep (9/30/14)	0–1'	14–16'	36–38'
MCHM	1400U	1000U	350U
PPH	1400U	1000U	350U

SS-15 (10/6/14)	0–1'
MCHM	1500U
PPH	1500U

SS-13 (10/6/14)	0–1'
MCHM	7200U
PPH	7200U

SS-6 (9/4/14)	0–1'
MCHM	400U
PPH	37J

SS-3 (9/16/14)	0–1'
MCHM	2200U
PPH	4700

MW-3A (10/14/14)	0–1'	6–8'	12–14'
MCHM	390U	4200U	1600U
PPH	390U	4200U	1600U

SS-16 (10/6/14)	0–1'
MCHM	3600U
PPH	3600U

SS-14 (10/6/14)	0–1'
MCHM	7300U
PPH	7300U

SS-9 (9/4/14)	0–1'
MCHM	390U
PPH	390U

SS-8 (9/4/14)	0–1'
MCHM	410U
PPH	410U

SS-7 (9/4/14)	0–1'
MCHM	390U
PPH	64J

SS-4 (9/16/14)	0–1'
MCHM	4100U
PPH	9700

SS-25 (10/6/14)	0–1'
MCHM	490U
PPH	490U

SS-5 (9/16/14)	0–1'
MCHM	400000
PPH	170000U

SS-24 (10/7/14)	0–1'
MCHM	490U
PPH	490U

SS-28 (10/6/14)	0–1'
MCHM	390U
PPH	390U

SS-23 (10/7/14)	0–1'
MCHM	410U
PPH	410U

MW-13 (10/13/14)	0–1'	12–14'	18–20'
MCHM	420U	21000	370U
PPH	420U	8700U	370U

SS-19 Deep (9/30/14)	0–1'	4–6'	36–38'
MCHM	360U	410U	340U
PPH	360U	410U	340U

MW-10 (10/7/14)	0–1'	20–22'	34–36'
MCHM	1800U	370U	370U
PPH	1800U	370U	370U

SS-17 Deep (9/30/14)	0–1'	12–14'	36–38'
MCHM	1500u	400U	360U
PPH	1500U	400U	360U

SS-18 (10/3/14)	0–1'
MCHM	410U
PPH	410U

SS-27 (10/2/14)	0–1'	10–12'	16–18'
MCHM	400U	400U	410U
PPH	400U	400U	410U

SS-12 (9/5/14)	0–1'
MCHM	380U
PPH	380U

MW-11 (10/8/14)	0–1'	8–10'	38–40'
MCHM	390U	370U	380U
PPH	390U	370U	380U

MW-12 (10/13/14)	0–1'	10–12'	34–36'
MCHM	1800U	410U	380U
PPH	1800U	410U	380U

MW-9 (10/8/14)	0–1'	12–14'	22–24'
MCHM	840U	410U	420U
PPH	840U	410U	420U

SS-22 (10/6/14)	0–1'
MCHM	400U
PPH	400U

SS-21 (10/2/14)	0–1'	4–6'	14–16'
MCHM	380U	2200U	390U
PPH	380U	2200U	390U

MW-8 (10/7/14)	0–1'	12–14'	36–38'
MCHM	440U	410U	380U
PPH	440U	410U	380U

SS-10 (10/6/14)	0–1'
MCHM	1800U
PPH	1800U

SS-11 (10/6/14)	0–1'
MCHM	4100
PPH	270J

SS-2 (9/5/14)	0–1'
MCHM	400U
PPH	400U

SS-26 (10/6/14)	0–1'
MCHM	580J
PPH	1900U

SS-1 (9/5/14)	0–1'
MCHM	2100U
PPH	2100U

OFF-SITE CULVERT

LEGEND

- EXISTING WELL (7)
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- MW NEW WELL (5)
- SS SURFACE SOIL SAMPLE (26, 0–1')
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- GRAY SHADING INDICATES SOILS FROM THESE DEPTHS HAS BEEN EXCAVATED
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST STORM SEWER LINE
- G NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

ARC-SS-10 (10/6/14)	SAMPLE IDENTIFICATION (DATE)
0–1'	SAMPLE DEPTH IN FEET
MCHM	4-METHYLCYCOHEXANEMETHANOL
PPH	GLYCOL ETHER
ug/kg	MICROGRAMS PER KILOGRAMS
WV DEP	WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
U	NON DETECT

Source: April 2015 Site Investigation Report

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

OH003003.0001

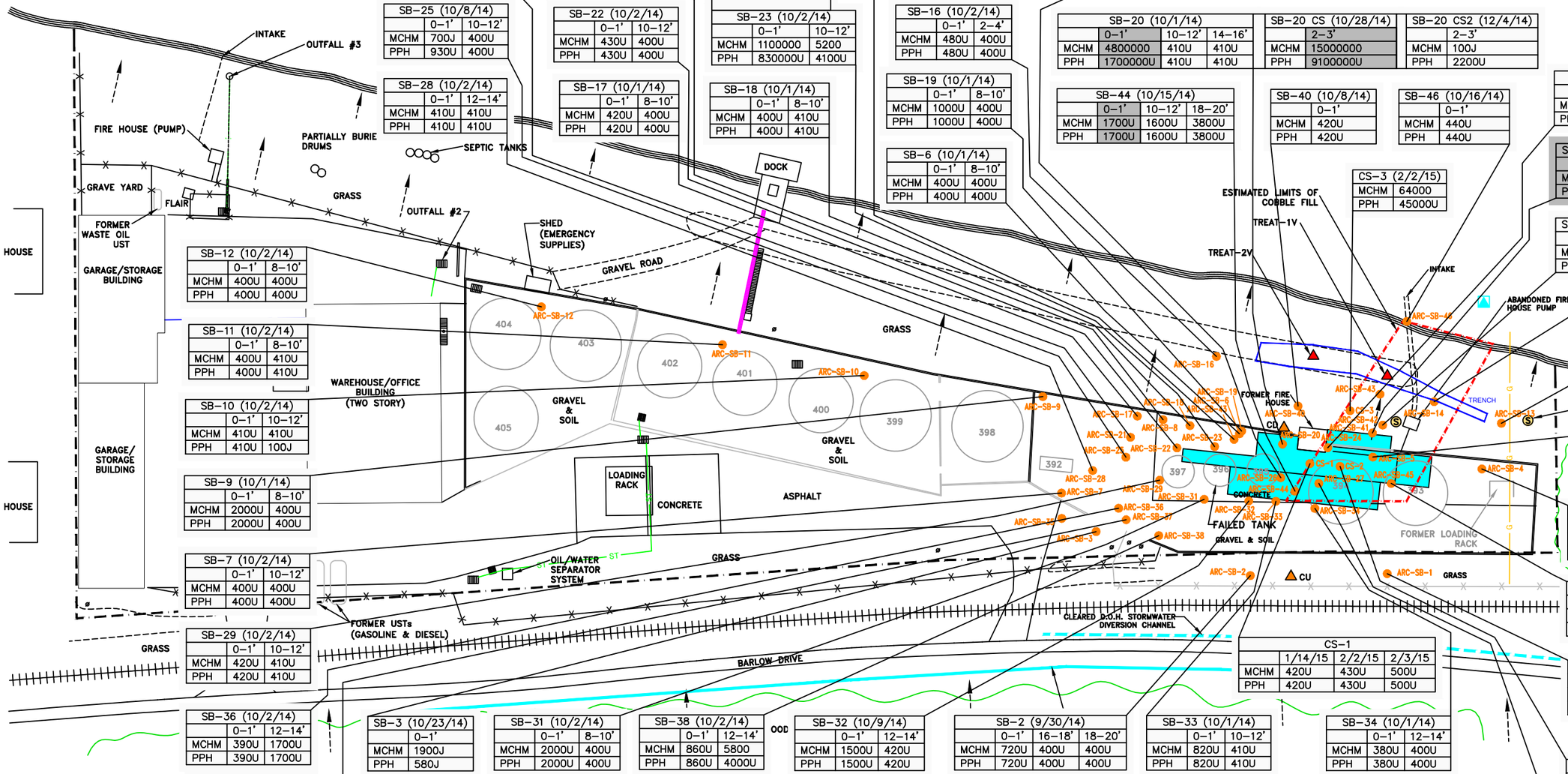
2014 "SS" Soil Sample Locations with MCHM and PPH Results

ARCADIS

FIGURE 3

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

CITY:(Columbus, Oh) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Marzo) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\Columbus-OH\ACTIOH003003 - FREEDOM INDUSTRIES\0001\003\OH3003-1-3-2015-01.dwg LAYOUT: FIG 6A - SS-MW-SW-SED SAMPLE DATA 2014 (2) SAVED: 4/29/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 2:08
PM BY: SMITH, BOB
XREFS:



SB-21 (10/2/14)	0–1'	8–10'
MCHM	400U	410U
PPH	400U	410U

SB-25 (10/8/14)	0–1'	10–12'
MCHM	700J	400U
PPH	930U	400U

SB-28 (10/2/14)	0–1'	12–14'
MCHM	410U	410U
PPH	410U	410U

SB-12 (10/2/14)	0–1'	8–10'
MCHM	400U	400U
PPH	400U	400U

SB-11 (10/2/14)	0–1'	8–10'
MCHM	400U	410U
PPH	400U	410U

SB-10 (10/2/14)	0–1'	10–12'
MCHM	410U	410U
PPH	410U	100J

SB-9 (10/1/14)	0–1'	8–10'
MCHM	2000U	400U
PPH	2000U	400U

SB-7 (10/2/14)	0–1'	10–12'
MCHM	400U	400U
PPH	400U	400U

SB-29 (10/2/14)	0–1'	10–12'
MCHM	420U	410U
PPH	420U	410U

SB-36 (10/2/14)	0–1'	12–14'
MCHM	390U	1700U
PPH	390U	1700U

SB-37 (10/2/14)	0–1'	8–10'
MCHM	400U	420U
PPH	400U	420U

SB-8 (10/1/14)	0–1'	8–10'
MCHM	410U	410U
PPH	410U	410U

SB-22 (10/2/14)	0–1'	10–12'
MCHM	430U	400U
PPH	430U	400U

SB-17 (10/1/14)	0–1'	8–10'
MCHM	420U	400U
PPH	420U	400U

SB-23CS (10/8/14)	0–1'
MCHM	2900
PPH	630J

SB-23 (10/2/14)	0–1'	10–12'
MCHM	1100000	5200
PPH	830000U	4100U

SB-18 (10/1/14)	0–1'	8–10'
MCHM	400U	410U
PPH	400U	410U

SB-43 (10/15/14)	0–1'	6–8'	22–24'
MCHM	490000	20000	1900U
PPH	260000U	660J	1900U

SB-16 (10/2/14)	0–1'	2–4'
MCHM	480U	400U
PPH	480U	400U

SB-19 (10/1/14)	0–1'	8–10'
MCHM	1000U	400U
PPH	1000U	400U

SB-6 (10/1/14)	0–1'	8–10'
MCHM	400U	400U
PPH	400U	400U

SB-26 (10/1/14)	0–1'	8–10'	14–16'
MCHM	800000	3700	400U
PPH	400000U	2700U	400U

SB-26-CS (10/8/14)	0–1'
MCHM	1400000
PPH	1000000U

SB-20 (10/1/14)	0–1'	10–12'	14–16'
MCHM	4800000	410U	410U
PPH	1700000U	410U	410U

SB-20 CS (10/28/14)	2–3'
MCHM	15000000
PPH	9100000U

SB-20 CS2 (12/4/14)	2–3'
MCHM	100J
PPH	2200U

SB-44 (10/15/14)	0–1'	10–12'	18–20'
MCHM	1700U	1600U	3800U
PPH	1700U	1600U	3800U

SB-40 (10/8/14)	0–1'
MCHM	420U
PPH	420U

SB-46 (10/16/14)	0–1'
MCHM	440U
PPH	440U

CS-3 (2/2/15)	
MCHM	64000
PPH	45000U

SB-24 (10/1/14)	0–1'	10–12'	14–16'
MCHM	220000	400U	420U
PPH	100000U	400U	420U

SB-41 (10/9/14)	0–1'
MCHM	420U
PPH	420U

SB-42 (10/9/14)	0–1'
MCHM	1800U
PPH	1800U

SB-14 (10/8/14)	0–1'
MCHM	420U
PPH	420U

SB-13 (10/8/14)	0–1'
MCHM	410U
PPH	410U

SB-5 (9/30/14)	0–1'	12–14'
MCHM	2000U	490U
PPH	2000U	490U

SB-4 (9/30/14)	0–1'	12–14'	22–24'
MCHM	410U	2000U	370U
PPH	410U	2000U	370U

SB-45 (10/16/14)	0–1'	12–14'	14–16'
MCHM	400U	440	370U
PPH	400U	380U	370U

CS-1	1/14/15	2/2/15	2/3/15
MCHM	420U	430U	500U
PPH	420U	430U	500U

SB-1 (9/30/14)	0–1'	16–18'	24–26'
MCHM	380U	420U	440U
PPH	380U	420U	440U

SB-3 (10/23/14)	0–1'
MCHM	1900J
PPH	580J

SB-31 (10/2/14)	0–1'	8–10'
MCHM	2000U	400U
PPH	2000U	400U

SB-38 (10/2/14)	0–1'	12–14'
MCHM	860U	5800
PPH	860U	4000U

SB-32 (10/9/14)	0–1'	16–18'	12–14'
MCHM	1500U	420U	
PPH	1500U	420U	

SB-2 (9/30/14)	0–1'	16–18'	18–20'
MCHM	720U	400U	400U
PPH	720U	400U	400U

SB-33 (10/1/14)	0–1'	10–12'
MCHM	820U	410U
PPH	820U	410U

SB-34 (10/1/14)	0–1'	12–14'
MCHM	380U	400U
PPH	380U	400U

OFF-SITE CULVERT

CS-2	1/14/15	2/2/15
MCHM	2400	400U
PPH	1100U	400U

SB-27 (10/1/14)	0–1'
MCHM	3700U
PPH	3700U

LEGEND

- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- SB DEEP SOIL BORING (38)
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- GRAY SHADING INDICATES SOILS FROM THESE DEPTHS HAS BEEN EXCAVATED
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST STORM SEWER LINE
- G NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

ARC-SB-7 (10/2/14)	SAMPLE IDENTIFICATION (DATE)
0–1'	SAMPLE DEPTH IN FEET
MCHM	4-METHYLCYCOHEXANEMETHANOL
PPH	GLYCOL ETHER
ug/kg	MICROGRAMS PER KILOGRAMS
WV DEP	WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
U	NON DETECT

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

Source: April 2015 Site Investigation Report

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

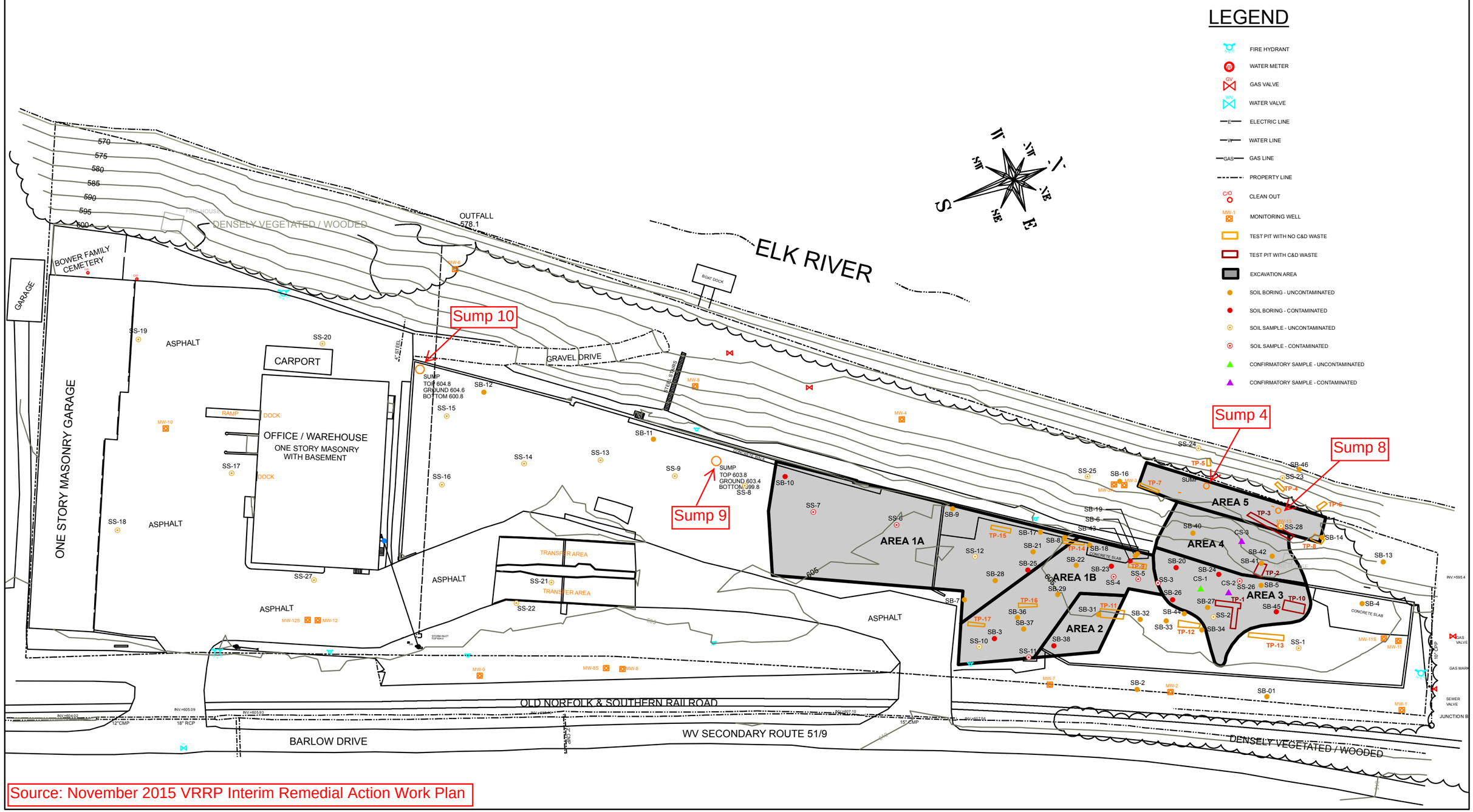
OH003003.0001

2014 "SB" Soil Sample Locations with MCHM and PPH Results

ARCADIS

FIGURE 4

CITY:(Columbus, OH) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Manzo) TM:(Opt) LYR:(On)ON=*;OFF=*REF*
G:\ENVCAD\Columbus-OH\ACTIONH003003 - FREEDOM INDUSTRIES\0001\0003\OH-SD003-1-3-2015-01.dwg LAYOUT: FIG 6B - SB SAMPLE DATA 2014 SAVED: 4/29/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 2:08 PM BY: SMITH, BOB
XREFS:



Source: November 2015 VRRP Interim Remedial Action Work Plan

CORE ENVIRONMENTAL SERVICES, INC.
533 North Jefferson Street
Suite 3
Lewisburg, WV 24901
T: 304-520-4260
F: 304-520-4265
WWW.CORE-ENV.COM

1 inch = 60 feet

0 60 120 Feet

Site Map with Approximate Location of Excavation Areas

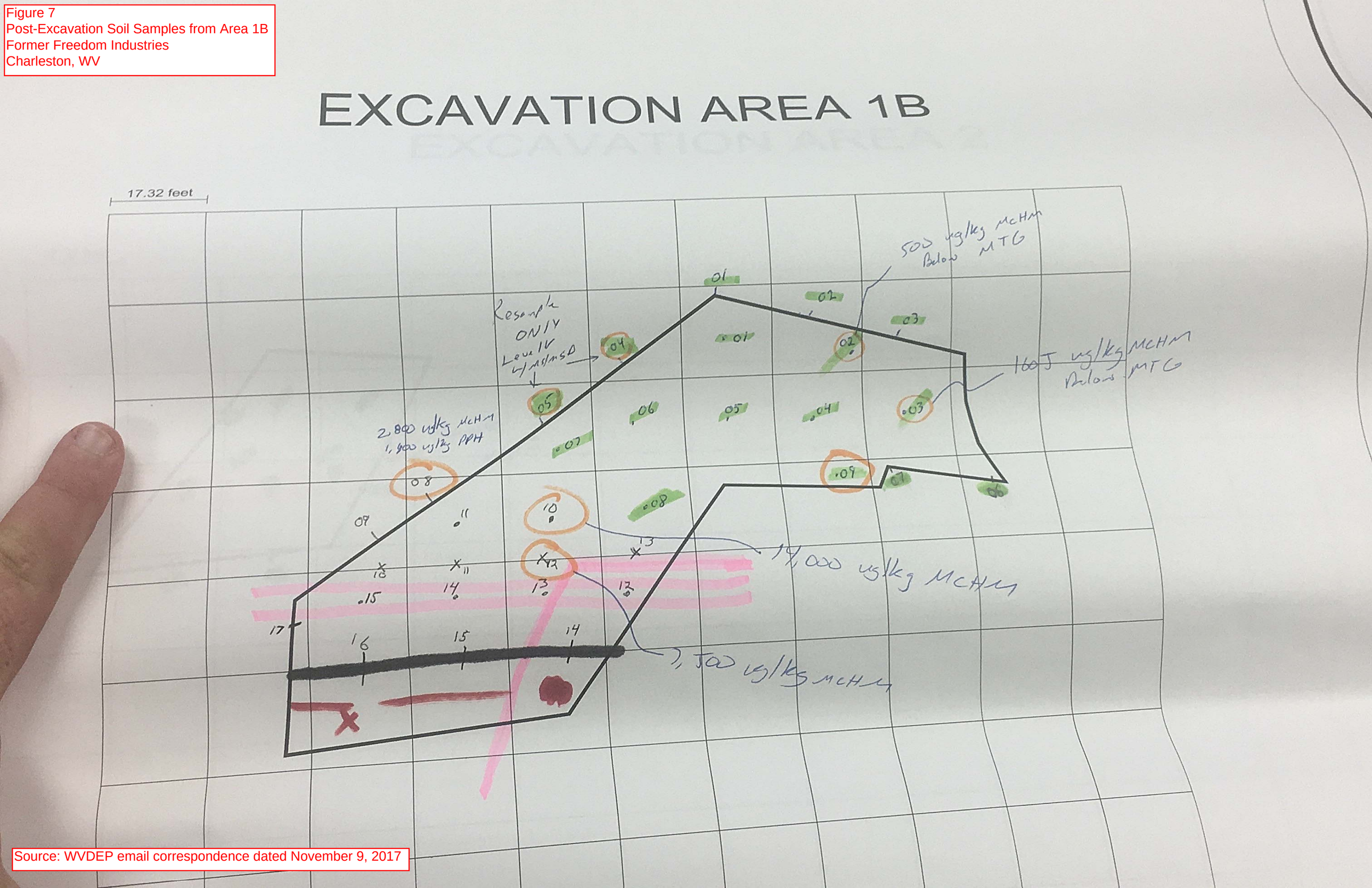
FREEDOM INDUSTRIES - ETOWAH RIVER TERMINAL
CHARLESTON, KANAWHA COUNTY, WEST VIRGINIA

DRAWN BY: DJ	DES.:	PROJECT NUMBER: FRE-2015-364
CHECKED BY:	APPROVED:	FIGURE NUMBER: 5
DATE: 11/5/2015	REVISED:	

Figure 6
Post-Excavation Soil Samples from Area 1A
Former Freedom Industries
Charleston, WV

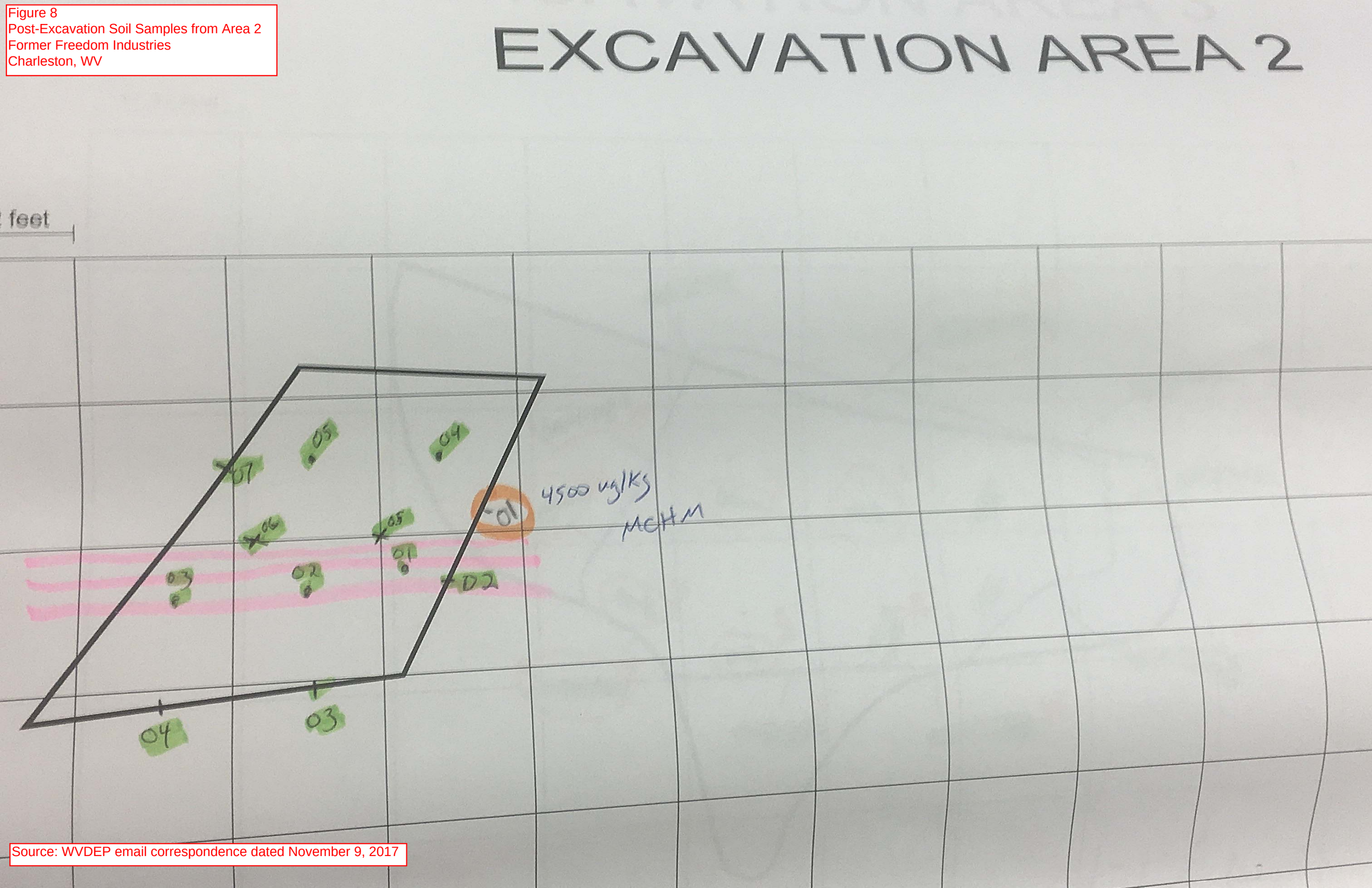
Source: WVDEP email correspondence dated November 9, 2017

Figure 7
Post-Excavation Soil Samples from Area 1B
Former Freedom Industries
Charleston, WV



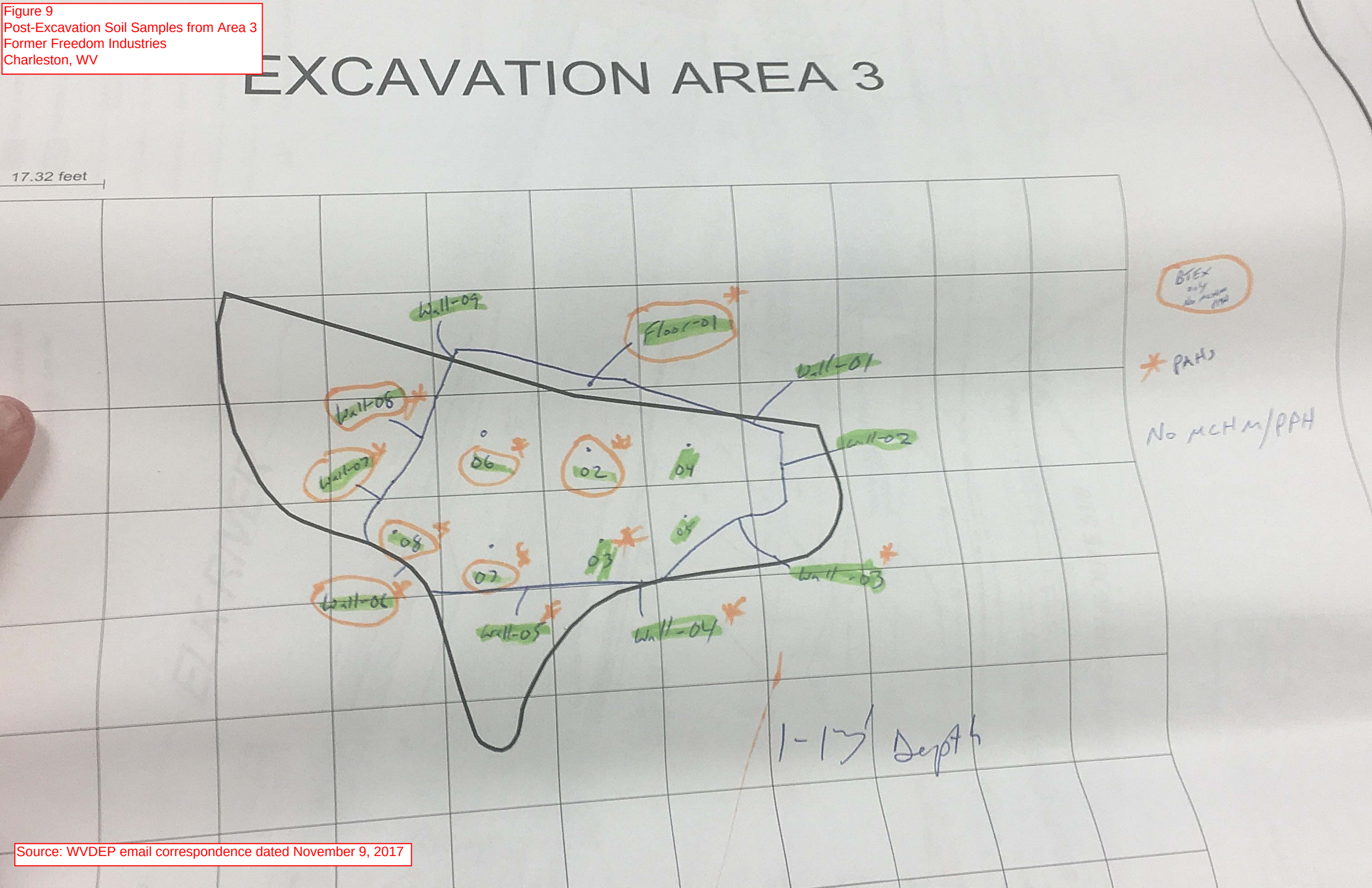
Source: WVDEP email correspondence dated November 9, 2017

Figure 8
Post-Excavation Soil Samples from Area 2
Former Freedom Industries
Charleston, WV



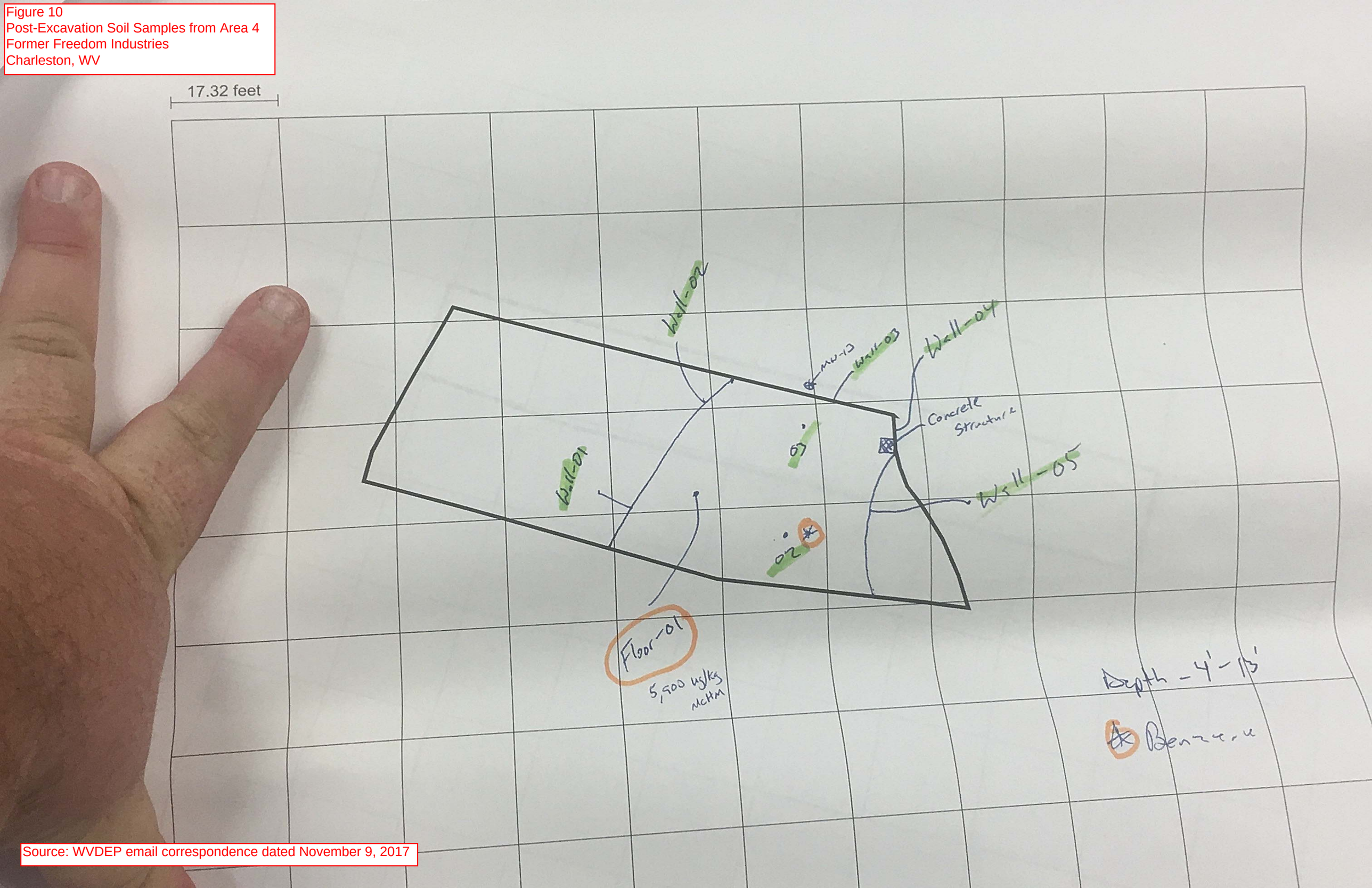
Source: WVDEP email correspondence dated November 9, 2017

Figure 9
Post-Excavation Soil Samples from Area 3
Former Freedom Industries
Charleston, WV

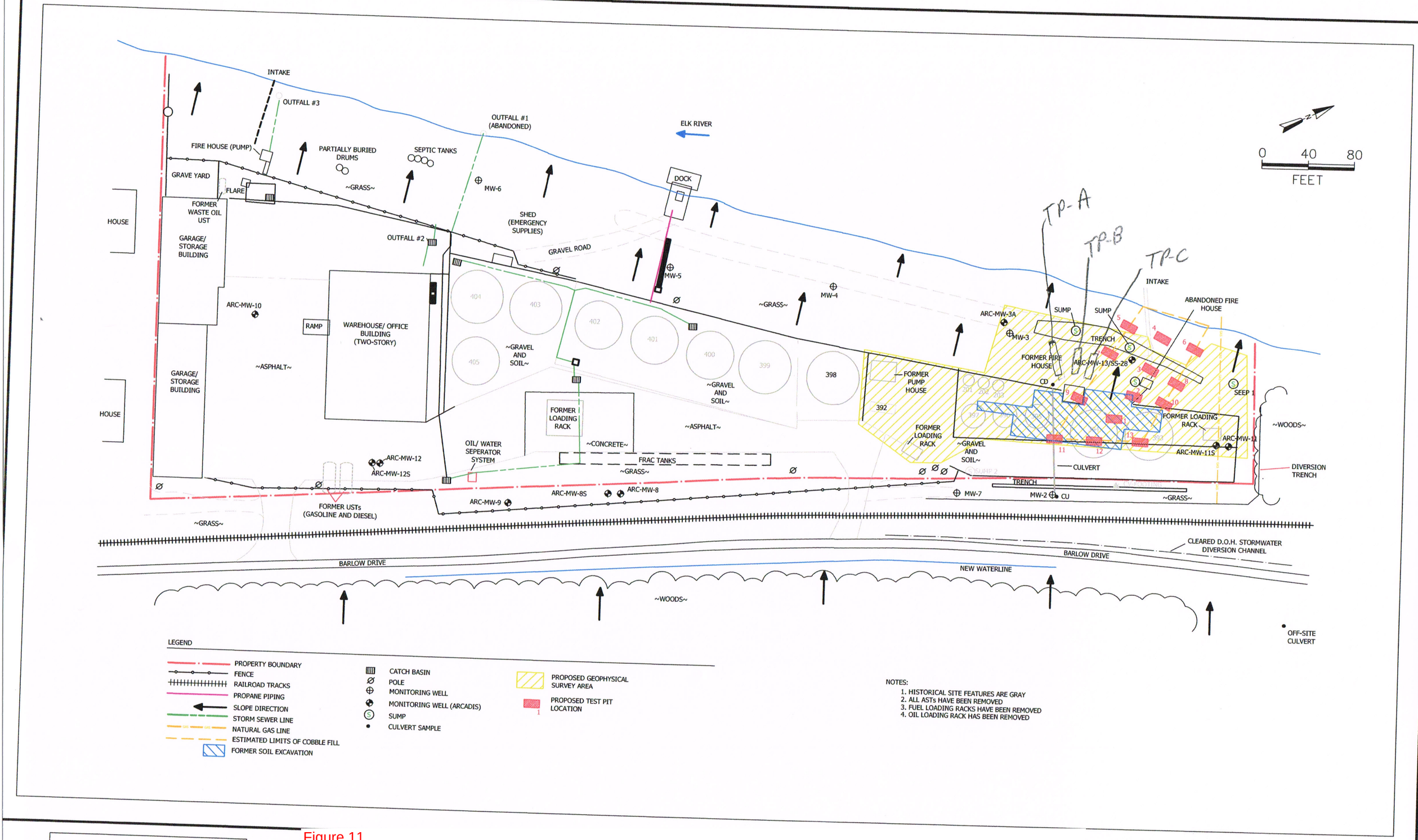


Source: WVDEP email correspondence dated November 9, 2017

Figure 10
Post-Excavation Soil Samples from Area 4
Former Freedom Industries
Charleston, WV



Source: WVDEP email correspondence dated November 9, 2017



CORE ENVIRONMENTAL SERVICES, INC.

Figure 11
Post-Excavation Test Pit Soil Samples from Area 5
Former Freedom Industries
Charleston, WV

Source: August 2015 VRRP Interim Site Assessment Work Plan - Revision No. 1

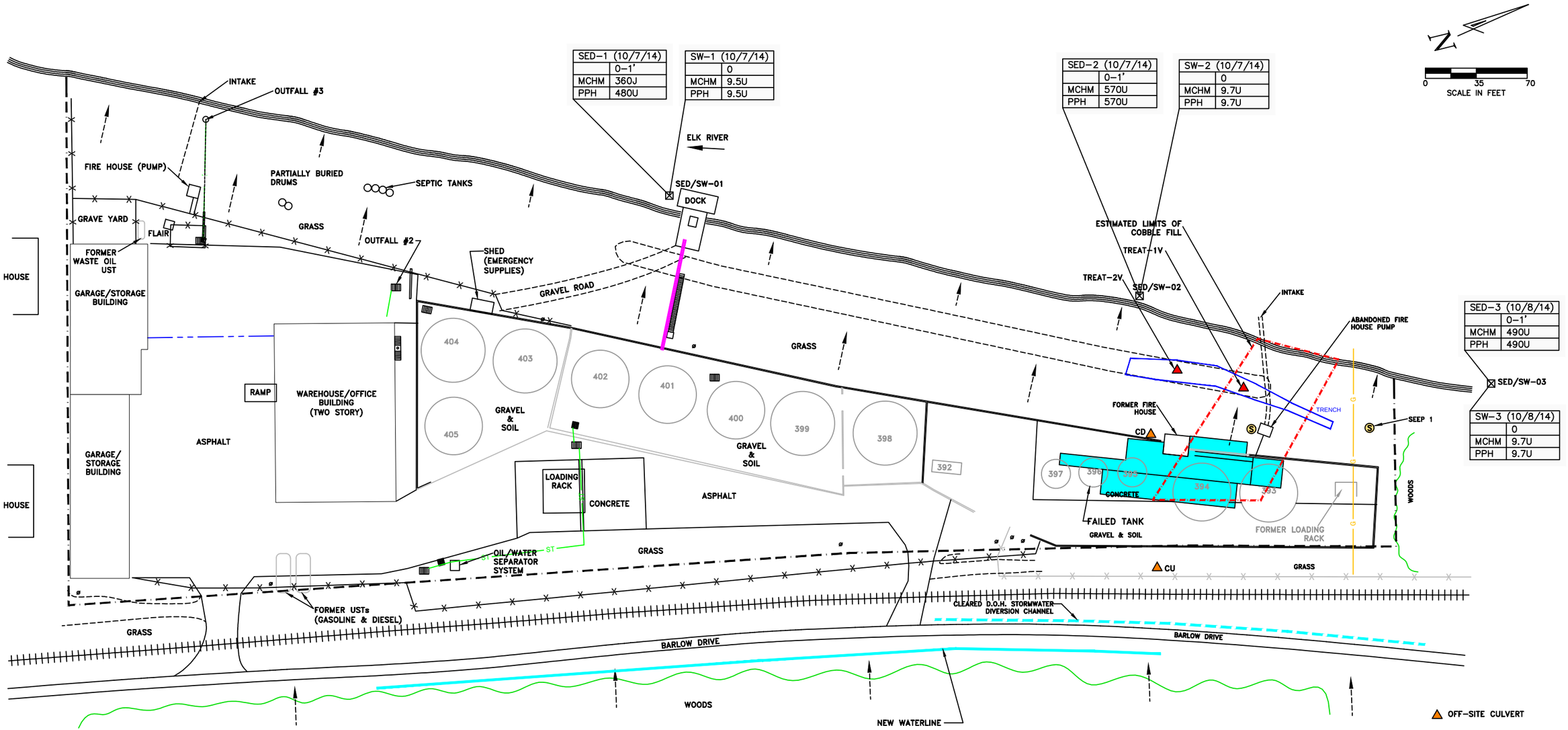
Figure 12
Supplemental Soil and Surface Water Samples Collected 9/8/17
Former Freedom Industries
Charleston, WV

Source: WVDEP email correspondence dated November 9, 2017

Notes:
Sample 1 and 2 are surface water samples
Sample 3 through 8 are soil samples

Figure 13
Supplemental PCB Soil Sample Locations
Former Freedom Industries
Charleston, WV

Source: WVDEP email correspondence dated November 9, 2017



LEGEND

- SEDIMENT AND SURFACE WATER SAMPLE
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- STORM SEWER LINE
- NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

SED–1 (10/6/14)	SAMPLE IDENTIFICATION (DATE)
0–1'	SAMPLE DEPTH IN FEET
MCHM	4–METHYLCYCOHEXANEMETHANOL
PPH	GLYCOL ETHER
ug/kg	MICROGRAMS PER KILOGRAMS
WV DEP	WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
U	NON DETECT

Source: April 2015 Site Investigation Report

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

OH003003.0001

2014 Sediment and Surface Water Sampling Locations with MCHM and PPH Results

ARCADIS

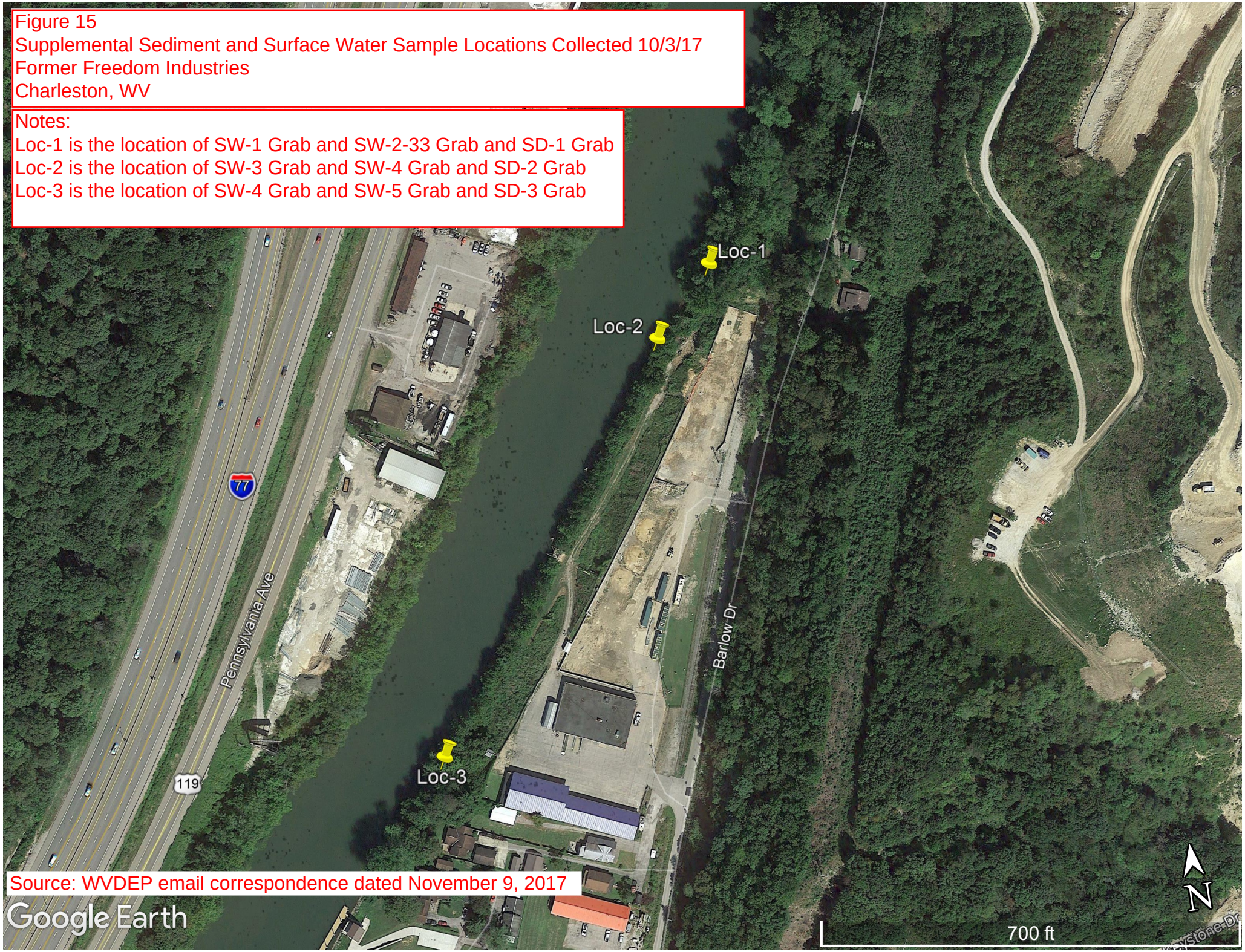
FIGURE 14

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

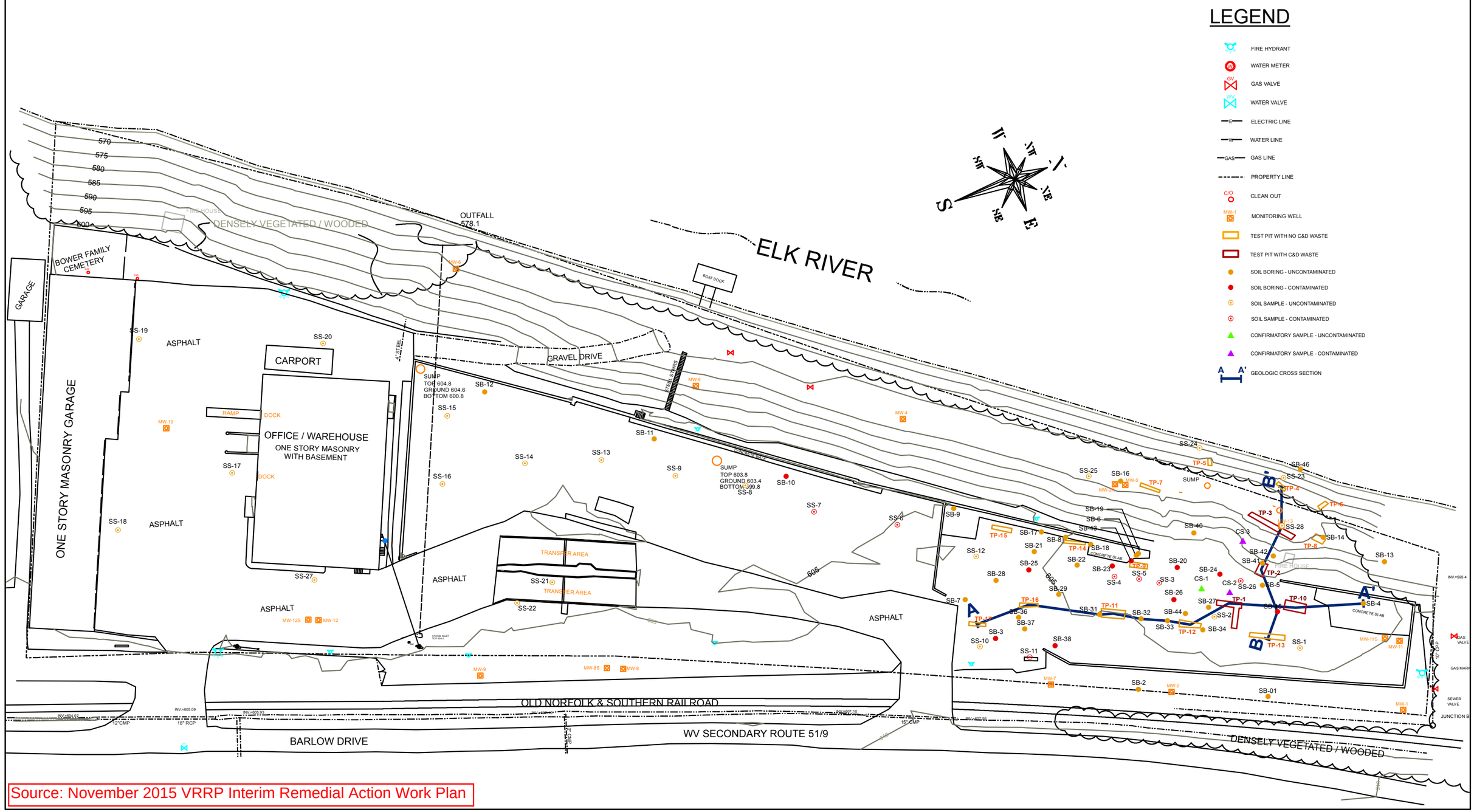
CITY:(Columbus, Oh) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Marzo) TM:(Opt) LYR:(Opt)ON=*;OFF=REF*
G:\ENVCAD\Columbus-OH\ACTIO\H003003 - FREEDOM INDUSTRIES\0001\003\OH3003-1-3-2015-01.dwg LAYOUT: FIG 7 - SW-SED SAMPLE DATA 2014
SAVED: 4/29/2015 2:08 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 2:10 PM BY:
SMITH, BOB
XREFS:

Figure 15
Supplemental Sediment and Surface Water Sample Locations Collected 10/3/17
Former Freedom Industries
Charleston, WV

Notes:
Loc-1 is the location of SW-1 Grab and SW-2-33 Grab and SD-1 Grab
Loc-2 is the location of SW-3 Grab and SW-4 Grab and SD-2 Grab
Loc-3 is the location of SW-4 Grab and SW-5 Grab and SD-3 Grab



Source: WVDEP email correspondence dated November 9, 2017



Source: November 2015 VRRP Interim Remedial Action Work Plan

CORE ENVIRONMENTAL SERVICES, INC.
533 North Jefferson Street
Suite 3
Lewisburg, WV 24901
T: 304-520-4260
F: 304-520-4265
WWW.CORE-ENV.COM

N

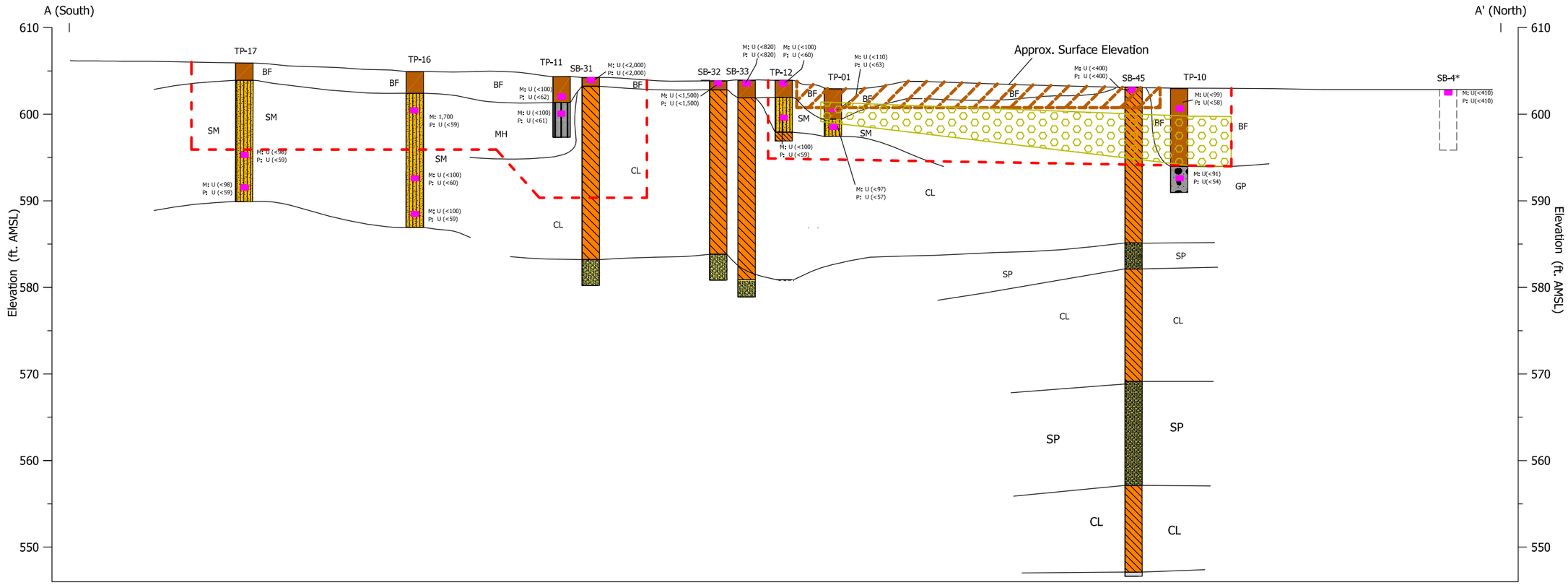
1 inch = 60 feet

0 60 120 Feet

Cross-Section Transect Map

FREEDOM INDUSTRIES - ETOWAH RIVER TERMINAL
CHARLESTON, KANAWHA COUNTY, WEST VIRGINIA

DRAWN BY: DJ	DES.:	PROJECT NUMBER: FRE-2015-364
CHECKED BY:	APPROVED:	
DATE: 11/5/2015	REVISED:	FIGURE NUMBER: 16



- Approximate Extent of C&D Waste

- Soil Sample Location and Result:
M - MCHM Result
P - PPH Result

All sample results reported in ug/kg
J- Laboratory Estimated Value
U- Undetected Value

* Soil boring log not provided in the Arcadis Site Investigation Report

- BF: Backfill
- SM: Silty Sand
- MH: Silt / Clayey Silt
- CL: Gravelly Clay/Sandy Clay/Silty Clay
- GP: Gravel / Sandy Gravel
- SP: Gravelly Sand / Sand
- BR: Bedrock

Approximate Soil Excavation Performed by Arcadis

Approximate Extent of C & D Waste

Proposed Soil and C & D Waste Excavation Extent

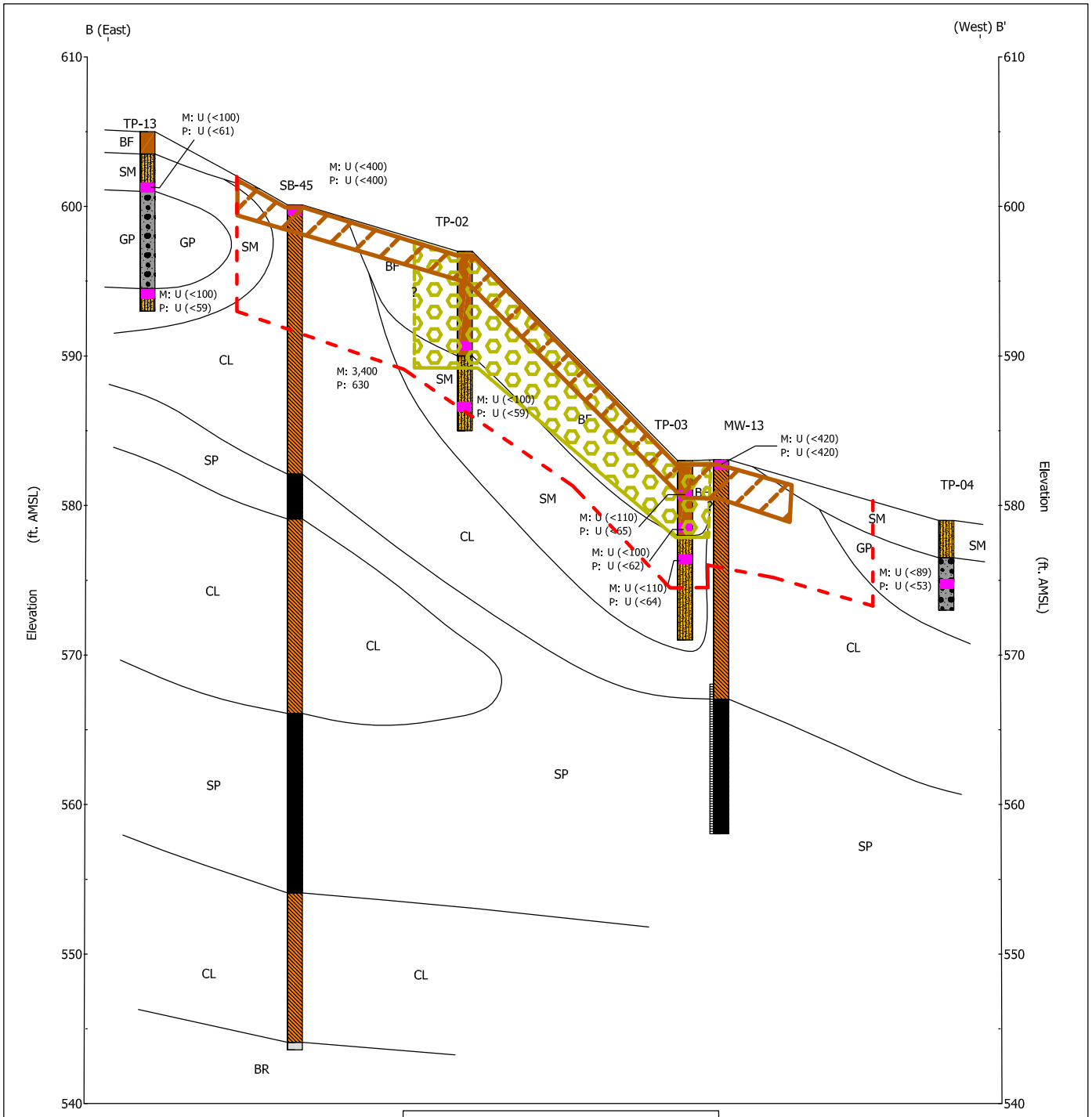
0 12.5 25
FEET
2x Vertical Exaggeration

CORE ENVIRONMENTAL SERVICES, INC.

TITLE:
GEOLOGIC CROSS SECTION A – A'
FREEDOM INDUSTRIES – ETOWAH RIVER TERMINAL
CHARLESTON, KANAWHA COUNTY, WEST VIRGINIA

Source: November 2015 VRRP Interim Remedial Action Work Plan

DWN: NZ	DES.:	PROJECT NO.: FRE–2015–364
CHKD:	APPD:	FIGURE NO.: 17
DATE: 10/9/15	REV.: DF	



- Soil Sample Location and Result:
  M - MCHM Result
  P - PPH Result

All sample results reported in ug/kg
J- Laboratory Estimated Value
U- Undetected Value

- SP: Gravelly Sand / Sand
- SM: Silty Sand
- GP: Gravel / Sandy Gravel
- CL: Gravelly Clay/Sandy Clay/Silty Clay
- BR: Bedrock
- BF: Back Fill

Approximate Soil Excavation Performed by Arcadis

Approximate Extent of C & D Waste

Proposed Soil and C & D Waste Excavation Extent

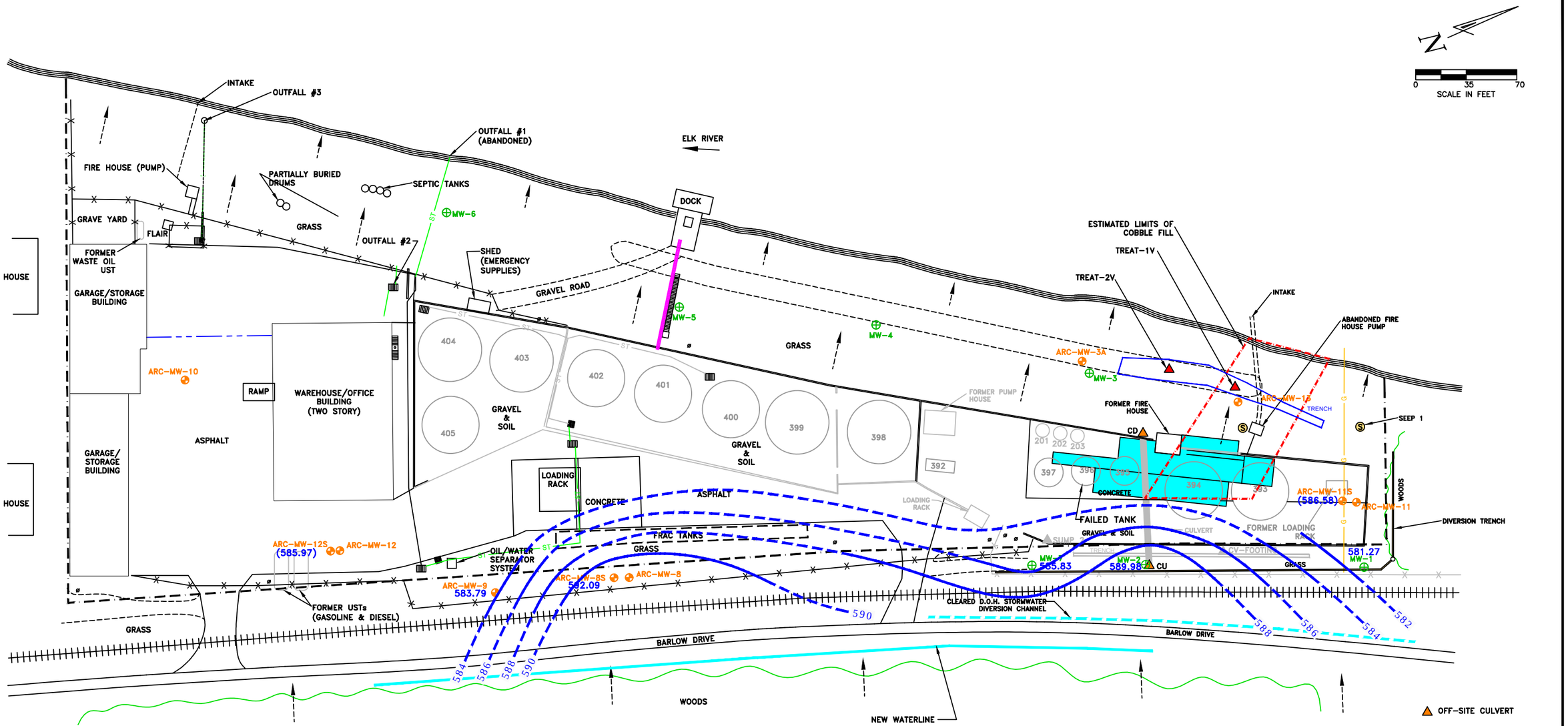
0 12.5 25
FEET
Vertical Exaggeration 2X

Source: November 2015 VRRP Interim Remedial Action Work Plan

CORE ENVIRONMENTAL SERVICES, INC.

TITLE:
GEOLOGIC CROSS SECTION B – B'
FREEDOM INDUSTRIES
ETOWHA RIVER TERMINAL
CHARLESTON, KANAWHA COUNTY, WEST VIRGINIA

DWN: DF	DES.:	PROJECT NO.: FRE-2015-364
CHKD:	APPD:	FIGURE NO.: 18
DATE: 10/19/15	REV.:	



LEGEND

- EXISTING WELL
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- MW — MONITORING WELL (ARCADIS)
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- 581.27 — GROUNDWATER ELEVATION
- 582 — GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- ( ) — NOT USED FOR CONTOURING
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST — STORM SEWER LINE
- G — NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

NOTES:
1. ALL ASTs HAVE BEEN REMOVED.
2. FLAIR AND PIPING REMOVED.
3. FUEL LOCADING RACK REMOVED.
4. OIL LOADING RACK REMOVED.

Source: April 2015 Site Investigation Report

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

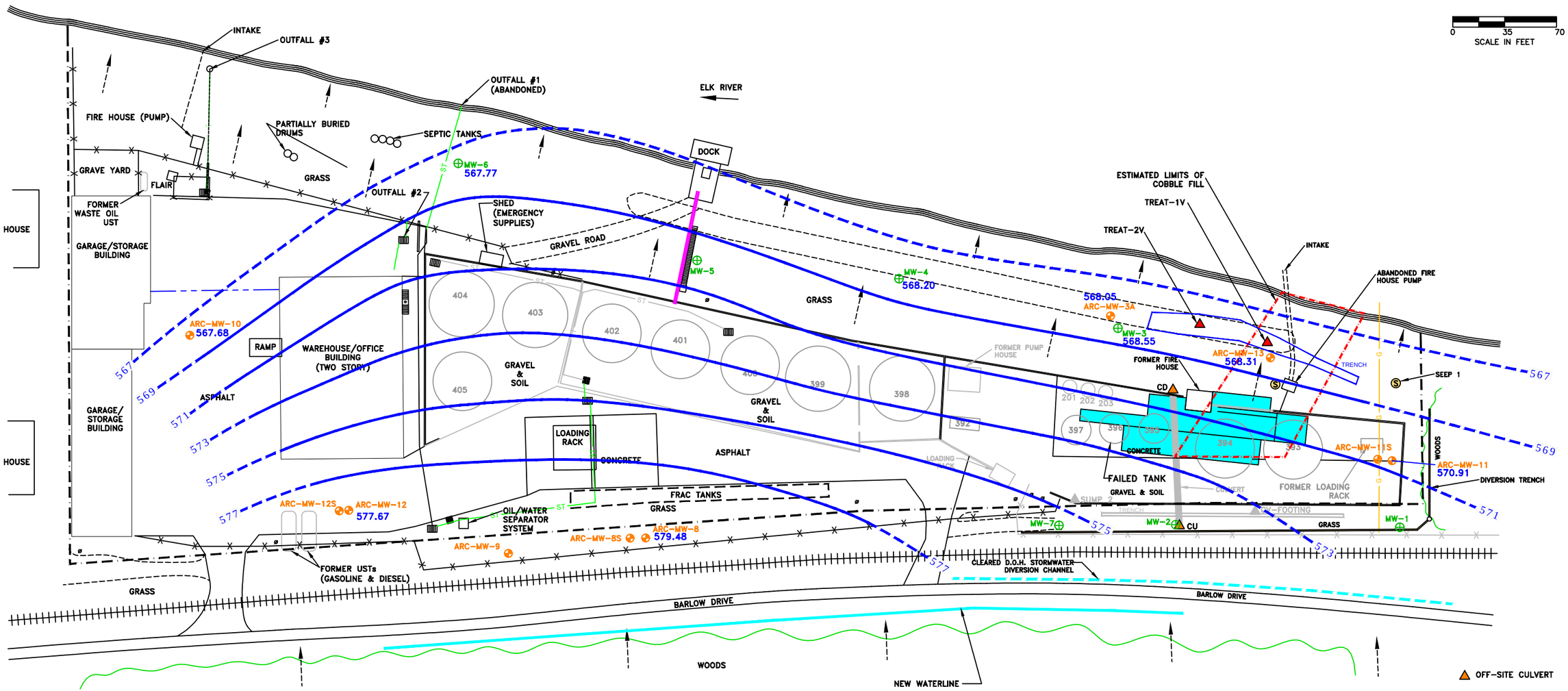
OH003003.0001

Potentiometric Surface Map
Shallow Aquifer - December 1-4, 2014

ARCADIS

FIGURE
19

CITY:(Columbus, OH) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Manzo) TM:(Opt) LYR:(Off)ON=*;OFF=*REF*
G:\IEV\CAD\Columbus-OH\ACTIONS\003 - FREEDOM INDUSTRIES\001\003\OH3003-1-3-2015-01.dwg LAYOUT: FIG 4A GW ELEV 120014 SHAL SAVED: 4/29/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 1:59 PM BY: SMITH, B2B
XREFS:



LEGEND

- EXISTING WELL
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- MW MONITORING WELL (ARCADIS)
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- 567.89 GROUNDWATER ELEVATION
- 582 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST STORM SEWER LINE
- G NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

NOTES:
1. ALL ASTs HAVE BEEN REMOVED.
2. FLAIR AND PIPING REMOVED.
3. FUEL LOCADING RACK REMOVED.
4. OIL LOADING RACK REMOVED.

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

OH003003.0001

Potentiometric Surface Map
Deep Aquifer December 1-4, 2014

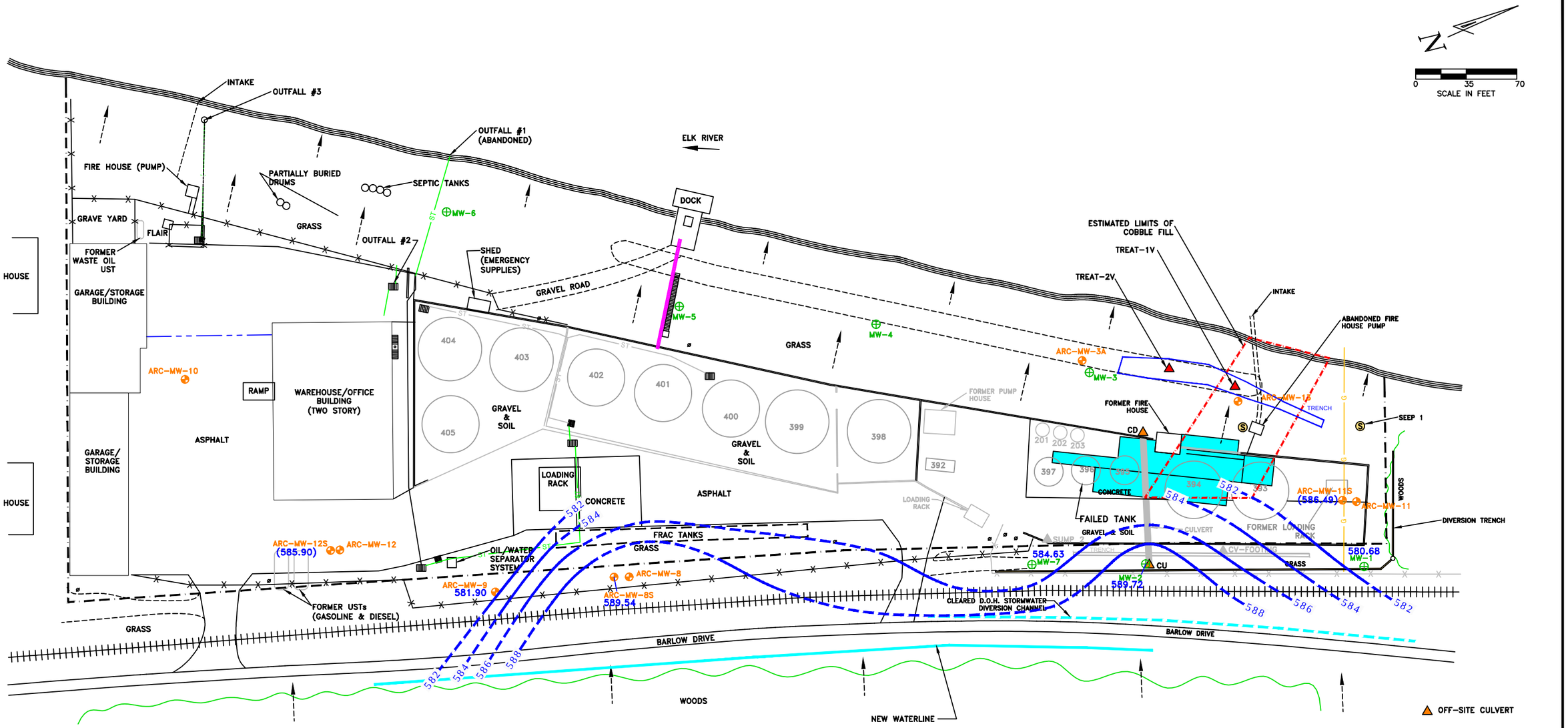
ARCADIS

FIGURE
20

Source: April 2015 Site Investigation Report

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

CITY:(Columbus, Oh) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Marra) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\Columbus-OH\ACTIONS\003003 - FREEDOM INDUSTRIES\001\003\OH003-1-3-2015-01.dwg LAYOUT: FIG 4B GW ELEV 120014 DEEP SAVED: 4/29/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 2:00 PM BY: SMITH, BOB
XREFS:



LEGEND

- EXISTING WELL
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- MW MONITORING WELL (ARCADIS)
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- 581.90 GROUNDWATER ELEVATION
- 582 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- ( ) NOT USED FOR CONTOURING
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST STORM SEWER LINE
- G NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

NOTES:
1. ALL ASTs HAVE BEEN REMOVED.
2. FLAIR AND PIPING REMOVED.
3. FUEL LOCADING RACK REMOVED.
4. OIL LOADING RACK REMOVED.

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

OH003003.0001

Potentiometric Surface Map
Shallow Aquifer January 12-14, 2015

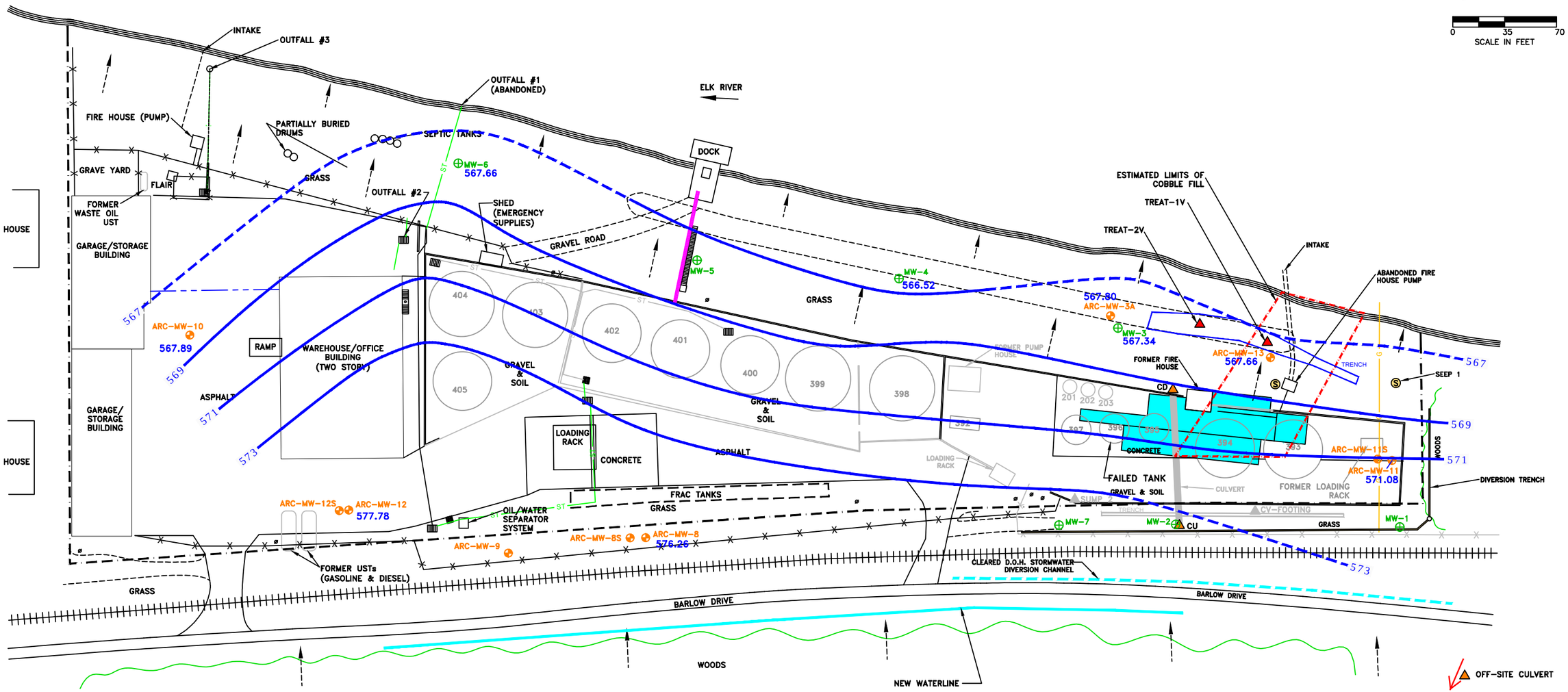
ARCADIS

FIGURE
21

Source: April 2015 Site Investigation Report

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

CITY:(Columbus, Oh) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Marra) TM:(Opt) LYR:(On)ON=*;OFF=*REF*
G:\ENVCAD\Columbus-OH\ACTIVE\003003 - FREEDOM INDUSTRIES\00010003\OH003-1-3-2015-01.dwg LAYOUT: FIG 5A GW ELEV 010015 SHAL SAVED: 4/29/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 2:00 PM BY: SMITH, BOB
XREFS:



LEGEND

- EXISTING WELL
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- MW — MONITORING WELL (ARCADIS)
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- 567.89 — GROUNDWATER ELEVATION
- 582 — GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST — STORM SEWER LINE
- G — NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

NOTES:
1. ALL ASTs HAVE BEEN REMOVED.
2. FLAIR AND PIPING REMOVED.
3. FUEL LOCADING RACK REMOVED.
4. OIL LOADING RACK REMOVED.

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

OH003003.0001

Potentiometric Surface Map
Deep Aquifer January 12-14, 2015

ARCADIS

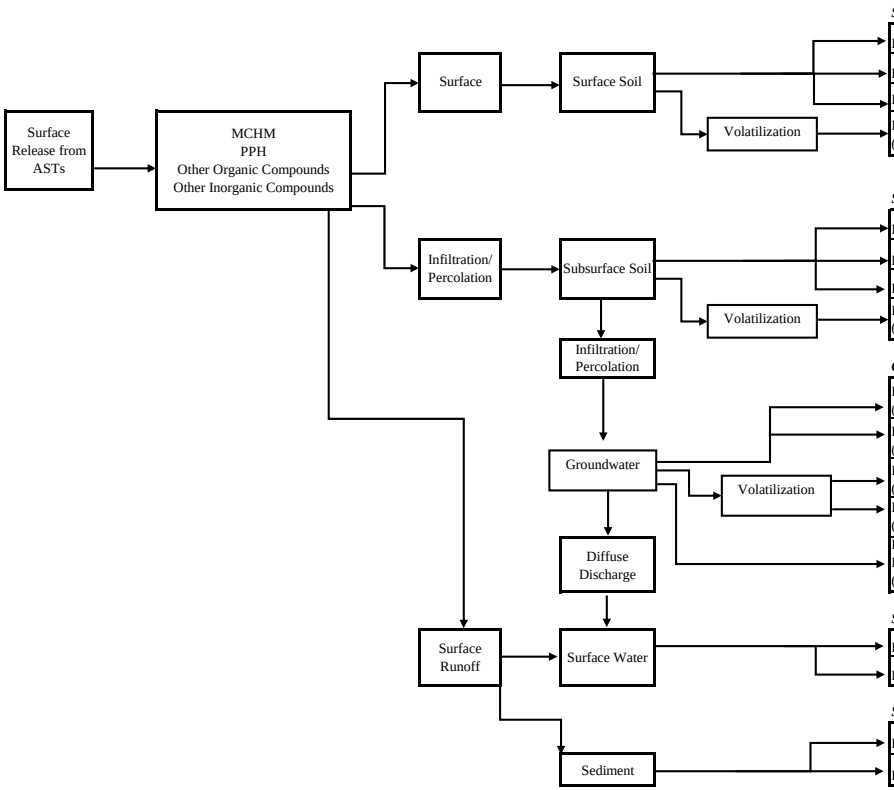
FIGURE
22

Source: April 2015 Site Investigation Report

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

CITY:(Columbus, OH) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Manzo) TM:(Opt) LYR:(Off)On=*;OFF=REF*
G:\ENVCAD\Columbus-OH\ACTIVE\003003 - FREEDOM INDUSTRIES\0001\003\OH003-1-3-2015-01.dwg LAYOUT: FIG 5B GW ELEV 010015 DEEP SAVED: 4/29/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 2:01 PM BY: SMITH, BOB
XREFS:

Figure 23
Conceptual Site Model for Potential Human Health and Ecological Receptors
Risk Evaluation Report
Former Freedom Industries
Charleston, WV



Exposure Pathway	Receptors: On-Site, Current/Future: Trespasser	On-Site, Future: Facility Worker	On-Site, Future: Indoor Worker - Curent Building	On-Site, Future: Indoor Worker - Future Building	On-Site, Future: Construction and Utility Worker	Off-Site, Current/Future: Recreational User	Off-Site, Current/Future: Aquatic Ecological Receptors
Surface Soil:							
Incidental Ingestion	NR	NR	---	---	NR	---	---
Dermal Contact	NR	NR	---	---	NR	---	---
Inhalation of Particulates	NR	NR	---	---	NR	---	---
Inhalation of Volatiles (Outdoor/Trench Air)	NR	NR	---	---	NR	---	---
Subsurface Soil:							
Incidental Ingestion	---	---	---	---	NR	---	---
Dermal Contact	---	---	---	---	NR	---	---
Inhalation of Particulates	---	---	---	---	NR	---	---
Inhalation of Volatiles (Outdoor/Trench Air)	NR	NR	---	---	NR	---	---
Groundwater:							
Incidental Ingestion (Intrusive Activities)	---	---	---	---	NR	---	---
Dermal Contact (Intrusive Activities)	---	---	---	---	NR	---	---
Inhalation of Volatiles (Outdoor/Trench Air)	DM [1]	DM [1]	---	---	DM [1]	---	---
Inhalation of Volatiles (Indoor Air)	---	---	NR	NR	---	---	---
Ingestion, Dermal Contact, and Inhalation of Volatiles (Potable Use)	NR	NR	NR	NR	---	---	---
Surface Water:							
Incidental Ingestion	---	---	---	---	---	NR	NR
Dermal Contact	---	---	---	---	---	NR	NR
Sediment:							
Incidental Ingestion	---	---	---	---	---	NR	NR
Dermal Contact	---	---	---	---	---	NR	NR

Notes:
Quant - exposure pathway is complete and was retained for quantitative risk analysis for that medium for the receptor.
Qual - exposure pathway was retained qualitatively for that medium for the receptor because the exposure pathway is potentially complete, however the pathway will be made incomplete through an engineering control and/or institutional control.
NR - indicates that the exposure pathway is not retained for that medium for the receptor.
DM - exposure pathway is potentially complete, but was considered de minimis and, therefore, not quantiatively evaluated.
"---" - indicates that the exposure pathway is not applicable to the receptor.
[1] This exposure pathway for this media and receptor is a potentially complete exposure pathway. However, based on the average depth to groundwater (approximately 22 ft-bgs), there is an adequent distance between groundwater and the receptor to allow attenuation of vapors that may migrate from groundwater to outdoor air or trench air. Therefore, this exposure pathway was considered a de minimis exposure pathway and was not quantitatively evaluated.

Attachment 1

Correspondence with WVDEP

Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Thursday, November 09, 2017 10:04 AM
To: Lisa Poppelreiter
Cc: Long, David W
Subject: RE: WD DEP17*07A-21 - Former Freedom Industries
Attachments: Conf_Sampl_Locs_4.pdf; Conf_Sampl_Locs_3.pdf; Conf_Sampl_Locs_2.pdf; Conf_Sampl_Locs_1B.pdf; Conf_Sampl_Locs_1A.pdf; Post-Remed_Stormwater-SW-GW_Updated2017DeMin_FINAL.xls; Post-Remed_Soil-Sed_Updated2017DeMin_FINAL.xls; Freedom Surface Water-Sediment Sample Location Map.pdf; Freedom PCB Sample Location Map.pdf; Feedom_Add_Soil_Samp_Locs.pdf

Lisa –

We are working on answers to each question, and should have those later today. In the meantime, I have attached the additional post-remediation analytical data that we discussed on the conference call earlier today (e.g. surface water and sediment analytical results, PCB soil analytical results, and additional MCHM-PPH soil/SW results). Also attached are location figures for each data set.

Thanks,
John

John M. Meeks, PG, LRS
Project Manager
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

From: Lisa Poppelreiter [mailto:lisa@themahfoodgroup.com]
Sent: Wednesday, November 08, 2017 3:20 PM
To: Cooper, Travis L <Travis.L.Cooper@wv.gov>; jmahfood@themahfoodgroup.com
Cc: Meeks, John M <John.M.Meeks@wv.gov>; Korbini, Casey E <Casey.E.Korbini@wv.gov>; Guynn, Catherine N <Catherine.N.Guynn@wv.gov>; Long, David W <David.W.Long@wv.gov>; Vickie Mahfood <vmahfood@themahfoodgroup.com>
Subject: RE: WD DEP17*07A-21 - Former Freedom Industries

Travis,

We had a conference call with John Meeks, Dave Long, and Casey Korbini earlier today. They had asked us to send them a list of questions related to our risk evaluation for the Former Freedom Industries Site. Below is our list. Some are questions and some are preliminary ideas and assumptions.

1. If available, please provide a figure that shows the final excavation limits and final sample locations after implementation of the Nov 2015 Interim Remedial Action Work Plan. If a final figure is not available, we will use Figure 4 from the Nov 2015 Interim Remedial Action Work Plan. However, after reviewing the analytical data in the Excel tables that were provided, we cannot find those samples on the figure.
2. Please provide the additional analytical data that we discussed on the conference call earlier today (e.g. surface water and sediment analytical results, PCB soil analytical results, any additional groundwater results, etc.).
3. Is there any data from the previous April 2015 Site Investigation Report or Oct 2015 Interim Site Assessment Report that is pre-remediation and was not mitigated and may still usable?
4. We understand the primary constituents of potential concern are MCHM and PPH. To clarify what we discussed this morning, should our risk evaluation include the additional parameters that were analyzed (e.g. alcohols,

BTEX, PAHs, lead) in the various media? If so, we will compare those COPCs to applicable WV De Minimis standards. If WV De Minimis standards are not available, then we may use USEPA RSLs. If WV De Minimis standards and USEPA RSLs are not available, then no standard will be used for comparison.

5. Are the seeps still present at the site (as identified in the figures from the April 2015 Site Investigation Report)?
6. Can you please supply us with the current LUC so we may see what the current activity and use limitations are on the property?
7. Based on our call earlier, we understand the post-remediation soil samples collected in 2015 and 2016 were shallow and deep soil samples that are now in the subsurface zone (i.e. under soil cover and cap). Please confirm.
8. It appears that the soil samples identified in the Excel data tables do not reflect the sample locations shown in Figure 4 of the Nov 2015 IRA Work Plan. For example, the Excel data table lists 65 soil samples for Area 1A, however Figure 4 of the IRA WP only shows 3 borings within Area 1A.
9. Looking at the Excel data table provided, it appears that there were not any post-remediation soil samples collected in Area 5. However, there were soil analytical results provided for 3 test pits (i.e. TP-A, TP-B, and TP-C). Are these test pits located in Area 5? In addition, were there any other soil samples collected in Area 5?
10. It remains unclear on how the post-remediation sump water data (Sump-4, Sump-8, Sump-9, and Sump-10) should be evaluated. Based on our call earlier today, it was stated that these sump locations are no longer accessible (i.e. covered over) and, therefore, could be rendered "not an issue" by means of pathway elimination (e.g. sumps will be remained covered by a cap). However, are these sumps connected to a discharge point that could be accessible by either a human or ecological receptor?
11. If the sediment and surface water samples were also analyzed for COPCs other than MCHM and PPH (e.g. analyzed for BTEX, PAHs, etc.), then these COPCs will be compared to available surface water quality criteria from WV and USEPA.
12. As we discussed on the call earlier, TMG will assume that the data validation will result in data that is acceptable for use in a risk evaluation.
13. Has WVDEP previously considered evaluating surface water due to exceedances of WV water quality criteria in groundwater monitoring wells closest to the river (e.g. MW-6)? For example, has diffuse groundwater discharge to surface water been evaluated previously? If this was considered previously and the results were favorable, then we can use those results in our risk evaluation. If it was not considered previously, there may be a need to perform groundwater to surface water modeling. It is our understanding that Pete Costello typically conducts groundwater fate and transport modeling and, therefore, our cost estimate does not reflect TMG conducting this modeling.
14. There are certain features in the Site Investigation Report figures (i.e. labeled as Outfall 2 and Outfall 3) that do not show up in the Nov 2015 IRA Work Plan figures. Were these outfall features covered over during the remediation activities?
15. As part of our risk evaluation, we will perform a local potable use evaluation (e.g. database search). However, has this been done previously either by the WVDEP or other previous consultants?

This is a start, but we may have more questions as we receive further information from you and perform additional review of the files in further detail. The estimated cost for this project is **$8,500**.

Thanks,

Lisa

From: Cooper, Travis L [mailto:Travis.L.Cooper@wv.gov]
Sent: Friday, November 03, 2017 3:58 PM
To: Lisa Smith (lisa@themahfoodgroup.com) <lisa@themahfoodgroup.com>; 'jmahfood@themahfoodgroup.com' <jmahfood@themahfoodgroup.com>
Cc: Meeks, John M <John.M.Meeks@wv.gov>; Korbini, Casey E <Casey.E.Korbini@wv.gov>; Guynn, Catherine N <Catherine.N.Guynn@wv.gov>

Subject: WD DEP17*07A-21
Importance: High

John and Lisa,

Attached you will find a work directive regarding the Former Freedom Industries site. If there is no conflict of interest, please have a cost estimate and work plan to me by November 10, 2017. I will upload the documents to be reviewed to your cloud drive on Monday. The project manager for this site is John Meeks. If you have any questions, please let one of us know.

Thanks,

Travis Cooper
Contract Specialist
Department of Environmental Protection
DLR/OER
601 57th St. SE
Charleston, WV 25304
304-926-0499 ext. 1117
Fax: 304-926-0457

Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Thursday, November 09, 2017 4:12 PM
To: Lisa Poppelreiter
Cc: Long, David W
Subject: RE: WD DEP17*07A-21 - Former Freedom Industries
Attachments: COCs - TestAmerica.pdf

Lisa –

Dave and I continue to work on the remaining questions, but we will be off work tomorrow for the Veteran's Day holiday. Before I leave today, I wanted to supply you with information regarding your question 3:

3. Is there any data from the previous April 2015 Site Investigation Report or Oct 2015 Interim Site Assessment Report that is pre-remediation and was not mitigated and may still be usable?

Yes. Arcadis completed a significant amount of investigation that went into the April 2015 Site Investigation Report (Arcadis Site Investigation Report - Part 1 of 6, which was previously uploaded to your cloud site). In selecting the data to be validated for the risk assessment, Core previously assembled Chain of Custody forms from the Arcadis investigation into one pdf COC's – TestAmerica (attached). Samples from areas that were excavated have a line drawn through them or an X next to the sample. It should be easy to tell which samples are still useable. Sample numbers correspond directly to the sample results in Tables 3A, 3B and 3C of the Arcadis April 2015 Site Investigation Report.

The October 2015 Interim Site Assessment Report completed by Core Environmental consisted of a series of Test Pit Excavations and associated soil sampling. Figure 4 of the Core Interim Remedial Action Work Plan identifies the test pit locations along with the areas to be excavated. Data from test pit locations TP-4, 5 & 6 (located on the final slope to the river, below the collection trench) and locations TP-12 and TP-13 (used to identify the eastern limits of excavation area 3) may be used in the risk assessment. This data may be found in Tables 1A, 1B & 1C of the Core October 2015 Interim Site Assessment Report.

Thanks,
John

John M. Meeks, PG, LRS
Project Manager
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

From: Lisa Poppelreiter [mailto:lisa@themahfoodgroup.com]
Sent: Wednesday, November 08, 2017 3:20 PM
To: Cooper, Travis L <Travis.L.Cooper@wv.gov>; jmahfood@themahfoodgroup.com
Cc: Meeks, John M <John.M.Meeks@wv.gov>; Korbini, Casey E <Casey.E.Korbini@wv.gov>; Guynn, Catherine N <Catherine.N.Guynn@wv.gov>; Long, David W <David.W.Long@wv.gov>; Vickie Mahfood <vmahfood@themahfoodgroup.com>
Subject: RE: WD DEP17*07A-21 - Former Freedom Industries

Travis,

We had a conference call with John Meeks, Dave Long, and Casey Korbini earlier today. They had asked us to send them a list of questions related to our risk evaluation for the Former Freedom Industries Site. Below is our list. Some are questions and some are preliminary ideas and assumptions.

1. If available, please provide a figure that shows the final excavation limits and final sample locations after implementation of the Nov 2015 Interim Remedial Action Work Plan. If a final figure is not available, we will use Figure 4 from the Nov 2015 Interim Remedial Action Work Plan. However, after reviewing the analytical data in the Excel tables that were provided, we cannot find those samples on the figure.
2. Please provide the additional analytical data that we discussed on the conference call earlier today (e.g. surface water and sediment analytical results, PCB soil analytical results, any additional groundwater results, etc.).
3. Is there any data from the previous April 2015 Site Investigation Report or Oct 2015 Interim Site Assessment Report that is pre-remediation and was not mitigated and may still usable?
4. We understand the primary constituents of potential concern are MCHM and PPH. To clarify what we discussed this morning, should our risk evaluation include the additional parameters that were analyzed (e.g. alcohols, BTEX, PAHs, lead) in the various media? If so, we will compare those COPCs to applicable WV De Minimis standards. If WV De Minimis standards are not available, then we may use USEPA RSLs. If WV De Minimis standards and USEPA RSLs are not available, then no standard will be used for comparison.
5. Are the seeps still present at the site (as identified in the figures from the April 2015 Site Investigation Report)?
6. Can you please supply us with the current LUC so we may see what the current activity and use limitations are on the property?
7. Based on our call earlier, we understand the post-remediation soil samples collected in 2015 and 2016 were shallow and deep soil samples that are now in the subsurface zone (i.e. under soil cover and cap). Please confirm.
8. It appears that the soil samples identified in the Excel data tables do not reflect the sample locations shown in Figure 4 of the Nov 2015 IRA Work Plan. For example, the Excel data table lists 65 soil samples for Area 1A, however Figure 4 of the IRA WP only shows 3 borings within Area 1A.
9. Looking at the Excel data table provided, it appears that there were not any post-remediation soil samples collected in Area 5. However, there were soil analytical results provided for 3 test pits (i.e. TP-A, TP-B, and TP-C). Are these test pits located in Area 5? In addition, were there any other soil samples collected in Area 5?
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11. If the sediment and surface water samples were also analyzed for COPCs other than MCHM and PPH (e.g. analyzed for BTEX, PAHs, etc.), then these COPCs will be compared to available surface water quality criteria from WV and USEPA.
12. As we discussed on the call earlier, TMG will assume that the data validation will result in data that is acceptable for use in a risk evaluation.
13. Has WVDEP previously considered evaluating surface water due to exceedances of WV water quality criteria in groundwater monitoring wells closest to the river (e.g. MW-6)? For example, has diffuse groundwater discharge to surface water been evaluated previously? If this was considered previously and the results were favorable, then we can use those results in our risk evaluation. If it was not considered previously, there may be a need to perform groundwater to surface water modeling. It is our understanding that Pete Costello typically conducts groundwater fate and transport modeling and, therefore, our cost estimate does not reflect TMG conducting this modeling.
14. There are certain features in the Site Investigation Report figures (i.e. labeled as Outfall 2 and Outfall 3) that do not show up in the Nov 2015 IRA Work Plan figures. Were these outfall features covered over during the remediation activities?
15. As part of our risk evaluation, we will perform a local potable use evaluation (e.g. database search). However, has this been done previously either by the WVDEP or other previous consultants?

This is a start, but we may have more questions as we receive further information from you and perform additional review of the files in further detail. The estimated cost for this project is **$8,500**.

Thanks,

Lisa

From: Cooper, Travis L [mailto:Travis.L.Cooper@wv.gov]
Sent: Friday, November 03, 2017 3:58 PM
To: Lisa Smith (lisa@themahfoodgroup.com) <lisa@themahfoodgroup.com>; 'jmahfood@themahfoodgroup.com' <jmahfood@themahfoodgroup.com>
Cc: Meeks, John M <John.M.Meeks@wv.gov>; Korbini, Casey E <Casey.E.Korbini@wv.gov>; Guynn, Catherine N <Catherine.N.Guynn@wv.gov>
Subject: WD DEP17*07A-21
Importance: High

John and Lisa,

Attached you will find a work directive regarding the Former Freedom Industries site. If there is no conflict of interest, please have a cost estimate and work plan to me by November 10, 2017. I will upload the documents to be reviewed to your cloud drive on Monday. The project manager for this site is John Meeks. If you have any questions, please let one of us know.

Thanks,

Travis Cooper
Contract Specialist
Department of Environmental Protection
DLR/OER
601 57th St. SE
Charleston, WV 25304
304-926-0499 ext. 1117
Fax: 304-926-0457

Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Tuesday, November 14, 2017 12:22 PM
To: Lisa Poppelreiter; Cooper, Travis L; jmahfood@themahfoodgroup.com
Cc: Korbini, Casey E; Long, David W; Vickie Mahfood
Subject: RE: WD DEP17*07A-21 - Former Freedom Industries
Attachments: 04506- PQS Etowah-LUC.pdf; MAFOOD WD GROUP QUESTIONS-ANSWERS_ 11-9-17.docx

Lisa –

Answers to your questions are in the attached Word document.

Thanks,
John

John M. Meeks, PG, LRS
Project Manager
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

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Travis,

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8. It appears that the soil samples identified in the Excel data tables do not reflect the sample locations shown in Figure 4 of the Nov 2015 IRA Work Plan. For example, the Excel data table lists 65 soil samples for Area 1A, however Figure 4 of the IRA WP only shows 3 borings within Area 1A.
9. Looking at the Excel data table provided, it appears that there were not any post-remediation soil samples collected in Area 5. However, there were soil analytical results provided for 3 test pits (i.e. TP-A, TP-B, and TP-C). Are these test pits located in Area 5? In addition, were there any other soil samples collected in Area 5?
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12. As we discussed on the call earlier, TMG will assume that the data validation will result in data that is acceptable for use in a risk evaluation.
13. Has WVDEP previously considered evaluating surface water due to exceedances of WV water quality criteria in groundwater monitoring wells closest to the river (e.g. MW-6)? For example, has diffuse groundwater discharge to surface water been evaluated previously? If this was considered previously and the results were favorable, then we can use those results in our risk evaluation. If it was not considered previously, there may be a need to perform groundwater to surface water modeling. It is our understanding that Pete Costello typically conducts groundwater fate and transport modeling and, therefore, our cost estimate does not reflect TMG conducting this modeling.
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This is a start, but we may have more questions as we receive further information from you and perform additional review of the files in further detail. The estimated cost for this project is **$8,500**.

Thanks,

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Sent: Friday, November 03, 2017 3:58 PM
To: Lisa Smith (lisa@themahfoodgroup.com) <lisa@themahfoodgroup.com>; 'jmahfood@themahfoodgroup.com' <jmahfood@themahfoodgroup.com>
Cc: Meeks, John M <John.M.Meeks@wv.gov>; Korbini, Casey E <Casey.E.Korbini@wv.gov>; Guynn, Catherine N <Catherine.N.Guynn@wv.gov>
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Importance: High

John and Lisa,

Attached you will find a work directive regarding the Former Freedom Industries site. If there is no conflict of interest, please have a cost estimate and work plan to me by November 10, 2017. I will upload the documents to be reviewed to

your cloud drive on Monday. The project manager for this site is John Meeks. If you have any questions, please let one of us know.

Thanks,

Travis Cooper
Contract Specialist
Department of Environmental Protection
DLR/OER
601 57th St. SE
Charleston, WV 25304
304-926-0499 ext. 1117
Fax: 304-926-0457

MAFOOD GROUP QUESTIONS (11/14/17)

1. If available, please provide a figure that shows the final excavation limits and final sample locations after implementation of the Nov 2015 Interim Remedial Action Work Plan. If a final figure is not available, we will use Figure 4 from the Nov 2015 Interim Remedial Action Work Plan. However, after reviewing the analytical data in the Excel tables that were provided, we cannot find those samples on the figure.

2. Please provide the additional analytical data that we discussed on the conference call earlier today (e.g. surface water and sediment analytical results, PCB soil analytical results, any additional groundwater results, etc.).

   The figures and data requested in Q1 and Q2 were provided to Lisa Poppelreiter via email on 11/9/17.

3. Is there any data from the previous April 2015 Site Investigation Report or Oct 2015 Interim Site Assessment Report that is pre-remediation and was not mitigated and may still usable?

   Yes. Arcadis completed a significant amount of investigation that went into the April 2015 Site Investigation Report (Arcadis Site Investigation Report - Part 1 of 6, which was previously uploaded to your cloud site). In selecting the data to be validated for the risk assessment, Core previously assembled Chain of Custody forms from the Arcadis investigation into one pdf, attached as COC's – TestAmerica. Samples from areas that were excavated have a line drawn through them or an X next to the sample. It should be easy to tell which samples are still useable. Sample numbers correspond directly to the sample results in Tables 3A, 3B and 3C of the Arcadis April 2015 Site Investigation Report.

   The October 2015 Interim Site Assessment Report completed by Core Environmental consisted of a series of Test Pit Excavations and associated soil sampling. Figure 4 of the Core Interim Remedial Action Work Plan identifies the test pit locations along with the areas to be excavated. Data from test pit locations TP-4, 5 & 6 (located on the final slope to the river, below the collection trench) and locations TP-12 and TP-13 (used to identify the eastern limits of excavation area 3) may be used in the risk assessment. This data may be found in Tables 1A, 1B & 1C of the Core October 2015 Interim Site Assessment Report.

4. We understand the primary constituents of potential concern are MCHM and PPH. To clarify what we discussed this morning, should our risk evaluation include the additional parameters that were analyzed (e.g. alcohols, BTEX, PAHs, lead) in the various media? If so, we will compare those COPCs to applicable WV De Minimis standards. If WV De Minimis standards are not available, then we may use USEPA RSLs. If WV De Minimis standards and USEPA RSLs are not available, then no standard will be used for comparison.

   Yes. Please screen all parameters against the relevant benchmarks.

5. Are the seeps still present at the site (as identified in the figures from the April 2015 Site Investigation Report)?

The northernmost seep (Seep 1) is outside the impacted area. A sample from that location (SAR SB-13) collected from 0 – 1 ft. contained no detected site related contaminants. The unlabeled seep in Excavation Area 4 was excavated during remediation activities. Approximately 5 feet of clean fill was placed in this location. Based on a site visit on 11/10/17, a wet area remains in this approximate location, however, no discharge is present.

6. Can you please supply us with the current LUC so we may see what the current activity and use limitations are on the property?

   Attached.

7. Based on our call earlier, we understand the post-remediation soil samples collected in 2015 and 2016 were shallow and deep soil samples that are now in the subsurface zone (i.e. under soil cover and cap). Please confirm.

   Yes. That is true. All remediated areas were backfilled with soil from an offsite borrow area that was confirmed to be uncontaminated through sampling and analysis prior to importing the soil.

8. It appears that the soil samples identified in the Excel data tables do not reflect the sample locations shown in Figure 4 of the Nov 2015 IRA Work Plan. For example, the Excel data table lists 65 soil samples for Area 1A, however Figure 4 of the IRA WP only shows 3 borings within Area 1A.

   The figures and data requested in Q1 and Q2 and provided earlier via email resolve this question.

9. Looking at the Excel data table provided, it appears that there were not any post-remediation soil samples collected in Area 5. However, there were soil analytical results provided for 3 test pits (i.e. TP-A, TP-B, and TP-C). Are these test pits located in Area 5? In addition, were there any other soil samples collected in Area 5?

   We are still waiting on the previous LRS (Matt Ford – CORE) for answer.

10. It remains unclear on how the post-remediation sump water data (Sump-4, Sump-8, Sump-9, and Sump-10) should be evaluated. Based on our call earlier today, it was stated that these sump locations are no longer accessible (i.e. covered over) and, therefore, could be rendered "not an issue" by means of pathway elimination (e.g. sumps will be remained covered by a cap). However, are these sumps connected to a discharge point that could be accessible by either a human or ecological receptor?

    Sump 4 and Sump 8 were in Area 5, at the base of the slope (Area 4). These sumps were backfilled with clean soil in the same manner as other excavations. Therefore, these sample locations no longer represent an exposure pathway.

    Sump 9 and Sump 10 were outside the impacted area, to the south of the area of excavation/remediation. They are unnumbered on the figures. These sumps remain in place.

None of the sumps discharged by gravity. While they operated, accumulated liquids were pumped to mobile storage tanks that were periodically emptied, and all liquids were disposed of offsite.

11. If the sediment and surface water samples were also analyzed for COPCs other than MCHM and PPH (e.g. analyzed for BTEX, PAHs, etc.), then these COPCs will be compared to available surface water quality criteria from WV and USEPA.

    Sediment and surface water samples were analyzed for MCHM/PPH and glycol only.

12. As we discussed on the call earlier, TMG will assume that the data validation will result in data that is acceptable for use in a risk evaluation.

    Agreed.

13. Has WVDEP previously considered evaluating surface water due to exceedances of WV water quality criteria in groundwater monitoring wells closest to the river (e.g. MW-6)? For example, has diffuse groundwater discharge to surface water been evaluated previously? If this was considered previously and the results were favorable, then we can use those results in our risk evaluation. If it was not considered previously, there may be a need to perform groundwater to surface water modeling. It is our understanding that Pete Costello typically conducts groundwater fate and transport modeling and, therefore, our cost estimate does not reflect TMG conducting this modeling.

    The concentrations of PAH compounds detected in MW-1, MW-2, MW-4, MW-6, and MW-7, are associated with the previous VRP project and have been addressed through the existing LUC. There is no reason to re-evaluate GW or SW for petroleum-related compounds.

14. There are certain features in the Site Investigation Report figures (i.e. labeled as Outfall 2 and Outfall 3) that do not show up in the Nov 2015 IRA Work Plan figures. Were these outfall features covered over during the remediation activities?

    These outfalls were outside the impacted/excavated area. We assume these features remain. They were not a part of the remediation. As discussed above, all surface water drainage from the site was collected and pumped to mobile storage tanks for off-site disposal.

15. As part of our risk evaluation, we will perform a local potable use evaluation (e.g. database search). However, has this been done previously either by the WVDEP or other previous consultants?

    This was previously performed by IT/Shaw during their assessment related to the previous VRP project. They found no water wells within 2 miles of the site.

Lisa Poppelreiter

From: Long, David W <David.W.Long@wv.gov>
Sent: Thursday, November 16, 2017 3:57 PM
To: Lisa Poppelreiter; Meeks, John M
Cc: John Mahfood
Subject: RE: WD DEP17*07A-21 - Former Freedom Industries
Attachments: COC(Sump#8)-1-28-16_1601R50_v1.pdf; SplitSampleRpt(Sump#8-1-28-16)_1601R50_Final_v1.pdf; COC-(MW-13&Sump#10)-2-1-16_1602183_v1.pdf; SplitSamplesRpt(MW-13&Sump#10-2-1-16)_1602183_Final_v1.pdf; FreedomVRPSiteVisitReport_1-28-16.pdf; FreedomVRPSiteVisitReport_2-1-16.pdf

Importance: High

HI Lisa:

During a meeting yesterday to go over the required data validation, I realized I had not forwarded you results of split samples I had taken in January & February 2016. These were splits taken when Core was sampling groundwater and the sumps located in the collection trench (area 5).

I split one sump sample (Sump 8) on 1/28/16 (a trip blank was also included) and one sump sample (Sump 10) and one GW sample (MW-13) on 2-1-16 (a trip blank was also included.

The Sump 8 sample coincides with Core/ALS SDG 16011119 (Lab sample ID 16011119-01), and the Sump 10 and MW-13 sample coincide with Core/ALS SDG 1602023 (Lab Sample ID's 1602023-01 (MW-13) and 1602023-02 (Sump 10).

I've attached the COC and Report for the 1/28/16 and 2/1/16 split sampling events, respectively, for your use. Let me know if you need the Level IV data package for each sampling event (they were too big to attach) and I will have Travis upload to your cloud drive.

I've also attached the site visit reports for each sampling event, including pictures, so you have an idea where the sumps and MW-13 are located in relation to the trench/Area 5 (the sumps were the access to the trench for sampling) and Area 4. Hope this helps.

We have site visit reports with pictures (every 2-3 days) from the entire time the excavation was going on (from 12/7/15 to 2/25/16) if you're interested (might help to understand the site better) – we can have Travis upload those also.

Let me know if you have questions.

Dave

Dave Long
WVDEP/DLR/OER
601 57th St., SE
Chaleston, WV 25304
304-926-0499, x-1265 (O)
304-942-0457 (Fax)
David.W.Long@wv.gov

From: Lisa Poppelreiter [mailto:lisa@themahfoodgroup.com]
Sent: Thursday, November 9, 2017 12:06 PM
To: Meeks, John M <John.M.Meeks@wv.gov>
Cc: Long, David W <David.W.Long@wv.gov>; John Mahfood <jmahfood@themahfoodgroup.com>
Subject: RE: WD DEP17*07A-21 - Former Freedom Industries

Thanks John!

Lisa

From: Meeks, John M [mailto:John.M.Meeks@wv.gov]
Sent: Thursday, November 09, 2017 10:04 AM
To: Lisa Poppelreiter <lisa@themahfoodgroup.com>
Cc: Long, David W <David.W.Long@wv.gov>
Subject: RE: WD DEP17*07A-21 - Former Freedom Industries

Lisa –

We are working on answers to each question, and should have those later today. In the meantime, I have attached the additional post-remediation analytical data that we discussed on the conference call earlier today (e.g. surface water and sediment analytical results, PCB soil analytical results, and additional MCHM-PPH soil/SW results). Also attached are location figures for each data set.

Thanks,
John

John M. Meeks, PG, LRS
Project Manager
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

From: Lisa Poppelreiter [mailto:lisa@themahfoodgroup.com]
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14. There are certain features in the Site Investigation Report figures (i.e. labeled as Outfall 2 and Outfall 3) that do not show up in the Nov 2015 IRA Work Plan figures. Were these outfall features covered over during the remediation activities?
15. As part of our risk evaluation, we will perform a local potable use evaluation (e.g. database search). However, has this been done previously either by the WVDEP or other previous consultants?

This is a start, but we may have more questions as we receive further information from you and perform additional review of the files in further detail. The estimated cost for this project is **$8,500**.

Thanks,

Lisa

From: Cooper, Travis L [mailto:Travis.L.Cooper@wv.gov]
Sent: Friday, November 03, 2017 3:58 PM
To: Lisa Smith (lisa@themahfoodgroup.com) <lisa@themahfoodgroup.com>; 'jmahfood@themahfoodgroup.com' <jmahfood@themahfoodgroup.com>
Cc: Meeks, John M <John.M.Meeks@wv.gov>; Korbini, Casey E <Casey.E.Korbini@wv.gov>; Guynn, Catherine N

<Catherine.N.Guynn@wv.gov>
Subject: WD DEP17*07A-21
Importance: High

John and Lisa,

Attached you will find a work directive regarding the Former Freedom Industries site. If there is no conflict of interest, please have a cost estimate and work plan to me by November 10, 2017. I will upload the documents to be reviewed to your cloud drive on Monday. The project manager for this site is John Meeks. If you have any questions, please let one of us know.

Thanks,

Travis Cooper
Contract Specialist
Department of Environmental Protection
DLR/OER
601 57th St. SE
Charleston, WV 25304
304-926-0499 ext. 1117
Fax: 304-926-0457

Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Monday, November 20, 2017 4:56 PM
To: Lisa Poppelreiter; John Mahfood
Subject: GW-SW Dilutions
Attachments: GW Diliution Factors at Freedom.pdf

Lisa – Here are the dilution factors I calculated. Meant to send it this morning.

The GW flux (and therefore the dilution factors) is conservative, and could be reduced if necessary.

Thank you,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
WVDEP Office of Environmental Remediation
Room 1037
601 57th Street, SE
Charleston, WV 25304
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Monday, November 20, 2017 4:45 PM
To: Lisa Poppelreiter
Cc: John Mahfood
Subject: RE: Former Freedom Industries

The site is vacant. The only structure remaining is the office building at the south end of the site.

Thanks,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

From: Lisa Poppelreiter [mailto:lisa@themahfoodgroup.com]
Sent: Monday, November 20, 2017 4:27 PM
To: Meeks, John M <John.M.Meeks@wv.gov>
Cc: John Mahfood <jmahfood@themahfoodgroup.com>
Subject: Former Freedom Industries

Hi John,

I just had a quick question. Is the former Freedom Industries site currently vacant? I looked back over my notes from our calls and I don't think I ever confirmed this with you. I did see the description in the Oct 2015 Interim SAR-Rev 1 that there are two cement block office buildings/garages and a few frac tanks to collect storm water and all the ASTs were removed (which matches the Google Earth aerials). Is there any indoor or outdoor worker maintaining anything at the facility currently?

Thanks,

Lisa

Woman/Disadvantaged Business Enterprise (M/W/DBE)
"Providing effective closure strategies and risk assessment services for over 10 years."

Lisa M. Poppelreiter
Environmental Scientist/Risk Assessor
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www.themahfoodgroup.com
www.thehealthyrootsproject.com
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Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Wednesday, November 22, 2017 11:01 AM
To: Lisa Poppelreiter
Cc: John Mahfood
Subject: Freedom Questions and Answers Round 2
Attachments: MAFOOD WD GROUP QUESTIONS-ANSWERS_11-17-17.docx; Test Pits A,B,C location map - Area 5.pdf

Lisa –

Please see attached. The consultant who can hopefully answer the remaining questions is on vacation until Monday. We'll get back to you then with the remaining information.

Thank you,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
WVDEP Office of Environmental Remediation
Room 1037
601 57th Street, SE
Charleston, WV 25304
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

WVDEP provided 11-22-17

1. In Table 1B, what is the difference between “1B-Wall-01” and “1B-Wall-01 Grab”? I see they were collected on different dates. Was “1B-Wall-01” removed and re-sampled as “1B-Wall-01 Grab”? Were these collected in different locations or the same location?

   Waiting on consultant

2. Also in Table 1B, what is the difference between “1B-Wall-04 Grab” and “1B-Wall-04A Composite”? Was “1B-Wall-04 Grab” removed? What locations comprise the composite sample?

   Waiting on consultant

3. In the hand drawn figure showing the Area 1B soil sample locations,
   a. are the samples marked with an “X” the wall samples (i.e. locations 10, 11, 12, and 13 written next to an “X”)?
   b. If locations 10, 11, 12, and 13 written next to an “X” are indeed wall samples, does this mean the wall of the excavation was originally at 10, 11, 12, and 13, and then expanded to 14, 15, and 16?

      Waiting on consultant

4. Based on our call, you confirmed that test pit samples TP-A, TP-B, and TP-C are indeed located in Area 5, and you are waiting on a figure from CORE to show exactly where they are located. Please forward this figure once you receive it.

   Attached

5. Can you tell us which sump location is sump 9 versus sump 10?

   Waiting on consultant

6. Why was groundwater monitoring well MW-13 sampled twice?

   This well is located immediately downgradient and adjacent to the spill/excavated area. There was a desire to confirm that any GW impacts that may have occurred were attenuated.

7. We had discussed that you will provide 7Q10 and groundwater flow information, and TMG will perform a mass balance equation to evaluate surface water as necessary.

   Sent previously via email

Lisa Poppelreiter

From: Long, David W <David.W.Long@wv.gov>
Sent: Wednesday, November 29, 2017 2:22 PM
To: 'Lisa' (lisa@themahfoodgroup.com)
Cc: Meeks, John M
Subject: RE: Freedom Questions and Answers Round 2

Importance: High

Hi Lisa –

Here are answers (as best we can provide) to your questions:

1. Excavation Area 1B - 1B-Wall-01 (12/8/15) and 1B-Wall-01 Grab (12/14/15); 1B-Wall-04 Grab (12/17/15) and 1B-Wall-04A Composite ((12/31/15) – Core Response: 1B-Wall-01 (12/8/15) and 1B-Wall-01 Grab (12/14/15) – Unsure why that sample location was collected twice; this area was not over-excavated; 1B-Wall-04 Grab (12/17/15) and 1B-Wall-04A Composite ((12/31/15) – Core Response: (Unsure) – Believe that sample 1B-Wall-04A was a resample due to the elevated reporting limits in sample 1B-Wall-04 Grab.
2. Post Excavation Supplemental Soil Locations – Surface Soil – these samples would all be considered surface soil (< 2') – these were all "recent" samples (2017) taken after all excavation/fill work had been completed.
3. Pre-Remediation Soil from April 2015 Site Investigation Report – depth of excavations? Unfortunately, OER was not on-site for any of the Arcadis excavations – this work was all done prior to the site coming into the VRP. The only data to go by are the ARCADIS CS (confirmation sample) samples, of which there are very few, and some of which have no depth indicated. The subsequent CORE excavation work would have covered the area excavated by ARCADIS, except for possibly the far northern end. Core excavations – Core Response: The excavations were completed to the depths proposed in the Interim Remedial Action Work Plan. However, Area 4 was not excavated as wide as proposed. These depths are as follows: Area 1A – 0-1'; Area 1B – 0-10'; Area 2 – 0-14'; Area 3 – 0-14'; Area 4 – 0-9'; Area 5 – not excavated.
4. Pre-Remediation Soil from April 2015 Site Investigation Report – MW-13 (0-1') – this sample would not have been removed, as the monitoring well would have been saved during any excavation in this area. Ultimately the well was removed and this area was covered with approximately 4' of fill.
5. Pre-Remediation Soil from April 2015 Site Investigation Report – SB-18(0-1') – This sample location was excavated.
6. Pre-Remediation Soil from April 2015 Site Investigation Report – SB-23(0-1') and SB-23-CS(0-1') – These sample locations were excavated.
7. Pre-Remediation Soil from April 2015 Site Investigation Report – SB-26-CS(0-1') and SB-26(8-10') – both of these sample locations were excavated. This area was excavated to 14', so SB-26(14-16') was not excavated
8. Pre-Remediation Soil from April 2015 Site Investigation Report – SS-18(0-1') – this is a mistake on the COC – there was no excavation on the south side of the site.
9. Pre-Remediation Soil from April 2015 Site Investigation Report – SS-27(0-1') – this is a mistake on the COC – there was no excavation on the south side of the site.
10. Pre-Remediation Soil from April 2015 Site Investigation Report – Subsurface Soil – please provide approximate depths of each excavation so that remaining soil sample results can be verified – see response to #3 above
11. Pre-Remediation Soil from April 2015 Site Investigation Report – Subsurface Soil – SB-26(8-10') – remains? – SB-26(8-10') was excavated.
12. Pre-Remediation Soil from April 2015 Site Investigation Report – Subsurface Soil – SS-27(10-12') – this is a mistake on the COC – there was no excavation on the south side of the site.
13. ARCADIS Sub Tank Soil Samples – were all these samples removed? – Yes, all sub tank sample locations were excavated.

14. Core Test Pit Samples – do any of these samples remain? – Core response: IF the test pits had MCHM or PPH impacts, they were excavated. The MCHM and PPH hits, as well as the buried bricks, were targeted for excavation. We collected BTEX, etc on very few samples and those results were not used to drive the excavation. Patty did not want constituents evaluated in the previous VRP project to drive the excavation.
15. 2017 Sediment Samples – At what depth were these sample collected? These samples were all collected from 0-6", ~ 1' from shore.

Dave

Dave Long
WVDEP/DLR/OER
601 57th St., SE
Chaleston, WV 25304
304-926-0499, x-1265 (O)
304-942-0457 (Fax)
David.W.Long@wv.gov

From: Meeks, John M
Sent: Tuesday, November 28, 2017 1:53 PM
To: Long, David W <David.W.Long@wv.gov>
Subject: Fwd: Freedom Questions and Answers Round 2

Can you look at these questions and get back to Lisa?

Sent from my iPhone

Begin forwarded message:

> **From:** Lisa Poppelreiter <lisa@themahfoodgroup.com>
> **Date:** November 28, 2017 at 1:47:53 PM EST
> **To:** "'Meeks, John M'" <John.M.Meeks@wv.gov>
> **Cc:** 'John Mahfood' <jmahfood@themahfoodgroup.com>
> **Subject: RE: Freedom Questions and Answers Round 2**
>
> Hi John,
>
> Thanks for sending the additional figure. I'll await the remaining answers to the questions. In the meantime, I prepared an analytical sample summary table to organize all of the analytical samples collected at the site. See attached table. This table specifies the chemical parameters analyzed in each sample and also indicates whether or not the sample remains at the site or was removed during excavation activities. The marked up chain of custodies you provided were very helpful. However, I just have a few remaining questions on a couple of samples. Please see the yellow highlighted cells and my comment boxes in the attached table. Since we have a tight schedule, if you could please answer the questions I have in my comment boxes as soon as possible, then we can stay on track to meet our deadline of Dec 7th.
>
> Thank you!
>
> Lisa
>
> ---
>
> **From:** Meeks, John M [mailto:John.M.Meeks@wv.gov]
> **Sent:** Wednesday, November 22, 2017 11:01 AM

To: Lisa Poppelreiter <lisa@themahfoodgroup.com>
Cc: John Mahfood <jmahfood@themahfoodgroup.com>
Subject: Freedom Questions and Answers Round 2

Lisa –

Please see attached. The consultant who can hopefully answer the remaining questions is on vacation until Monday. We'll get back to you then with the remaining information.

Thank you,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
WVDEP Office of Environmental Remediation
Room 1037
601 57th Street, SE
Charleston, WV 25304
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Wednesday, November 29, 2017 12:09 PM
To: Lisa Poppelreiter
Subject: RE: Freedom Questions and Answers Round 2

Lisa –

Got the answer back. Sump 10 is the southernmost one, in the corner of the upper area near the office building. Sump 9 is to the north of Sump 10.

Thanks,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

From: Lisa Poppelreiter [mailto:lisa@themahfoodgroup.com]
Sent: Wednesday, November 29, 2017 11:29 AM
To: Meeks, John M <John.M.Meeks@wv.gov>
Subject: RE: Freedom Questions and Answers Round 2

John,

In the answers you just sent, you said that Sump 10 is located within Area 5. However, I thought the two sumps in Area 5 were Sump 4 and Sump 8? And Sump 9 and Sump 10 were located on the southern side of the site? (see question 10 in attached Q&A file). Is Sump 10 located by SS-8 and Sump 9 located by SS-15? or vice versa?

Lisa

From: Meeks, John M [mailto:John.M.Meeks@wv.gov]
Sent: Wednesday, November 29, 2017 11:04 AM
To: Lisa Poppelreiter <lisa@themahfoodgroup.com>
Cc: 'John Mahfood' <jmahfood@themahfoodgroup.com>
Subject: RE: Freedom Questions and Answers Round 2

Lisa –

We received some information from the consultant (attached), and Dave Long is working on your questions from the sample table.

Thanks,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

From: Lisa Poppelreiter [mailto:lisa@themahfoodgroup.com]
Sent: Tuesday, November 28, 2017 1:48 PM
To: Meeks, John M <John.M.Meeks@wv.gov>
Cc: 'John Mahfood' <jmahfood@themahfoodgroup.com>
Subject: RE: Freedom Questions and Answers Round 2

Hi John,

Thanks for sending the additional figure. I'll await the remaining answers to the questions. In the meantime, I prepared an analytical sample summary table to organize all of the analytical samples collected at the site. See attached table. This table specifies the chemical parameters analyzed in each sample and also indicates whether or not the sample remains at the site or was removed during excavation activities. The marked up chain of custodies you provided were very helpful. However, I just have a few remaining questions on a couple of samples. Please see the yellow highlighted cells and my comment boxes in the attached table. Since we have a tight schedule, if you could please answer the questions I have in my comment boxes as soon as possible, then we can stay on track to meet our deadline of Dec 7th.

Thank you!

Lisa

From: Meeks, John M [mailto:John.M.Meeks@wv.gov]
Sent: Wednesday, November 22, 2017 11:01 AM
To: Lisa Poppelreiter <lisa@themahfoodgroup.com>
Cc: John Mahfood <jmahfood@themahfoodgroup.com>
Subject: Freedom Questions and Answers Round 2

Lisa –

Please see attached. The consultant who can hopefully answer the remaining questions is on vacation until Monday. We'll get back to you then with the remaining information.

Thank you,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
WVDEP Office of Environmental Remediation
Room 1037
601 57th Street, SE
Charleston, WV 25304
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Wednesday, November 29, 2017 11:04 AM
To: Lisa Poppelreiter
Cc: 'John Mahfood'
Subject: RE: Freedom Questions and Answers Round 2
Attachments: MAFOOD GROUP QUESTIONS-ANSWERS_TO CORE.PDF

Lisa –

We received some information from the consultant (attached), and Dave Long is working on your questions from the sample table.

Thanks,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

From: Lisa Poppelreiter [mailto:lisa@themahfoodgroup.com]
Sent: Tuesday, November 28, 2017 1:48 PM
To: Meeks, John M <John.M.Meeks@wv.gov>
Cc: 'John Mahfood' <jmahfood@themahfoodgroup.com>
Subject: RE: Freedom Questions and Answers Round 2

Hi John,

Thanks for sending the additional figure. I'll await the remaining answers to the questions. In the meantime, I prepared an analytical sample summary table to organize all of the analytical samples collected at the site. See attached table. This table specifies the chemical parameters analyzed in each sample and also indicates whether or not the sample remains at the site or was removed during excavation activities. The marked up chain of custodies you provided were very helpful. However, I just have a few remaining questions on a couple of samples. Please see the yellow highlighted cells and my comment boxes in the attached table. Since we have a tight schedule, if you could please answer the questions I have in my comment boxes as soon as possible, then we can stay on track to meet our deadline of Dec 7th.

Thank you!

Lisa

From: Meeks, John M [mailto:John.M.Meeks@wv.gov]
Sent: Wednesday, November 22, 2017 11:01 AM
To: Lisa Poppelreiter <lisa@themahfoodgroup.com>
Cc: John Mahfood <jmahfood@themahfoodgroup.com>
Subject: Freedom Questions and Answers Round 2

Lisa –

Please see attached. The consultant who can hopefully answer the remaining questions is on vacation until Monday. We'll get back to you then with the remaining information.

Thank you,
John

John M. Meeks, PG, LRS
Brownfields Program Manager – South Region
WVDEP Office of Environmental Remediation
Room 1037
601 57th Street, SE
Charleston, WV 25304
304/926-0499 X1268 (Office)
304/539-1875 (Cell)

Provided by WVDEP 11-29-17

1. In Table 1B, what is the difference between "1B-Wall-01" and "1B-Wall-01 Grab"? I see they were collected on different dates. Was "1B-Wall-01" removed and re-sampled as "1B-Wall-01 Grab"? Were these collected in different locations or the same location?

   We do not recall why that sample location was collected twice. QC samples were not collected with sample ID 1B-Wall-01. The location was not over-excavated.

2. Also in Table 1B, what is the difference between "1B-Wall-04 Grab" and "1B-Wall-04A Composite"? Was "1B-Wall-04 Grab" removed? What locations comprise the composite sample?

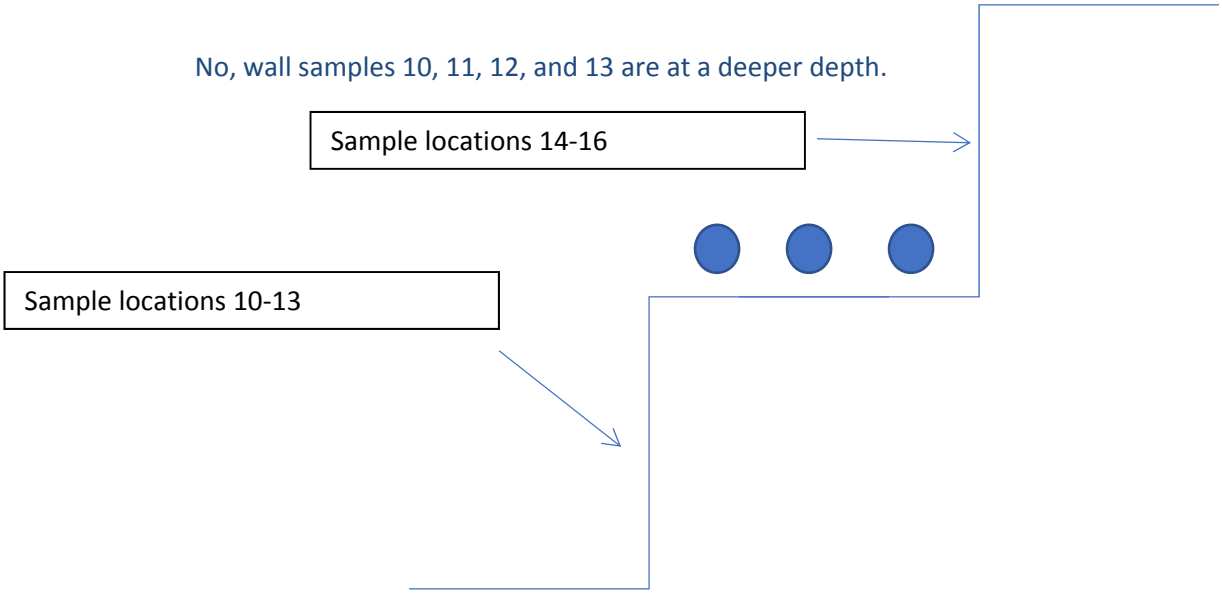
   Based on my notes and review of the lab report, I am thinking that 1B-Wall-04B was resampled due to the elevated reporting limits.

3. In the hand drawn figure showing the Area 1B soil sample locations,
   a. are the samples marked with an "X" the wall samples (i.e. locations 10, 11, 12, and 13 written next to an "X")?

   Yes, these samples are wall samples. They were collected along the wall associated with a bench that was created when we excavated around the utility piping shown on the hand drawn map (pink highlighted lines).

   b. If locations 10, 11, 12, and 13 written next to an "X" are indeed wall samples, does this mean the wall of the excavation was originally at 10, 11, 12, and 13, and then expanded to 14, 15, and 16?

   No, wall samples 10, 11, 12, and 13 are at a deeper depth.



4. Can you tell us which sump location is sump 9 versus sump 10?

There were two sumps located in the collection trench in Area 5. Sump 10 is the one on the downstream side of the trench.

Lisa Poppelreiter

From: Meeks, John M <John.M.Meeks@wv.gov>
Sent: Wednesday, December 06, 2017 4:06 PM
To: Lisa Poppelreiter
Cc: John Mahfood
Subject: Re: WV Former Freedom Industries

None of the asts were on concrete pads. They were steel bottom tanks sitting on bedding sand or pea gravel.

Sent from my iPhone

On Dec 6, 2017, at 4:03 PM, Lisa Poppelreiter <lisa@themahfoodgroup.com> wrote:

> John,
>
> I had a few questions about the ASTs and about a few of the surface soil samples collected in 2014 (presented in the April 2015 Site Investigation Report).
>
> 1. Were the ASTs sitting on top of pads? If so, were the pads removed?
> 2. There are a couple of surface soil samples shown on the figures from the April 2015 SIR that are located within the AST footprint. For example, SS-8, SS-9, SS-13, SS-14, SS-15, and SS-16 are located within the footprint of the ASTs and would still be remaining soil samples since they are not within the excavation areas on the northern side of the site. Where these surface soil samples collected beneath the pads of the ASTs (e.g. drilled into the pad to collect soil below it)? Or were the pads removed before these surface soil samples were collected?
>
> Thanks,
>
> Lisa
>
> <image001.jpg>
> ***Woman/Disadvantaged Business Enterprise (M/W/DBE)***
> ***"Providing effective closure strategies and***
> ***risk assessment services for over 10 years."***
>
> **Lisa M. Poppelreiter**
> **Environmental Scientist/Risk Assessor**
> **The Mahfood Group LLC®**
> 1061 Waterdam Plaza Drive, Suite 201
> McMurray, PA 15317
> Phone: 724-260-5219
> Fax: 724-260-5226
> Email: lisa@themahfoodgroup.com
>
> ***www.themahfoodgroup.com***
> ***www.thehealthyrootsproject.com***
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TestAmerica Canton
4101 Shuffel Street, N. N.
North Canton, OH 44720
Phone: 330.497.9396 Fax: 330.497.0772

2.0

Chain of Custody Record

038394

J41561

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TestAmerica Laboratories, Inc.
TAL-8210 (0713)

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other:

Client Contact		Project Manager: Jason Manzo	Site Contact: Todd Acbie	Date: 9/4/14	COC No: 038394
Company Name: ARCADIS		Tel/Fax: 614-995-9100	Lab Contact: Mark Loeb	Carrier: FedEx	1 of 1 COCs
Address: 100 E. Campus View Blvd		Analysis Turnaround Time			Sampler: T. Acbie
City/State/Zip: Columbus, OH 43235		☒ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone: 614-995-9100		TAT if different from Below _____			Walk-in Client:
Fax: 614-985-9170		☒ 2 weeks			Lab Sampling:
Project Name: Freedom Industries		☐ 1 week			
Site: Charleston, WV		☐ 2 days			Job / SDG No.:
PO#		☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	8015C DRO 8270A PCB	8260 CBTEX 8015C GRO	8015D-DAT (MOD)	8015D_DAT-6 (MOD)	Lead 6010C	Sample Specific Notes:
~~ARC-SS-06-09/04/14~~	09/04/14	1300	G	Soil	4	N	N	X	X	X	X	X	Ice to 4°C 0-1' bgs
~~ARC-SS-07-09/04/14~~	↓	1330	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
ARC-SS-08-09/04/14 ✓	↓	1400	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
ARC-SS-09-09/04/14 ✓	↓	1430	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

Validate only SS-08 & SS-09

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: 248850 | Cooler Temp. (°C): Obs'd: _____ Corr'd: _____ Therm ID No.: _____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Todd Acbie	ARCADIS	9/4/14 1700	[signature]	TA-Canton	9/5/14 9:20
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

If marked out, sample location was excavated

Chain of Custody Record

TAL-4124 (1007)

Temperature on Receipt 4.0

Drinking Water? Yes ☐ No ☒

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

J41606

Client	ARCADIS
Address	100 E Campus View Blvd. STE 200
City	Columbus
State	OH
Zip Code	43202
Project Name and Location (State)	Freedom Industries, W.V.
Contract/Purchase Order/Quote No.	
Project Manager	Jason Munzo
Telephone Number (Area Code)/Fax Number	614-985-9100 / 614-985-9170
Site Contact	Todd Albie
Lab Contact	Mark Loeb
Carrier/Waybill Number	FedEx / 802710969642
Date	09/05/14
Chain of Custody Number	258245
Lab Number	
Page	1 of 1

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8015C DRO	8082A PCB	8270D Meth. Part	6010C Lead	8260C BTEX/MTBE	8015C-GRO	8015D-DAT (Meth)	8015D-DAT-G					Special Instructions/ Conditions of Receipt
ARC-SS-01-09/05/14 ✓	09/05/14	1330				X	X						X	X	X	X	X	X	X	X					Ice To 4°C
~~ARC-SS-02-09/05/14~~	↓	1400				↓	↓						↓	↓	↓	↓	↓	↓	↓	↓					↓
~~ARC-SS-12-09/05/14~~		1430				↓	↓						↓	↓	↓	↓	↓	↓	↓	↓					

Validate only SS-01

Page 1466 of 1468

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☒ 14 Days ☐ 21 Days ☐ Other ____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: Todd Albie, ARCADIS	9/5/14	1530	1. Received By: Jakob Cluzner	9/6/14	9:50
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments
If marked out, sample location was excavated

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Validate All 1.4, 1.2, 1.6

J42501

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information

Client Contact: Todd Aebie
Company: ARCADIS U.S., Inc.
Address: 100 E. Campus View Blvd Suite 200
City: Columbus
State, Zip: OH, 43235
Phone: 614-764-2310(Tel)
Email: todd.aebie@arcadis-us.com
Project Name: Freedom Industries - Soil Investigation
Site:

Sampler: Alan Gillespie
Phone: (859) 333-7702

Due Date Requested:
TAT Requested (days):
PO #: OH003003.0002
WO #:
Project #: 24012621
SSOW#:

Lab PM: Loeb, Mark J
E-Mail: mark.loeb@testamericainc.com

Carrier Tracking No(s):

COC No: 240-23696-10309.1
Page: Page 1 of 2
Job #:

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH					Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N						
SS-19-Deep (0-1')	9/30/14	9:00	G	Solid			✓		✓	✓			✓		✓					4	
SS-19-Deep (4-6')		9:15		Solid			✓								✓					2	
SS-19-Deep (36-38')		10:00		Solid			✓								✓					2	
SS-20-Deep (0-1')	9/30/14	10:30	G	Solid			✓		✓	✓			✓		✓					4	
SS-20-Deep (14-16')		11:20		Solid			✓								✓					2	
SS-20-Deep (36-38')		11:30		Solid			✓								✓					2	
SS-17-Deep (0-1')	9/30/14	12:00	G	Solid			✓		✓	✓			✓		✓					4	
SS-17-Deep (12-14')		12:30		Solid			✓								✓					2	
SS-17-Deep (36-38')		12:40		Solid			✓								✓					2	
SB-1 (0-1')	9/30/14	1:45	G	Solid			✓		✓	✓			✓		✓					4	
SB-1 (16-18')		2:15		Solid			✓								✓					4	MS/MSD

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	9/30/14 6:15	ARCADIS	[signature]	10-1-14 930	TVS

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

1.2, 1.4, 1.4, 3.8, 3.6

J42601

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information			
Client Contact: Todd Aebie	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):
Company: ARCADIS U.S., Inc.	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com	COC No: 240-23696-10309.3
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:		Page: Page ~~9 of 7~~ 1 of 4
City: Columbus	TAT Requested (days):		Job #:
State, Zip: OH, 43235			
Phone: 614-764-2310(Tel)	PO #: OH003003.0002		
Email: todd.aebie@arcadis-us.com	WO #:		
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621		
Site:	SSOW#:		

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	8010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	8010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
SB-24 (0-1') X	10/1/14	8:30	G	Solid			✓		✓	✓			✓		✓		
Dup-01 (X	10/1/14	8:40	↓	Solid			✓								✓		
SB-24 (10-12') X		9:50		Solid			✓								✓		
SB-24 (14-16') X		9:00		Solid			✓								✓		
SB-20 (12-14')	10.1.14	0950		Solid			✓								✓		
SB-20 (10-12')	10.1.14	0930		Solid			✓								✓		
SB-20 (0-1') X	10.1.14	0910	↓	Solid			✓		✓	✓			✓		✓		
				Solid													
Validate SB-20 (12-14')				Solid													
SB-20 (10-12')				Solid													
				Solid													

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements:
ignore "analysis & bottle type" on label. refer to COC.

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time:	Company	Received by: Jerry Burns — Date/Time: 10/2/14 0925 — Company: TA Co.
Relinquished by:	Date/Time:	Company	Received by: — Date/Time: — Company
Relinquished by:	Date/Time:	Company	Received by: — Date/Time: — Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:

J42601

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information			
Client Contact: Todd Aebie	Sampler: Josh Forry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):
Company: ARCADIS U.S., Inc.	Phone: 423-794-9835	E-Mail: mark.loeb@testamericainc.com	COC No: 240-23696-10309.4
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:		Page: Page ~~4 of 7~~ 2 of 4
City: Columbus	TAT Requested (days):		Job #:
State, Zip: OH, 43235			
Phone: 614-764-2310(Tel)	PO #: OH003003.0002		
Email: todd.aebie@arcadis-us.com	WO #:		
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621		
Site:	SSOW#:		

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	8010C, 8270D, 8056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	8056A_28D - Chloride	8010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
				Preservation Code:			N	N	N	N	A	N	N	D	N		
SB-6 (0-1') X	10.1.14	1030		Solid			✓		✓	✓			✓		✓		
SB-6 (8-10') X	10.1.14	1100		Solid			✓								✓		Validate
SB-19 (0-1') X	10.1.14	1130		Solid			✓		✓	✓			✓		✓		SB-8(8-10')
SB-19 (8-10') X	10.1.14	1140		Solid			✓								✓		SB-17(8-10')
SB-8 (8-10') X	10.1.14	1340		Solid			✓								✓		SB-9(8-10')
SB-8 (0-1') X	10.1.14	1320		Solid			✓		✓	✓			✓		✓		
DUP-02 X	10.1.14	1330		Solid			✓		✓	✓			✓		✓		
SB-17 (0-1') X	10.1.14	1345		Solid			✓		✓	✓			✓		✓		
SB-17 (8-10')	10.1.14	1350		Solid			✓								✓		
SB-9 (0-1') X	10.1.14	1355		Solid			✓		✓	✓			✓		✓		
SB-9 (8-10')	10.1.14	1400		Solid			✓								✓		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time:	Company	Received by: Tony Bruna
Relinquished by:	Date/Time:	Company	Received by:
Relinquished by:	Date/Time:	Company	Received by:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:

Received by:	Date/Time:	Company
Tony Bruna	10/2/14 0925	TA Can

J42601

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.5
Client Contact: Todd Aebie	Phone: 423-794-9835	E-Mail: mark.loeb@testamericainc.com		Page: ~~Page 5 of 7~~ 3 of 4
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
SB-18 (0-1')	10.1.14	1430		Solid			✓		✓	✓			✓		✓		
SB-18 (8-10')	10.1.14	1440		Solid			✓								✓		
SB-26 (0-1') X	10.1.14	1500		Solid			✓		✓	✓			✓		✓		MS/MSD
SB-26 (14-16)	10.1.14	1505		Solid			✓								✓		
DUP-03 X	10.1.14	1545		Solid			✓		✓	✓			✓		✓		Validate All
SB-27 (6-8)	10.1.14	1540		Solid			✓								✓		except
SB-27 (0-1) X	10.1.14	1530		Solid			✓		✓	✓			✓		✓		SB-26(0-1')
SB-27 (14-16)	10.1.14	1535		Solid			✓								✓		Dup-03
SB-34 (12-14)	10.1.14	1725		Solid			✓								✓		
SB-34 (0-1)	10.1.14	1720		Solid			✓		✓	✓			✓		✓		SB-27(0-1)
SB-33 (0-1)	10.1.14	1730		Solid			✓		✓	✓			✓		✓		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			Terry Sherman	10/2/14 0925	TA Can
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

J42601

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information

Client Contact:	Todd Aebie
Company:	ARCADIS U.S., Inc.
Address:	100 E. Campus View Blvd Suite 200
City:	Columbus
State, Zip:	OH, 43235
Phone:	614-764-2310(Tel)
Email:	todd.aebie@arcadis-us.com
Project Name:	Freedom Industries - Soil Investigation
Site:	

Sampler:	Josh Ferry
Phone:	423-794-9835
Lab PM:	Loeb, Mark J
E-Mail:	mark.loeb@testamericainc.com
Carrier Tracking No(s):	
COC No:	240-23696-10309.6
Page:	Page ~~6 of 7~~ 4 of 4
Job #:	
Due Date Requested:	
TAT Requested (days):	
PO #:	OH003003.0002
WO #:	
Project #:	24012621
SSOW#:	

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 8066A_28D	VFA_IC - Standard VFA Compounds	8316A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9066A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH						Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N							
SB-33 (10-12)	10.1.14	1735	G	Solid			✓								✓							
				Solid																		
JF				Solid																		Validate
	10/1/14			Solid																		All
				Solid																		
SS-EQB-03	10/1/14	0800	6	Water			✓		✓				✓		✓							
SS-EQB-04	10/1/14	1700	6	Water			✓		✓				✓		✓							
				Water																		
				Water																		
				Water																		
				Water																		

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			Terry Burns	10/2/14 0925	TA Can
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Page 292 of 299

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

0.8, 2.4, 0.4, 1.4, 0.6, 1.8

J42714

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information				
Client Contact: Todd Aebie	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.1
Company: ARCADIS U.S., Inc.	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com		Page: Page 1 of 1 5
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			Job #:
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
SB-32 (0-1) Validate	10.2.14	0810	G	Solid	N	N	✓		✓	✓			✓		✓		
SB-32 (12-14) Validate		0815		Solid			✓								✓		
~~SB-31 (0-1)~~		0830		Solid			✓		✓	✓			✓		✓		
~~SB-31 (8-10)~~		1005		Solid			✓								✓		
~~SB-25 (0-1)~~		0854		Solid			✓		✓	✓			✓		✓		
SB-25 (10-12) Validate		0910		Solid			✓								✓		
~~SB-21 (0-1)~~		0940		Solid			✓		✓	✓			✓		✓		
SB-21 (8-10) Validate		0945		Solid			✓								✓		
~~SB-28 (0-1)~~		1025		Solid			✓		✓	✓			✓		✓		
SB-28 (12-14) Validate		1035		Solid			✓								✓		
				Solid													

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time:	Company	Received by: Dakota Turner
Relinquished by:	Date/Time:	Company	Received by:
Relinquished by:	Date/Time:	Company	Received by:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:

Date/Time:	Company
10/4/14 0945	TA-Canton

J42714

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information

Client Contact: Todd Aebie
Company: ARCADIS U.S., Inc.
Address: 100 E. Campus View Blvd Suite 200
City: Columbus
State, Zip: OH, 43235
Phone: 614-764-2310(Tel)
Email: todd.aebie@arcadis-us.com
Project Name: Freedom Industries - Soil Investigation
Site:

Sampler: Josh Ferry
Phone: (423) 794-9835
Due Date Requested:
TAT Requested (days):
PO #: OH003003.0002
WO #:
Project #: 24012621
SSOW#:

Lab PM: Loeb, Mark J
E-Mail: mark.loeb@testamericainc.com
Carrier Tracking No(s):
COC No: 240-23696-10309.2
Page: Page 2 of 5
Job #:

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8316A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
~~SB-29 (0-1)~~	10.2.14	1050	G	Solid	N	N	✓		✓	✓			✓		✓		
SB-29 (10-12) Validate		1055		Solid			✓								✓		
DUP-04 Validate		1050		Solid			✓								✓		
~~SB-38 (0-1)~~		1145		Solid			✓		✓	✓			✓		✓		
~~DUP-05~~		1215		Solid			✓								✓		
~~SB-38 (12-14)~~		1220		Solid			✓								✓		
DUP-06 Validate		1355		Solid			✓								✓		
SB-36 (12-14) Validate		1355		Solid			✓								✓		
~~SB-36 (0-1)~~		1355		Solid			✓		✓	✓			✓		✓		
SB-23 (0-1) Validate		1420		Solid			✓		✓	✓			✓		✓		
SB-23 (10-12) Validate		1425		Solid		Y	✓								✓		MS/MSD

Preservation Codes:
A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2SO3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - ph 4-5
Z - other (specify)
Other:

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by: Dakota Turner	Date/Time: 10/4/14 0945	Company: TA-Canton
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

J42714

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information				
Client Contact: Todd Aebie	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.3
Company: ARCADIS U.S., Inc.	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com		Page: Page 3 of 15
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			Job #:
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8016D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8316A - Aldehydes	8016C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
~~SB-22 (0-1)~~	10.2.14	1435	G	Solid	N	N	✓		✓	✓			✓		✓		
SB-22 (10-12) Validate		1435		Solid			✓								✓		
~~SB-37 (0-1)~~		1500		Solid			✓		✓	✓			✓		✓		
~~SB-37 (8-10)~~		1505		Solid			✓								✓		
~~SB-7 (0-1)~~		1530		Solid			✓		✓	✓			✓		✓		
SB-7 (10-12) Validate		1540		Solid			✓								✓		
DUP-07 Validate		1540		Solid			✓								✓		
~~SB-10 (0-1)~~		1610		Solid			✓		✓	✓			✓		✓		
SB-11 (0-1) Validate		1630		Solid			✓		✓	✓			✓		✓		
~~SB-(CA~~ SB-11 (8-10) Validate		1635		Solid			✓								✓		
SB-12 (0-1) Validate		1650		Solid			✓		✓	✓			✓		✓		

Page 2940 of 2950

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time:	Company	Received by: Nakita Clinton
Relinquished by:	Date/Time:	Company	Received by:
Relinquished by:	Date/Time:	Company	Received by:

Date/Time	Company
10/4/14 0945	TA-Canton

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

J42714

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.4
Client Contact: Todd Aebie	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com		Page: Page 4 of 5
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
SB-12 (8-10) Validate	10.2.14	1655	G	Solid	N	N	✓								✓		
SB-10 (10-12)		1620		Solid			✓								✓		
SB-16 (0-1)		1800		Solid			✓		✓	✓			✓		✓		
SB-16 (2-4)		1800		Solid			✓								✓		
~~SB-18 (0-1)~~ CR ~~SS-18 (0-1)~~	10.3.14	0715		Solid			✓		✓	✓			✓		✓		
~~SS-27 (0-1)~~		0720		Solid			✓		✓	✓			✓		✓		
~~SS-27 Deep (10-12)~~		0810		Solid			✓								✓		
SS-27 Deep (16-18) Validate		0800		Solid			✓								✓		
SS-21 (0-1)		0820		Solid			✓		✓	✓			✓		✓		
DUP-08		0840		Solid			✓								✓		
SS-21 Deep (14-16)		0845		Solid			✓								✓		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 10/4/14 0945	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

J42714

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information			
Client Contact: Todd Aebie	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):
Company: ARCADIS U.S., Inc.	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com	COC No: 240-23696-10309.5
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:		Page: Page 5 of 7 5
City: Columbus	TAT Requested (days):		Job #:
State, Zip: OH, 43235			
Phone: 614-764-2310(Tel)	PO #: OH003003.0002		
Email: todd.aebie@arcadis-us.com	WO #:		
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621		
Site:	SSOW#:		

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8316A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
SS-21 Deep (4-6) V-Update	10.3.14	0850	G	Solid	N	Y	✓								✓		MS/MSD
				Solid													
				Solid													
JF				Solid													
				Solid													
10/3/14				Solid													
				Solid													
				Solid													
				Solid													
				Solid													
				Solid													

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			Debora Clinton	10/4/14 0945	TA-Canton
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

J42754

0.8, 0.8, 4.2, 1.2

TestAmerica

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

Client Information			
Client Contact: Todd Aebie	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):
Company: ARCADIS U.S., Inc.	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com	COC No: 240-23696-10309.6
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:		Page: ~~Page 6 of 7~~ 1 of 2
City: Columbus	TAT Requested (days):		Job #:
State, Zip: OH, 43235			
Phone: 614-764-2310(Tel)	PO #: OH003003.0002		
Email: todd.aebie@arcadis-us.com	WO #:		
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621		
Site:	SSOW#:		

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8316A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH					Total Number of containers	Special Instructions/Note:
			Preservation Code				N	N	N	N	A	N	N	D	N						
SS-25 Validate	10.6.14	1410	G	Solid	N	N	✓		✓	✓			✓		✓						
~~SS-28~~		1415		Solid			✓		✓	✓			✓		✓						
~~SS-26~~		1405		Solid			✓		✓	✓			✓		✓						
~~SS-11~~		1400		Solid			✓		✓	✓			✓		✓						
~~SS-10~~		1355		Solid			✓		✓	✓			✓		✓						
SS-22 Validate		1350		~~Water~~			✓		✓	✓			✓		✓						
SS-13		1100		~~Water~~			✓		✓	✓			✓		✓						
SS-14		1105		~~Water~~			✓		✓	✓			✓		✓						
SS-16		1120		~~Water~~			✓		✓	✓			✓		✓						
SS-15		1115		~~Water~~			✓		✓	✓			✓		✓						
Trip Blank		—		Water																	

Page 3060 of 3069

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			Nakata Duzon	10-7-14 9:30	TA-Canton
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

J42754

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

0.8, 0.8, 4.2, 1.2

TestAmerica

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Client Contact: Todd Aebie	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com		Page: ~~Page 6 of 7~~ 2 of 2
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	6016C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	TPH - Full scan	8260 - BTEX, MTBE	PCBs	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N					
SS-EQB-01	10.6.14	0800	C	Solid	N	N	✓		✓		✓		✓	✓	✓	✓	✓	✓		
SS-EQB-02		0900		Solid			✓								✓					
SS-EQB-05		1000		Solid			✓								✓					
SS-EQB-06		1200		Solid			✓								✓					
				Solid																
				Water																
				Water																
				Water																
				Water																
				Water																
				Water																

Valid All

CR

Page 3061 of 3069

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by: Dakota Durham	Date/Time: 10-7-14 9:50	Company TA-Canton
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

J42796

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

1.8, 1.0, 0.4

Chain of Custody Record

TestAmerica

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Client Contact: Todd Aebie	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com		Page: Page ~~8 of 7~~ of 2
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
~~SW-01~~	10.7.14	0815	G	W ~~Solid~~	N	N	✓		✓			✓	✓		✓		
~~SW-02~~	10.7.14	0900	G	W ~~Solid~~			✓		✓			✓	✓		✓		
SED-01 Validate	10.7.14	0800	G	Solid			✓		✓	✓			✓		✓		
SED-02	10.7.14	0845	G	Solid			✓		✓	✓			✓		✓		
SS-23	10.7.14	1000	G	Solid			✓		✓	✓			✓		✓		
SS-24	10.7.14	0930	G	S ~~Water~~			✓		✓	✓		JF	✓		✓		
MW-10 (0-1)	10.7.14	1100	G	S ~~Water~~			✓		✓	✓		MK	✓		✓		
MW-10 (20-22)	10.7.14	1115	G	S ~~Water~~			✓								✓		
MW-10 (34-36)	10.7.14	1130	G	S ~~Water~~			✓								✓		
MW-8 (0-1)	10.7.14	1430	G	S ~~Water~~	✓	✓	✓		✓	✓			✓		✓		
MW-8 (12-14)	10.7.14	1440	G	S ~~Water~~	✓	✓	✓								✓		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 10.8.14 9:15	Company TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

J42796

TestAmerica

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Client Contact: Todd Aebie	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com		Page: Page ~~6 of 7~~ 2 of 2
Company: ARCADIS U.S., Inc.				Job#:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8316A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	N	N	N	N	A	N	N	D	N	X	
MW-8(36-38) Validate	10.7.14	1450	G	~~Solid~~ S	N	N	✓								✓		
				Solid													
				Solid													
				Solid													
				Solid													
				Water													
				Water													
				Water													
				Water													
				Water													
				Water													

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			[signature]	10-8-14 9:5	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

J42852

TestAmerica

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

1,4,1,6

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Client Contact: Todd Aebie	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com		Page: ~~Page 6 of 7~~ 1 of 2
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (Alt An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead) Calcium	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
SB-13 (0-1) Validate	10.8.14	1015	G	Solid	N	N	✓		✓	✓		✓	✓	✓	✓		
SB-14 (0-1)		1000		Solid			✓		✓	✓		✓	✓	✓	✓		
SB-26-CS		1105		Solid			✓		✓	✓		✓	✓	✓	✓		
SB-23-CS		1050		Solid			✓		✓	✓		✓	✓	✓	✓		
MW-9 (22-24)		1130		Solid			✓								✓		
MW-9 (12-14)		1100		Water			✓								✓		
MW-9 (0-1)		1050		Water			✓		✓	✓		✓	✓	✓	✓		
~~SB-40 (0-1)~~		1345		Water			✓		✓	✓		✓	✓	✓	✓		
SED-03		1430		Water			✓		✓	✓		✓	✓	✓	✓		
SW-03		1440		Water			✓		✓	✓		✓	✓	✓	✓		
MW-11 (0-1)		1545		Water			✓		✓	✓		✓	✓	✓	✓		

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month): ☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			[signature]	10.9.14 920	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

J42852

TestAmerica

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

Client Information	Sampler: Josh Terry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Client Contact: Todd Aebie	Phone: (423) 754-9835	E-Mail: mark.loeb@testamericainc.com		Page: Page 6 of 7 2 of 2
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8016D_DAI, 8015D_DAI_G	8010C, 8270D, 9056A_28D	VFA_JC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH					Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N						
MW-11 (8-10) Validate	10.8.14	1550	G	Solid	N	N	✓								✓						
MW-11 (38-40) ↓	10.8.14	1550	G	Solid			✓								✓						
				Solid																	
				Solid																	
				Solid																	
				Water																	
				Water																	
				Water																	
				Water																	
				Water																	
				Water																	

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

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Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			[signature]	10-9-14 920	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

4.0

J43106

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information				
Client Contact: Todd Aebie	Sampler: Chris Richardson	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Company: ARCADIS U.S., Inc.	Phone: 276.245.0953	E-Mail: mark.loeb@testamericainc.com		Page: Page 6 of 7
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			Job #:
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	8010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (total Calcium	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
EQB-09	10.14.14	1530	C	W ~~Solid~~	N	N	✓		✓	X		✓	✓	✓	✓		No Aldehyde
EQB-10	10.14.14	1600	C	W ~~Solid~~	N	N	✓		✓	X		✓	✓	✓	✓		No Aldehyde
EQB-11	10.14.14	1700	C	W ~~Solid~~	N	N	✓		✓			✓	✓	✓	✓		
				Solid													
				Solid													
				Water													
				Water													
				Water													
				Water													
				Water													
				Water													

Validate All

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

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☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 10/14/14 9:15	Company TAL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

1.2, 0.6, [illegible]

J43107

TestAmerica

Client Information	Sampler: Bill Sharp	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Client Contact: Todd Aebie	Phone: (276) 492-3329	E-Mail: mark.loeb@testamericainc.com		Page: Page 6 of 1
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

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A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
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			Preservation Code:				N	N	N	N	A	N	N	D	N		
MW-13 (0-1)	10.14.14	1100	G	Solid	N	N	✓		✓	✓			✓		✓		
MW-13 (12-14)	10.14.14	1115	G	Solid	N	Y	✓								✓		MS/MSD
MW-13 (18-20)	10.14.14	1130	G	Solid	N	N	✓								✓		
DUP-08	10.14.14		G	Solid	N	N	✓								✓		
DUP-09	10.14.14		G	Solid	N	N	✓								✓		
MW-3A (0-1)	10.14.14	1645	G	~~Water~~ Sol. d	N	N	✓		✓	✓			✓		✓		
MW-3A (6-8)	10.14.14	1700	G	~~Water~~ Sol. d	N	Y	✓								✓		MS/MSD
MW-3A (12-14)	10.14.14	1715	G	~~Water~~ Sol. d	N	N	✓								✓		
				Water													
				Water													
				Water													

Validate All

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Bill Sharp	10-14-14 1830	ARCADIS	Fed Ex Drop off	10-14-14 1830	Fed EX
				10-15-14 915	TA

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

J43111

2.4

TestAmerica

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):
Client Contact: Todd Aebie	Phone: (423) 794-9835	E-Mail: mark.loeb@testamericainc.com	COC No: 240-23696-10309.7
Company: ARCADIS U.S., Inc.			Page: Page ~~7 of 7~~ 1 of 1
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:		Job #:
City: Columbus	TAT Requested (days):		
State, Zip: OH, 43235			
Phone: 614-764-2310(Tel)	PO #: OH003003.0002		
Email: todd.aebie@arcadis-us.com	WO #:		
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621		
Site:	SSOW#:		

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			Preservation Code:				N	N	N	N	A	N	N	D	N		
MW-12 (0-1)	10/13/14	1400	G	S ~~Water~~	N	N	✓		✓	✓			✓	✓	✓		
MW-12 (10-12)	↓	1500	↓	S ~~Water~~	↓	Y	✓								✓		MS/MSD
MW-12 (34-36)		1545		S ~~Water~~		N	✓								✓		
DUP-07		→		S ~~Water~~		↓	✓								✓		
SS-EQB-08	↓	1600	↓	Water	↓	↓	✓								✓		

JF
10/13/14

Valid
AM

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 10/15/14 9:15am	Company TA Canton
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record U.8

J43111

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.7
Client Contact: Todd Aebie	Phone: (423) 794-9838	E-Mail: mark.loeb@testamericainc.com		Page: Page ~~7 of 7~~ 1 of 1
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead, Calcium	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
MW-12 (0-1)	10/13/14	1400	G	S ~~Water~~	N	N	✓		✓	✓			✓	✓	✓		
MW-12 (10-12)	↓	1500	↓	S ~~Water~~	↓	Y	✓								✓		MS/MSD
MW-12 (34-36)		1545		S ~~Water~~		N	✓								✓		
DUP-07		→		S ~~Water~~		↓	✓								✓		
SS-EQB-08	↓	1600	↓	water	↓	↓	✓								✓		

JF
10/13/14

Validate
AH

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			Jakob Dunn	10-14 9:40	TA-Canton
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

1.2, 2.2

J 43172

TestAmerica

Client Information	Sampler: Chris Richardson	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Client Contact: Todd Aebie	Phone: 276. 245. 0953	E-Mail: mark.loeb@testamericainc.com		Page: Page ~~6 of 7~~ 1 of 1
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	8010C, 8270D, 8056A_28D	VFA_IC - Standard VFA Compounds	8316A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	8056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
~~SB-43 (0-1)~~	10.15.14	0950	G	Solid	N	N	✓		✓	✓			✓	✓	✓		
~~SB-43 (6-8)~~		1045		Solid	N	Y	✓								✓		MS/MSD
SB-43 (22-24) Validate		1100		Solid	N	N	✓								✓		
DUP-10		1100		Solid	N	N	✓								✓		
EQB-12		0800		~~W-Solid~~	N	N	✓								✓		
SB-44 (0-1)		1345		S ~~Water~~	N	N	✓		✓	✓			✓	✓	✓		
SB-44 (10-12)		1515		S ~~Water~~	N	Y	✓								✓		MS/MSD
SB-44 (18-20)		1530		S ~~Water~~	N	N	✓								✓		
DUP-11		1530		S ~~Water~~	N	N	✓								✓		
				S ~~Water~~													
				S ~~Water~~													

Page 1846 of 1852

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			Sandra Stevens	10-16-14 9:20	TA-Canton
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

0.8, 1.8, 2.8

J43252

TestAmerica

Client Information

Client Contact: Todd Aebie
Company: ARCADIS U.S., Inc.
Address: 100 E. Campus View Blvd Suite 200
City: Columbus
State, Zip: OH, 43235
Phone: 614-764-2310(Tel)
Email: todd.aebie@arcadis-us.com
Project Name: Freedom Industries - Soil Investigation
Site:

Sampler: Chris Richardson
Phone: 276.245.0953
Lab PM: Loeb, Mark J
E-Mail: mark.loeb@testamericainc.com
Carrier Tracking No(s):
COC No: 240-23696-10309.6
Page: Page ~~6 of 7~~ 1 of 1
Job #:

Due Date Requested:
TAT Requested (days):
PO #: OH003003.0002
WO #:
Project #: 24012621
SSOW#:

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=soil, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	8010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8316A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
CV-Footing Validate	10.16.14	0735	G	~~W Solid~~	N	N									✓		
Sump-2		0730		~~W Solid~~	N	N									✓		
Treat-1V		0745		~~W Solid~~	N	N									✓		
SB-46 (0-1)		0800		Solid	N	N	✓		✓	✓			✓	✓	✓		
Treat-2V		0750		~~W Solid~~	N	N									✓		
~~SB-45 (0-1)~~		0945		~~S Water~~	N	N	✓		✓	✓			✓	✓	✓		
~~SB-45 (12-14)~~		0950		~~S Water~~	N	Y	✓								✓		MS/MSD
~~SB-45 (14-16)~~ Validate		0955		~~S Water~~	N	N	✓								✓		
DUP-12 Validate		0955		Water	N	N	✓								✓		
				Water													
				Water													

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested: I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by: Date: Time: Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by: Denny Bruna	Date/Time: 10/17/14 0930	Company: TA Can
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

J433386

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

2.4, 1.2, 1.0, 1.2

TestAmerica

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309 6
Client Contact: Todd Aebie	Phone: 276.245.0953	E-Mail: mark.loeb@testamericainc.com		Page: Page 6 of 7
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries ~~Soil Investigation~~	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8315A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead) Calcium	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
MW-3A Validate	10 21.14	1045	G	W ~~Solid~~	N	Y											MS/MSD
DUP-02		1045	G	W ~~Solid~~	N	N											
MW-3		1400	G	W ~~Solid~~	N	N											
MW-4		1510	G	W ~~Solid~~	N	N											
MW-13		0915	G	W ~~Solid~~	N	Y											MS/MSD
MW-8S		0800	G	Water	N	N											See Below
DUP-01		0915	G	Water	N	N											
MW-6		1620	G	Water	N	N											
MW-5		1530	G	Water	N	N											MCHM/PPH, Then what you can get
				Water													
				Water													

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by	Date/Time:	Company	Received by:	Date/Time: 1022AM 9.10	Company JA
Relinquished by	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks

J43386

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Nashville

Chain of Custody Record

TestAmerica

Client Information	Sampler: Josh Ferry	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309 6
Client Contact: Todd Aebie	Phone: 276.245.0953	E-Mail: mark.loeb@testamericainc.com		Page: Page 6 of 7
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries ~~- Soil Investigation~~	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaC2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	8010C, 8270D, 9056A_28D	VFA_IC - Standard VFA Compounds	8315A - Aldehydes	8016C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N		
MW-3A Validate	10 21.14	1045	G	W ~~Solid~~	N	Y				/						4	MS/MSD
DUP-02		1045	G	W ~~Solid~~	N	N				/						2	
MW-3		1400	G	W ~~Solid~~	N	N				/						2	
MW-4		1510	G	W ~~Solid~~	N	N				/						2	
MW-13		0915	G	W ~~Solid~~	N	Y				/						4	MS/MSD
CR ~~MW-8S~~		~~0800~~	~~G~~	Water	N	N											
DUP-01		0915	G	Wate	N	N				/						2	
MW-6		1620	G	Water	N	N				/						2	
CR ~~MW-5~~		~~1530~~	~~G~~	~~Water~~	~~N~~	~~N~~											
				Water													
				Water													

Loc: 240
43386

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			0.2, 1.6	10-22-14 08:30	TAN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☐ Yes ☐ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks

TestAmerica Canton
4101 Shuffel Street, N. N.

North Canton, OH 44720
Phone: 330.497.9396 Fax: 330.497.0772

Chain of Custody Record

1.8 039293

J44442

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.
TAL-8210 (0713)

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other:

Client Contact	Project Manager: Jason Manzo	Site Contact: Todd Arbie	Date: 11/13/14	COC No:
Company Name: ARCADIS	Tel/Fax: 614-985-9100	Lab Contact: Mark Cocks	Carrier: FedEx	1 of 1 COCs
Address: 100 E. Campus View Blvd	Analysis Turnaround Time			Sampler:
City/State/Zip: Columbus, Ohio 43235	☐ CALENDAR DAYS ☒ WORKING DAYS			For Lab Use Only:
Phone: 614-985-9100	TAT if different from Below _____			Walk-in Client:
Fax: 614-985-9170	☒ 2 weeks			Lab Sampling:
Project Name: Freedom	☐ 1 week			
Site: Freedom	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	MCHM + PPL													Sample Specific Notes:
Diversion Trench Soil 2 Validate	11/13/14	1100	Comp	S	2	N	N	Y													Ice to 4°C
Diversion Trench Soil 3	↓	1115	Comp	S	2	N	N	Y													
Diversion Trench Soil 4	↓	1130	Comp	S	2	N	N	Y													
Diversion Trench Water 2	11/13/14	1200	Grab	W	2	N	N	Y													1-Week TAT

Page 1 of 302

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: 252609 & 252610 | Cooler Temp. (°C): Obs'd: _____ Corr'd: _____ Therm ID No.: _____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Todd J Arbie	ARCADIS	11/13/14 1600	Jakob Owens	TA Canton	11-14-14 10:10
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

J45092

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

1.0, 2.0, 0.4

TestAmerica

Client Information	Sampler: Chris Richardson	Lab PM: Loeb, Mark J	Carrier Tracking No(s):	COC No: 240-23696-10309.6
Client Contact: Todd Aebie	Phone: 270.245.0953	E-Mail: mark.loeb@testamericainc.com		Page: Page 6 of 7 1 of 1
Company: ARCADIS U.S., Inc.				Job #:
Address: 100 E. Campus View Blvd Suite 200	Due Date Requested:			
City: Columbus	TAT Requested (days):			
State, Zip: OH, 43235				
Phone: 614-764-2310(Tel)	PO #: OH003003.0002			
Email: todd.aebie@arcadis-us.com	WO #:			
Project Name: Freedom Industries - Soil Investigation	Project #: 24012621			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Validate

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015D_DAI, 8015D_DAI_G	6010C, 8270D, 9056A_28D	VFA_JC - Standard VFA Compounds	8315A - Aldehydes	8015C_GRO, 8260C	8316A - (MOD) Carbonyl Compounds by HPLC (All An	9056A_28D - Chloride	6010C - (MOD) Metals (Lead)	8270D - MCHM & PPH					Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	A	N	N	D	N						
SB-20 (2-3) CS2	12.4.14	1100	G	Solid	N	N															
MW-3	12.4.14	1030	G	W ~~Solid~~	N	N									X						
MW-3A	12.4.14	0925	G	W ~~Solid~~	N	Y	X		X				X	X	X						MS/MSD
MW-13	12.4.14	0825	G	W ~~Solid~~	N	N	X		X				X	X	X						
DUP-1	12.4.14	0825	G	W ~~Solid~~	N	N	X		X				X	X	X						
				Water																	
				Water																	
				Water																	
				Water																	
				Water																	
				Water																	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

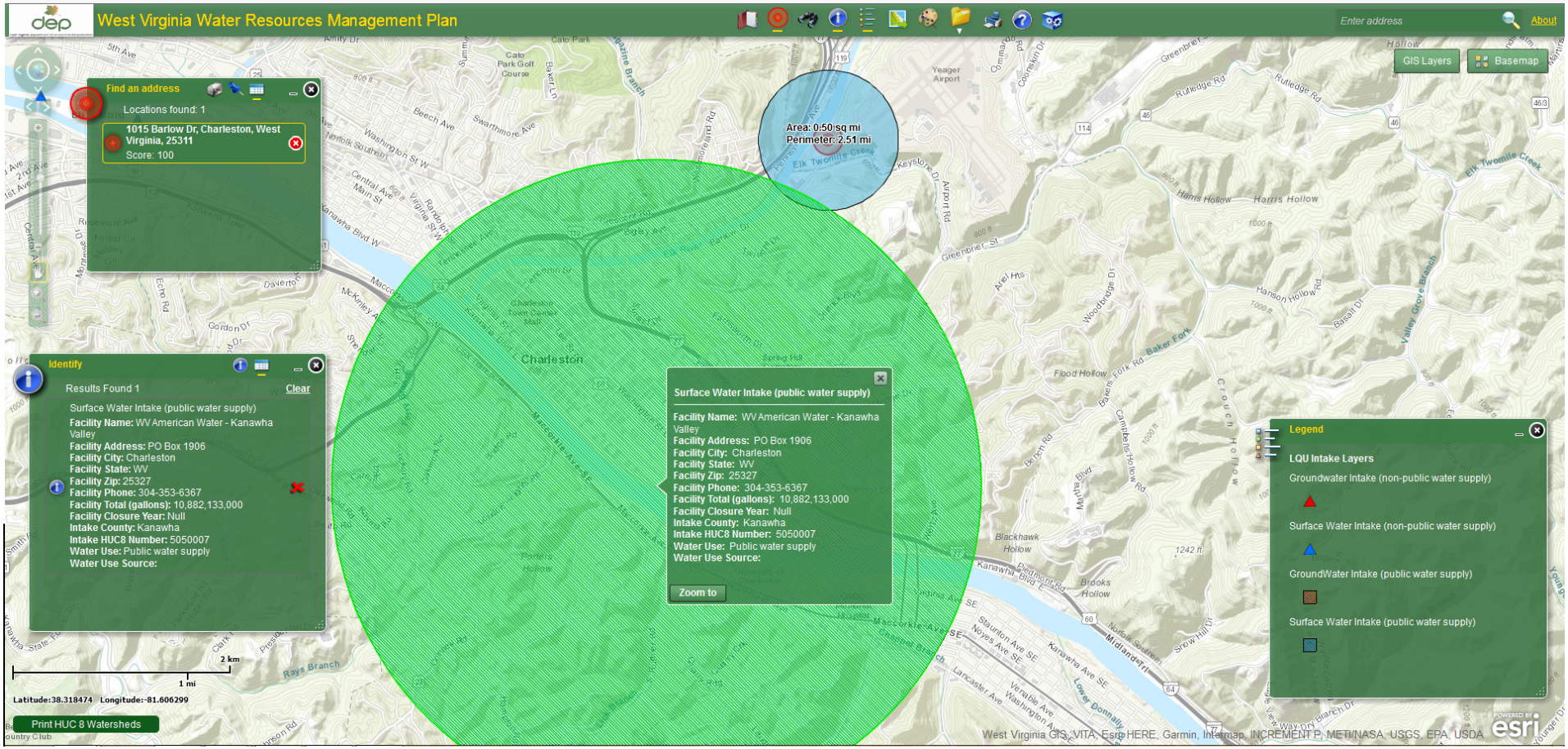
Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:			
Relinquished by: [signature]	Date/Time: 12/4/14 1200	Company	Received by: [signature]	Date/Time: 12-5-14 1820	Company TA	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company	

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

Attachment 2

Groundwater and Surface Water Intake Search


West Virginia Water Resources Management Plan
Enter address
About
GIS Layers
Basemap
Find an address
Locations found: 1
1015 Barlow Dr, Charleston, West Virginia, 25311
Score: 100
Area: 0.50 sq mi
Perimeter: 2.51 mi
Identify
Results Found 1
Clear
Surface Water Intake (public water supply)
Facility Name: WV American Water - Kanawha Valley
Facility Address: PO Box 1906
Facility City: Charleston
Facility State: WV
Facility Zip: 25327
Facility Phone: 304-353-6367
Facility Total (gallons): 10,882,133,000
Facility Closure Year: Null
Intake County: Kanawha
Intake HUC8 Number: 5050007
Water Use: Public water supply
Water Use Source:
Surface Water Intake (public water supply)
Facility Name: WV American Water - Kanawha Valley
Facility Address: PO Box 1906
Facility City: Charleston
Facility State: WV
Facility Zip: 25327
Facility Phone: 304-353-6367
Facility Total (gallons): 10,882,133,000
Facility Closure Year: Null
Intake County: Kanawha
Intake HUC8 Number: 5050007
Water Use: Public water supply
Water Use Source:
Zoom to
Legend
LQU Intake Layers
Groundwater Intake (non-public water supply)
Surface Water Intake (non-public water supply)
GroundWater Intake (public water supply)
Surface Water Intake (public water supply)
Charleston
2 km
1 mi
Latitude:38.318474 Longitude:-81.606299
Print HUC 8 Watersheds
West Virginia GIS, VITA, Esri, HERE, Garmin, Intermap, INCREMENT P, METI/NASA, USGS, EPA, USDA
esri

12-12-17

Attachment 3

Calculated Uniform Standards for MCHM and PPH

TECHNICAL MEMORANDUM

CALCULATION OF SOIL AND GROUNDWATER SITE-SPECIFIC SCREENING VALUES FOR 4-METHYLCYCLOHEXANEMETHANOL (MCHM) FREEDOM INDUSTRIES SITE - CHARLESTON, WEST VIRGINIA

January 20, 2016

1.0 INTRODUCTION

This technical memorandum has been prepared by RBR Consulting, Inc. for the Freedom Industries site located in Charleston, West Virginia (site). Specifically, this memorandum presents the calculation of soil and groundwater site-specific screening values for 4-methylcyclohexanemethanol (MCHM). The site-specific screening values are incorporated into the non-residential human health risk assessment of the site.

2.0 SITE-SPECIFIC SCREENING VALUE FOR NON-RESIDENTIAL SOIL

A *de minimis* value for industrial soil is not available for MCHM. Therefore, a standard was calculated for this constituent using the outdoor worker soil land use equation as presented in Section 4.3.1 of the United States Environmental Protection Agency (USEPA) Regional Screening Level Table User's Guide (USEPA, 2015), which applies to non-carcinogenic constituents. The USEPA equations are used to be consistent with current recommendations from WVDEP.

2.1 Equation and Input Assumptions

The equation below was used to calculate a site-specific screening value for non-residential soil. The input factors and exposure assumptions used in the calculation are based on WVDEP (2012) recommended values. Toxicity values were derived as described in Section 2.2 below. The equation was modified to account for the fact that MCHM is not sufficiently volatile; as such, the inhalation of volatiles component of the soil equation is not included. The inhalation of particulates component of the equation was included however.

$$SL\ (mg/kg) = \frac{1}{\dfrac{EF \times ED \times (1/RfD \times IR \times 1E\text{-}6)}{THQ \times AT \times BW} + \dfrac{EF \times ED \times (1/RfD \times GIABS \times SA \times AF \times ABS \times 1E\text{-}6)}{THQ \times AT \times BW} + \dfrac{EF \times ED \times (ET/24 \times 1/RfC \times 1/PEF)}{THQ \times AT}}$$

Each of the input factors included in this equation is described below.

SL Screening level in soil (mg/kg).

THQ Target Hazard Quotient (unitless): The THQ is the default value of 1 as per the WVDEP (1997).

BW Body Weight (kg): The default value for the average body weight of an adult is 70 kg based on WVDEP (2012).

AT Averaging Time (days): The doses for noncarcinogenic health effects are averaged over the specific period of exposure for a given receptor. Noncarcinogenic averaging times are, therefore, calculated by multiplying the exposure duration for the receptor by 365 days/year. For this evaluation the exposure duration is 25 years, resulting in an averaging time of 9125 days (WVDEP, 2012).

EF Exposure Frequency – occupational (days/yr): Default exposure factors for industrial workers are provided by WVDEP (2012). Exposure frequency for the worker is 5 days per week for 50 weeks a year, or 250 days per year.

ED Exposure Duration – occupational (yrs): The exposure duration for industrial workers is 25 years (WVDEP, 2012).

IR Soil Ingestion Rate – occupational (mg/day): The WVDEP (2012) recommended value of 50 mg/day is used to describe soil ingestion for a worker not involved in construction or intrusive activities.

RfD Oral Reference Dose (mg/kg-day): The derivation of the RfD in units of (mg/kg-day) is described in the following subsection.

GIABS Gastrointestinal Absorption Factor (unitless): The GIABS is the default value of 1 as per USEPA (2015).

SA Surface Area (cm^2): The SA used in this evaluation is 3,300 cm^2 as presented in the WVDEP Exposure Assumptions Spreadsheet (WVDEP, 2012).

AF Adherence Factor (mg/cm^2): The AF used in this evaluation is 0.20 mg/cm^2 as presented in the WVDEP Exposure Assumptions Spreadsheet (WVDEP, 2012).

ABS Absorption Factor (unitless): The ABS is the default value of 0.1 for semivolatiles as per USEPA (2015).

PEF Particulate Emission Factor (m^3/kg): The PEF used in this evaluation is the default value of 1.316×10^9 m^3/kg as presented in Appendix D of the WVDEP (2001) Guidance Manual and the Exposure Assumptions Spreadsheet (WVDEP, 2012).

ET Exposure Time (hrs): Inhalation exposures are calculated over the specific daily amount of time during which the receptor is exposed to airborne concentrations of constituents. The industrial worker is assumed to be present and subject to inhalation exposure from soil for 8 hours (WVDEP 2012). In the equation, this value is divided by 24 hours/day.

RfC Inhalation Reference Concentration (mg/m^3): The derivation of the inhalation reference concentration is described in the following subsection.

2.2 Toxicity Values for MCHM

For the purposes of calculating a site-specific screening value, toxicity values have been developed from the primary scientific research literature for MCHM. All available data were reviewed in order to determine the most appropriate studies to use for reference dose calculations. For the oral reference dose (RfD), the four-week toxicity study by Hosenfeld (1990) was chosen. This study had the longest duration of the applicable studies, and the results were supported by recent studies conducted by the NTP (2014, 2015a). In the Hosenfeld (1990) study, rats were dosed with MCHM in corn oil for five days. Doses were either 200, 400, or 800 mg/kg/day. Results of this study indicate that the lowest-observed-adverse-effect level (LOAEL) was 400 mg/kg-day and the no-observed-effect level (NOEL) was 100 mg/kg-day (Hosenfeld, 1990).

Using the NOEL value of 100 mg/kg-day and dividing by an extremely conservative uncertainty factor of 10,000 based on the following rationale:

- 10 for interspecies variability;

- 10 for intraspecies variability (human-to-human and consideration of the possible effects on sensitive subpopulations);
- 10 for database incompleteness; and
- 10 for the use of a subchronic study to model a potential chronic exposure

results in a chronic oral RfD of 0.01 mg/kg-day.

The inhalation reference concentration (RfC) was derived using the following equation presented by USEPA (2009):

$$RfC = RfD \times (BW / IR)$$

Where:

RfC = Reference Concentration (mg/m^3)

RfD = Oral Reference Dose (mg/kg-day)

BW = Body weight (70 kg for an adult)

IR = Inhalation Rate (20 m^3/day for an adult)

Applying these factors, the chronic inhalation RfC for MCHM calculates to be 0.035 mg/m^3.

It should be noted that none of the toxicological studies available are of sufficient duration to accurately simulate lifetime durations of exposure by themselves. In order to address the time duration, an uncertainty factor of 10 which results in an extremely conservative uncertainty factor of 10,000 for the calculation is included in the derivation of the chronic values. Should a chronic study for MCHM become available, the analysis will be revisited.

2.3 Final Non-Residential Soil Site-Specific Screening Value

The toxicity values presented in Section 2.2 and the WVDEP exposure factors described in Section 2.1 were incorporated into the outdoor worker soil land use equation as presented in Section 4.3.1 of the USEPA Regional Screening Level Table User's Guide (USEPA, 2015). The resulting non-residential soil site-specific screening value for MCHM is calculated to be 8.81E+3 mg/kg.

3.0 SITE-SPECIFIC SCREENING VALUE FOR GROUNDWATER

A site-specific groundwater screening value for MCHM was calculated using the tapwater equation as presented in Section 4.8.1 of the USEPA Regional Screening Level Table User's Guide (USEPA, 2015), incorporating the toxicity values described above in Section 2.2. Consistent with WVDEP protocol, the dermal pathway component of the groundwater equation is not included. Additionally, to account for the fact that MCHM is not sufficiently volatile, the inhalation component of the groundwater equation is not included.

$$SL\ (ug/L) = \frac{THQ \times AT \times BW \times 1000}{EF \times ED \times (1/RfD \times IRW)}$$

The parameters THQ and RfD were described previously in Section 2. The additional input factors included in this equation are described below.

SL Screening level in water (ug/L).

EF Exposure Frequency – residential (days/yr): Exposure frequency for a residential child is 350 days per year (WVDEP, 2012).

ED Exposure Duration – residential (yrs): The exposure duration for a residential child is 6 years (WVDEP, 2012).

AT Averaging Time (days): Because the exposure duration for a resident is 6 years, the averaging time is 2,190 days (WVDEP, 2012).

IRW Water Ingestion Rate – child (L/day): The WVDEP (2012) recommended ingestion rate for a residential child is 1 L/day.

The toxicity values and WVDEP exposure factors were incorporated into the tapwater equation as presented in Section 4.8.1 of the USEPA Regional Screening Level Table User's Guide (USEPA, 2015). The groundwater site-specific screening value for MCHM is calculated to be 156 ug/L.

4.0 SITE-SPECIFIC SCREENING VALUE FOR SOIL MIGRATION TO GROUNDWATER

A site-specific migration to groundwater screening value for MCHM was calculated using Equation D-11 of the VRRA Guidance Manual (WVDEP, 2001). This equation is consistent with the Method 1 partitioning

equation for migration to groundwater as presented in Section 4.12.3 of the USEPA Regional Screening Table User's Guide (USEPA, 2015).

First, a target soil leachate concentration must be calculated by multiplying the acceptable groundwater concentration (i.e., calculated site-specific groundwater screening value) by the dilution factor. The WVDEP (2001) default value of 20 was used for the dilution factor. Using the calculated site-specific groundwater screening value of 156 ug/L (0.156 mg/L) identified above in Section 3.0 and a dilution factor of 20, the target soil/water leachate concentration is 3.12 mg/L.

The partition equation (Equation D-11) below was then used to calculate the total soil concentration corresponding to the soil leachate concentration identified above.

$$\textit{Screening Level in Soil (mg/kg)} = C_w [K_d + \frac{(\theta_w + \theta_a H')}{\rho_b}]$$

Each of the input factors included in this equation is described below.

C_w Target soil leachate concentration (mg/L). The target soil leachate concentration is 3.12 mg/L as calculated above.

K_d Soil/water partition coefficient (L/kg). The value for K_d is calculated using the equation (K_{oc} x f_{oc}) based on WVDEP (2001). Using the K_{oc} and f_{oc} values below, the calculated Kd value used in this evaluation is 0.068 L/kg.

K_{oc} Soil organic carbon/water partition coefficient (L/kg), chemical-specific. For this evaluation, a K_{oc} value of 34 L/kg was used, which was obtained from the TOXNET Hazardous Substances Data Bank (HSDB) records for MCHM (NIH, 2016).

F_{oc} Fraction organic carbon in soil (g/g). The default value for F_{oc} is 0.002 g/g based on WVDEP (2001).

θ_w Water-filled soil porosity (L_{water}/L_{soil}). The default value for θ_w is 0.3 L_{water}/L_{soil} based on WVDEP (2001).

θ_a Air-filled soil porosity (L_{air}/L_{soil}). The value for θ_a is calculated using the equation (n - θ_w) based on WVDEP (2001). Using the calculated n value below and the default θ_w value identified above, the calculated θ_a value used in this evaluation is 0.13 L_{air}/L_{soil}.

ρ_b Dry soil bulk density (kg/L). The default value for ρ_b is 1.5 kg/L based on WVDEP (2001).

n Soil porosity (L_{pore}/L_{soil}). The value for n is calculated using the equation (1-(ρ_b / ρ_s)) based on WVDEP (2001). Using the default values for ρ_b and ρ_s, the calculated n value of 0.43 L_{pore}/L_{soil} is used in this evaluation.

ρ_s Soil particle density (kg/L). The default value for ρ_s is 2.65 kg/L based on WVDEP (2001).

H' Dimensionless Henry's law constant, chemical-specific. For this evaluation, a H' value of 2.62×10^{-4} was used, which was converted from the value of 6.4×10^{-6} atm-cu m/mole presented in the TOXNET HSDB records for MCHM (NIH, 2016).

The input factors above were incorporated into the Equation D-11 of the WVDEP (2001) Guidance Manual. The site-specific soil migration to groundwater screening value for MCHM is calculated to be 0.84 mg/kg.

5.0 SUMMARY

Soil and groundwater *de minimis* values are not available from WVDEP for MCHM. This memorandum presented the calculation of extremely conservative site-specific screening values for this constituent. The non-residential soil site-specific screening value for MCHM is calculated to be 8.81E+3 mg/kg and the groundwater site-specific screening value is 156 ug/L. The site-specific soil migration to groundwater screening value is calculated to be 0.84 mg/kg.

6.0 REFERENCES

Hosenfeld, R. S. (1990) Four-Week Oral Toxicity Study of 4-Methylcyclohexane Methanol in the Rat. Toxicological Science Laboratory, Health and Environmental Laboratories. Eastman Kodak Company. April 3, 1990.

National Institutes of Health (NIH, 2016) TOXNET Hazardous Substances Database (HSDB) records for MHCM. Available at http://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?./temp/~zCrLeK:1

National Toxicological Program (NTP; 2014) West Virginia Chemical Spill: Prenatal Developmental Toxicity Evaluation, December 2014 NTP Update.

National Toxicological Program (NTP; 2015a) West Virginia Chemical Spill: Prenatal Developmental Toxicity Evaluation, June 2015 NTP Update.

United States Environmental Protection Agency (USEPA; 2009) Risk Assessment Guidance For Superfund (RAGS) Volume I: Human Health Evaluation Manual; Part F: Supplemental Guidance for Inhalation Risk Assessment. EPA-540-R-070-002. January.

United States Environmental Protection Agency (USEPA; 2015) Regional Screening Level Table User's Guide. November 2015 Update.

West Virginia Department of Environmental Protection (WVDEP; 2001) West Virginia Voluntary Remediation and Redevelopment Act – Guidance Manual, Version 2.1. March 13.

West Virginia Department of Environmental Protection (WVDEP; 2012) WVDEP-Approved Exposure Assessments Spreadsheet. January 2012.

TECHNICAL MEMORANDUM

CALCULATION OF SOIL AND GROUNDWATER SITE-SPECIFIC SCREENING VALUES FOR PROPYLENE GLYCOL PHENYL ETHER (PPH) FREEDOM INDUSTRIES SITE - CHARLESTON, WEST VIRGINIA

January 20, 2016

1.0 INTRODUCTION

This technical memorandum has been prepared by RBR Consulting, Inc. for the Freedom Industries site located in Charleston, West Virginia (site). Specifically, this memorandum presents the calculation of soil and groundwater site-specific screening values for propylene glycol phenyl ether (PPH). The site-specific screening values are incorporated into the non-residential human health risk assessment of the site.

2.0 SITE-SPECIFIC SCREENING VALUE FOR NON-RESIDENTIAL SOIL

A *de minimis* value for industrial soil is not available for PPH. Therefore, a standard was calculated for this constituent using the outdoor worker soil land use equation as presented in Section 4.3.1 of the United States Environmental Protection Agency (USEPA) Regional Screening Level Table User's Guide (USEPA, 2015), which applies to non-carcinogenic constituents. The USEPA equations are used to be consistent with current recommendations from WVDEP. It should be noted that PPH is highly degradable in the environment (OECD, 2004) and its inclusion in a quantitative human health risk assessment is likely to result in overestimates of the potential for adverse effects.

2.1 Equation and Input Assumptions

The equation below was used to calculate a site-specific screening value for non-residential soil. The input factors and exposure assumptions used in the calculation are based on WVDEP (2012) recommended values. Toxicity values were derived as described in Section 2.2 below. The equation was modified to account for the fact that PPH is not sufficiently volatile; as such, the inhalation of volatiles component of

the soil equation is not included. The inhalation of particulates component of the equation was included however.

$$SL\ (mg/kg) = \frac{1}{\dfrac{EF \times ED \times (1/RfD \times IR \times 1E\text{-}6)}{THQ \times AT \times BW} + \dfrac{EF \times ED \times (1/RfD \times GIABS \times SA \times AF \times ABS \times 1E\text{-}6)}{THQ \times AT \times BW} + \dfrac{EF \times ED \times (ET/24 \times 1/RfC \times 1/PEF)}{THQ \times AT}}$$

Each of the input factors included in this equation is described below.

SL Screening level in soil (mg/kg).

THQ Target Hazard Quotient (unitless): The THQ is the default value of 1 as per the WVDEP (1997).

BW Body Weight (kg): The default value for the average body weight of an adult is 70 kg based on WVDEP (2012).

AT Averaging Time (days): The doses for noncarcinogenic health effects are averaged over the specific period of exposure for a given receptor. Noncarcinogenic averaging times are, therefore, calculated by multiplying the exposure duration for the receptor by 365 days/year. For this evaluation the exposure duration is 25 years, resulting in an averaging time of 9125 days (WVDEP, 2012).

EF Exposure Frequency – occupational (days/yr): Default exposure factors for industrial workers are provided by WVDEP (2012). Exposure frequency for the worker is 5 days per week for 50 weeks a year, or 250 days per year.

ED Exposure Duration – occupational (yrs): The exposure duration for industrial workers is 25 years (WVDEP, 2012).

IR Soil Ingestion Rate – occupational (mg/day): The WVDEP (2012) recommended value of 50 mg/day is used to describe soil ingestion for a worker not involved in construction or intrusive activities.

RfD Oral Reference Dose (mg/kg-day): The derivation of the RfD in units of (mg/kg-day) is described in the following subsection.

GIABS Gastrointestinal Absorption Factor (unitless): The GIABS is the default value of 1 as per USEPA (2015).

SA Surface Area (cm^2): The SA used in this evaluation is 3,300 cm^2 as presented in the WVDEP Exposure Assumptions Spreadsheet (WVDEP, 2012).

AF Adherence Factor (mg/cm^2): The AF used in this evaluation is 0.20 mg/cm^2 as presented in the WVDEP Exposure Assumptions Spreadsheet (WVDEP, 2012).

ABS Absorption Factor (unitless): The ABS is the default value of 0.1 for semivolatiles as per USEPA (2015).

PEF Particulate Emission Factor (m^3/kg): The PEF used in this evaluation is the default value of 1.316×10^9 m^3/kg as presented in Appendix D of the WVDEP (2001) Guidance Manual and the Exposure Assumptions Spreadsheet (WVDEP, 2012).

ET Exposure Time (hrs): Inhalation exposures are calculated over the specific daily amount of time during which the receptor is exposed to airborne concentrations of constituents. The industrial worker is assumed to be present and subject to inhalation exposure from soil for 8 hours (WVDEP 2012). In the equation, this value is divided by 24 hours/day.

RfC Inhalation Reference Concentration (mg/m^3): The derivation of the inhalation reference concentration is described in the following subsection.

2.2 Toxicity Values for PPH

For the purposes of calculating a site-specific screening value, toxicity values have been developed from the primary scientific research literature for PPH. All available data were reviewed in order to determine the most appropriate studies to use for reference dose calculations. For the oral reference dose, the toxicity study determined to be most appropriate was that conducted by ECHA (2014). In this study, Wistar rats were continuously administered PPH in drinking water for 90 days at concentrations of 0, 500, 2000, and 6000 ppm (0, 35/46, 146/177, and 429/486 mg/kg-day bw in males/females). The no-observed-adverse-effect level (NOAEL) in this study was 146 mg/kg-day (2000 ppm group), based on body weight changes in males and discoloration of urine in both males and females seen in the next highest dose group of 6000 ppm (429/486 mg/kg-day bw in males/females), which was the highest dose tested.

Using the NOAEL value of 146 mg/kg-day and dividing by an extremely conservative uncertainty factor of 10,000 based on the following rationale:

- 10 for interspecies variability;
- 10 for intraspecies variability (human-to-human and consideration of the possible effects on sensitive subpopulations);
- 10 for database incompleteness; and
- 10 for the use of a subchronic study to model a potential chronic exposure

results in a chronic oral RfD of 0.015 mg/kg-day.

The inhalation reference concentration (RfC) was derived using the following equation presented by USEPA (2009):

$$RfC = RfD \times (BW / IR)$$

Where:

RfC = Reference Concentration (mg/m^3)

RfD = Oral Reference Dose (mg/kg-day)

BW = Body Weight (70 kg for an adult)

IR = Inhalation Rate (20 m^3/day for an adult)

Applying these factors, the chronic inhalation RfC for PPH calculates to be 0.053 mg/m^3.

It should be noted that the study duration of 90 days on which the toxicity values are based is a less than lifetime duration. There is uncertainty associated with applying less than lifetime study results to a simulation of a lifetime exposure. However, in the absence of a longer or more appropriate study, the data from ECHA (2014) were considered to be the most suitable. An uncertainty factor of 10 which results in an extremely conservative uncertainty factor of 10,000 for the calculation was included in the derivation to account for the study duration.

2.3 Final Non-Residential Soil Site-Specific Screening Value

The toxicity values presented in Section 2.2 and the WVDEP exposure factors described in Section 2.1 were incorporated into the outdoor worker soil land use equation as presented in Section 4.3.1 of the USEPA Regional Screening Level Table User's Guide (USEPA, 2015). The resulting non-residential soil site-specific screening value for PPH in soil is calculated to be 1.32E+4 mg/kg.

3.0 SITE-SPECIFIC SCREENING VALUE FOR GROUNDWATER

A site-specific groundwater screening value for PPH was calculated using the tapwater equation as presented in Section 4.8.1 of the USEPA Regional Screening Level Table User's Guide (USEPA, 2015), incorporating the toxicity values described above in Section 2.2. Consistent with WVDEP protocol, the dermal pathway component of the groundwater equation is not included. Additionally, to account for the fact that PPH is not sufficiently volatile, the inhalation component of the groundwater equation is not included.

$$SL\ (ug/L) = \frac{THQ \times AT \times BW \times 1000}{EF \times ED \times (1/RfD \times IRW)}$$

The parameters THQ and RfD were described previously in Section 2. The additional input factors included in this equation are described below.

SL Screening level in water (ug/L).

EF Exposure Frequency – residential (days/yr): Exposure frequency for a residential child is 350 days per year (WVDEP, 2012).

ED Exposure Duration – residential (yrs): The exposure duration for a residential child is 6 years (WVDEP, 2012).

AT Averaging Time (days): Because the exposure duration for a resident is 6 years, the averaging time is 2,190 days (WVDEP, 2012).

IRW Water Ingestion Rate – child (L/day): The WVDEP (2012) recommended ingestion rate for a residential child is 1 L/day.

The toxicity values and WVDEP exposure factors were incorporated into the tapwater equation as presented in Section 4.8.1 of the USEPA Regional Screening Level Table User's Guide (USEPA, 2015). The groundwater site-specific screening value for PPH is calculated to be 235 ug/L.

4.0 SITE-SPECIFIC SCREENING VALUE FOR SOIL MIGRATION TO GROUNDWATER

A site-specific migration to groundwater screening value for PPH was calculated using Equation D-11 of the VRRA Guidance Manual (WVDEP, 2001). This equation is consistent with the Method 1 partitioning equation for migration to groundwater as presented in Section 4.12.3 of the USEPA Regional Screening Table User's Guide (USEPA, 2015).

First, a target soil leachate concentration must be calculated by multiplying the acceptable groundwater concentration (i.e., calculated site-specific groundwater screening value) by the dilution factor. The WVDEP (2001) default value of 20 was used for the dilution factor. Using the calculated site-specific groundwater screening value of 235 ug/L (0.235 mg/L) identified above in Section 3.0 and a dilution factor of 20, the target soil/water leachate concentration is 4.7 mg/L.

The partition equation (Equation D-11) below was then used to calculate the total soil concentration corresponding to the soil leachate concentration identified above.

$$\textit{Screening Level in Soil (mg/kg)} = C_w [K_d + \frac{(\theta_w + \theta_a H')}{\rho_b}]$$

Each of the input factors included in this equation is described below.

C_w Target soil leachate concentration (mg/L). The target soil leachate concentration is 4.7 mg/L as calculated above.

K_d Soil/water partition coefficient (L/kg). The value for K_d is calculated using the equation (K_{oc} x f_{oc}) based on WVDEP (2001). Using the K_{oc} and f_{oc} values below, the calculated Kd value used in this evaluation is 0.04 L/kg.

K_{oc} Soil organic carbon/water partition coefficient (L/kg), chemical-specific. For this evaluation, a K_{oc} value of 20 L/kg was used, which is the midpoint of the range of estimated values presented in the Material Safety Data Sheet (MSDS) (Dow, 2013).

F_{oc} Fraction organic carbon in soil (g/g). The default value for F_{oc} is 0.002 g/g based on WVDEP (2001).

θ_w Water-filled soil porosity (L_{water}/L_{soil}). The default value for θ_w is 0.3 L_{water}/L_{soil} based on WVDEP (2001).

θ_a Air-filled soil porosity (L_{air}/L_{soil}). The value for θ_a is calculated using the equation ($n - \theta_w$) based on WVDEP (2001). Using the calculated n value below and the default θ_w value identified above, the calculated θ_a value used in this evaluation is 0.13 L_{air}/L_{soil}.

ρ_b Dry soil bulk density (kg/L). The default value for ρ_b is 1.5 kg/L based on WVDEP (2001).

n Soil porosity (L_{pore}/L_{soil}). The value for n is calculated using the equation $(1-(\rho_b / \rho_s))$ based on WVDEP (2001). Using the default values for ρ_b and ρ_s, the calculated n value of 0.43 L_{pore}/L_{soil} is used in this evaluation.

ρ_s Soil particle density (kg/L). The default value for ρ_s is 2.65 kg/L based on WVDEP (2001).

H' Dimensionless Henry's law constant, chemical-specific. For this evaluation, a H' value of 1.81E-5 was used, which was converted from the value of 4.41E-7 atm-m^3/mol presented in the MSDS (Dow, 2013).

The input factors above were incorporated into the Equation D-11 of the WVDEP (2001) Guidance Manual. The site-specific soil migration to groundwater screening value for PPH is calculated to be 1.13 mg/kg.

5.0 SUMMARY

Soil and groundwater *de minimis* values are not available from WVDEP for PPH. This memorandum presented the calculation of extremely conservative site-specific screening values for this constituent. The non-residential soil site-specific screening value for PPH is calculated to be 1.32E+4 mg/kg and the groundwater site-specific screening value is 235 ug/L. The site-specific soil migration to groundwater screening value is calculated to be 1.13 mg/kg.

6.0 REFERENCES

Dow Chemical Company (Dow, 2013) Material Safety Data Sheet (MSDS): DOWANOL™ PPH Glycol Ether. MSDS No. 82587/0000.Midland, MI, February 11, 2013.

European Chemicals Agency (ECHA; 2014) Registration Dossier for 1-phenoxypropan-2-ol (PPH). Exp Key Toxicity to Reproduction. 001; DOW Product Safety Report: BASF 2000; Last modified 3-11-14. Available at http://apps.echa.europa.eu/registered/data/dossiers/DISS-a212e0a8-c808-5392-e044-00144f67d031/DISS-a212e0a8-c808-5392-e044 00144f67d031_DISS-a212e0a8-c808-5392-e044-00144f67d031.html

Organization for Economic Cooperation and Development (OECD; 2004) Propylene Glycol Phenol Ether. SIDS Initial Assessment Report for SIAM 18. Paris, France 20-23 April 2004. UNEP Publications.

United States Environmental Protection Agency (USEPA; 2009) Risk Assessment Guidance For Superfund (RAGS) Volume I: Human Health Evaluation Manual; Part F: Supplemental Guidance for Inhalation Risk Assessment. EPA-540-R-070-002. January.

United States Environmental Protection Agency (USEPA; 2015) Regional Screening Level Table User's Guide. November 2015 Update.

West Virginia Department of Environmental Protection (WVDEP; 2001) West Virginia Voluntary Remediation and Redevelopment Act – Guidance Manual, Version 2.1. March 13.

West Virginia Department of Environmental Protection (WVDEP; 2012) WVDEP-Approved Exposure Assessments Spreadsheet. January 2012.

west virginia department of environmental protection

Office of Environmental Remediation
131A Peninsula Street
Wheeling, WV 26003
Phone: 304-238-1220/Fax: 304-238-1006

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

MEMORANDUM

To: David Long

From: Lawrence P. Sirinek, Ph.D. LPS

Date: January 27, 2016

cc: Erin Brittain
John Dempsey
Patty Hickman

Subject: Freedom Industries Site
Target concentrations for PPH and MCHM in soil and groundwater

I have reviewed Technical Memoranda submitted by Dr. Bruce Fishman, RBR Consulting, Inc. on behalf of the Former Freedom Industries Site (VRRP #15017). The purpose of these documents was to derive risk-based target concentrations (i.e. VRRP Uniform Standards) for 4-methylcyclohexanemethanol (MCHM) and propylene glycol phenyl ether (PPH) in soil and groundwater.

In evaluating the potential toxicity of both of these constituents, it should be noted that the existing toxicological literature is based primarily on short term studies. For this reason, there are considerable levels of uncertainty when applying short term data to derive target cleanup values applicable to long term exposures, as required by the Voluntary Remediation and Redevelopment Rule (60CSR3). Nonetheless, in order to facilitate timely remediation of this site, Dr. Fishman has employed the standard approach in deriving cleanup concentrations, and has incorporated default uncertainty factors that assume toxic effects in susceptible populations of humans exposed on a long term basis to these chemicals, could occur at concentrations 10,000 times lower than those causing observable effects in laboratory animals (rats) exposed on a short term basis. Thus, the resulting target values described in these memoranda are expected to provide a sufficient level of protectiveness, and are recommended for use at the Freedom site.

Please contact me should you have any questions.

west virginia department of environmental protection

Office of Environmental Remediation
601 57th Street SE
Charleston, WV 25304
Phone: 304-926-0455

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
dep.wv.gov

February 5, 2016

Certified Mail #91 7199 9991 7035 6611 7556

Mr. Robert L. Johns
Freedom Industries Spill Claim Plan Administrator
Turner & Johns, PLLC
216 Brooks Street, Suite 200
Charleston, WV 25301

RE: Approval of Target Concentrations for MCHM and PPH in Soil and Groundwater
VRP# 15017 - Freedom Industries, Charleston, Kanawha County

Dear Mr. Johns:

The West Virginia Department of Environmental Protection, Office of Environmental Remediation (WVDEP/OER) has completed a review of target screening concentrations for 4-methylcyclohexanemethanol (MCHM) and propylene glycol phenyl ether (PPH) for the former Freedom Industries site in Charleston, WV.

More specifically, WVDEP/OER personnel have reviewed the technical memoranda prepared by Dr. Bruce Fishman of RBR Consulting, Inc. titled "Calculation of Soil and Groundwater Site-Specific Screening Values for 4-Methylcyclohexanemethanol (MCHM) - Freedom Industries Site - Charleston, West Virginia" and "Calculation of Soil and Groundwater Site-Specific Screening Values for Propylene Glycol Phenyl Ether (PPH) - Freedom Industries Site - Charleston, West Virginia", dated January 20, 2016. The purpose of these documents was to derive risk-based target concentrations (i.e., VRRP Uniform Standards) for MCHM and PPH in soil and groundwater.

This is your notice that the resulting target values are **approved** for use at the site.

If you have any questions or wish to discuss any specific issues, please contact me by phone at 304-926-0499, ext. 1265 or email at David.W.Long@wv.gov.

Sincerely,

Dave Long
Project Manager

cc: Matt Ford, LRS
Charleston File # 15017
ec: Erin Brittain, Program Manager, WVDEP/OER

Attachment 4

Split Sample Laboratory Reports

CHAIN OF CUSTODY RECORD

dep

West Virginia Department of Environmental Protection
Office of Environmental Remediation

Project: Freedom Industries #15017 Location: Charleston, WV
Lab: REIC Results: ☐ Email ☐ Mail ☐ Fax
Turnaround: ☐ 24-Hour RUSH ☐ 3-Day RUSH ☑ Normal
Data Deliverables: ☐ Level I ☐ Level II ☐ Level III ☑ Level IV (CLP-like)
☑ EQUIS EDD in Excel Format

Send Reports and Invoices to:

Project Manager: Dave Long
Address: 601 57th St, SE
City: Charleston State: WV Zip: 25304
Phone: 304-926-0455 Fax: 304-926-0457
Email: David.W.Long@wv.gov

ANALYSIS REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	COMP/ GRAB	NO. CONTAINERS	4-MCHM + PPH (8270)	BTEX + MTBE (8260)	PAH's (SIM) (8270 SIM)	ALCOHOLS (8015)	GLYCOLS (8015)	DISS. LEAD (6020A)		
SUMP-BSAL-1-16	1/28/16	1300	W	G	6-VOAs, 2-UC AMB: 1-250 ML-AMB: 1-250 ML-PLASTIC	✓	✓	✓	✓	✓	✓		
~~TRIP BLANK~~			~~W~~										
TRIP BLANK			W		2 VOA's		✓		✓	✓			

◀ ANALYTICAL METHOD
◀ PRESERVATIVE

COMMENTS:
- SAMPLES ICED
- DISS LEAD SAMPLE FIELD-FILTERED
- DEP CONTRACT PRICING (WHERE APPLICABLE)

	Relinquished by: (Signature)	Received by: (Signature)	Date	Time
1	Dave Long	MAHoeley 1/29/16 12:01	1/29/16	
2				
3		C. Meadows 1/29/16	14:35	

White – Retained by Lab ■ Yellow – Returned with Report ■ Pink – Retained by Sampler

DELIVERY
☐ Hand Delivered ☑ Courier ☐ UPS ☐ FedEx ☐ Other:
Tracking #

ARRIVAL
Chain of Custody Seal: ☒ Intact ☐ Broken ☐ Absent Sealed
Iced: ☒ Yes ☐ No Temperature: 1.3 °C

Page ____ of ____

REI Consultants, Inc.
PO Box 286
Beaver, WV 25813
TEL: (304) 255-2500
Website: www.reiclabs.com

Improving the environment, one client at a time...

3029-C Peters Creek Road
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101 17th Street
Ashland, KY 41101
TEL: 606.393.5027

1557 Commerce Road, Suite 201
Verona, VA 24482
TEL: 540.248.0183

16 Commerce Drive
Westover, WV 26501
TEL: 304.241.5861

Friday, February 12, 2016

Mr. David Long
WV DEP - CHARLESTON
601 57th ST SE
CHARLESTON, WV 25304

TEL: (304) 926-0440
FAX: (304) 926-0457

RE: FREEDOM INDUSTRIES #15017

Work Order #: 1601R50

Dear Mr. David Long:

REI Consultants, Inc. received 2 sample(s) on 1/29/2016 for the analyses presented in the following report.

Sincerely,

Stacy Heasley

Stacy Heasley

Project Manager

REI Consultants, Inc. - Case Narrative

WO#: 1601R50

Date Reported: 2/12/2016

Client: WV DEP - CHARLESTON

Project: FREEDOM INDUSTRIES #15017

The analytical results presented in this report were produced using documented laboratory SOPs that incorporate appropriate quality control procedures as described in the applicable methods. Verification of required sample preservation (as required) is recorded on associated laboratory logs. Any deviation from compliance or method modification is identified within the body of this report by a qualifier footnote which is defined at the bottom of this page.

All sample results for solid samples are reported on an "as-received" wet weight basis unless otherwise noted.

Results reported for sums of individual parameters, such as TTHM and HAA5, may vary slightly from the sum of the individual parameter results, due to rounding of individual results, as required by EPA.

The test results in this report meet all NELAP and/or VELAP requirements for parameters clearly designated as PA, VA, PA/VA, or VELAP in the column labeled NELAP.

Please note if the sample collection time is not provided on the Chain of Custody, the default recording will be 0:00:00. This may cause some tests to be apparently analyzed out of hold.

All tests performed by REIC Service Centers are designated by an annotation on the test code. All other tests were performed by REIC's Main Laboratory in Beaver, WV.

This report may not be reproduced, except in full, without the written approval of REIC.

DEFINITIONS:
MCL: Maximum Contaminant Level
MDL: Method Detection Limit; The lowest concentration of analyte that can be detected by the method in the applicable matrix.
Mg/Kg or mg/L: Units of part per million (PPM) - milligram per Kilogram (weight/weight) or milligram per Liter (weight/volume).
NA: Not Applicable
ND: Not Detected at the PQL or MDL
PQL: Practical Quantitation Limit; The lowest verified limit to which data is quantified without qualifications. Analyte concentrations below PQL are reported either as ND or as a number with a "J" qualifier.
Qual: Qualifier that applies to the analyte reported.
TIC: Tentatively Identified Compound, Estimated Concentration denoted by "J" qualifier.
Ug/Kg or ug/L: Units of part per billion (PPB) - microgram per kilogram (weight/weight) or microgram per liter (weight/volume).

QUALIFIERS:
X: Reported value exceeds required MCL
B: Analyte detected in the associated Method Blank at a concentration > 1/2 the PQL
E: The sample result is within the method accepted Linear Dynamic Range determined by the lab for this analysis. However, it may be considered estimated when applying the TNI (The NELAC Institute) standard.
H: Holding time for preparation or analysis has been exceeded.
J: Analyte concentration is reported, and is less than the PQL and greater than or equal to the MDL. The result reported is an estimate.
S: % REC (% recovery) exceeds control limits

CERTIFICATIONS:
Beaver, WV: WVDHHR 00412CM, WVDEP 060, VADCLS 00281, KYDEP 90039, TNDEQ TN02926, NCDWQ 466, PADEP 68-00839, VADCLS (VELAP) 460148
Bioassay (Beaver, WV): WVDEP 060, VADCLS(VELAP) 460148, PADEP 68-00839
Roanoke, VA: VADCLS(VELAP) 460150
Verona, VA: VADCLS(VELAP) 460151
Ashland, KY: KYDEP 00094, WVDEP 389
Morgantown, WV: WVDHHR 003112M, WVDEP 387

REI Consultants, Inc. - Analytical Report

WO#: 1601R50

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	1/28/2016 1:00:00 PM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	1/29/2016
Lab ID:	1601R50-01A	**Matrix:**	Liquid
Client Sample ID:	SUMP-8-SPL-1-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
GLYCOLS, Total			**Method: GC-FID**				**Analyst: TS**	
Diethylene Glycol	ND	9.84	40.0	NA		mg/L	02/08/16	
Dipropylene Glycol	ND	8.57	40.0	NA		mg/L	02/08/16	
Monoethylene Glycol	ND	6.01	40.0	NA		mg/L	02/08/16	
Propylene Glycol	ND	8.00	40.0	NA		mg/L	02/08/16	
Triethylene Glycol	ND	12.4	40.0	NA		mg/L	02/08/16	
POLYNUCLEAR AROMATIC HYDROCARBONS (SIM)			**Method: SW8270D**				**Analyst: JD**	
Acenaphthene	0.000072	0.000060	0.000120	NA	J	mg/L	02/10/16	PA/VA
Acenaphthylene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(a)anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(a)pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(b)fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(g,h,i)perylene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(k)fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Chrysene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Dibenzo(a,h)anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Fluorene	0.000072	0.000060	0.000120	NA	J	mg/L	02/10/16	PA/VA
Indeno(1,2,3-cd)pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Naphthalene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Phenanthrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Surr: Nitrobenzene-d5	777	NA	16.1-147	NA	S	%Rec	02/10/16	
Surr: 2-Fluorobiphenyl	74.0	NA	37.9-130	NA		%Rec	02/10/16	
Surr: 4-Terphenyl-d14	84.0	NA	58.1-130	NA		%Rec	02/10/16	

Notes:

Insufficient sample was available to prepare and analyze a matrix spike. Acceptable LCS results demonstrate the accuracy of the analysis.

SEMIVOLATILE ORGANIC COMPOUNDS			**Method: SW8270D**				**Analyst: JD**	
1-Phenoxy-2-propanol	0.0108	NA	0.0050	NA		mg/L	02/06/16	
4-Methylcyclohexanemethanol	0.121	NA	0.0252	NA		mg/L	02/09/16	
Surr: 2-Fluorophenol	36.4	NA	32.9-110	NA		%Rec	02/06/16	
Surr: Phenol-d5	27.0	NA	25.8-110	NA		%Rec	02/06/16	
Surr: 2,4,6-Tribromophenol	107	NA	63.8-110	NA		%Rec	02/06/16	
Surr: Nitrobenzene-d5	127	NA	61.8-110	NA	S	%Rec	02/06/16	
Surr: 2-Fluorobiphenyl	88.4	NA	58.6-110	NA		%Rec	02/06/16	

REI Consultants, Inc. - Analytical Report

WO#: 1601R50

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	1/28/2016 1:00:00 PM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	1/29/2016
Lab ID:	1601R50-01A	**Matrix:**	Liquid
Client Sample ID:	SUMP-8-SPL-1-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
Surr: 4-Terphenyl-d14	61.7	NA	55.1-110	NA		%Rec	02/06/16	
VOLATILE ORGANIC COMPOUNDS			**Method: SW8015C**				**Analyst: CB**	
Methanol	ND	5.00	10.0	NA		mg/L	02/10/16	
VOLATILE ORGANIC COMPOUNDS-ADDITIONAL			**Method: SW8260B**				**Analyst: MD**	
1-Propanol	ND	50.0	100	NA		µg/L	02/10/16	
tert-Butyl alcohol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Ethanol	ND	100	200	NA		µg/L	02/10/16	PA/VA
2-Propanol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	106	NA	80-120	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	105	NA	80-120	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	102	NA	80-120	NA		%Rec	02/10/16	
Surr: Toluene-d8	96.3	NA	80-120	NA		%Rec	02/10/16	
VOLATILE ORGANIC COMPOUNDS			**Method: SW8260B**				**Analyst: MD**	
Benzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Ethylbenzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
m,p-Xylene	ND	1.00	2.00	NA		µg/L	02/10/16	PA/VA
Methyl tert-butyl ether	ND	2.50	5.00	NA		µg/L	02/10/16	PA/VA
o-Xylene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Toluene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	98.0	NA	75.9-132	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	100	NA	73.6-132	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	100	NA	80.1-127	NA		%Rec	02/10/16	
Surr: Toluene-d8	94.8	NA	72.4-119	NA		%Rec	02/10/16	

REI Consultants, Inc. - Analytical Report

WO#: 1601R50

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	1/28/2016 1:00:00 PM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	1/29/2016
Lab ID:	1601R50-01B	**Matrix:**	Liquid
Client Sample ID:	SUMP-8-SPL-1-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
DISSOLVED METALS by ICP-MS			**Method: SW6020A**				**Analyst: BG**	
Lead	0.0026	0.0002	0.0010	NA		mg/L	02/10/16	PA/VA

REI Consultants, Inc. - Analytical Report

WO#: 1601R50

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	1/28/2016 12:00:00 AM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	1/29/2016
Lab ID:	1601R50-02A	**Matrix:**	Trip Blank
Client Sample ID:	TRIP BLANK	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
VOLATILE ORGANIC COMPOUNDS			**Method: SW8015C**				**Analyst: CB**	
Methanol	ND	5.00	10.0	NA		mg/L	02/10/16	
VOLATILE ORGANIC COMPOUNDS-ADDITIONAL			**Method: SW8260B**				**Analyst: MD**	
1-Propanol	ND	50.0	100	NA		µg/L	02/10/16	
tert-Butyl alcohol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Ethanol	ND	100	200	NA		µg/L	02/10/16	PA/VA
2-Propanol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	108	NA	80-120	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	105	NA	80-120	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	101	NA	80-120	NA		%Rec	02/10/16	
Surr: Toluene-d8	98.2	NA	80-120	NA		%Rec	02/10/16	
VOLATILE ORGANIC COMPOUNDS			**Method: SW8260B**				**Analyst: MD**	
Benzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Ethylbenzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
m,p-Xylene	ND	1.00	2.00	NA		µg/L	02/10/16	PA/VA
Methyl tert-butyl ether	ND	2.50	5.00	NA		µg/L	02/10/16	PA/VA
o-Xylene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Toluene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	99.3	NA	75.9-132	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	97.0	NA	73.6-132	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	101	NA	80.1-127	NA		%Rec	02/10/16	
Surr: Toluene-d8	96.7	NA	72.4-119	NA		%Rec	02/10/16	

REI Consultants, Inc.
PO Box 286
Beaver, WV 25813
TEL: (304)255-2500
Website: www.reiclabs.com

Improving the environment, one client at a time...

Sample Receipt Checklist

Client Name:	**WES012**			Work Order Number:	**1601R50**
RCPNo:	**1**	Date and Time Received:	**1/29/2016 3:59:56 PM**	Received by:	**Mary Ann Holley**
Completed By:	**Candace Meadows**		Reviewed By:	**Stacy Heasley**	
Completed Date:	**1/29/2016 4:01:25 PM**		Reviewed Date:	**2/1/2016 11:01 AM**	

Carrier Name: REIC

1.	Chain of custody present?	Yes [x]	No [ ]	
2.	Chain of custody signed when relinquished and received?	Yes [x]	No [ ]	
3.	Are matrices correctly identified on Chain of custody?	Yes [x]	No [ ]	
4.	Is it clear what analyses were requested?	Yes [x]	No [ ]	
5.	Custody seals intact?	Yes [x]	No [ ]	Not Present [ ]
6.	Samples in proper container type and preservative?	Yes [x]	No [ ]	
7.	Were correct preservatives noted on COC?	Yes [x]	No [ ]	NA [ ]
8.	Sample containers intact?	Yes [x]	No [ ]	
9.	Sufficient sample volume for indicated test?	Yes [ ]	No [x]	
10.	Were container labels complete?	Yes [x]	No [ ]	
11.	All samples received within holding time?	Yes [x]	No [ ]	
12.	Was an attempt made to cool the samples?	Yes [x]	No [ ]	NA [ ]
13.	Sample Temp. taken and recorded upon receipt?	Yes [x]	No [ ]	To 1.3 ºC
14.	Water - Were bubbles absent in VOC vials?	Yes [x]	No [ ]	No Vials [ ]
15.	Are Samples considered acceptable?	Yes [x]	No [ ]	
16.	COC filled out properly?	Yes [x]	No [ ]	

Client Notification/Response

Client Name: **WES012** Work Order Number: **1601R50**

Comment: NOT ENOUGH TRIP BLANK SAMPLE FOR GLYCOLS.

Client Contacted: Yes [ ] No [ ] NA [x] Person Contacted:

Contact Mode: Phone [ ] Fax: [ ] Email: [ ] In Person: [ ]

Date Contacted: Contacted By:

Regarding:

Client Instructions:

Corrective Action:

DBPix Evaluation

CHAIN OF CUSTODY RECORD

dep

West Virginia Department of Environmental Protection
Office of Environmental Remediation

Project: Freedom Industries #15017 Location: Charleston, WV
Lab: REIC Results: ☑ Email ☐ Mail ☐ Fax
Turnaround: ☐ 24-Hour RUSH ☐ 3-Day RUSH ☑ Normal
Data Deliverables: ☐ Level I ☐ Level II ☐ Level III ☑ Level IV (CLP-like)
☑ EQUIS EDD in Excel Format

Send Reports and Invoices to:

Project Manager: Dave Long
Address: 601 57th St, SE
City: Charleston State: WV Zip: 25304
Phone: 304-926-0455 Fax: 304-926-0457
Email: David.W.Long@wv.gov

ANALYSIS REQUIRED

SAMPLES RECEIVED IN REIC SUPPLIED CONTAINERS WITH PROPER PRESERVATION INDICATED

SAMPLE ID	DATE	TIME	MATRIX	COMP/ GRAB	NO. CONTAINERS	4-Methanol PPH	Part's (SIM)	8270 Base Neutrals	8270-SIM Glycols	8260 Alcohols	8015 Diss Lead	8015	6020		
ANALYTICAL METHOD						—	—	8270	8270-SIM	8260	8015	8015	6020		
PRESERVATIVE						—	—	HCl	HCl	—	HNO3				
MW-13-SPL-2-16	2/1/16	1135	W	G	6 VOAs, 3-L AMB, 1-250ml AMB.; 1-250 PLAS	✓	✓	✓	✓	✓	✓				
~~SUMP-10-SPL-2-16~~	~~2/1/16~~	~~1310~~	~~W~~												
SUMP-10-SPL-2-16	2/1/16	1310	W	G	6 VOAs, 3-L AMB. 1-250 W-AMB 1-250 ml PLAS	✓	✓	✓	✓	✓	✓				
TRIP BLANK			W		*1 VOA			✓	✓	✓					

COMMENTS:
* - 1 TRIP BLANK VOA BROKEN DURING DEP TRANSFER
- SAMPLES ICED
- DISS. LEAD SAMPLE WAS FIELD FILTERED
- DEP CONTAINER SEALING, WHERE APPLICABLE
Sealed

	Relinquished by: (Signature)	Received by: (Signature)	Date	Time
1	Dave Long	Matthew Lay 2/2/16 11:00	2/2/16	
2			2/2/16	14:32
3				

White – Retained by Lab ■ Yellow – Returned with Report ■ Pink – Retained by Sampler

DELIVERY
☐ Hand Delivered ☑ Courier ☐ UPS ☐ FedEx ☐ Other:
Tracking #

ARRIVAL
Chain of Custody Seal: ☐ Intact ☐ Broken ☑ Absent
Iced: ☑ Yes ☐ No Temperature: 2.2 °C

www.ammara.com

REI Consultants, Inc.
PO Box 286
Beaver, WV 25813
TEL: (304) 255-2500
Website: www.reiclabs.com

Improving the environment, one client at a time...

3029-C Peters Creek Road
Roanoke, VA 24019
TEL: 540.777.1276

101 17th Street
Ashland, KY 41101
TEL: 606.393.5027

1557 Commerce Road, Suite 201
Verona, VA 24482
TEL: 540.248.0183

16 Commerce Drive
Westover, WV 26501
TEL: 304.241.5861

Friday, February 12, 2016

Mr. David Long
WV DEP - CHARLESTON
601 57th ST SE
CHARLESTON, WV 25304

TEL: (304) 926-0440
FAX: (304) 926-0457

RE: FREEDOM INDUSTRIES #15017

Work Order #: 1602183

Dear Mr. David Long:

REI Consultants, Inc. received 3 sample(s) on 2/2/2016 for the analyses presented in the following report.

Sincerely,

Stacy Heasley

Stacy Heasley

Project Manager

REI Consultants, Inc. - Case Narrative

WO#: 1602183

Date Reported: 2/12/2016

Client: WV DEP - CHARLESTON

Project: FREEDOM INDUSTRIES #15017

The analytical results presented in this report were produced using documented laboratory SOPs that incorporate appropriate quality control procedures as described in the applicable methods. Verification of required sample preservation (as required) is recorded on associated laboratory logs. Any deviation from compliance or method modification is identified within the body of this report by a qualifier footnote which is defined at the bottom of this page.

All sample results for solid samples are reported on an "as-received" wet weight basis unless otherwise noted.

Results reported for sums of individual parameters, such as TTHM and HAA5, may vary slightly from the sum of the individual parameter results, due to rounding of individual results, as required by EPA.

The test results in this report meet all NELAP and/or VELAP requirements for parameters clearly designated as PA, VA, PA/VA, or VELAP in the column labeled NELAP.

Please note if the sample collection time is not provided on the Chain of Custody, the default recording will be 0:00:00. This may cause some tests to be apparently analyzed out of hold.

All tests performed by REIC Service Centers are designated by an annotation on the test code. All other tests were performed by REIC's Main Laboratory in Beaver, WV.

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DEFINITIONS:
MCL: Maximum Contaminant Level
MDL: Method Detection Limit; The lowest concentration of analyte that can be detected by the method in the applicable matrix.
Mg/Kg or mg/L: Units of part per million (PPM) - milligram per Kilogram (weight/weight) or milligram per Liter (weight/volume).
NA: Not Applicable
ND: Not Detected at the PQL or MDL
PQL: Practical Quantitation Limit; The lowest verified limit to which data is quantified without qualifications. Analyte concentrations below PQL are reported either as ND or as a number with a "J" qualifier.
Qual: Qualifier that applies to the analyte reported.
TIC: Tentatively Identified Compound, Estimated Concentration denoted by "J" qualifier.
Ug/Kg or ug/L: Units of part per billion (PPB) - microgram per kilogram (weight/weight) or microgram per liter (weight/volume).

QUALIFIERS:
X: Reported value exceeds required MCL
B: Analyte detected in the associated Method Blank at a concentration > 1/2 the PQL
E: The sample result is within the method accepted Linear Dynamic Range determined by the lab for this analysis. However, it may be considered estimated when applying the TNI (The NELAC Institute) standard.
H: Holding time for preparation or analysis has been exceeded.
J: Analyte concentration is reported, and is less than the PQL and greater than or equal to the MDL. The result reported is an estimate.
S: % REC (% recovery) exceeds control limits

CERTIFICATIONS:
Beaver, WV: WVDHHR 00412CM, WVDEP 060, VADCLS 00281, KYDEP 90039, TNDEQ TN02926, NCDWQ 466, PADEP 68-00839, VADCLS (VELAP) 460148
Bioassay (Beaver, WV): WVDEP 060, VADCLS(VELAP) 460148, PADEP 68-00839
Roanoke, VA: VADCLS(VELAP) 460150
Verona, VA: VADCLS(VELAP) 460151
Ashland, KY: KYDEP 00094, WVDEP 389
Morgantown, WV: WVDHHR 003112M, WVDEP 387

REI Consultants, Inc. - Analytical Report

WO#: 1602183

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	2/1/2016 11:35:00 AM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	2/2/2016
Lab ID:	1602183-01A	**Matrix:**	Liquid
Client Sample ID:	MW-13-SPL-2-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
GLYCOLS, Total			**Method: GC-FID**				**Analyst: TS**	
Diethylene Glycol	ND	9.84	40.0	NA		mg/L	02/09/16	
Dipropylene Glycol	ND	8.57	40.0	NA		mg/L	02/09/16	
Monoethylene Glycol	ND	6.01	40.0	NA		mg/L	02/09/16	
Propylene Glycol	ND	8.00	40.0	NA		mg/L	02/09/16	
Triethylene Glycol	ND	12.4	40.0	NA		mg/L	02/09/16	
POLYNUCLEAR AROMATIC HYDROCARBONS (SIM)			**Method: SW8270D**				**Analyst: JD**	
Acenaphthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Acenaphthylene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(a)anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(a)pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(b)fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(g,h,i)perylene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(k)fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Chrysene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Dibenzo(a,h)anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Fluorene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Indeno(1,2,3-cd)pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Naphthalene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Phenanthrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Surr: Nitrobenzene-d5	73.0	NA	16.1-147	NA		%Rec	02/10/16	
Surr: 2-Fluorobiphenyl	67.0	NA	37.9-130	NA		%Rec	02/10/16	
Surr: 4-Terphenyl-d14	78.0	NA	58.1-130	NA		%Rec	02/10/16	

Notes:

Insufficient sample was available to prepare and analyze a matrix spike. Acceptable LCS results demonstrate the accuracy of the analysis.

SEMIVOLATILE ORGANIC COMPOUNDS			**Method: SW8270D**				**Analyst: JD**	
1-Phenoxy-2-propanol	ND	NA	0.0060	NA		mg/L	02/06/16	
4-Methylcyclohexanemethanol	ND	NA	0.0060	NA		mg/L	02/06/16	
Surr: 2-Fluorophenol	42.5	NA	32.9-110	NA		%Rec	02/06/16	
Surr: Phenol-d5	32.5	NA	25.8-110	NA		%Rec	02/06/16	
Surr: 2,4,6-Tribromophenol	100	NA	63.8-110	NA		%Rec	02/06/16	
Surr: Nitrobenzene-d5	86.0	NA	61.8-110	NA		%Rec	02/06/16	
Surr: 2-Fluorobiphenyl	77.6	NA	58.6-110	NA		%Rec	02/06/16	

REI Consultants, Inc. - Analytical Report

WO#: 1602183

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	2/1/2016 11:35:00 AM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	2/2/2016
Lab ID:	1602183-01A	**Matrix:**	Liquid
Client Sample ID:	MW-13-SPL-2-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
Surr: 4-Terphenyl-d14	67.9	NA	55.1-110	NA		%Rec	02/06/16	
VOLATILE ORGANIC COMPOUNDS			**Method: SW8015C**				**Analyst: CB**	
Methanol	ND	5.00	10.0	NA		mg/L	02/10/16	
VOLATILE ORGANIC COMPOUNDS-ADDITIONAL			**Method: SW8260B**				**Analyst: MD**	
1-Propanol	ND	50.0	100	NA		µg/L	02/10/16	
tert-Butyl alcohol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Ethanol	ND	100	200	NA		µg/L	02/10/16	PA/VA
2-Propanol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	105	NA	80-120	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	104	NA	80-120	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	103	NA	80-120	NA		%Rec	02/10/16	
Surr: Toluene-d8	96.7	NA	80-120	NA		%Rec	02/10/16	
VOLATILE ORGANIC COMPOUNDS			**Method: SW8260B**				**Analyst: MD**	
Benzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Ethylbenzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
m,p-Xylene	ND	1.00	2.00	NA		µg/L	02/10/16	PA/VA
Methyl tert-butyl ether	ND	2.50	5.00	NA		µg/L	02/10/16	PA/VA
o-Xylene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Toluene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	97.1	NA	75.9-132	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	98.7	NA	73.6-132	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	103	NA	80.1-127	NA		%Rec	02/10/16	
Surr: Toluene-d8	95.2	NA	72.4-119	NA		%Rec	02/10/16	

REI Consultants, Inc. - Analytical Report

WO#: 1602183

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	2/1/2016 11:35:00 AM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	2/2/2016
Lab ID:	1602183-01B	**Matrix:**	Liquid
Client Sample ID:	MW-13-SPL-2-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
DISSOLVED METALS by ICP-MS			**Method: SW6020A**				**Analyst: BG**	
Lead	ND	0.0002	0.0010	NA		mg/L	02/10/16	PA/VA

REI Consultants, Inc. - Analytical Report

WO#: 1602183

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	2/1/2016 1:10:00 PM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	2/2/2016
Lab ID:	1602183-02A	**Matrix:**	Liquid
Client Sample ID:	SUMP-10-SPL-2-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
GLYCOLS, Total			**Method: GC-FID**				**Analyst: TS**	
Diethylene Glycol	ND	9.84	40.0	NA		mg/L	02/09/16	
Dipropylene Glycol	ND	8.57	40.0	NA		mg/L	02/09/16	
Monoethylene Glycol	ND	6.01	40.0	NA		mg/L	02/09/16	
Propylene Glycol	ND	8.00	40.0	NA		mg/L	02/09/16	
Triethylene Glycol	ND	12.4	40.0	NA		mg/L	02/09/16	
POLYNUCLEAR AROMATIC HYDROCARBONS (SIM)			**Method: SW8270D**				**Analyst: JD**	
Acenaphthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Acenaphthylene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(a)anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(a)pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(b)fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(g,h,i)perylene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Benzo(k)fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Chrysene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Dibenzo(a,h)anthracene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Fluoranthene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Fluorene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Indeno(1,2,3-cd)pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Naphthalene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Phenanthrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Pyrene	ND	0.000060	0.000120	NA		mg/L	02/10/16	PA/VA
Surr: Nitrobenzene-d5	76.0	NA	16.1-147	NA		%Rec	02/10/16	
Surr: 2-Fluorobiphenyl	70.0	NA	37.9-130	NA		%Rec	02/10/16	
Surr: 4-Terphenyl-d14	70.0	NA	58.1-130	NA		%Rec	02/10/16	

Notes:

Insufficient sample was available to prepare and analyze a matrix spike. Acceptable LCS results demonstrate the accuracy of the analysis.

SEMIVOLATILE ORGANIC COMPOUNDS			**Method: SW8270D**				**Analyst: JD**	
1-Phenoxy-2-propanol	ND	NA	0.0060	NA		mg/L	02/06/16	
4-Methylcyclohexanemethanol	ND	NA	0.0060	NA		mg/L	02/06/16	
Surr: 2-Fluorophenol	46.3	NA	32.9-110	NA		%Rec	02/06/16	
Surr: Phenol-d5	36.6	NA	25.8-110	NA		%Rec	02/06/16	
Surr: 2,4,6-Tribromophenol	108	NA	63.8-110	NA		%Rec	02/06/16	
Surr: Nitrobenzene-d5	96.9	NA	61.8-110	NA		%Rec	02/06/16	
Surr: 2-Fluorobiphenyl	87.2	NA	58.6-110	NA		%Rec	02/06/16	

REI Consultants, Inc. - Analytical Report

WO#: 1602183

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	2/1/2016 1:10:00 PM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	2/2/2016
Lab ID:	1602183-02A	**Matrix:**	Liquid
Client Sample ID:	SUMP-10-SPL-2-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
Surr: 4-Terphenyl-d14	95.2	NA	55.1-110	NA		%Rec	02/06/16	
VOLATILE ORGANIC COMPOUNDS			**Method: SW8015C**				**Analyst: CB**	
Methanol	ND	5.00	10.0	NA		mg/L	02/10/16	
VOLATILE ORGANIC COMPOUNDS-ADDITIONAL			**Method: SW8260B**				**Analyst: MD**	
1-Propanol	ND	50.0	100	NA		µg/L	02/10/16	
tert-Butyl alcohol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Ethanol	ND	100	200	NA		µg/L	02/10/16	PA/VA
2-Propanol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	108	NA	80-120	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	103	NA	80-120	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	103	NA	80-120	NA		%Rec	02/10/16	
Surr: Toluene-d8	95.1	NA	80-120	NA		%Rec	02/10/16	
VOLATILE ORGANIC COMPOUNDS			**Method: SW8260B**				**Analyst: MD**	
Benzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Ethylbenzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
m,p-Xylene	ND	1.00	2.00	NA		µg/L	02/10/16	PA/VA
Methyl tert-butyl ether	ND	2.50	5.00	NA		µg/L	02/10/16	PA/VA
o-Xylene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Toluene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	99.7	NA	75.9-132	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	99.4	NA	73.6-132	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	101	NA	80.1-127	NA		%Rec	02/10/16	
Surr: Toluene-d8	93.6	NA	72.4-119	NA		%Rec	02/10/16	

REI Consultants, Inc. - Analytical Report

WO#: 1602183

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	2/1/2016 1:10:00 PM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	2/2/2016
Lab ID:	1602183-02B	**Matrix:**	Liquid
Client Sample ID:	SUMP-10-SPL-2-16	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
DISSOLVED METALS by ICP-MS			**Method: SW6020A**				**Analyst: BG**	
Lead	0.0002	0.0002	0.0010	NA	J	mg/L	02/10/16	PA/VA

REI Consultants, Inc. - Analytical Report

WO#: 1602183

Date Reported: 2/12/2016

Client:	WV DEP - CHARLESTON	**Collection Date:**	2/1/2016 12:00:00 AM
Project:	FREEDOM INDUSTRIES #15017	**Date Received:**	2/2/2016
Lab ID:	1602183-03A	**Matrix:**	Trip Blank
Client Sample ID:	TRIP BLANK	**Site ID:**	CHARLESTON, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
VOLATILE ORGANIC COMPOUNDS			**Method: SW8015C**				**Analyst: CB**	
Methanol	ND	5.00	10.0	NA		mg/L	02/10/16	
VOLATILE ORGANIC COMPOUNDS-ADDITIONAL			**Method: SW8260B**				**Analyst: MD**	
1-Propanol	ND	50.0	100	NA		µg/L	02/10/16	
tert-Butyl alcohol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Ethanol	ND	100	200	NA		µg/L	02/10/16	PA/VA
2-Propanol	ND	50.0	100	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	108	NA	80-120	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	104	NA	80-120	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	100	NA	80-120	NA		%Rec	02/10/16	
Surr: Toluene-d8	98.6	NA	80-120	NA		%Rec	02/10/16	
VOLATILE ORGANIC COMPOUNDS			**Method: SW8260B**				**Analyst: MD**	
Benzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Ethylbenzene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
m,p-Xylene	ND	1.00	2.00	NA		µg/L	02/10/16	PA/VA
Methyl tert-butyl ether	ND	2.50	5.00	NA		µg/L	02/10/16	PA/VA
o-Xylene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Toluene	ND	0.500	1.00	NA		µg/L	02/10/16	PA/VA
Surr: 1,2-Dichloroethane-d4	99.4	NA	75.9-132	NA		%Rec	02/10/16	
Surr: 4-Bromofluorobenzene	96.7	NA	73.6-132	NA		%Rec	02/10/16	
Surr: Dibromofluoromethane	101	NA	80.1-127	NA		%Rec	02/10/16	
Surr: Toluene-d8	97.1	NA	72.4-119	NA		%Rec	02/10/16	

REI Consultants, Inc.
PO Box 286
Beaver, WV 25813
TEL: (304)255-2500
Website: www.reiclabs.com

Improving the environment, one client at a time...

Sample Receipt Checklist

Client Name:	**WES012**			Work Order Number:	**1602183**
RCPNo:	**1**	Date and Time Received:	**2/2/2016 4:09:11 PM**	Received by:	**Mary Ann Holley**
Completed By:	**Brandon Cole**		Reviewed By:	**Stacy Heasley**	
Completed Date:	**2/2/2016 4:10:22 PM**		Reviewed Date:	**2/3/2016 11:34 AM**	

Carrier Name: REIC

1.	Chain of custody present?	Yes [x]	No [ ]	
2.	Chain of custody signed when relinquished and received?	Yes [x]	No [ ]	
3.	Are matrices correctly identified on Chain of custody?	Yes [x]	No [ ]	
4.	Is it clear what analyses were requested?	Yes [x]	No [ ]	
5.	Custody seals intact?	Yes [x]	No [ ]	Not Present [ ]
6.	Samples in proper container type and preservative?	Yes [x]	No [ ]	
7.	Were correct preservatives noted on COC?	Yes [x]	No [ ]	NA [ ]
8.	Sample containers intact?	Yes [x]	No [ ]	
9.	Sufficient sample volume for indicated test?	Yes [ ]	No [x]	
10.	Were container labels complete?	Yes [x]	No [ ]	
11.	All samples received within holding time?	Yes [x]	No [ ]	
12.	Was an attempt made to cool the samples?	Yes [x]	No [ ]	NA [ ]
13.	Sample Temp. taken and recorded upon receipt?	Yes [x]	No [ ]	To 2.2 ºC
14.	Water - Were bubbles absent in VOC vials?	Yes [x]	No [ ]	No Vials [ ]
15.	Are Samples considered acceptable?	Yes [x]	No [ ]	
16.	COC filled out properly?	Yes [x]	No [ ]	

Client Notification/Response

Client Name: **WES012** Work Order Number: **1602183**

Comment: NOT ENOUGH TRIP BLANK SAMPLE FOR GLYCOLS.

Client Contacted: Yes [ ] No [ ] NA [x] Person Contacted:

Contact Mode: Phone [ ] Fax: [ ] Email: [ ] In Person: [ ]

Date Contacted: Contacted By:

Regarding:

Client Instructions:

Corrective Action:

Attachment 5

USEPA VISL Calculator

OSWER VAPOR INTRUSION ASSESSMENT
Vapor Intrusion Screening Level (VISL) Calculator Version 3.5, June 2017 RSLs

The primary objective of risk-based screening is to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Generally, at properties where subsurface concentrations of vapor-forming chemicals (e.g., groundwater or "near source" soil gas concentrations) fall below screening levels (i.e., VISLs), no further action or study is warranted, so long as the exposure assumptions match those taken into account by the calculations and the site fulfills the conditions and assumptions of the generic conceptual model underlying the screening levels. In a similar fashion, the results of risk-based screening can help the data review team identify areas, buildings, and/or chemicals that can be eliminated from further assessment. The generic conceptual model underlying these screening levels is described in OSWER Publication 9200.2-154 (OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air) (EPA 2015; Section 6.5)

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (°C)	Tgw	25	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

	CAS	Chemical Name	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1) Yes/No	Does chemical have inhalation toxicity data? (IUR and/or RfC) Yes/No	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? Cvp > Cia,target? Yes/No	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? Chc > Cia,target? Yes/No	Target Indoor Air Conc. @ TCR = 1E-06 or THQ = 1 MIN(Cia,c;Cia,nc) (ug/m^3)	Toxicity Basis C/NC	Target Sub-Slab and Exterior Soil Gas Conc. @ TCR = 1E-06 or THQ = 1 Csg (ug/m^3)	Target Ground Water Conc. @ TCR = 1E-06 or THQ = 1 Cgw (ug/L)	Is Target Ground Water Conc. < MCL? Cgw<MCL? Yes/No (MCL ug/L)	Pure Phase Vapor Conc. @ 25°C Cvp (ug/m^3)	Maximum Groundwater Vapor Conc. Chc (ug/m^3)	Temperature for Max. Groundwater Vapor Conc. Tgw or 25 C	Lower Explosive Limit** LEL (% by vol)	LEL Source	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i	Target Indoor Air Conc. for Carcinogens @ TCR = 1E-06 Cia,c (ug/m^3)	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1 Cia,nc (ug/m^3)
X	75-07-0	Acetaldehyde	Yes	Yes	Yes	Yes	1.3E+00	C	4.3E+01	4.7E+02	--	2.14E+09	2.73E+09	25	4	E	2.20E-06	I	9.00E-03	I		1.3E+00	9.4E+00
x	71-43-2	Benzene	Yes	Yes	Yes	Yes	3.6E-01	C	1.2E+01	1.6E+00	Yes (5)	3.98E+08	4.06E+08	25	1.2	N	7.80E-06	I	3.00E-02	I		3.6E-01	3.1E+01
x	100-41-4	Ethylbenzene	Yes	Yes	Yes	Yes	1.1E+00	C	3.7E+01	3.5E+00	Yes (700)	5.48E+07	5.44E+07	25	0.8	N	2.50E-06	CA	1.00E+00	I		1.1E+00	1.0E+03
X	50-00-0	Formaldehyde	Yes	Yes	Yes	Yes	2.2E-01	C	7.2E+00	1.6E+04	--	6.28E+09	5.52E+06	25	7	N	1.30E-05	I	9.80E-03	A		2.2E-01	1.0E+01
X	64-18-6	Formic Acid	Yes	Yes	Yes	Yes	3.1E-01	NC	1.0E+01	4.6E+04	--	1.05E+08	6.83E+06	25	18	N			3.00E-04	X			3.1E-01
X	67-63-0	Isopropanol	Yes	Yes	Yes	Yes	2.1E+02	NC	7.0E+03	6.3E+05	--	1.47E+08	3.31E+08	25	2	N			2.00E-01	P			2.1E+02
X	67-56-1	Methanol	Yes	Yes	Yes	Yes	2.1E+04	NC	7.0E+05	1.1E+08	--	2.19E+08	1.86E+08	25	6	N			2.00E+01	I			2.1E+04
X	1634-04-4	Methyl tert-Butyl Ether (MTBE)	Yes	Yes	Yes	Yes	1.1E+01	C	3.6E+02	4.5E+02	--	1.19E+09	1.22E+09	25	1.6	M	2.60E-07	CA	3.00E+00	I		1.1E+01	3.1E+03
x	91-20-3	Naphthalene	Yes	Yes	Yes	Yes	8.3E-02	C	2.8E+00	4.6E+00	--	5.86E+05	5.58E+05	25	0.9	N	3.40E-05	CA	3.00E-03	I		8.3E-02	3.1E+00
x	108-88-3	Toluene	Yes	Yes	Yes	Yes	5.2E+03	NC	1.7E+05	1.9E+04	No (1000)	1.41E+08	1.43E+08	25	1.1	N			5.00E+00	I			5.2E+03
x	1330-20-7	Xylenes	Yes	Yes	Yes	Yes	1.0E+02	NC	3.5E+03	3.8E+02	Yes (10000)	4.56E+07	2.87E+07	25					1.00E-01	I			1.0E+02

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell G10) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R	70	ATc_C	70	ATc	70
Averaging time for non-carcinogens	(yrs)	ATnc_R	26	ATnc_C	25	ATnc	26
Exposure duration	(yrs)	ED_R	26	ED_C	25	ED	26
Exposure frequency	(days/yr)	EF_R	350	EF_C	250	EF	350
Exposure time	(hr/day)	ET_R	24	ET_C	8	ET	24

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell G10) Symbol	Selected Value
Groundwater	(-)	AFgw_R	0.001	AFgw_C	0.001	AFgw	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R	0.03	AFss_C	0.03	AFss	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell G10) Symbol	Selected Value
	mIURTCE_R	1.00E-06	mIURTCE_C	0.00E+00	mIURTCE	1.00E-06
	IURTCE_R	3.10E-06	IURTCE_C	4.10E-06	IURTCE	3.10E-06

Mutagenic Chemicals

The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration (years)	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 This factor is used in the equations for mutagenic chemicals.

See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:
NVT = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated medium
C = Carcinogenic
NC = Non-carcinogenic
I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
E = The Engineering ToolBox. Available online at http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.html
N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online at: http://www.cdc.gov/niosh/npg/default.html http://www.cdc.gov/niosh/npg/default.html
M = Chemical-specific MSDS
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
**Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explode.

OSWER VAPOR INTRUSION ASSESSMENT
Vapor Intrusion Screening Level (VISL) Calculator Version 3.5, June 2017 RSLs

The primary objective of risk-based screening is to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Generally, at properties where subsurface concentrations of vapor-forming chemicals (e.g., groundwater or "near source" soil gas concentrations) fall below screening levels (i.e., VISLs), no further action or study is warranted, so long as the exposure assumptions match those taken into account by the calculations and the site fulfills the conditions and assumptions of the generic conceptual model underlying the screening levels. In a similar fashion, the results of risk-based screening can help the data review team identify areas, buildings, and/or chemicals that can be eliminated from further assessment. The generic conceptual model underlying these screening levels is described in OSWER Publication 9200.2-154 (OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air) (EPA 2015; Section 6.5)

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-05	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (°C)	Tgw	25	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

	CAS	Chemical Name	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1) Yes/No	Does chemical have inhalation toxicity data? (IUR and/or RfC) Yes/No	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? Cvp > Cia,target? Yes/No	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? Chc > Cia,target? Yes/No	Target Indoor Air Conc. @ TCR = 10E-06 or THQ = 1 MIN(Cia,c;Cia,nc) (ug/m^3)	Toxicity Basis C/NC	Target Sub-Slab and Exterior Soil Gas Conc. @ TCR = 10E-06 or THQ = 1 Csg (ug/m^3)	Target Ground Water Conc. @ TCR = 10E-06 or THQ = 1 Cgw (ug/L)	Is Target Ground Water Conc. < MCL? Cgw<MCL? Yes/No (MCL ug/L)	Pure Phase Vapor Conc. @ 25°C Cvp (ug/m^3)	Maximum Groundwater Vapor Conc. Chc (ug/m^3)	Temperature for Max. Groundwater Vapor Conc. Tgw or 25 C	Lower Explosive Limit** LEL (% by vol)	LEL Source	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i	Target Indoor Air Conc. for Carcinogens @ TCR = 10E-06 Cia,c (ug/m^3)	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1 Cia,nc (ug/m^3)
X	75-07-0	Acetaldehyde	Yes	Yes	Yes	Yes	3.9E+01	NC	1.3E+03	1.4E+04	--	2.14E+09	2.73E+09	25	4	E		2.20E-06	I	9.00E-03	I		5.6E+01	3.9E+01
x	71-43-2	Benzene	Yes	Yes	Yes	Yes	1.6E+01	C	5.2E+02	6.9E+01	No (5)	3.98E+08	4.06E+08	25	1.2	N		7.80E-06	I	3.00E-02	I		1.6E+01	1.3E+02
x	100-41-4	Ethylbenzene	Yes	Yes	Yes	Yes	4.9E+01	C	1.6E+03	1.5E+02	Yes (700)	5.48E+07	5.44E+07	25	0.8	N		2.50E-06	CA	1.00E+00	I		4.9E+01	4.4E+03
X	50-00-0	Formaldehyde	Yes	Yes	Yes	Yes	9.4E+00	C	3.1E+02	6.8E+05	--	6.28E+09	5.52E+06	25	7	N		1.30E-05	I	9.80E-03	A		9.4E+00	4.3E+01
X	64-18-6	Formic Acid	Yes	Yes	Yes	Yes	1.3E+00	NC	4.4E+01	1.9E+05	--	1.05E+08	6.83E+06	25	18	N				3.00E-04	X			1.3E+00
X	67-63-0	Isopropanol	Yes	Yes	Yes	Yes	8.8E+02	NC	2.9E+04	2.6E+06	--	1.47E+08	3.31E+08	25	2	N				2.00E-01	P			8.8E+02
X	67-56-1	Methanol	Yes	Yes	Yes	Yes	8.8E+04	NC	2.9E+06	4.7E+08	--	2.19E+08	1.86E+08	25	6	N				2.00E+01	I			8.8E+04
X	1634-04-4	Methyl tert-Butyl Ether (MTBE)	Yes	Yes	Yes	Yes	4.7E+02	C	1.6E+04	2.0E+04	--	1.19E+09	1.22E+09	25	1.6	M		2.60E-07	CA	3.00E+00	I		4.7E+02	1.3E+04
x	91-20-3	Naphthalene	Yes	Yes	Yes	Yes	3.6E+00	C	1.2E+02	2.0E+02	--	5.86E+05	5.58E+05	25	0.9	N		3.40E-05	CA	3.00E-03	I		3.6E+00	1.3E+01
x	108-88-3	Toluene	Yes	Yes	Yes	Yes	2.2E+04	NC	7.3E+05	8.1E+04	No (1000)	1.41E+08	1.43E+08	25	1.1	N				5.00E+00	I			2.2E+04
x	1330-20-7	Xylenes	Yes	Yes	Yes	Yes	4.4E+02	NC	1.5E+04	1.6E+03	Yes (10000)	4.56E+07	2.87E+07	25						1.00E-01	I			4.4E+02

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell G10) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R	70	ATc_C	70	ATc	70
Averaging time for non-carcinogens	(yrs)	ATnc_R	26	ATnc_C	25	ATnc	25
Exposure duration	(yrs)	ED_R	26	ED_C	25	ED	25
Exposure frequency	(days/yr)	EF_R	350	EF_C	250	EF	250
Exposure time	(hr/day)	ET_R	24	ET_C	8	ET	8

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell G10) Symbol	Selected Value
Groundwater	(-)	AFgw_R	0.001	AFgw_C	0.001	AFgw	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R	0.03	AFss_C	0.03	AFss	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell G10) Symbol	Selected Value
	mIURTCE_R	1.00E-06	mIURTCE_C	0.00E+00	mIURTCE	0.00E+00
	IURTCE_R	3.10E-06	IURTCE_C	4.10E-06	IURTCE	4.10E-06

Mutagenic Chemicals

The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration (years)	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 This factor is used in the equations for mutagenic chemicals.

See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:
NVT = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated medium
C = Carcinogenic
NC = Non-carcinogenic
I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
E = The Engineering ToolBox. Available online at http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.html
N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online at: http://www.cdc.gov/niosh/npg/default.html http://www.cdc.gov/niosh/npg/default.html
M = Chemical-specific MSDS
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
**Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explode.

Attachment 6

Dilution Factor Calculations

Groundwater Flux @ Freedom
For GW->SW mass balance calcs.

Flux (Q) = K i A

K = 4 ft/day (1×10^{-5} cm/s)

From Arcadis boring log MW-4
Soil desc. = silty sand (SP)

i = 10 ft/102 ft (Dec 2014) From Arcadis Pot. Surf. Maps
= 6 ft/126 ft (Jan 2015)
≃ 0.05

A = 910 ft (Site border along Elk River)
× 6 ft
5460 ft^2 (Sat. thickness @ MW4)

$Q = 4 \frac{ft}{d} \times 0.05 \times 5460\ ft^2$
$= 1{,}092\ ft^3/day$

Determine SW Dilution Factor for GW → SW discharge @ Freedom Ind.

$$\text{Dilution Factor}_{\text{Human Health}} = \frac{\frac{1}{3}(7Q10)}{Q_{gw}}$$

(From App. J, WVDEP Guidance Manual)

7Q10 Elk River @ Site Location

= 75 cfs (tagis.dep.wv.gov/stream flow)

$$\boxed{DF_{HH}} = \frac{\frac{1}{3}(75\text{ cfs})\left(60\frac{s}{min}\right)\left(1440\frac{min}{day}\right)}{1{,}092\ ft^3/day}$$

(From GW Flux calc.)

= 1,978

$$\text{Dilution Factor}_{\text{Aquatic Life}} = \frac{7Q10_{\text{available}}}{Q_{gw}}$$

7Q10 avail. = 1% @ 75 cfs (From Table J.2-1)

$$\boxed{DF_{Aq.\ Life}} = \frac{(0.01)(75\text{ cfs})\left(60\frac{s}{min}\right)\left(1440\frac{min}{day}\right)}{1{,}092\ ft^3/day}$$

= 59.34

ARCADIS

BORING/WELL CONSTRUCTION LOG

WELL NO.: **SB-4/MW-4**

TOTAL DEPTH: **20** **feet bgs**

PROJECT INFORMATION

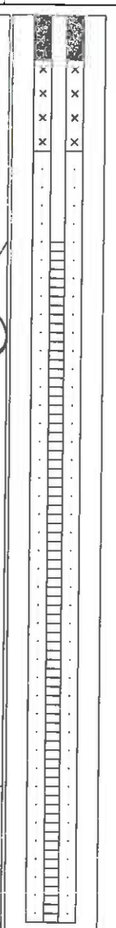
CLIENT:	**Freedom Industries, Inc.**
SITE LOCATION:	**1015 Barlow Drive**
CITY, STATE:	**Charleston, West Virginia**
PROJECT NUMBER:	**OH003003.0001**
LOGGED BY:	**Lewis Eplin (CEC Consulting)**

DRILLING INFORMATION

DRILLING CO.:	**Enviroprobe**
DRILLER:	**D.K, M.H., J.L.**
DRILLING METHOD:	**Direct Push**
DATE STARTED:	**01/13/2014**
DATE COMPLETED:	**01/13/2014**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Symbol	USCS Classification	SOIL DESCRIPTION
0	20	<1		CL	(0.0 - 5.0) Grass cover, silty CLAY, moist, soft, dark brown. (Hand Clear to 5.0 feet).
2					
4	12	369			Note: At 4.5 feet gray, strong odor.
6	20	454		SP	(5.0 - 17.0) Silty SAND, moist, loose, medium dense, strong odor, gray.
8	20	601			↳ ≃ 4 ft/day (K) ≃ 1x10⁻⁵ cm/s
10	24	960			Note: At 10 feet trace clay. Note: At 11 feet wet.
12					
14	24	822			
16	30	530			
18	30	NM		SP	(17.0 - 20.0) Clayey SAND, wet, loose, brown.
20					End of boring at 20 feet.
22					

WELL CONSTRUCTION DETAILS



Flush Mount

Concrete (0 to 1 ft)

2" PVC Sch 40 Casing (0 to 5 ft)

Bentonite pellets (1 to 3 ft)

Sand Pack (3 to 20 ft)

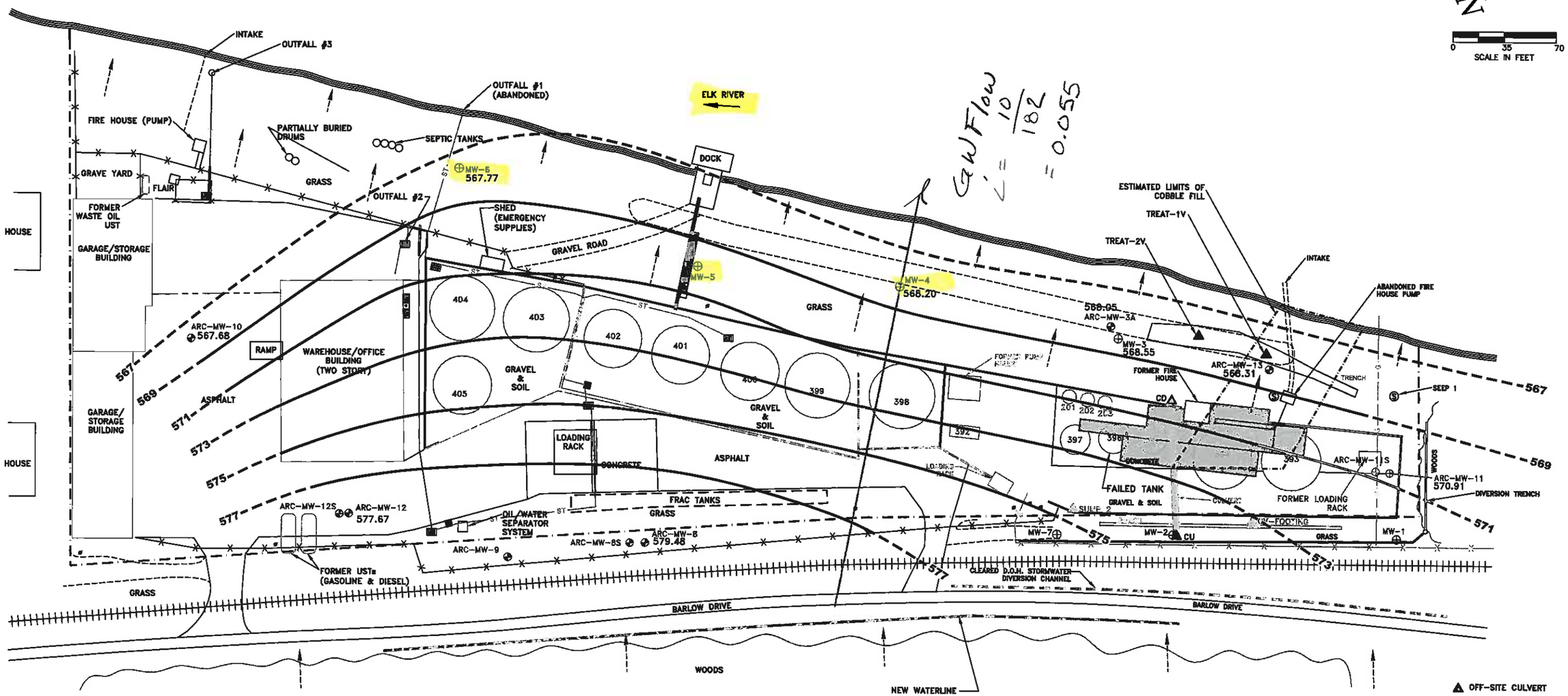
2" Screen slot size 0.10 (5 to 20 ft)

Notes:

bgs: below ground surface USCS: Unified Soil Classification System
ppm: parts per million NM: Not measured NA: Not Available
*Indicates sample submitted for laboratory analysis.

PID: Photo-ionization Detector
ft: feet
HA: Hand auger

Date: 2/17/2015
Page: 1 of 1



GW Flow
i = 10/182
= 0.055

LEGEND

- EXISTING WELL
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- MW MONITORING WELL (ARCADIS)
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- 567.89 GROUNDWATER ELEVATION
- 582 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- PROPERTY BOUNDARY
- FENCE
- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST STORM SEWER LINE
- G NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

NOTES:
1. ALL ASTs HAVE BEEN REMOVED.
2. FLAIR AND PIPING REMOVED.
3. FUEL LOCADING RACK REMOVED.
4. OIL LOADING RACK REMOVED.

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

OH003003.0001

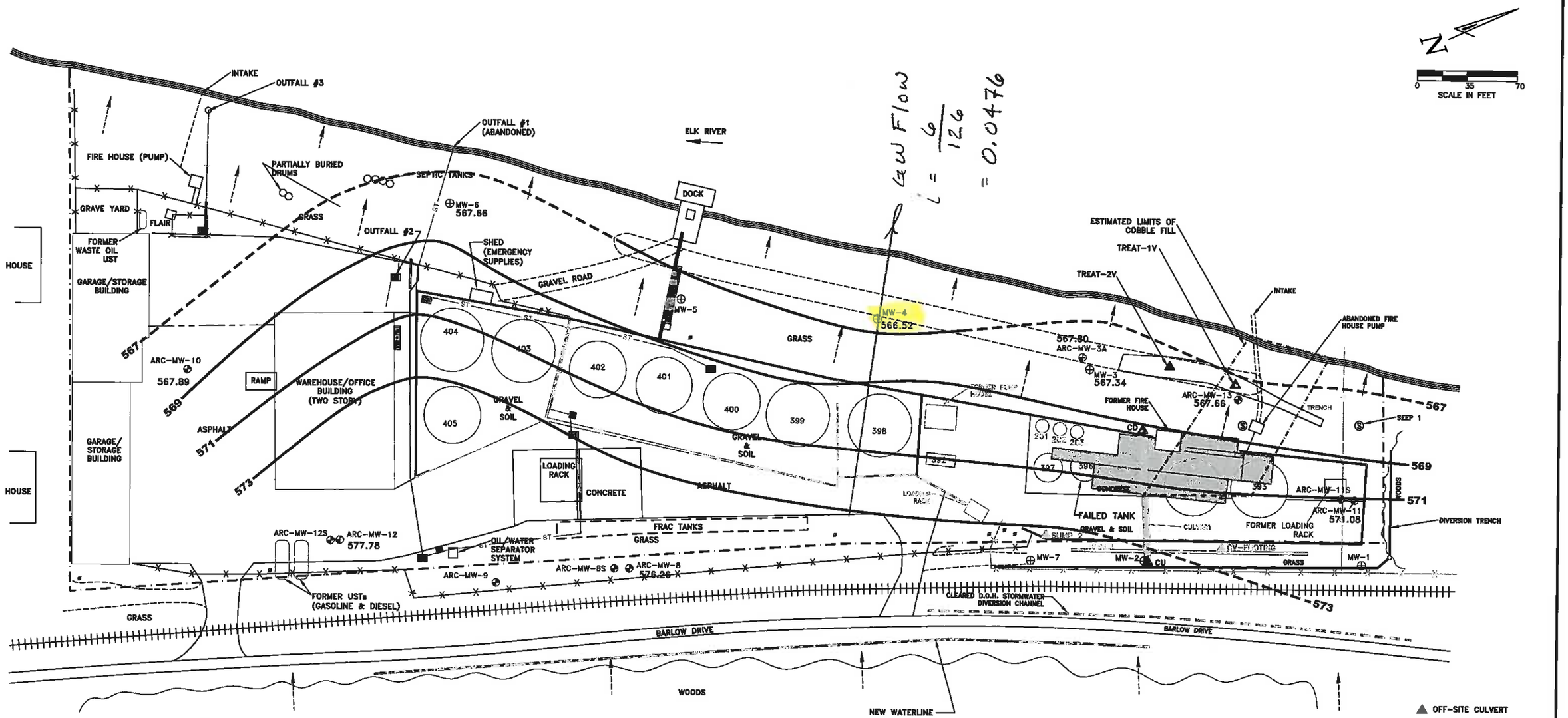
□OTENTIOMETRIC SUR□ACE MA□
DEE□ □□□□□□□□

ARCADIS

FIGURE
□□

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

CITY:(Columbus, Oh) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Manzo) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\Columbus-OH\ACTIO\H003003 - FREEDOM INDUSTRIES\0001\0003\OH3003-1-3-2015-01.dwg LAYOUT: FIG 4B GW ELEV 120014 DEEP SAVED: 4/29/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2015 2:00 PM BY: SMITH, BOB
XREFS:



GW Flow
i = 6/126
= 0.0476

LEGEND

- EXISTING WELL
- SEEP
- CULVERT SAMPLE
- SUMP SAMPLE
- MW MONITORING WELL (ARCADIS)
- HISTORICAL SITE FEATURES
- SOIL EXCAVATION
- 567.89 GROUNDWATER ELEVATION
- 582 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- PROPERTY BOUNDARY
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- RAILROAD TRACKS
- PRODUCT PIPING
- DIKE WALL
- STEEP SLOPE
- TREE LINE
- ST STORM SEWER LINE
- G NATURAL GAS LINE
- STEAM LINE
- DRAIN
- POLE

NOTES:
1. ALL ASTs HAVE BEEN REMOVED.
2. FLAIR AND PIPING REMOVED.
3. FUEL LOCADING RACK REMOVED.
4. OIL LOADING RACK REMOVED.

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

FREEDOM INDUSTRIES
1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA

OH003003.0001

□OTENTIOMETRIC SUR□ACE MA□
DEE□ A□UI□ER
□ANUARY □□□□□□□□□□□

ARCADIS

FIGURE
□□

CITY:(Columbus, Oh) DIV/GROUP:(IM/DV) DB:(R. Smith) LD:(Opt) PIC:(Opt) PM:(J. Manzo) TM:(Opt) LYR:(On)(On=*;OFF=*REF*
G:\ENVCAD\Columbus-OH\ACT\OH003003 - FREEDOM INDUSTRIES\00910003\OH3003-1-3-2015-01.dwg LAYOUT: FIG 5B GW ELEV 010015 DEEP SAVED: 4/28/2015 1:55 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/28/2015 2:01 PM BY: SMITH,
BOB
XREFS:

Attachment 7

2016 Water Quality Report Used for Surface Water Hardness

2016 Annual Water Quality Report

Elk River Regional System
PWS ID: WV3302016

WEST VIRGINIA AMERICAN WATER

We encourage you to read and share this annual Water Quality Report that can be viewed electronically at www.amwater.com/ccr/kanawhavalley.pdf

A Message from the West Virginia American Water President

To Our Valued Customer:

On behalf of all West Virginia American Water employees, I am pleased to share some very good news about the quality of your drinking water. As you read through our Annual Water Quality Report, you will see that we continue to supply water that meets or surpasses state and federal water quality standards. And did you know that the price you pay for this high-quality water service is less than two cents per gallon? This is an exceptional value when you consider the science, expertise, equipment and technology that go into bringing water from the source, treating it, and delivering clean water to your tap.

The important public service we provide also requires significant investment to maintain and upgrade aging infrastructure. **In 2016 alone, we invested $62 million in the following system improvements across the Mountain State:**

- **Treatment and Water Quality:** Our treatment plants received upgrades to control systems, online instruments and chemical feed systems. We continued multi-year projects to fully automate our Weston and New River water treatment plants and installed an air stripper in our Huntington system to reduce the potential for harmful disinfection byproducts.
- **Pipes**: We invested $12 million to replace more than 23 miles of aging pipe installed primarily between the early 1900s and the 1940s. Pipeline improvement projects help improve water quality, pressure, fire protection and service reliability.
- **Pump Stations:** We replaced, rebuilt and updated numerous booster stations to improve reliability and safety.
- **Fire Hydrants:** Reliable fire protection is incredibly important to the safety of the communities we serve, and we replaced 68 fire hydrants to continue this public service.
- **Storage Tanks:** We constructed new tanks at Drawdy Mountain in Boone County and Mount Olive in Kanawha County to reinforce these areas of our system. We also invested $1.5 million to rehabilitate and paint five water storage tanks in Bluefield, Clendenin, Huntington, Pratt and Sharples to extend the life of the tanks and bring them up to current industry standards.
- **Source Water Protection:** We installed new laboratory equipment at our Kanawha Valley treatment plant to analyze source water for fuels and installed a new online sensor at our Huntington treatment plant for the early detection of algae. We also continued to develop the WaterSuite platform for managing source water monitoring data and information about potential sources of contamination in the areas upstream of our intakes.

Water is essential for public health, fire protection, economic development and our overall quality of life. This is a responsibility that West Virginia American Water employees take very seriously to ensure that quality water keeps flowing not only today but well into the future. Please take the time to review this report with its details about the source and quality of your drinking water. **We hope you agree that your water service is worth every penny.**

Proud to be your local water service provider,

Brian Bruce
President, West Virginia American Water

AT ABOUT A PENNY PER GALLON WATER IS A GREAT VALUE™

American Water Works Company, Inc., together with its subsidiaries, is referred to as American Water. "West Virginia American Water" and the star logo are the registered trademarks of American Water Works Company, Inc. All rights reserved.

Commonly Asked Questions

Is there lead in my water?
If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. West Virginia American Water is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http//www.epa.gov/safewater/lead.

How hard is my water?
Hardness is a measure of the concentration of two minerals, calcium and magnesium, naturally present in water. Hardness levels range from 18 to 106 ppm, or 1 to 6 grains per gallon of water.

How much sodium is in my water?
The sodium level is approximately 11.2 ppm (or mg/L).

What is the pH (acidity) range of my water?
Water in the distribution system averages 7.2 pH units. A pH of 7.0 is considered neutral, neither acidic nor alkaline.

Is there fluoride in my water?
West Virginia American Water adds fluoride to a level of near 0.8 ppm to assist in the prevention of dental cavities.

Where Does My Water Come From?

West Virginia American Water and its customers in the Elk River Regional Water system are fortunate because we enjoy an abundant water supply from the Elk River, which is a surface water source. The current treatment plant provided roughly 8 billion gallons of water throughout the year to customers in Kanawha, Boone, Putnam, Lincoln, Logan and Cabell counties. The water supply is distributed for residential, commercial and industrial use. To learn more about our watershed on the internet, go to the U.S. EPA's Search Your Watershed at www.epa.gov/owow/.

Partnership for Safe Drinking Water Program

West Virginia American Water is a member of the national Partnership for Safe Water (an association of water utilities and government) which is committed to providing drinking water quality that is far better than what is required by federal regulation. This facility completed its self-assessment in 2010 and received the "Director's Award" presented by the administrator of the US Environmental Protection Agency. In 2015, this facility received the Five Year Directors award for continuous compliance with the Partnership goals.

Source Water Assessment and Protection

A Source Water Assessment describes the source of drinking water supply for a public water system and potential contaminant sources that could affect that source. The West Virginia Bureau for Public Health developed a Source Water Assessment for the Elk River Regional System under the 1996 amendments to the Federal Safe Drinking Water Act (SDWA). West Virginia American Water has since updated the Source Water Assessment as part of our source water protection planning efforts in accordance with State regulatory requirements established in 2014 under Senate Bill 373. Information about the Elk River Regional System and Source Water Assessment is included in the public version of the Source Water Protection Plan, which is available online at www.westvirginiaamwater.com under the Water Quality & Stewardship > Source Water Protection menu. A copy can also be obtained by contacting our Source Water Protection Manager at (800) 685-8660.

Share This Report

Landlords, businesses, schools, hospitals and other groups are encouraged to share this important information with water users at their location who are not billed customers of West Virginia American Water and therefore do not receive this report directly.

How is My Water Treated and Purified?

Current treatment processes include coagulation and settling followed by filtration and disinfection. An inhibitor is added for corrosion control and fluoridation is provided for reduction of dental cavities. Throughout the process dedicated plant operations and water quality staff continuously monitor and control these plant processes to assure you, our customers, a superior quality water.

Information on the Internet

The U.S. EPA Office of Water and the Centers for Disease Control and Prevention websites provide a substantial amount of information on many issues relating to water resources, water conservation and public health. You may visit these sites or West Virginia American Water's website at the web addresses below:

West Virginia American Water
www.westvirginiaamwater.com

West Virginia Bureau for Public Health
www.wvdhhr.org/oehs

United States Environmental Protection Agency
www.epa.gov/safewater

Safe Drinking Water Hotline: (800) 426-4791

Centers for Disease Control and Prevention
www.cdc.gov

Special Monitoring:

In addition to the unregulated contaminants normally monitored by our facility, in 2015 the Elk River Regional Water system completed sampling for a series of unregulated contaminants in accordance with the Unregulated Contaminant Monitoring Rule (UCMR3). Unregulated contaminants are those that don't yet have a drinking water standard set by USEPA. The purpose of monitoring for these contaminants is to help the EPA decide whether the contaminants should have a standard. Two of the unregulated compounds included in the UCMR3 study were detected in the Elk River Regional Water facility samples collected in 2015. Strontium and Chromium (VI) were both detected, with detection levels listed in the Unregulated Substances section of this report. Should you desire any further information, the specific UCMR3 results from each sampling event are available at West Virginia American Water, P. O. Box 1906, Charleston, WV 25327 or may be requested by calling (800) 685-8660.

Chromium, a metallic element, is found in rocks, soil, plants, and animals. Chromium is also used in steel making, metal plating, leather tanning, paints, dyes and wood preservatives. The most common forms of chromium in the environment are trivalent (chromium-3), hexavalent (chromium-6) and the metal form, (chromium-0). USEPA currently regulates chromium-6 as part of the total chromium drinking water standard. Additional information can be found at http://water.epa.gov/drink/info/chromium/index.cfm/.

Substances Expected to be in Drinking Water

To ensure that tap water is of high quality, U.S. Environmental Protection Agency prescribes regulations limiting the amount of certain substances in water provided by public water systems. U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. West Virginia American Water's advanced water treatment processes are designed to reduce any such substances to levels well below any health concern.

The source of drinking water (both tap water and bottled water) includes rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:
Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, or wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally occurring or may result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and may also, come from gas stations, urban storm water runoff, and septic systems.

Radioactive contaminants, which can be naturally occurring or may be the result of oil and gas production and mining activities.

For more information about contaminants and potential health effects, call the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Additional Regulatory Requirements

Cryptosporidium is a microbial pathogen found in surface water throughout the US. Although *Cryptosporidium* can be removed through commonly-used filtration methods, US EPA issued a new rule in January 2006 that requires systems with higher *Cryptosporidium* levels in their source water to provide additional treatment. West Virginia American Water's Elk River Regional Treatment Plant monitored for *Cryptosporidium* in its raw water in 2004-2005. Based on the results of this round of *Cryptosporidium* monitoring, no additional treatment was required under US EPA regulation. In 2015, the Elk River Regional Treatment Plant began a second round of monitoring for Cryptosporidium which is scheduled for completion in 2017.

Special Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800) 426-4791 or by calling our Customer Service Center at (800) 685-8660.

How to Read the Data Tables

For your information, we have compiled a list in the adjacent table showing what substances were detected in our drinking water during 2016. Although all of the substances listed are under the Maximum Contaminant Level (MCL) set by the U.S. EPA, we feel it is important that you know exactly what was detected and how much of the substance was present in the water. Please carefully review this report as it provides important information about drinking water and your health. The company remains committed to providing the highest quality water to our

customers. For help with interpreting this table, see the "Table Definitions" section.

Unregulated substances are measured, but maximum allowed contaminant levels have not been established by the government.

Table Definitions and Abbreviations

- **Action Level:** The concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.
- **MCL (Maximum Contaminant Level):** The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
- **MCLG (Maximum Contaminant Level Goal):** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- **MRDL (Maximum Residual Disinfectant Level):** The highest level of disinfectant routinely allowed in drinking water. Addition of a disinfectant is necessary for control of microbial contaminants.
- **MRDLG (Maximum Residual Disinfectant Level Goal):** The level of drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.
- **NA:** Not applicable
- **NTU - Nephelometric Turbidity Units:** Measurement of the clarity, or turbidity, of water.
- **pCi/L (picocuries per liter):** Measurement of the natural rate of disintegration of radioactive contaminants in water (also beta particles).
- **ppm (parts per million):** One part substance per million parts water, or milligrams per liter.
- **ppb (parts per billion):** One part substance per billion parts water, or micrograms per liter.
- **ng/L (parts per trillion):** One part substance per trillion parts water, or nanograms per liter.
- **µg/L:** Micrograms per liter or parts per billion.
- **pH:** A measurement of acidity, 7.0 being neutral.
- **Secondary MCL (Secondary Maximum Contaminant Level):** Contaminants levels that may result in cosmetic or aesthetic effects in drinking water.
- **TT (Treatment Technique):** A required process intended to reduce the level of a contaminant in drinking water.

About American Water

West Virginia American Water, a subsidiary of American Water (NYSE: AWK), is the largest investor-owned water utility in the state, providing high-quality and reliable water services to approximately 540,000 people.

With a history dating back to 1886, American Water is the largest and most geographically diverse U.S. publicly-traded water and wastewater utility company. The company employs more than 6,700 dedicated professionals who provide regulated and market-based drinking water, wastewater and other related services to an estimated 15 million people in 47 states and Ontario, Canada. More information can be found by visiting www.amwater.com.

Water Quality Statement

The staff and management of West Virginia American Water are pleased to report that the water provided to our Kanawha Valley customers during the past year met all the state and federal standards set for drinking water.

The state requires a water utility to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

Water Quality Results

Regulated Substances (Measured on the Water Leaving the Treatment Facility unless noted)

Substance (units)	Year Sampled	MCLG	MCL	Amount Detected	Range Low-High	Compliance Achieved	Typical Source
Alpha Emitters (pCi/L)	2014	0	15	< 0.7	NA	Yes	Radioactive decay of natural deposits
Barium (ppm)	2016	2	2	< 0.1	NA	Yes	Discharge of drilling waste; Discharge of from metal refineries; Erosion of natural deposits
Beta/photon emitters (pCi/L)[1]	2014	0	50	< 1.0	NA	Yes	Radioactive decay of natural deposits and man made sources
Chlorine (ppm)[2]	2016	MRDLG=4	MRDL=4	2.0	0.3 – 3.8	Yes	Water additive to control microbes
Fluoride (ppm)	2016	4	4	0.8	0.3 - 1.0	Yes	Water additive which promotes strong teeth
Haloacetic Acids (HAAs) (ppb) [3]	2016	0	60	24	11 – 31	Yes	By-product of drinking water chlorination
Nitrate (ppm)	2016	10	10	0.22	NA	Yes	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Total Trihalomethanes (TTHMs) (ppb) [4]	2016	0	80	52	21 - 76	Yes	By-product of drinking water chlorination
Total Organic Carbon (Removal Ratio) [5]	2016	NA	TT	1.0	0.5 – 1.2	Yes	Naturally decaying vegetation
Turbidity (NTU) [6]	2016	NA	TT	0.04	0.01 – 0.14	Yes	Soil runoff

[1] The MCL for Beta/photon emitters is written as 4 mrem/year. EPA considers 50 pCi/L as the level of concern for beta emitters.
[2] Amount detected based on a yearly running average of all bacteriological samples collected in the distribution system.
[3] Based on a yearly running average. The amount detected was determined by averaging the numerical running annual average at each of 8 distribution compliance sites.
[4] Based on a yearly running average. The amount detected was determined by averaging the numerical running annual average at each of 8 distribution compliance sites. Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys or central nervous system, and may have an increased risk of getting cancer.
[5] The Treatment Technique (TT) is met if the TOC Removal Ratio (based on a four quarter running annual average) is greater than or equal to 1.0.
[6] Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration. A minimum of **100%** of all samples taken to measure turbidity met the treatment technique requirement.

Regulated Substances: Lead and Copper Results (water tap samples)

Substance (units)	Year Sampled	MCLG	Action Level	Amount Detected 90th Percentile	Number of Samples	Homes Above Action Level	Compliance Achieved	Typical Source
Copper (ppm)	2015	1.3	1.3	0.094	50	0	Yes	Corrosion of household plumbing systems, erosion of natural deposits
Lead (ppb)	2015	0	15	2	50	0	Yes	Corrosion of household plumbing systems, erosion of natural deposits

Bacterial Results (from the Distribution System)

Substance (units)	Year Sampled	MCLG	MCL	Highest Percentage Detected	Compliance Achieved	Typical Source
Total coliform (% Positive samples)	2016	0	5% Positive samples	0%	Yes	Bacteria naturally present in the environment

Unregulated Substances (Measured on the Water Leaving the Treatment Facility unless otherwise noted)

Substance (units)	Year Sampled	Average Results	Secondary MCL	Range Low—High	Typical Source
Aluminum (ppb)	2016	40	200	NA	Mineral that occurs naturally in the soil
Chlorides (ppm)	2016	16	250	NA	Mineral that occurs naturally in the soil and runoff from road deicing
Iron (ppb)	2016	3	300	0 – 20	Mineral that occurs naturally in the soil and runoff from mining operations
Manganese (ppb)	2016	6	50	0 - 15	Mineral that occurs naturally in the soil and runoff from mining operations
Nickel (ppb)	2016	< 5	NA	NA	Industrial sources such as metal reclamation and production of certain alloys
Total Chromium(ppb)	2016	<7.0	NA	NA	Industrial sources such as metal reclamation and production of certain alloys
Sodium (ppm)	2016	11.2	NA	NA	Element that occurs naturally in water and soil; road salt; water softeners
Sulfate (ppm)	2016	18.0	250	NA	Mineral that occurs naturally in the soil
Zinc (ppm)	2016	0.11	5	0.01 – 0.23	Element that occurs naturally in the water; constituent of corrosion control additive

Additional Water Quality Parameters of Interest

This table shows average levels of additional water quality parameters which are often of interest to consumers. Values shown here are averages of operating data for 2016. Values may vary from day to day. There are no health-based limits for these substances in drinking water.

Additional Constituents

Substance (units)	Year Sampled	Average Amount Detected	Range Low-High
Alkalinity, Total (ppm)	2016	44	24 - 83
Hardness, Total (ppm)	2016	45	18 - 106
pH (standard units)	2016	7.2	7.1 – 7.4

Attachment 8

Ecological Checklist

APPENDIX C-2: CHECKLIST TO DETERMINE THE APPLICABLE ECOLOGICAL STANDARD

This checklist is cross referenced to 60CSR3, the Voluntary Remediation and Redevelopment Rule (the Rule). This checklist is based on Section 9.5 – Ecological – De Minimis Screening Evaluation (cited as 60-3-9.5). The specific references are to subsections of this section of the Rule.

Step 1. Determine Whether a De Minimis Ecological Screening Evaluation is Appropriate for Your Site

See 60-3.9.5.a.1

Check "yes" or "no" to each of the following questions:

1.1 Has there been a release to the environment at or from the site?

_X_ yes ___ no ___ unknown

If the answer to 1.1 is "no", then no further ecological evaluation is required. File this completed form with the Final Report for the site. If the answer to 1.1 is "yes" or "unknown", proceed to Step 1.2.

1.2 Has the entire site been developed (e.g., predominantly covered by buildings, pavement, etc.)?

_X_ yes ___ no

If "yes", go to 1.6. If "no", go to 1.3.

1.3 Are there any undeveloped areas on or adjacent to the site (e.g., areas that are not under intensive landscape or agricultural control)?

___ yes ___ no

If the answer to 1.3 is "no" then no further ecological evaluation of terrestrial habitat is required. Continue with Step 1.4.

1.4 Are there any potential wetlands (including vernal pools) on or adjacent to the site?

___ yes ___ no

If the answer to 1.4 is "no", then no further ecological evaluation of wetland habitats is required. Continue with Step 1.5.

1.5 Are there any surface water bodies (i.e., lotic or lentic habitat) on or adjacent to the site?

___ yes ___ no

If the answer to 1.5 is "no", then no further ecological evaluation of lotic and lentic aquatic habitat is required. Continue with Step. 1.6

1.6 Are there any terrestrial, wetland, or aquatic habitats off-site, but situated downstream, downwind, or downgradient from the site that may be affected by site-related stressors?

X yes ___ no

1.7 Are there any project land uses for the site that would result in undeveloped areas, wetland habitat, lotic habitat, or lentic habitat?

___ yes X no

If the answers to 1.3 through 1.7 are "no", then no further ecological evaluation is required. File this completed form with the Final Report of the site. If a question was answered "yes", then go to Step 2 because a complete exposure pathway may exist for potential ecological receptors of concern.

Step 2. Identify any Readily Apparent Harm or Exceedances of Surface Water Quality Standards.

See 60-3-2-2.44 and 60-3-9.5.a.5

2.1 Have there been any incidents where harm to wildlife attributable to contaminants originating from the site has been readily apparent?

___ yes X no

If the answer to 2.1 is "yes", go to 2.2; if "no", go to Step 2.3.

2.2 Has the cause of such harm been eliminated?

___ yes ___ no

If the answer to 2.2 is "yes", briefly describe the action taken and continue with this checklist.

If "no", the applicant can proceed directly to the remedy evaluation or alternately proceed with a determination of a Uniform or Site Specific Ecological Standard, as described in the guidance manual prior to implementation of the remedy.

2.3 Is the site contributing to exceedances of Surface Water Quality Standards established for the protection of aquatic life (see 46 CSR1)?

___ yes X no

If the answer to 2.3 is "yes", the applicant can proceed directly to the remedy evaluation or, alternately, proceed with a determination of a Uniform or Site Specific Ecological Standard, as described in the guidance manual prior to implementation of the remedy.

If "no", go to Step 3.

Step 3. Identification of Contamination Associated with Ecological Habitats

See 60-3-9.5.a.2 and 60-3-9.5.a.3

3.1 Have the environmental media (e.g., soil, surface water, sediment, biota) associated with the ecological habitat(s) identified in 1.3 through 1.6 been sampled and analyzed with regard to potential site-related contaminants of concern?

X yes ___ no

If the answer to 3.1 is "yes", proceed to 3.2; if "no", proceed to Step 4.

3.2 Have any site-related contaminants been detected above natural background concentrations in environmental media collected from terrestrial habitat?

___ yes ___ no X not applicable (no terrestrial)

3.3 Have any site-related contaminants been detected above natural background concentrations in environmental media collected from wetland or aquatic habitats (lotic or lentic habitats)?

___ yes X no ___not applicable (no wetland/aquatic habitat)

If the answer to 3.3 is "yes", go to 3.4. If the answer is "no", go to 3.6.

3.4 Are site related contaminants presenting an ecological risk over and above "local" condition?

___ yes ___ no

If the answer to 3.4 is "yes", go to Step 4. If the answer is "no", go to 3.5.

3.5 Have site-related releases of contaminants been stopped?

___ yes ___ no

If the answer to 3.5 is "yes", go to 3.6. If the answer is "no", go to Step 4.

3.6 Are site-related contaminants currently migrating to aquatic habitat (e.g., lotic, lentic, or wetland habitat)?

___ yes X no ___ not applicable (no aquatic habitat)

If the answers to 3.2, 3.3, and 3.6 are "no" or "not applicable", no further ecological evaluation is required. File this completed form with the Final Report for the site. If the answers to 3.2, 3.3, or 3.6 are "yes", proceed to Step 4 because a complete exposure pathway may exist.

Step 4. Characterize the Potential Ecological Habitat

See 60-3-9.5.a.4

4.1 Describe the general land use in the immediate vicinity of the site.

___ Urban ___ Industrial / Commercial
___ Rural / Agricultural ___ Rural / Undeveloped
___ Residential ___ Other (Describe) _____

4.2 For all affected areas that fulfill the descriptions in Questions 1.3 through 1.6, answer the following and provide a site map identifying the potential ecological habitat.

4.2.1 Outline the following characteristics for potential terrestrial habitats.
Location: _____
Contiguous area: _____
General topography: _____
Predominant vegetation species: _____
Primary soil type: _____

4.2.2 Outline the following characteristics for potential wetland habitats (e.g., vernal pools, marshes, etc.

Location: _____

Contiguous area: _____

General topography: _____

Predominant vegetation species: _____

Primary soil type: _____

4.2.3 Outline the following characteristics for potential lotic habitats (e.g., flowing water habitat such as rivers and streams).

Location: _____

Typical width and depth: _____

Typical flow rate: _____

Typical gradient (m/km): _____

Type of river / creek bottom: _____

Types of aquatic vegetation present: _____

Topography of the riparian zone: _____

Predominant riparian vegetation: _____

Human utilization of the river / creek and riparian zone: _____

Local conditions: _____

4.2.4 Outline the following characteristics for potential lentic habitats (e.g., standing water habitats such as lakes and ponds).

Location: _____

Is the pond / lake natural or man-made: _____

Area of the pond / lake: _____

Typical and maximum depth: _____

Brief description of sources and drainage: _____

Predominant aquatic vegetation: _____

Topography of the littoral zone: _____

Predominant vegetation in littoral zone: _____

Human utilization of the pond / lake and shoreline: _____

Local conditions: _____

4.3 Indicate if the site contains or is adjacent to any of the following types of valued terrestrial habitats:

___ Area designated as a National Preserve

___ Federal land designated for protection of natural ecosystems

___ National or State wildlife refuge

___ Designated Federal wilderness area or administratively proposed wilderness area

___ Federal or State land designated for wildlife or game management

___ National or State park

___ National or State forest

___ State designated natural area

___ Climax community (e.g., old growth forest)

___ Area utilized for breeding by large or dense aggregations of wildlife

___ Area important to the maintenance of unique biotic communities (e.g., area with a high proportion of endemic species
___ Critical habitat for federally designated threatened or endangered species
___ Habitat known to be used or potentially used by Federal or State designated threatened or endangered species
___ Habitat needed for feeding, breeding, nesting, cover, or wintering habitat for migratory birds

4.4 Indicate if the site contains or is adjacent to any of the following types of valued wetlands:

___ Area important to the maintenance of unique biotic communities (e.g., area with a high proportion of endemic species)
___ Area utilized for breeding by large or dense aggregations of wildlife
___ Feeding, breeding, nesting, cover, or wintering habitat for migratory waterfowl or other aquatic birds
___ Spawning or nursery areas critical to the maintenance of fish / shellfish species
___ Critical habitat for Federal-designated threatened or endangered species
___ Habitat known to be used or potentially used by Federal or State designated threatened or endangered species.

4.5 Indicate if the site is within or adjacent to any of the following valued aquatic habitats:

___ Area important to the maintenance of unique biotic communities (e.g., area with a high proportion of endemic species
___ Critical areas identified under the Clean Lakes Program
___ National river reach designated as recreational
___ Federal or State designated scenic or wild river
___ Federal or State fish hatchery
___ Trout-stocked streams or wild trout streams with verified trout production
___ Habitat needed for feeding, breeding, nesting, cover, or wintering habitat for migratory waterfowl or other aquatic birds
___ Spawning or nursery areas critical to the maintenance of fish / shellfish species
___ Critical habitat for Federal designated threatened or endangered species
___ Habitat known to be used or potentially used by Federal or State designated threatened or endangered species

4.6 Have valued terrestrial, wetland, or aquatic habitats been identified within or adjacent to the site?

___ yes ___ no

(A list of agencies that can provide information that should assist in making a determination of whether the site is located within or adjacent to the areas listed in 4.3, 4.4, and 4.5 is provided at end of Section C2)

After completing 4.6, proceed to Step 5.

Step 5. Identify any Potential Ecological Receptors of Concern

See 60-3-2.2.14 and 60-3-9.5.a.4

5.1 Threatened and Endangered Species

Were any potential habitats within or adjacent to the site identified as critical habitat for Federally designated threatened or endangered species listed in 50 CFS 17.95 or 17.96, or areas known to be used by Federal or State designated threatened or endangered species?

___ yes ___ no

If "yes", indicate which species:

Mammals:

___ Gray bat *(Myotis grisescens)*
___ Indiana bat *(Myotis sodalis)*
___ Virginia big-eared bat *(Corynorhinus towsendii virginianus)*
___ Virginia northern flying squirrel *(Glaucomys sabrinus fuscus)*
___ Eastern cougar *(Felis concolor couguar)*

Birds:

___ Bald eagle *(Haliaeetus leucocephalus)*

Amphibians:

___ Cheat Mountain salamander *(Plethodon nettingi)*

Snails:

___ Flat-spired three-toothed land snail *(Triodopsis platysayoides)*

Clams:

___ Pink mucket pearlymussel *(Lampsilis abrupta)*
___ Tuberculed blossom pearlymussel *(Epioblasma torulosa torulosa)*
___ James spinymussel *(Pleurobema collina)*
___ Fanshell *(Cyprogenia stegaria)*
___ Clubshell *(Pleurobema clava)*
___ Northern riffleshell *(Epioblasma torulosa rangiana)*

Flowering Plants:

___ Shale barren rock cress *(Arabis perstellata)*
___ Harperella *(Ptilimnium nodosum)*
___ Northeastern bulrush *(Scirpus ancistrochaetus)*
___ Virginia spiraea *(Spiraea virginiana)*

___ Running buffalo clover *(Trifolium stoloniferum)*
___ Small whorled pogonia *(Isotria medeoloides)*

(The above list contains those federally designated threatened and endangered species that are indigenous to West Virginia. They will be revised as necessary to reflect changes to a species federal designation (e.g., addition or removal of a species from the list of federally designated species). The West Virginia Division of Natural Resources, Wildlife Resources Section should be consulted to ensure the above list is current. Note that West Virginia has not established a list of State designated threatened or endangered species. If such a list is established, the Federal designated species list will be revised to include State designated threatened and endangered species.)

5.2 Local populations that provide important natural or economic resources, functions, and values

Were any valued terrestrial, wetland or aquatic habitats listed in 4.3, 4.4, or 4.5 identified within or adjacent to the site?

___ yes ___ no

(The valued terrestrial, wetland, and aquatic habitats listed in 4.3, 4.4, and 4.5 may potentially contain local populations that provide important natural or economic resources, functions, and values)

If 5.1 and 5.2 are answered "no" and surface water bodies are shown to be in compliance with Appendix J. the ecological evaluation is complete and the site has passed the De Minimis Ecological Screening Evaluation. File this completed form with the Final Report for the site.

If either 5.1 or 5.2 are answered "yes", the site does not pass the De Minimis ecological risk screening since a complete exposure pathway may exist for potential ecological receptors of concern. Further evaluation of the site is required using either the Uniform Ecological Standard or the Site-specific Ecological Standard. See Guidance Manual, Section 4.

AGENCIES

West Virginia Division of Natural Resources
Main Office
State Capitol Complex, Building 3
1900 Kanawha Boulevard
Charleston, West Virginia 25305
(304) 558-2754
http://www.dnr.state.wv.us/default.htm

West Virginia Division of Natural Resources
Wildlife Resources Section
PO Box 67
Elkins, West Virginia 26241
(304) 637-0245
http://www.dnr.state.wv.us/wvwildlife/default.htm

West Virginia Division of Forestry
1900 Kanawha Boulevard East
Charleston, West Virginia 25303
(304) 558-2788

US Fish and Wildlife Service
West Virginia Ecological Services Field Office
Elkins Shopping Plaza
PO Box 1278
Elkins, West Virginia 26241
(304) 636-6586
http://northeast.fws.gov/wv.htm

US Department of Agriculture
Natural Resource and Conservation Service
75 Night Street -- Room 301
Morgantown, WV 26505
(304) 291-4153