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31 March 2016

Mr. Kim T. Caulk
NCDENR DWM Superfund Section
Inactive Hazardous Sites Branch
REC Program
1646 Mail Service Center
Raleigh, NC 27699-1646

Subject: Workplan for Supplemental Assessment
Norfolk Southern Railway Company
Shulimson Brothers Scrap Yard
Asheville, Buncombe County, North Carolina
Site I.D. No. NCN 000 407 206
NSRC Project No. SA96.036-001
Geosyntec Project No. KX5615

Dear Mr. Caulk:

Geosyntec Consultants of NC, PC (Geosyntec) is pleased to submit this workplan for the Shulimson Brothers Scrap Yard (the "Site"). This report will also serve as the progress report for the first quarter of 2016 and is submitted on behalf of Norfolk Southern Railway Company (NSRC).

The *Workplan for Supplemental Assessment* (February 2016) was prepared and is included as an attachment. This plan was developed to address data gaps identified in the *Remedial Investigation Report* prepared by Marshall Miller & Associates, Inc. in July 2009. Data obtained from the supplemental assessment will be used to develop a Remedial Action Plan (RAP) for impacted soil at the Site. We anticipate that the scope of work outlined in the supplemental assessment workplan will be executed in the second and third quarter of 2016.

In addition to the supplemental assessment work plan developed in the first quarter, the Site was cleared in January 2016 to facilitate the additional sampling effort and prepare the Site for the eventual remediation of soils. Site clearing consisted of removing trees on the interior portions of the property, bush-hogging, and consolidation of waste materials (e.g. concrete, railroad ties, tires, and larger trees) for disposal at a later date. Bush-hogging will occur on a scheduled basis during the warmer months to keep the Site clear of larger weeds and trees.

The required Remediating Party and CSM Certifications are attached. Work is progressing to complete requires elements of the REC program in a timely manner.

If you have any questions, feel free to contact the undersigned. Mr. Leonard can be contacted at 865-323-5683 and Mr. Hodge can be contacted at 919-424-1828.

Regards,

L. Leroy Leonard
Senior Scientist

Beau Hodge, P.G., RSM
Principal

Attachments: *Workplan for Supplemental Assessment*
Remediating Party Document Certification Statement
Registered Site Manager Document Certification Statement

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 1 OF 2
IHSB SITE NAME Shulimson Brothers Scrap Yard
DATE & NAME OF DOCUMENT 3/31/2016 Q12016 Quarterly Progress Report and Workplan for Supplemental Assessment
TYPE OF SUBMITTAL (circle all that apply): Report, Work plan, Work Phase Comp. Statement, Schedule Change

REMEDIATING PARTY DOCUMENT CERTIFICATION STATEMENT (.0306(B)(2))

"I certify under penalty of law that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this certification, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

C.R. McDANIEL - DIRECTOR ENVIRONMENTAL ENGINEERING

Norfolk Southern Railway Company
Name of Remediating Party

Signature of Remediating Party

4-20-2016
Date

NOTARIZATION

Georgia (Enter State)

Fayette **COUNTY**

I, Nathan Perkins, a Notary Public of said County and State, do hereby certify that C. Russell McDaniel did personally appear and sign before me this day, produced proper identification in the form of drivers license, was duly sworn or affirmed, and declared that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 20 day of April, 2016.

Notary Public (signature)

(OFFICIAL SEAL)

My commission expires: 2/11/20.

NATHAN PERKINS
MY COMMISSION EXPIRES
NOTARY PUBLIC
FEBRUARY 11, 2020
FAYETTE COUNTY, GA

Document Certification Form No. DC - 1
(Revised 8/11)

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 2 OF 2
IHSB SITE NAME Shullmson Brothers Scrap Yard
DATE & NAME OF DOCUMENT 3/31/2016 Work Plan for Supplemental Assessment
TYPE OF SUBMITTAL (circle all that apply): Report, Work plan, Work Phase Comp. Statement, Schedule Change

REGISTERED SITE MANAGER CERTIFICATION OF SIGNATURES

As the Registered Environmental Consultant for the Site for which this filing is made, I certify that the signatures included herewith are genuine and authentic original handwritten signatures and/or true, accurate, and complete copies of the genuine and authentic original handwritten signatures of the persons who purport to sign for this filing. I further certify that I have collected through reliable means the originals and/or copies of said signatures from the persons authorized to sign for this filing who, in fact, signed the originals thereof. Those persons and I understand and agree that any copies of signatures have the same legally binding effect as original handwritten signatures, and I certify that any person for whom I am submitting a copy of their signature has provided me with their express consent to submit said copy. Additionally, I certify that I am authorized to attest to the genuineness and authenticity of the signatures, both originals and any copies, being submitted herewith and that by signing below, I do in fact attest to the genuineness and authenticity of all the signatures, both originals and copies, being submitted for this filing.

Beau Hodge, P.G.
Name of Registered Site Manager

Signature of Registered Site Manager

5/3/16
Date

REGISTERED SITE MANAGER DOCUMENT CERTIFICATION STATEMENT (.0306(b)(1))

"I certify under penalty of law that I am personally familiar with the information contained in this submittal, including any and all supporting documents accompanying this certification, and that the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete and complies with the Inactive Hazardous Sites Response Act N.C.G.S. 130A-310, et seq, and the remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Beau Hodge, P.G.
Name of Registered Site Manager

Signature of Registered Site Manager

5/3/16
Date

NOTARIZATION

North Carolina (Enter State)

Wake **COUNTY**

I, Holly Van Norman, a Notary Public of said County and State, do hereby certify that Beau Hodge did personally appear and sign before me this day, produced proper identification in the form of NC DL, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant of the remediating party of the property referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certifications is true and accurate, and he or she then signed these Certifications in my presence.

WITNESS my hand and official seal this 3 day of May, 2016.

Notary Public (signature)

HOLLY VAN NORMAN
(OFFICIAL SEAL)
Notary Public
Wake County
NORTH CAROLINA

My commission expires: Nov. 15, 2017

Document Certification Form No. DC - II
(Revised 8/11)

Prepared for

Norfolk Southern Railway Company
1200 Peachtree Road, NE
Atlanta, GA 30309-0013

WORKPLAN FOR SUPPLEMENTAL ASSESSMENT

FORMER SHULIMSON BROTHERS SCRAP YARD
ASHEVILLE, BUNCOMBE COUNTY, NC
SITE ID # NCN000407206

Prepared by

Geosyntec Consultants of NC, PC
2501 Blue Ridge Road, Suite 430
Raleigh, NC 27607

Project Number KX5615

March 2016

Geosyntec consultants

I, Beau Hodge, a Professional Geologist for Geosyntec Consultants of NC, PC certify that the information in this report if correct and accurate to the best of my knowledge.

NORTH CAROLINA LICENSED SEAL 1243 GEOLOGIST BEAUMONT HODGE

5/3/2016

Geosyntec Consultants of NC, PC is licensed to practice engineering in North Carolina. The certification number (Firm's License Number) is C-3500.

Geosyntec Consultants of NC, PC is licensed to practice geology in North Carolina. The certification number (Firm's License Number) is C-295.

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1. INTRODUCTION

On behalf of Norfolk Southern Railway Company (NSRC), Geosyntec Consultants of NC, PC (Geosyntec) has prepared this Work Plan for a supplemental soil and groundwater assessment at the former Shulimson Brothers Scrap Yard (the "Site") located in Asheville, Buncombe County, North Carolina. Marshall Miller & Associates, Inc. (MM&A) prepared a Remedial Investigation (RI) (MM&A, 2009) of the Site that identified impacts to soil and groundwater. On May 20, 2011, MM&A submitted a *Groundwater Remedial Action Plan* (MM&A, 2011) that specified a monitored natural attenuation (MNA) remedy for groundwater. Data obtained during this supplemental assessment will support amendment of the Remedial Action Plan (RAP) and a Remedial Design (RD) to address impacted soils.

NSRC entered into an Administrative Agreement (Agreement) on July 17, 2006 for Registered Environmental Consultant (REC)-Directed Remedial Action, with the North Carolina Department of Environmental Quality (NCDEQ). Within the REC program, the remediating party contracts with an NCDEQ approved environmental consulting firm to direct, implement, and certify that investigation and remediation work is performed in compliance with the program regulations found under Title 15A of the North Carolina Administrative Code, Subchapter 13C .0300 (15A NCAC 13C .0300). A Registered Site Manager (RSM), employed by the REC, certifies the work as specified in the Agreement. NCDEQ retains the right to audit the project.

1.1 Project Objectives

The RI conducted by MM&A did not clearly establish remedial goals for soils at the Site. In addition, monitoring wells have not been installed at locations near soils highly impacted with metals to adequately assess the potential for leaching to groundwater. Further delineation of impacted soil is required to determine the full areal extent of soil remediation. The following goals have been established for this phase of the project:

- install monitoring wells near areas with soils impacted by high concentrations of metals;
- review previous analytical results and assess concentrations of metals in background soils;

- conduct a Preliminary Risk Evaluation (PRE) of chemicals of potential concern (COPC) at the Site to help establish remedial goals;

- based on the evaluation of background metals and the PRE, conduct an additional assessment of soils to fill data gaps for delineation and development of final remedial goals and the soil RAP; and

- account for remediation and management of polychlorinated biphenols (PCBs) in accordance with the Toxic Substances Control Act (TSCA), in addition to applicable North Carolina regulations.

1.2 Project Organization

Management of the project is the responsibility of NSRC. Geosyntec will provide technical consultation, oversight, and conduct field work as described in this Work Plan. Geosyntec personnel are trained in Health and Safety for Hazardous Waste Sites as required by 29 CFR 1910.120, have undergone NSRC's Roadway Worker Protection, Contractor Safety program, and are badged as "e-RAILSAFE". Field team personnel are qualified based on their education, training, and experience as determined by the project manager with concurrence by the quality officer. Eurofins Lancaster Laboratories Environmental, LLC (Eurofins) in Lancaster, Pennsylvania (PA) is the prime contract laboratory performing the required analyses. Eurofins is an accredited environmental laboratory under the National Environmental Laboratory Accreditation Program and is a North Carolina certified (Cert. # 521) laboratory. Both the organizational structure and responsibilities are designed to ensure adequate project control and quality assurance (QA). Roles and responsibilities of key personnel are as follows:

- NSRC Engineer Environmental Remediation: Mr. Scott Pittenger

  Mr. Pittenger will have the overall responsibility for overseeing the work, including representing NSRC on technical and administrative matters with NCDEQ.

- Registered Site Manager: Mr. Beau Hodge, P.G., Geosyntec

  Mr. Hodge serves as the RSM for this project and is responsible for the oversight of the project.

- Project Manager: Mr. Leroy Leonard, Geosyntec

  The project manager will provide direction of the technical and administrative functions within the project. He will be responsible for the implementation of and modification to project plans and the coordination of and communication among groups involved. He is also responsible for project deliverables.

- Technical Manager: Mr. Tyler McNabb, Geosyntec

  The technical manager will be responsible for the day-to-day activities associated with this project. He will focus on the appropriate implementation of field work and the management and interpretation of data collected therein.

- Quality Officer: Julia Caprio, Geosyntec

  The quality officer will be responsible for assuring the integrity of the QA elements of this project and will coordinate quality specific activities. The quality officer will:

  - Coordinate with the field team with regard to field sampling procedures and assure that appropriate analytical procedures are employed by the laboratory;
  - Be responsible for data validation and will advise the project manager with respect to data management; and
  - Be responsible for performance and/or systems audits of the laboratories, should they be required.

- Field Team

  The Field Team will:

  - Perform sampling in accordance with the approved Work Plan and Quality Assurance Project Plan (QAPP);
  - Ensure that field Quality Assurance/Quality Control (QA/QC) samples are collected as specified in the QAPP;
  - Complete field sampling notes, forms, and/or sample logs, as directed by the technical manager;
  - Coordinate laboratory and field sampling activities; and,
  - Implement corrective action as required.

Points of Contact – NSRC

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2. SITE INFORMATION

The Site is an approximate six-acre parcel owned by NSRC located along Meadow Road in Asheville, North Carolina and is part of a larger parcel of property that encompasses approximately 39 acres. According to the Buncombe County, North Carolina online geographical information system (GIS) website (http://www.buncombecounty.org/Governing/Depts/GIS/), the Site encompasses a portion of parcel number 9647-19-4713-00000. The Site and surrounding area are shown on the U.S. Geological Survey topographic quadrangle excerpt in **Figure 1**. The Site geographic coordinates are 35.5650774° north and -82.562165° west.

The Site is surrounded by railroad operations (NSRC Asheville Rail Yard) to the north and east. Meadow Road and then the Swannanoa River are located to the south and west of the Site. The confluence of the Swannanoa River and the French Broad River are located approximately 1,000 feet (ft) northwest of the Site.

2.1 Site History

NSRC and its predecessor companies have owned the Site for over 100 years. According to the RI report, Shulimson Brothers Scrap Yard leased the six-acre Site from NSRC and operated a metal scrap yard and recycling operation for approximately 40 years (MM&A, 2009). In 1997, operations at the facility ceased and the Site was abandoned. MM&A documented that the Site was littered with materials and debris. When operations were terminated, there was a metal warehouse building, an adjacent concrete loading dock area, and a truck scale. A twin set of railroad spurs, leading to the warehouse, was located along the southern portion of the Site.

Clearing the Site of debris began in 1997. The warehouse was completely destroyed by fire in 1998 leaving only the concrete loading dock area and the truck scales. Site clearing was completed in 2002 and a chain-link fence was installed around the perimeter of the Site to prevent public access (MM&A, 2009).

2.2 Remedial Investigation

During the remedial investigation, MM&A applied a grid network over the Site on 75 ft by 75 ft spacing and sampled each grid node (64 nodes) for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), PCBs, and metals in surface soil (MM&A, 2009). In addition, three to four adjacent grid nodes were composited

together into seventeen composite samples and analyzed for SVOCs and PCBs. In March 2009, subsurface samples were collected from an additional 25 grid node locations. In April 2009, eleven grid nodes were resampled to confirm the presence of PCBs. During the April 2009 event, subsurface samples were collected at depths from between three to four ft below ground surface (bgs) and seven to eight ft bgs. The samples collected from three to four feet below ground surface were analyzed for PCBs, SVOCs, and metals. The samples collected from seven to eight ft bgs were analyzed for select constituents including detected constituents from the surface samples. Nineteen offsite samples were collected following analysis of the initial samples. These offsite samples were collected in April and May 2009 and were analyzed for select constituents (SVOCs, PCBs, and/or metals) based on detections of nearby initial samples. Sample results indicate impacts of select SVOCs, PCBs, and metals above NCDEQ's preliminary soil remediation goals both on and offsite. In November 2012, MM&A performed additional subsurface sampling to refine the vertical extents of SVOCs, PCBs, and metals.

MM&A submitted a certified RI report in July 2009. In the 2009 RI, MM&A concluded the following regarding soils and sediments onsite:

- "The extent of soil impacts associated with the Site do not appear to have migrated offsite into drainage features bordering the Site to the west (Meadow Road drainage swales) and north (storm water drainage ditch bordering the Site).";

- "The results of this RI along with previous offsite soil and sediment sampling performed by MM&A and NCDEQ indicate the Site is not posing a threat to the quality of sediment in the Swannanoa River. Therefore, additional sediment investigation is not warranted at this time."

- "Given the Sites location in an industrial corridor, the generic remediation goals established by the NCDEQ REC program are not appropriate for remediation of Site soils. As part of the remedial action process, Site-specific remediation goals based on land use and realistic exposure scenarios should be developed."

Geosyntec noted that the RI conducted by MM&A had several data gaps. Specifically, the RI did not clearly establish (i) Site-specific remedial goals for soils; (ii) identify the

full areal extent of impacted soils; and (iii) adequately assess and establish background soil concentrations for metals at the Site.

As part of the RI, eight groundwater monitoring wells were installed to assess groundwater conditions. Groundwater analysis indicated VOC concentrations exceeded groundwater standards and MM&A submitted a RAP for groundwater in May 2011. Periodic groundwater sampling is ongoing to assess the progress of MNA at the Site. Although the RAP approach is sufficient for VOCs in groundwater, the RI did not adequately assess the potential for metals to leach from the soil to the groundwater and Geosyntec has also identified this as a data gap.

3. SOIL REMEDIAL GOALS

Geosyntec will update Site-specific soil remedial goals consistent with the REC Program Implementation Guidance, Appendix D (NCDEQ, 2014). Geosyntec will establish soil remediation goals prior to developing an addendum to the RAP to address soil and RD. Appendix E of the implementation guidance provides guidance for calculating adjusted final health-based soil remediation goals. Appendix F of the implementation guidance provides additional guidance in establishing alternate health-based remediation goals and subsequent land use restrictions.

Remedial goals for soil are dependent upon the following factors at the Site: TSCA regulations for the PCBs, background concentrations of naturally occurring metals in the soil, and a Site-specific, risk-based evaluation of soils for metals and SVOCs.

3.1 TSCA Regulations

The REC program requires compliance with applicable federal, state and local laws (15A NCAC 13C .0302(c)). PCB cleanup and disposal are governed by TSCA. Regulations applicable to PCBs are found in Title 40, Code of Federal Regulations Part 761.

Based on elevated PCB concentrations, several options exist for the remediation of PCBs under TSCA regulations. PCB-impacted soil at the Site is considered "bulk PCB contamination waste" (PCB waste). As such, any PCB waste that has concentrations above 50 parts per million (ppm) must be evaluated for management.

Under TSCA regulations, PCB-impacted soils can be managed onsite under several scenarios. First, TSCA regulations require institutional controls which are characterized as either "low occupancy" or "high occupancy". A low occupancy area is defined as any area where PCB waste has been left onsite and where occupancy for an individual not wearing dermal and respiratory protection for a calendar year is less than 335 hours (an average of 6.7 hours per week). A high occupancy area for an individual is defined as Site occupation more than 335 hours per calendar year.

Under a high occupancy institutional control scenario, PCB impacted soil greater than 1 ppm would have to be excavated and disposed offsite and no further controls would be needed. If soil concentrations are greater than 1 ppm but less than or equal to 10 ppm, an impervious cap would be required. PCB concentrations above 1 ppm are widely

distributed across the Site (**Figures 2, 3 and 4**) such that a large-scale excavation and disposal effort is not practical. An impervious cap would require significant long-term maintenance and storm water management.

Based on the concentrations of PCBs in soil at the Site and the cost to excavate and dispose of PCB-impacted soil, NSRC proposes low occupancy institutional controls with limited excavation of soils. TSCA regulations provide three pathways for managing PCB-impacted soil onsite. One option is to excavate and dispose of PCB impacted soil to concentrations less than or equal to 100 ppm. Under this option, an impervious cap would be required in addition to low occupancy land use restrictions. Alternatively, PCB-impacted soil can be excavated and disposed such that concentrations of soil left in place would be less than 25 ppm. Under this option, no further controls would be needed for PCBs other than low occupancy land use restrictions. Based on previous soil sample results, the spatial extent of PCB impacted soil greater than or equal to 25 ppm could be substantial. This option would not address remedial objectives for other constituents of concern (COCs) at the Site.

NSRC will implement a third option for the management of PCBs in a low occupancy land use restriction scenario. NSRC proposes to excavate and dispose PCB-impacted soil greater than or equal to 50 ppm. Once the soil is removed, the Site will be secured with fencing and marked with regulation-specified signage in addition to installing a soil cover system to mitigate contact to PCBs, metals, and SVOCs left in place.

3.2 Evaluation of Background Metals

Many metals commonly found at industrial sites are also found in non-impacted areas. United States Environmental Protection Agency (USEPA) refers to background as constituents or locations that are not influenced by the releases from a site, and is usually described as naturally occurring or anthropogenic (USEPA, 2002). Naturally occurring metals are present in the environment in forms that are not influenced by human activity while anthropogenic refers to natural and human-made substances present as a result of human activities (not specifically related to a release) (USEPA, 2002). Understanding typical background concentrations of metals in soil is important to interpreting soil screening levels. Background levels in North Carolina vary according to the geology of the area and historic activity; therefore, Site-specific background analysis of unimpacted areas is a tool frequently utilized and supported by NCDEQ to evaluate soil screening data.

As part of the RI conducted by MM&A, only five background soil samples were collected to assess naturally occurring metals. All five background samples were collected from a single, relatively small area located in a line, approximately 20 feet apart. The low number of background samples previously collected and poor spatial resolution of samples should not be used to establish background levels of naturally occurring metals for the Site.

Geosyntec conducted a preliminary, revised assessment of background levels of naturally occurring metals using all soil samples from the RI that were located outside the property lease boundary. A total of 21 soil samples (excluding MM&A's background samples) located to the south, east, and west of the lease boundary were included in the analysis. Analytical results for these samples indicate exceedances for antimony, arsenic, cadmium, chromium (III+VI), manganese, and mercury when compared with USEPA's Residential Soil Regional Screening Level (RSL) for non-cancer or cancer endpoints (USEPA, 2014) and/or North Carolina's Preliminary Soil Remediation Goals for Residential, Industrial, and Protection of Groundwater (NCDEQ, 2014). Our preliminary assessment indicates that soil samples located outside the lease boundary may indicate elevated levels of background metal concentrations. However, additional samples, as outlined in the supplemental assessment below, will be required to establish non-biased and statistically significant Site-specific background threshold values for metal concentrations.

3.3 Preliminary Risk Evaluation

To further evaluate Site-specific soil remediation goals, a PRE was performed on the same set of 21 soil samples from the RI that were assessed for naturally occurring background concentrations. A brief summary of the PRE approach, results, and conclusions are provided below and further described in detail in **Appendix A**.

COPCs were first identified as those metals/SVOCs that showed exceedances when compared to screening levels during preliminary assessment of naturally occurring background levels. COPCs identified in soil samples outside the property boundary include: polycyclic aromatic hydrocarbons (PAHs), antimony, arsenic, cadmium, total chromium (III+VI), manganese, and mercury.

For the COPCs identified above, the PRE calculated excess lifetime cancer risks (ELCR) and non-cancer hazard quotients (HQs) using the default RSLs for residential

soil. HQs and ELCRs are computed from exposure point concentrations (EPCs) based on the 95% Upper Confidence Limit (UCL) for each COPC using all of the soil data (regardless of depth). **Table 1** provides EPCs calculated using all 21 soil sample results for COPCs identified above.

From the computed EPC values, a PRE was first performed for the present Site condition as shown in **Table 1**. The sum of HQs for all COPCs is represented by non-cancer hazard index (HI). Two HI and excess lifetime cancer risk (ELCR) estimates are computed for chromium (III) and (VI) because the measured concentrations represent "total" chromium and relative proportion of chromium III and VI is unknown. Baseline non-cancer HI estimates of 0.8 and 1.0 are computed, both of which meet the USEPA threshold for acceptable non-cancer hazard (HI≤1). ELCR estimates of 1.0E-4 and 2.5E-4 are computed. The higher ELCR estimate exceeds the high end of USEPA's acceptable risk range of 1E-6 to 1E-4, and is driven by chromium VI. However, it is likely that chromium is in the trivalent form (see discussion in **Appendix A** of the NCDEQ guidance for chromium speciation). When chromium VI is excluded, the ELCR is at the high-end of EPA's acceptable risk range and is driven by PAHs [as benzo(a)pyrene (B(a)P) Toxic Equivalence Quotient (TEQ)].

Since the ELCR estimate for the present Site condition was at the high-end of EPA's acceptable risk range, a second PRE was performed for a "virtual remediation" scenario to see if minimal soil excavation would reduce the risk. Details of this PRE are provided in **Appendix A**. Revised non-cancer HI and ELCR estimates (excluding chromium VI) for this scenario are within EPA's acceptable risk range.

The results of the two PREs indicate that the area outside of the lease boundary is close to acceptable EPA hazard and risk thresholds. Hazard and risk estimates above these thresholds are based on the unlikely assumption that all chromium is present in the hexavalent form. The carcinogenic PAHs [as (B(a)P) TEQ] are considered the more significant risk driver. While the PRE for the present Site condition indicates that the cumulative ELCR estimate is at the upper limit of EPA's acceptable risk range, this estimate is associated with some uncertainty because the analytical method used for PAHs had elevated detection/reporting limits, likely resulting in higher B(a)P TEQ risk estimates. On the other hand, half of the samples in which PAHs were target analytes did not include results for all seven of the carcinogenic PAH constituents used to compute the B(a)P TEQ concentration, which potentially resulted in lower B(a)P TEQ risk estimates. Additional samples will be required to delineate several constituents with

detected concentrations that exceed risk-based screening levels for unrestricted (i.e., residential) use or natural background conditions. Given the relatively small dataset for the area outside of the lease boundary, the collection and analysis of additional samples for the COPCs identified in this evaluation would address concerns about the adequacy of sampling and would likely lower the baseline UCL estimates for the COPCs. A limited number of additional samples may also be needed to help bound some of the existing samples with elevated PAH or arsenic concentrations; however, some of the additional samples should be collected in an unbiased manner.

The supplemental soil assessment proposed in this Work Plan addresses all of the above factors that help in establishing soil remedial goals at the Site.

3.4 Preliminary Soil Remedial Design

3.4.1 PCBs

NSRC proposes to excavate and dispose of PCB-impacted soil greater than or equal to 50 ppm. Once the soil is removed, the Site will be secured with fencing and marked with regulation-specified signage. A soil cover system will be installed as well to mitigate contact.

3.4.2 SVOCs and Metals

In addition to PCB impacts, the RI indicated Site-wide soil impacts of SVOCs and metals. A large-scale excavation at the Site would not be practical. To prevent exposure to SVOCs, metals, and PCBs left in place post-excavation, NSRC proposes to install a cover system (containment remedy). The cover is intended to prevent exposure to SVOCs, metals, and PCB-impacted soil above remediation goals. Typical cover systems include a six inch layer of moderately compacted, contaminant-free soil above impacted soil overlain by a geotextile layer and a second six inch layer of moderately compacted, clean soil. A layer of topsoil and a grass vegetative cover with appropriately engineered storm water runoff/run-on controls would complete the cover system. In addition to being protective from surface contact exposure, NSRC plans to evaluate the potential for SVOCs, metals, and PCBs to leach into the groundwater per the supplemental groundwater assessment below.

3.5 Soil Remedial Action Plan

Once soil remediation goals are finalized, Geosyntec will write an addendum to the RAP to address soil consistent with the REC program regulations, rules, and guidance. The soil remedial design as proposed will require advanced concurrence from NCDEQ due to the proposed land use restrictions.

4. SUPPLEMENTAL ASSESSMENT

Geosyntec will conduct supplemental groundwater and soil assessments in support of writing the RAP addendum and further advancing the Remedial Design. The supplemental assessments are detailed in the following sections.

4.1 Supplemental Groundwater Assessment

Geosyntec reviewed MM&A's data and documents and identified several data gaps. Primarily, the existing monitoring well network does not appear to have adequate coverage in the southeastern portion of the Site where the highest detections of COPCs were found.

Geosyntec proposes to install four new monitoring wells to assess potential soil to groundwater leaching. Three of the monitoring wells will be positioned near and slightly down gradient from MM&A's soil borings B12, B20 and B33. These three borings had the highest concentrations detected at the Site in surface soil for arsenic, lead, and antimony, respectively. The fourth well will be positioned in a similar manner near MM&A's soil boring B1. Soil boring B1 had the highest concentration of benzo(k)fluoranthene at the Site in surface soil. Proposed locations for the new wells are shown on **Figure 5**. Prior to installing the new monitoring wells, Geosyntec will sample all existing wells onsite for PCBs, select SVOCs, and metals. The results from sampling existing wells will help confirm the placement of the new monitoring wells.

Geosyntec will sample groundwater from these new wells (MW-9 through MW-12) plus MW-3R for select VOCs, select SVOCs, PCBs and metals. Soil samples will be collected from the surface (0-1 foot), intermediate (1-2 ft), and deep (3-4 ft) depths during monitoring well installation and analyzed for Synthetic Precipitate Leaching Procedure (SPLP). The combined groundwater and soil sampling data will provide direct evidence of leachability of Site soils within the portion of the Site with the highest concentrations of SVOCs, PCBs, and metals. Absence or presence of leachability will affect the Site-wide final soil remediation goals and the soil remedial design/action.

4.1.1 Monitoring Well Installation

The new monitoring wells will be constructed in general accordance with the Standard Operating Procedure (SOP) of USEPA Science and Ecosystem Support Division

(SESD) and 15A NCAC, Subchapter 2C, Well Construction Standards. A drilling subcontractor licensed in the State of North Carolina will install the wells under direct supervision of Geosyntec's onsite engineer or geologist.

Two-inch, schedule 40 PVC wells with ten foot, 0.01-inch slotted screens will be installed consistent with the existing onsite monitoring wells. The new wells will be screened in the surficial, shallow aquifer into the silts/clays and sandy gravel/cobbles layer just above competent bedrock (approximately 10 ft). Each well is anticipated to be 15 to 20 ft in total depth. The bentonite seal will be allowed to hydrate overnight prior to grouting. Likewise, the grout will be allowed to setup overnight prior to constructing the well pad with a stick-up manhole cover.

Well development will be performed by a combination of surging with a surge block followed by pumping to remove the turbid water and sediments. Well development will not be initiated until the well is allowed to sit/settle overnight following installation of the surface completion. Well development will continue until the water clarity is acceptable as determined by Geosyntec's onsite engineer or geologist.

A North Carolina licensed surveyor will locate the new monitoring wells and collect top of casing measurements for use in preparing potentiometric surface or groundwater flow direction determinations.

4.1.2 Groundwater Sampling

Following well development, the monitoring wells will be allowed to stabilize for at least one week prior to collecting groundwater samples. Prior to groundwater sampling, Geosyntec will measure the depth to water in each monitoring well to assess groundwater flow direction. The monitoring wells will be sampled by low-flow sampling procedures with an electric, submersible, or peristaltic pump and dedicated Teflon®-lined tubing. At monitoring wells with low yields, the method will be modified to allow drawdown to exceed the maximum of 0.1 foot drawdown criterion as long as the water level stabilizes during purging.

During well purging, groundwater quality parameters including specific conductivity, pH, temperature, dissolved oxygen (DO), turbidity, and oxidation-reduction potential (ORP) will be measured with a water quality meter.

Groundwater samples will be collected once water quality parameters stabilized (when practical) as follows:

- ± 0.1 pH units
- ± 3% for specific conductivity
- ± 10 millivolts (mV) for oxidation reduction potential (ORP)
- ± 10% for turbidity
- ± 0.3 milligrams per liter (mg/L) for dissolved oxygen

Groundwater samples will not be filtered in the field unless called for in the method for hexavalent chromium speciation.

Collected samples will be immediately placed on ice and shipped overnight under chain of custody procedures to Eurofins Lancaster Laboratories (NC DENR Cert. # 521) in Lancaster, PA. The samples will be analyzed for the constituents listed in **Table 2** by the applicable methods listed in **Table 3**.

Quality control samples will be collected as described below:

- duplicate: 1 per sampling event or 1 per 20 samples
- matrix spike (MS) and matrix spike duplicate (MSD): 1 per sampling event or 1 per 20 samples
- equipment rinse: If necessary, 1 per day or 1 per 20 samples
- field blank: 1 per sampling event or 1 per 20 samples
- trip blank: 1 per cooler

4.2 Supplemental Soil Assessment

4.2.1 PCBs

The REC program requires compliance with applicable federal, state and local laws (15A NCAC 13C .0302(c)). PCBs cleanup and disposal are governed by the Toxic Substances Control Act (TSCA). Regulations applicable to PCBs are found in Title 40, Code of Federal Regulations Part 761. TSCA regulations set a cleanup level of between 25 and 50 parts per million (total PCB concentration) for bulk PCB remediation waste (i.e. in-situ soil) in low occupancy areas provided the Site is secured by a fence, marked with appropriate signage and an institutional control (i.e. deed restriction) is

implemented. A component of Geosyntec's proposed remedial action is to excavate and dispose of soils in excess of 50 parts per million consistent with TSCA regulations.

Consistent with TSCA regulations (40 CFR Part 761, SubPart N) and for more efficient soil management during excavation, Geosyntec will further delineate the two PCB "hotspots" previously identified by MM&A. Borings B2, B3, B14, B15 and B29, B30 will be located and staked in the field based on MM&A's surveyed coordinates. The locations at B10 and B27 will be further delineated based on data uncertainty. Geosyntec will begin delineating these three areas by collecting surface samples (0 to 1 foot bgs) from the locations shown on **Figure 6**. Individual grab samples will be collected in a manner consistent with MM&A's procedures used during the remedial investigation stage and USEPA SESD's SOP for soil sampling. Multiple sampling events may be required to adequately delineate horizontally and vertically on ten foot spacing.

Collected samples will be immediately placed on ice and shipped overnight under chain of custody procedures to Eurofins Lancaster Laboratories (NC DENR Cert. # 521) in Lancaster, PA. The samples will be analyzed by EPA Method 8082 (project specific list) for PCB aroclors analysis. In accordance with *REC Program, Implementation Guidance* (NCDEQ, 2015), five samples will be collected from locations shown on **Figure 6** and analyzed for PCB aroclors and congeners by EPA Method 1668A (World Health Organization list), as well as VOCs. All soil sample locations will be staked and flagged in the field and surveyed by a licensed surveyor.

4.2.2 Background Metals

Background soil samples will be collected to the west of the former lease boundary line to determine Site-specific background threshold values for metal concentrations. Geosyntec will layout the 12 additional background sample locations consistent with **Figure 7**. All samples will be shallow grab samples (0 to 1 foot bgs) collected in general accordance with MM&A's sampling technique and USEPA SESD's SOP for soil sampling.

Collected samples will be immediately placed on ice and shipped overnight under chain of custody procedures to Eurofins Lancaster Laboratories (NC DENR Cert. # 521) in Lancaster, PA. The samples will be analyzed for the metals listed in **Table 3** by the applicable methods listed in the same table.

Quality control samples will be collected as described below:

- MS and MSD: 1 per sampling event or 1 per 20 samples
- equipment rinse: If necessary, 1 per day or 1 per 20 samples

All soil sample locations will be staked and flagged in the field and surveyed by a licensed surveyor.

4.2.3 Chromium Speciation

Three additional soil samples will be collected to speciate hexavalent chromium offsite. As part of the project review and preparation for additional fieldwork, Geosyntec performed a PRE on MM&A's offsite sample results as discussed in Section 3.3. Because MM&A did not speciate chromium concentrations in soil, Geosyntec made a conservative assumption with respect to chromium speciation. MM&A's sampling locations SB-76, SB-77 and SB-80 were historically among the highest concentrations of total chromium offsite. These previous sample locations will be relocated and staked in the field based on MM&A's surveyed coordinates. Geosyntec will re-sample these locations as shallow surface grab samples (0 to 1 foot bgs) collected in general accordance with MM&A's sampling technique and USEPA SESD's SOP for soil sampling.

Collected samples will be immediately placed on ice and shipped overnight under chain of custody procedures to Eurofins Lancaster Laboratories (NC DENR Cert. # 521) in Lancaster, PA. The samples will be analyzed by EPA Method 6020 (for total chromium only) and EPA Method 3060/7199 (for hexavalent chromium).

4.3 Determination of Remedial Goals and Reporting

Following receipt of laboratory data, remedial goals for the RD will be reassessed to ascertain whether remedial goals need to be adjusted. The results and rationale for establishing the remedial goals will be presented in a Supplemental Assessment report. The report will be certified by the remediator and the REC in accordance with guidelines.

5. INVESTIGATION DERIVED WASTE MANAGEMENT

Investigation derived waste (IDW) generated as part of assessment activities will include drill cuttings and mud, residual/sampled soil and groundwater, and well development and purge water may be discharged or stored in the area of contamination and are not subject to Resource Conservation and Recovery Act (RCRA) permitting as long as the material:

- Stays onsite and remains in the contaminated area;
- Is secured;
- Does not increase the spread of contamination of concentrations in a particular medium;
- Does not cause mobilization of contaminants; and
- Does not introduce contamination to uncontaminated soil.

IDW cannot be transferred and discharged to another area of contamination.

6. QUALITY ASSURANCE

Data quality must be established commensurate with its intended use. Project specific data quality objectives have been developed and are presented in **Table 4**.

6.1 Field Quality Control

The procedures for sample collection, preservation, handling, custody and decontamination will follow guidance described in USEPA SESD's SOPs, (http://www.epa.gov/region4/sesd/fbqstp/). Field sampling activities will be conducted under the supervision of the quality officer. The quality officer may schedule audits of field activities at any time. Field corrective action will be implemented as needed.

6.1.1 Decontamination Procedures

Prior to use and after each sampling event, reusable sampling equipment will be decontaminated and cleaned to prevent cross-contamination. Field cleaning and decontamination procedures will be based on USEPA SESD's SOP for field equipment cleaning and decontamination as described below.

6.1.1.1 Downhole Drilling Equipment

Tools and equipment involved in monitoring well construction, primary auger flights, or other downhole equipment will be decontaminated with a high pressure, hot water steam cleaner prior to use and in between monitoring well locations. Prior to washing, loose soil will be brushed off of the equipment. Measures will be taken to prevent cleaned flights from becoming re-contaminated. A decontamination pad may be required.

The procedure for decontamination of direct-push technology (DPT) downhole equipment is as described in USEPA SESD's SOP.

6.1.1.2 Groundwater Sampling Equipment Decontamination

The following procedure will be used for sampling/monitoring equipment which cannot be replaced:

1. Disassemble equipment as much as possible to facilitate internal cleaning.

2. Using a brush, scrub components with detergent and tap water.

3. Rinse thoroughly with tap water.

4. Rinse thoroughly with distilled water and place on a clean foil-wrapped surface to air dry.

5. After decontamination, sampling equipment will be wrapped and stored in aluminum foil until the next use.

6.1.1.3 Soil Sampling Equipment Decontamination

Equipment will be decontaminated after each sample is collected. For non-disposable equipment or tools in contact with samples, the following decontamination procedure will be used:

1. Clean with tap water and detergent using a brush to remove particulate matter and surface films.

2. Rinse thoroughly with tap water.

3. Rinse thoroughly with distilled water and place on a clean foil wrapped surface to air dry.

4. Decontamination and rinse water baths will be refreshed each morning and periodically during the day as needed based on the judgment of the Field Team Leader.

5. After decontamination, sampling equipment will be wrapped and stored in aluminum foil until the next use.

6.1.2 Field Documentation

Bound, weatherproof field logbooks and/or media-specific sampling forms will be maintained by the field team. Project information will be entered into the project logbook or onto field forms. General guidelines for documentation are:

- Documentation will be completed in indelible ink;
- Written errors will be crossed out with a single line, initialed, and dated;
- Upon completion, documentation will be stored in project files and / or scanned and stored in the project directory on the Geosyntec server, which is regularly backed up.

Field personnel will record all information regarding sampling times and activities, chain of custody details, shipping information, and sampling identification nomenclature. Weather conditions, unusual events, field measurements, visitors, and other fieldwork activities will be described on a daily basis.

During fieldwork, the field notebooks and field forms will be maintained by the technical manager. The technical manager will report to the quality officer and project manager if there are problems encountered through direct observation or through review of the field notebooks and field forms.

6.2 Laboratory Quality Control

Project specific lists of constituents compared to their respective standards and the laboratory's quantitation limits are presented in **Tables 2** and **3** for soil and groundwater, respectively.

The quality officer may schedule audits of the laboratory at any time. This systems audit includes evaluation of the analytical instruments, personnel, facilities, adherence to the method procedures and quality control. Geosyntec's quality officer will coordinate with the laboratory's quality assurance manager if corrective action is needed.

6.2.1 Laboratory Quality Control Samples

In-house, laboratory performance criteria for control samples and surrogate recovery control limits will be used for this project.

6.2.2 Laboratory Equipment Maintenance and Calibration

Instruments will be maintained, calibrated and verified consistent with the laboratory's SOP with respect to frequency and acceptance criteria. Corrective action, if necessary, will follow the laboratory's SOP.

6.3 Laboratory Analytical Reports

Laboratory reports should include the items listed below. Full Contract Laboratory Program (CLP) documentation packages are not necessary.

1. The laboratory report should state that the laboratory is either certified for applicable parameters under 15A NCAC Subchapter 2H .0800 and provide its certification number, or that it is a contract laboratory under EPA's Contract Laboratory Program.

2. A signed statement from the laboratory that the samples were received in good condition, at the required temperature and that analysis of the samples complied with all procedures outlined in the analytical method, unless otherwise specified. Any deviation from the methods, additional sample preparation, sample dilution and unrectified analytical problems, should be justified in a narrative with the laboratory report.

3. Laboratory sheets for all analytical results, including sample identification, sampling dates, date samples were received by laboratory, extraction dates, analysis dates, analytical methods used, dilution factors and sample quantitation limits. Note: The laboratory should provide written explanation for any sample having sample quantitation limits that exceed 10 times the U.S. EPA method detection limits.

4. Laboratory sheets for all laboratory quality control samples, including results for bias and precision and control limits used. The following minimum laboratory quality control sample reporting is typical industry practice: (a) at least one matrix spike and one matrix spike duplicate per sample delivery group or 14-day period, whichever is more frequent (control limits should be specified); (b) at least one method blank per sample delivery group or 12-hour period, whichever is less; and (c) system monitoring compounds, surrogate recovery required by the method and laboratory control ample analysis (acceptance criteria should be specified). All samples which exceed control limits/acceptance criteria must be flagged in the laboratory report.

5. The results of any library searches performed for Tentatively Identified Compounds (TICs). The library search should identify TICs for the largest 10 peaks in each analytical fraction that have reasonable agreement with reference spectra (i.e., relative intensities of major ions agree within ± 20%) and provide percent probabilities of match. TICs should not include compounds which are laboratory control sample compounds, internal standards, surrogates, matrix spike compounds, system monitoring compounds and target compounds. Any identified TICs should be evaluated to determine the correlation to any contaminant source materials.

   All constituents detected must be reported even if they were not definitively quantified. All estimated concentrations with data qualifiers must be reported.

6. Completed chain of custody with associated air bill (if applicable) attached.

7. The laboratory report should include the names of the individuals performing each analysis, the quality assurance officer reviewing the data and the laboratory manager.

8. The submitted data should include the laboratory summary sheet, laboratory results, QA/QC results, and chain of custody documentation. Copies of QA/QC such as chromatograms are not needed or desired.

6.4 Data Validation

Upon receipt of analytical reports from the laboratory, the quality officer or designee will validate each report consistent with the data quality objectives (**Table 4**).

7. REFERENCES

Marshall Miller & Associates, Inc. 2009. *Remedial Investigation Report – Former Shulimson Brothers Scrap Yard.* Raleigh, North Carolina. July 2009.

Marshall Miller & Associates, Inc. 2011. *Groundwater Remedial Action Plan*. Raleigh, North Carolina. May 20, 2011.

State of North Carolina, Department of Environment and Natural Resources, Inactive Hazardous Sites Branch. 2014. *Registered Environmental Consultant Program, Implementation Guidance.* Raleigh, North Carolina. November 2014.

State of North Carolina, Department of Environmental Quality, Inactive Hazardous Sites Branch. 2015. *Registered Environmental Consultant Program, Implementation Guidance.* Raleigh, North Carolina. October 2015.

U.S. Environmental Protection Agency (EPA). 2002. *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites*. EPA 540-R-01-003-OSWER 9285.7-41. September 2002.

U.S. Environmental Protection Agency Regions 3, 6, and 9 (EPA). 2014. *Regional Screening Levels for Chemical Contaminants at Superfund Sites.* November 2014.

TABLES

Table 1
Preliminary Risk Evaluation for Current Site Condition

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Current Baseline Condition - No Remediation												
Exposure Medium	COPC	EPC[1] (mg/kg)	USEPA RSLnc[2] Residential (mg/kg)	USEPA RSLnc[3] Industrial (mg/kg)	Non-Cancer HQ Residential[4]	Non-Cancer HQ Industrial[4]	COPC	EPC[1] (mg/kg)	USEPA RSLc[2] Residential (mg/kg)	USEPA RSLc[3] Industrial (mg/kg)	ELCR Residential [5]	ELCR Industrial [3]
Soil	Antimony	-	31		NA		Antimony	-	NA		NA	
Soil	Arsenic	7.1	34		0.2		Arsenic	7.1	0.67		1.1E-05	
Soil	Cadmium	1.4	70		0.0		Cadmium	1.4	2100		6.8E-10	
Soil	Chromium (III)	42.5	120000		0.0		Chromium (III)	42.5	NA		NA	
Soil	Chromium (VI)	42.5	230		0.2		Chromium (VI)	42.5	0.3		1.4E-04	
Soil	Manganese	1019.0	1800		0.6		Manganese	1019.0	NA		NA	
Soil	Mercury	0.1	9		0.0		Mercury	0.1	NA		NA	
Soil	PAHs	1.4	NA		NA		PAHs	1.4	0.015		9.3E-05	

Calculated Hazard Index (CrIII):	**0.8**	**Calculated Excess Lifetime Cancer Risk (CrIII):**	**1.0E-04**
Calculated Hazard Index (CrVI):	**1.0**	**Calculated Excess Lifetime Cancer Risk (CrVI):**	**2.5E-04**

Notes:

(1) With the exception of Antimony, Exposure Point Concentrations (EPCs) are the Upper Confidence Limits (UCLs) on the mean Contiminantof Potential Concern (COPC) concentrations calculated using United States Environmental Protection Agency (USEPA) ProUCL software version 5.0. The EPC for antimony is the maximum detected concentration

(2) Values shown are USEPA's Residential Soil Regional Sreening Level (RSL) for non-cancer or cancer endpoints, where applicable, taken from the RSL Resident Soil Table November 2014

(3) Values shown are USEPA's Industrial Soil RSL for non-cancer or cancer endpoints, where applicable, taken from the RSL Industrial Soil Table November 2014

(4) Hazard Quotient (HQ) Estimate = (EPC / PRG)i , where:
- i - Non-carcinogenic COPC
- EPC - Exposure Point Concentration
- RSL - RSL for COPCi based on non-carcinogenic endpoints

(5) Excess Lifetime Cancer Risk (ELCR) Estimate = (EPC / RSLc)j $\times$ (10^{-6}), where:
- j - Carcinogenic COPCj
- EPC - Exposure Point Concentration
- RSL - RSL for COPCj based on carcinogenic endpoints

Table 2
Standards and Laboratory Methods and Limits of Soil Constituents

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Analytical Constituent	Units	North Carolina Standards				Laboratory		
		Residential PSRG	Industrial PSRG	Protection of Groundwater PSRG	Lowest of Standards	Method	MDL	LOQ (PQL or RL)
Polychlorinated Biphenols (PCBs)								
PCB-1016	ug/kg	-	-	-	-	8082	3.6	17
PCB-1221	ug/kg	-	-	-	-	8082	4.6	17
PCB-1232	ug/kg	-	-	-	-	8082	8	17
PCB-1242	ug/kg	-	-	-	-	8082	3.3	17
PCB-1248	ug/kg	-	-	-	-	8082	3.3	17
PCB-1254	ug/kg	-	-	-	-	8082	3.3	17
PCB-1260	ug/kg	-	-	-	-	8082	4.9	17
Total PCBs	ug/kg	1000	1000	140	140			
PCB-105[a]	ug/kg	120	510	-	120	1668A	0.0017	0.005
PCB-114[a]	ug/kg	120	510	-	120	1668A	0.0015	0.005
PCB-118[a]	ug/kg	120	510	-	120	1668A	0.003	0.01
PCB-123[a]	ug/kg	120	510	-	120	1668A	0.0017	0.005
PCB-126[a]	ug/kg	0.12	0.51	-	0.12	1668A	0.0016	0.005
PCB-156+157[a]	ug/kg	120	500	-	120	1668A	0.0023	0.01
PCB-167[a]	ug/kg	120	500	-	120	1668A	0.0013	0.005
PCB-169[a]	ug/kg	120	500	-	120	1668A	0.0015	0.005
PCB-189[a]	ug/kg	120	500	-	120	1668A	0.0013	0.005
PCB-77[a]	ug/kg	0.037	0.15	-	0.037	1668A	0.0014	0.005
PCB-81[a]	ug/kg	230	970	-	230	1668A	0.0018	0.005
Semi-volatile Organic Compounds (SVOCs)								
1,2-dichlorobenzene	mg/kg	360	380	0.24	0.24	8270	0.017	0.033
4-methylphenol	mg/kg	1300	16,000	0.4	0.4	8270	0.017	0.033
Bis(2-ethylhexyl) phthalate	mg/kg	39	160	7.2	7.2	8270	0.067	0.17
Butyl benzyl phthalate	mg/kg	290	1200	150	150	8270	0.067	0.17
Carbazole	mg/kg	None	None	0.37	0.37	8270	0.017	0.033
Dibenzofuran	mg/kg	15	200	5.2	5.2	8270	0.017	0.033
Dimethyl phthalate	mg/kg	9800	98000	37	37	8270	0.067	0.17
Di-n-butyl phthalate	mg/kg	1300	16,000	19	19	8270	0.067	0.17
Di-n-octyl phthalate	mg/kg	130	1600	280	130	8270	0.067	0.17
Polynuclear Aromatic Hydrocarbons (PAHs)								
1-Methylnaphthalene	mg/kg	18	73	0.055	0.055	8270 SIM	0.00067	0.0017
2-methylnaphthalene	mg/kg	48	600	1.6	1.6	8270 SIM	0.00067	0.0017
Acenaphthene	mg/kg	720	9000	8.4	8.4	8270 SIM	0.00067	0.0017
Acenaphthylene	mg/kg	None	None	21	21	8270 SIM	0.00033	0.0017
Anthracene	mg/kg	3600	46,000	660	660	8270 SIM	0.00033	0.0017
Benz(a)anthracene	mg/kg	0.16	2.9	0.18	0.16	8270 SIM	0.00067	0.0017
Benzo(a) pyrene	mg/kg	0.016	0.29	0.059	0.016	8270 SIM	0.00067	0.0017
Benzo(b)fluoranthene	mg/kg	0.16	2.9	0.6	0.16	8270 SIM	0.00067	0.0017
Benzo(g,h,i)perylene	mg/kg	None	None	7800	7800	8270 SIM	0.00067	0.0017
Benzo(k)fluoranthene	mg/kg	1.6	29	5.9	1.6	8270 SIM	0.00067	0.0017
Chrysene	mg/kg	16	290	18	16	8270 SIM	0.00033	0.0017
Dibenz(a,h)anthracene	mg/kg	0.016	0.29	0.19	0.016	8270 SIM	0.00067	0.0017
Fluoranthene	mg/kg	480	6000	330	330	8270 SIM	0.00067	0.0017
Fluorene	mg/kg	480	6000	56	56	8270 SIM	0.00067	0.0017
Indeno(1,2,3-c,d)pyrene	mg/kg	0.16	2.9	2	0.16	8270 SIM	0.00067	0.0017
Naphthalene	mg/kg	3.8	17	0.21	0.21	8270 SIM	0.00067	0.0017
Phenanthrene	mg/kg	68	None	None	68	8270 SIM	0.00067	0.0017
Pyrene	mg/kg	360	4600	220	220	8270 SIM	0.00067	0.0017

Table 2
Standards and Laboratory Methods and Limits of Soil Constituents

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Analytical Constituent	Units	North Carolina Standards				Laboratory		
		Residential PSRG	Industrial PSRG	Protection of Groundwater PSRG	Lowest of Standards	Method	MDL	LOQ (PQL or RL)
Metals								
Lead	mg/kg	400	800	270	270	6020	0.0128	0.2
Antimony	mg/kg	6.2	94	0.9	0.9	6020	0.084	0.2
Arsenic	mg/kg	0.68	3	5.8	0.67	6020	0.086	0.4
Barium	mg/kg	3000	44,000	580	580	6020	0.06	0.4
Beryllium	mg/kg	32	460	63	32	6020	0.009	0.1
Cadmium	mg/kg	14	200	3	3	6020	0.0148	0.1
Chromium, Total	mg/kg	24000	100000	360000	24000	6020	0.108	0.4
Chromium, Hexvalent	mg/kg	0.3	6.3	3.8	0.3	3060/7199	0.14	0.4
Copper	mg/kg	620	9400	700	620	6020	0.154	0.4
Manganese	mg/kg	360	5200	65	65	6020	0.076	0.4
Mercury	mg/kg	1.9	3.1	1	1	7471	0.01	0.1
Nickel	mg/kg	300	4400	130	130	6020	0.084	0.4
Selenium	mg/kg	78	1200	2.1	2.1	6020	0.1	0.4
Silver	mg/kg	78	1200	3.4	3.4	6020	0.02	0.1
Thallium	mg/kg	0.16	2.4	0.28	0.16	6020	0.03	0.1
Zinc	mg/kg	4600	70,000	1200	1200	6020	0.46	3
Volatile Organic Compounds (VOCs)								
1,1,1-Trichloroethane	mg/kg	640	640	1.2	1.2	8260B	0.001	0.005
1,1,2,2-Tetrachloroethane	mg/kg	0.6	2.7	0.0012	0.0012	8260B	0.001	0.005
1,1,2-Trichloroethane	mg/kg	0.3	1.3	0.0032	0.0032	8260B	0.001	0.005
1,1-Dichloroethane	mg/kg	3.6	16	0.03	0.03	8260B	0.001	0.005
1,1-Dichloroethene	mg/kg	46	200	2.3	2.3	8260B	0.001	0.005
1,2-Dichloroethane	mg/kg	0.46	2	0.002	0.002	8260B	0.001	0.005
1,2-Dichloropropane	mg/kg	1	4.4	0.0032	0.0032	8260B	0.001	0.005
2-Butanone	mg/kg					8260B	0.004	0.01
2-Hexanone	mg/kg	40	260	0.17	0.17	8260B	0.003	0.01
4-Methyl-2-pentanone	mg/kg	1100	3400	0.43	0.43	8260B	0.003	0.01
Acetone	mg/kg	12,000	100,000	24	24	8260B	0.007	0.02
Benzene	mg/kg	1.2	5.1	0.0073	0.0073	8260B	0.0005	0.005
Bromodichloromethane	mg/kg	0.29	1.3	0.0029	0.0029	8260B	0.001	0.005
Bromoform	mg/kg	19	86	0.019	0.019	8260B	0.001	0.005
Bromomethane	mg/kg	1.4	6	0.048	0.048	8260B	0.002	0.005
Carbon Disulfide	mg/kg	150	700	3.8	3.8	8260B	0.001	0.005
Carbon Tetrachloride	mg/kg	0.65	2.9	0.0021	0.0021	8260B	0.001	0.005
Chlorobenzene	mg/kg	56	260	0.44	0.44	8260B	0.001	0.005
Chloroethane	mg/kg					8260B	0.002	0.005
Chloroform	mg/kg	0.32	1.4	0.34	0.34	8260B	0.001	0.005
Chloromethane	mg/kg	22	92	0.015	0.015	8260B	0.002	0.005
cis-1,2-Dichloroethene	mg/kg	32	460	0.36	0.36	8260B	0.001	0.005
cis-1,3-Dichloropropene	mg/kg					8260B	0.001	0.005
Dibromochloromethane	mg/kg	0.75	3.3	0.019	0.019	8260B	0.001	0.005
Ethylbenzene	mg/kg	5.8	25	8.1	8.1	8260B	0.001	0.005
Methylene Chloride	mg/kg	57	640	0.023	0.023	8260B	0.002	0.005
Styrene	mg/kg	870	870	0.92	0.92	8260B	0.001	0.005
Tetrachloroethene	mg/kg	16	78	0.005	0.005	8260B	0.001	0.005
Toluene	mg/kg	820	820	5.5	5.5	8260B	0.001	0.005
trans-1,2-Dichloroethene	mg/kg	320	1900	0.55	0.55	8260B	0.001	0.005
trans-1,3-Dichloropropene	mg/kg					8260B	0.001	0.005
Trichloroethene	mg/kg	0.82	3.8	0.018	0.018	8260B	0.001	0.005
Vinyl Chloride	mg/kg	0.059	1.7	0.00019	0.00019	8260B	0.001	0.005
Xylene (Total)	mg/kg	130	258	6	6	8260B	0.001	0.005

Notes:
Preliminary Soil Remediation Goals (PSRGs) in this table are from September 2015
MDL - Method Detection Limits
LOQ - Limits of Quantitation
RL - Reporting Limit
PQL - Practical Quantitation Limit
a - Analysis for select sample locations indicated on Figure 6

Table 3
Standards and Laboratory Methods and Limits of Groundwater Constituents

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Analytical Constituent	Units	2L / IMAC Standard	Laboratory		
			Method	MDL	LOQ (PQL or RL)
Volatile Organic Compounds (VOCs)					
carbon tetrachloride	ug/L	0.3	8260 (25-ml purge)	0.1	0.5
1,2-Dichloropropane	ug/L	0.6	8260 (25-ml purge)	0.1	0.5
Chloroform	ug/L	70	8260 (25-ml purge)	0.1	0.5
Chloromethane	ug/L	3	8260 (25-ml purge)	0.2	0.5
Methylene chloride	ug/L	5	8260 (25-ml purge)	0.2	0.5
PCE	ug/L	0.7	8260 (25-ml purge)	0.1	0.5
TCE	ug/L	3	8260 (25-ml purge)	0.1	0.5
cis-1,2-DCE	ug/L	70	8260 (25-ml purge)	0.1	0.5
trans-1,2-DCE	ug/L	100	8260 (25-ml purge)	0.1	0.5
Vinyl chloride	ug/L	0.03	8260 (25-ml purge)	0.1	0.5
Semivolatile Organic Compounds (SVOCs)					
1,2-dichlorobenzene	ug/L	20	8270C	0.5	1
4-methylphenol	ug/L	40	8270C	0.5	1
Bis(2-ethylhexyl) phthalate	ug/L	3	8270C	2	5
Butyl benzyl phthalate	ug/L	1000	8270C	2	5
Carbazole	ug/L	2	8270C	0.5	1
Dibenzofuran	ug/L	28	8270C	0.5	1
Dimethyl phthalate	ug/L		8270C	2	5
Di-n-butyl phthalate	ug/L	700	8270C	2	5
Di-n-octyl phthalate	ug/L	100	8270C	2	5
Polychlorinated Biphenols (PCBs)					
PCB-1016	ug/L		8082	0.1	0.5
PCB-1221	ug/L		8082	0.1	0.5
PCB-1232	ug/L		8082	0.2	0.5
PCB-1242	ug/L		8082	0.1	0.5
PCB-1248	ug/L		8082	0.1	0.5
PCB-1254	ug/L		8082	0.1	0.5
PCB-1260	ug/L		8082	0.15	0.5
Total PCBs	ug/L	0.09			

Table 3
Standards and Laboratory Methods and Limits of Groundwater Constituents

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Analytical Constituent	Units	2L / IMAC Standard	Laboratory		
			Method	MDL	LOQ (PQL or RL)
Polynuclear Aromatic Hydrocarbons (PAHs)					
1-Methylnaphthalene	ug/L	1	8270 SIM	0.01	0.05
2-methylnaphthalene	ug/L	30	8270 SIM	0.01	0.05
Acenaphthene	ug/L	80	8270 SIM	0.01	0.05
Acenaphthylene	ug/L	200	8270 SIM	0.01	0.05
Anthracene	ug/L	2000	8270 SIM	0.01	0.05
Benz(a)anthracene	ug/L	0.05	8270 SIM	0.01	0.05
Benzo(a) pyrene	ug/L	0.005	8270 SIM	0.01	0.05
Benzo(b)fluoranthene	ug/L	0.05	8270 SIM	0.01	0.05
Benzo(g,h,i)perylene	ug/L	200	8270 SIM	0.01	0.05
Benzo(k)fluoranthene	ug/L	0.5	8270 SIM	0.01	0.05
Chrysene	ug/L	5	8270 SIM	0.01	0.05
Dibenz(a,h)anthracene	ug/L	0.005	8270 SIM	0.01	0.05
Fluoranthene	ug/L	300	8270 SIM	0.01	0.05
Fluorene	ug/L	300	8270 SIM	0.01	0.05
Indeno(1,2,3-c,d)pyrene	ug/L	0.05	8270 SIM	0.01	0.05
Naphthalene	ug/L	6	8270 SIM	0.03	0.05
Phenanthrene	ug/L	200	8270 SIM	0.03	0.05
Pyrene	ug/L	200	8270 SIM	0.01	0.05
Metals					
Lead	ug/L	15	6020	0.082	1
Antimony	ug/L	1	6020	0.33	1
Arsenic	ug/L	10	6020	0.82	2
Barium	ug/L	700	6020	0.58	2
Beryllium	ug/L	4	6020	0.045	0.5
Cadmium	ug/L	2	6020	0.17	0.5
Chromium, Total	ug/L	10	6020	0.5	2
Chromium, Hexvalent	ug/L	NS	218.6	5	10
Copper	ug/L	1000	6020	0.5	2
Manganese	ug/L	50	6020	0.55	2
Mercury	ug/L	1	7470	0.06	0.2
Nickel	ug/L	100	6020	0.79	2
Selenium	ug/L	20	6020	0.5	2
Silver	ug/L	20	6020	0.13	0.5
thallium	ug/L	0.2	6020	0.15	0.5
Zinc	ug/L	1000	6020	2.4	15

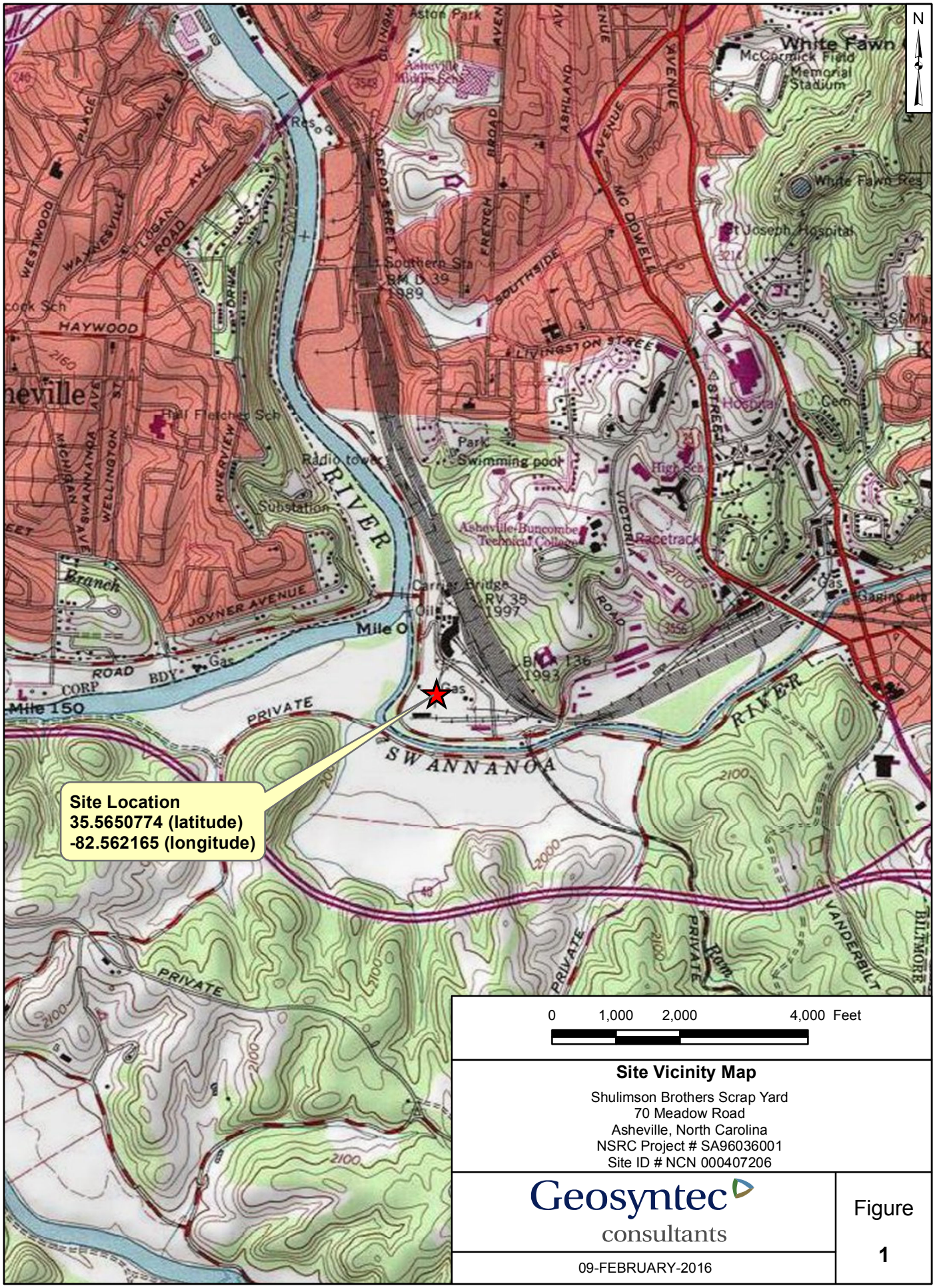
Notes:
2L/IMACs standards in this table are from 15A NCAC 02L .0202 Groundwater Standard, April 2013
MDL - Method Detection Limits
LOQ - Limits of Quantitation
RL - Reporting Limit
PQL - Practical Quantitation Limit

Table 4
Data Quality Objectives

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Data Quality Objective	Decision	Inputs	Study Boundaries	Decision Rule	Limits on Decision Error
Assess Potential Groundwater Impacts from SVOCs, PCBs, and Metals	Is groundwater impacted by SVOCs, PCBs, or metals?	a. Monitoring wells will be installed to collect water level readings to confirm groundwater flow direction.	Project related monitoring well network including the four new monitoring wells.	1. If water level data does not confirm that monitoring wells are positioned correctly to capture the potential plume based on groundwater flow direction, then additional monitoring wells must be installed.	Data is of sufficient quality for use if no major, repeated, or systematic quality issues are encountered during data validation.
	If so, at what concentrations?	b. Multiple volume purge or low flow sampling for COCs will be performed after the new monitoring wells are installed.		2. Sample results will be screened against 15A NCAC 2L standards. If metals are detected above 2L standards, they will be compared against the concentrations at MW3 (an upgradient well). If SVOCs or PCBs are detected above 2L standards, additional delineation and/or analysis will be required.	
		c. Full (Level 4) data validation will be performed on the resulting sample data packages.			
	Are SVOCs, PCBs and metals leaving from soil?	d. Synthetic Precipitate Leaching Procedure (SPLP) samples will be collected during installation of new monitoring wells.		3. Sample results will be compared with groundwater results above.	
Delineate PCBs in Soil	Where are PCBs present in soil (horizontally) above 50 ppm?	a. Sample locations per Figure 6.	Samples will be collected from locations shown on Figure 6.	1. If analytical results indicate PCBs are detected above 50 ppm then additional delineation and / or study will be required.	Data is of sufficient quality for use if no major, repeated, or systematic quality issues are encountered during data validation.
		b. Level 2A data validation will be performed on the resulting sample data packages.			
Determine Background Metal Concentrations	What is the site-specific background threshold values for metals?	a. Sample locations per figure 8.	Samples will be collected from locations shown on Figure 8.	1. Statistical analysis should be used to establish site-specific background metal concentrations to delineate metals in soil below.	Data is of sufficient quality for use if no major, repeated, or systematic quality issues are encountered during data validation.
Speciate Chromium Offsite	What is the concentration of hexavalent chromium at 3 historical sample locations with elevated concentrations of total Chromium?	a. MM&A's historical sample locations SB76, SB77, and SB80.	MM&A's historical sample locations SB76, SB77, and SB80.	None	Data is of sufficient quality for use if no major, repeated, or systematic quality issues are encountered during data validation.
		b. Level 2A data validation will be performed on the resulting sample data packages.			

FIGURES



Site Vicinity Map

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # NCN 000407206

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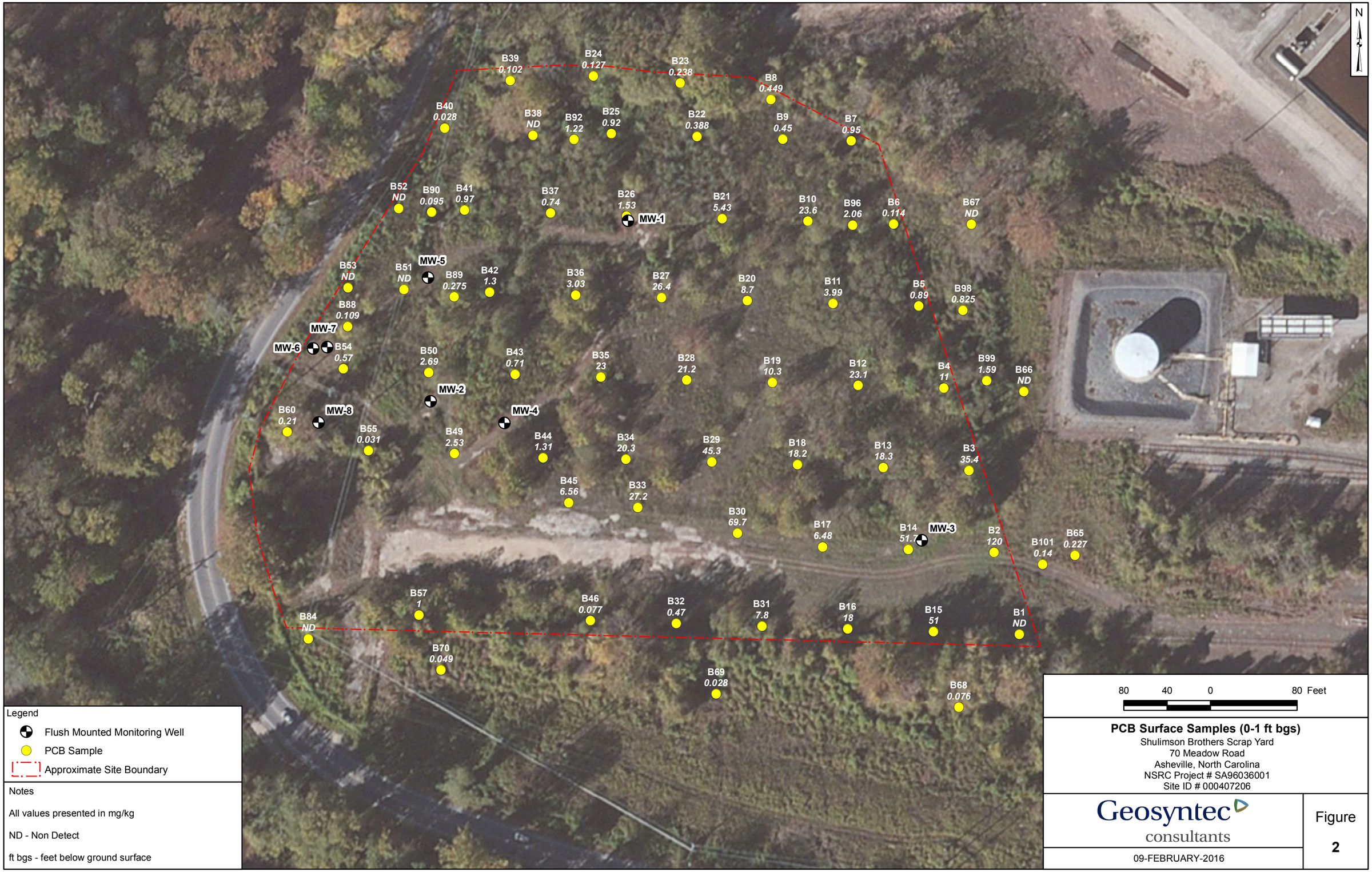
Figure 1



PCB Surface Samples (0-1 ft bgs)

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

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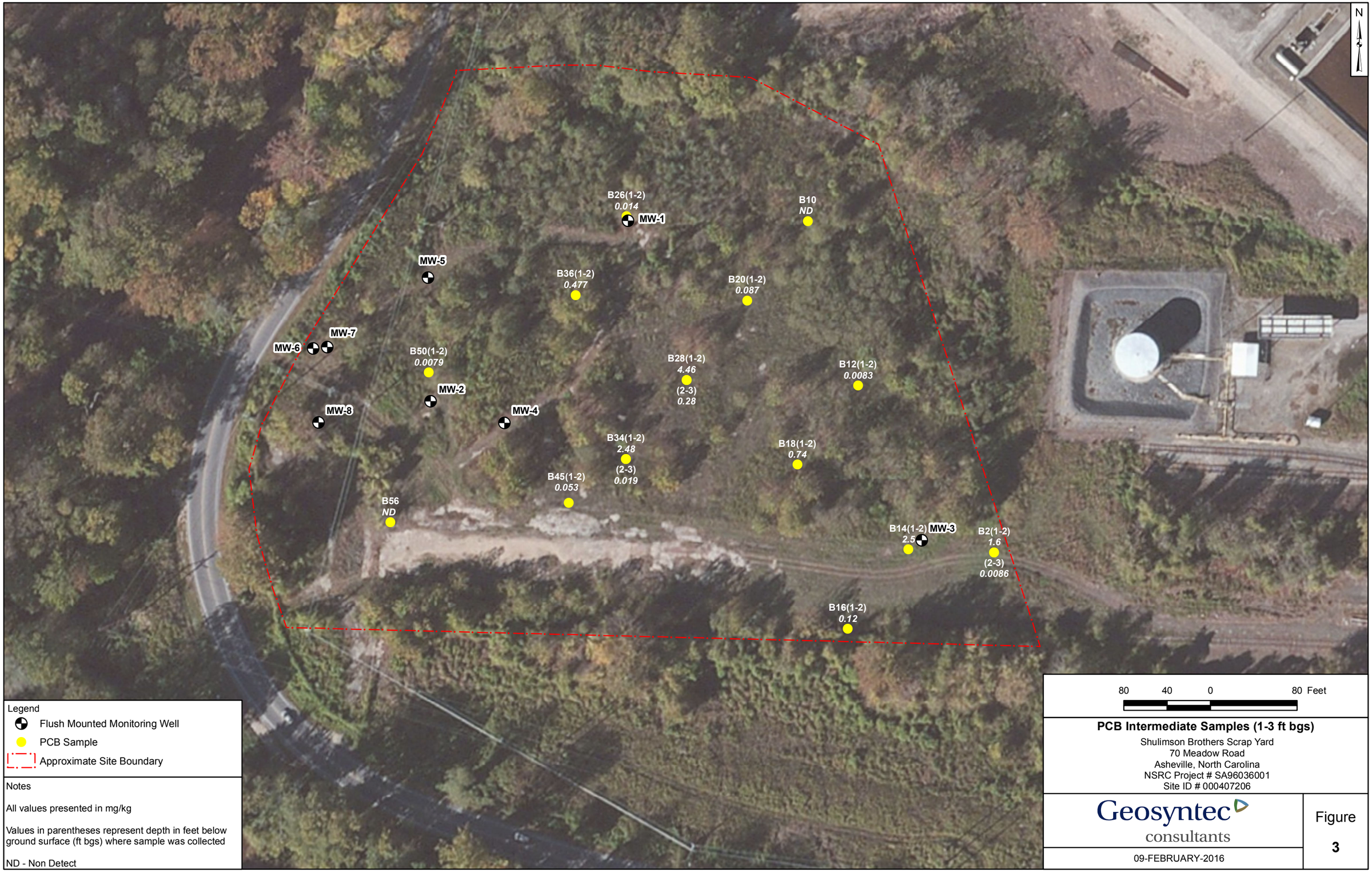
Figure 2



PCB Intermediate Samples (1-3 ft bgs)

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

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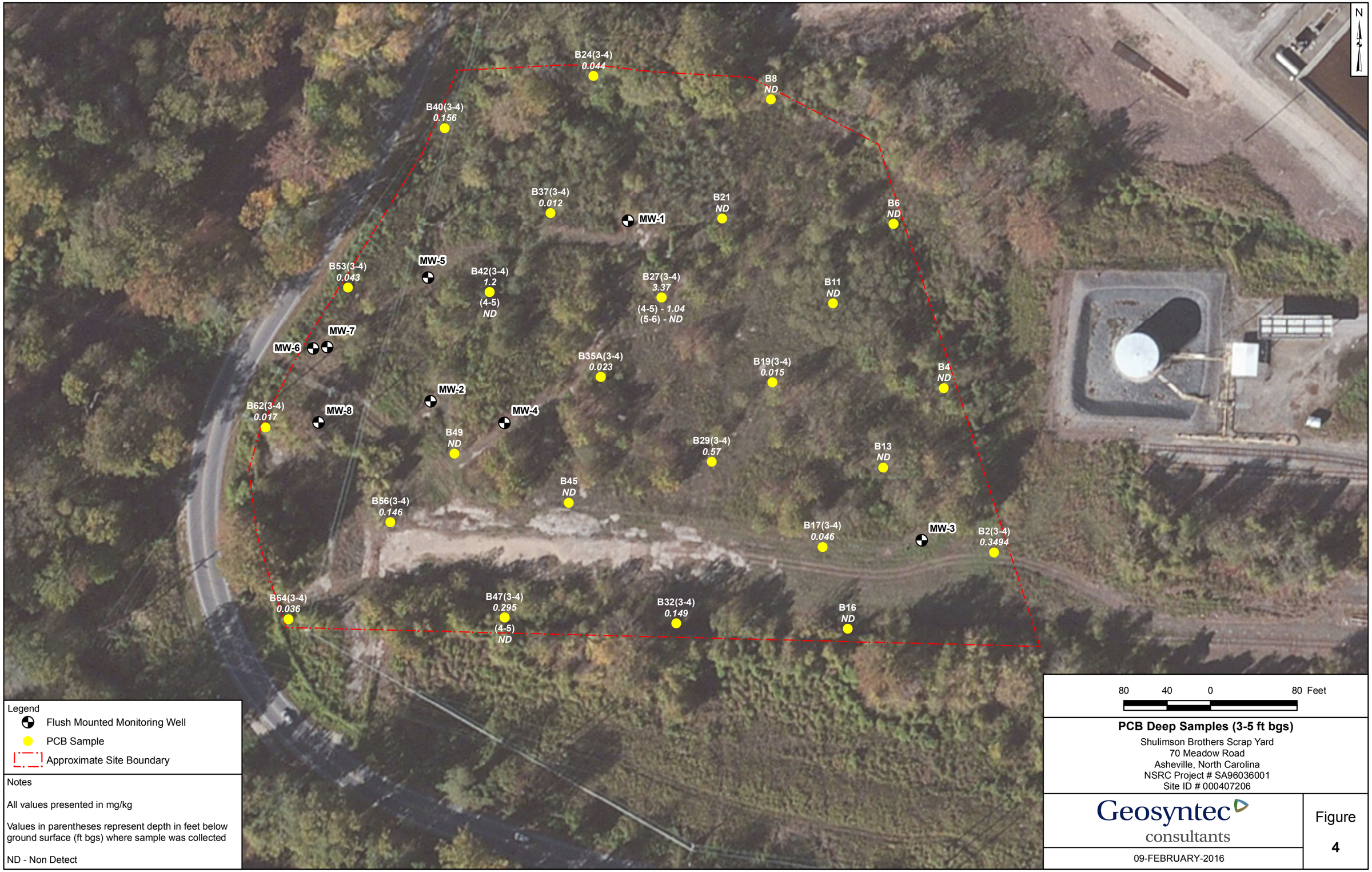
Figure 3



Legend

- Flush Mounted Monitoring Well
- PCB Sample
- Approximate Site Boundary

Notes

All values presented in mg/kg

Values in parentheses represent depth in feet below ground surface (ft bgs) where sample was collected

ND - Non Detect

PCB Deep Samples (3-5 ft bgs)

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

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Figure 4

Legend
- Supplemental Monitoring Well
- Flush Mounted Monitoring Well
- Approximate Site Boundary

Notes

Supplemental well locations are approximate

Proposed Supplemental Monitoring Well Locations
Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

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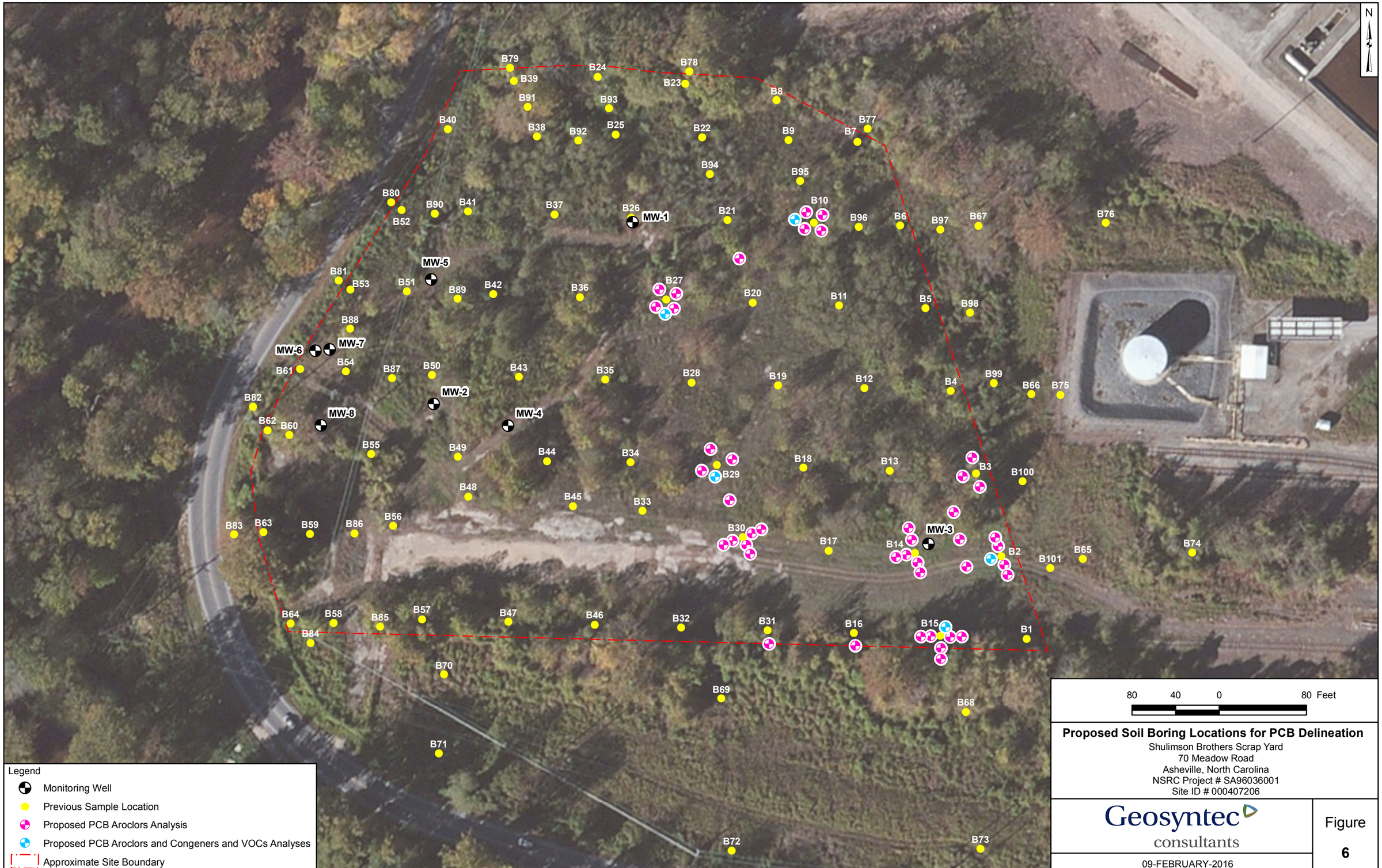
Figure 5



Proposed Soil Boring Locations for PCB Delineation

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

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Figure 6

Proposed Background Soil Sample Locations

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

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Figure 7

APPENDIX A

Preliminary Risk Assessment

Appendix A - Preliminary Risk Evaluation

1. Overview

To further evaluate site-specific soil remediation goals, a Preliminary Risk Evaluation (PRE) was performed on a total of 21 soil samples from the RI that were located to the south, east and west of the lease boundary. A Preliminary Risk Evaluation (PRE) is a streamlined form of human health risk assessment that is intentionally designed to provide a conservative assessment of potential risk (USEPA 1998). The PRE is based on a risk-ratio approach to calculate excess lifetime cancer risks (ELCR) and non-cancer hazard quotients (HQs) using the default RSLs for residential soil, which incorporate broadly applicable and conservative exposure and toxicity factors. Calculation of HQs and ELCRs require computing exposure point concentrations (EPCs) based on the 95% Upper Confidence Limit (95% UCL) for each Contaminant of Potential Concern (COPC) using all of the soil data (regardless of depth).

2. Data Overview and COPCs Screening

21 soil samples were identified from the RI that were located outside the lease boundary but were not background samples. These samples include B65, 66, 67, 68, 69, 70, 70A, 71, 72, 73, 74, 74A, 75, 76, 77, 78, 79, 80, 81, 82, and 83 as shown in **Table A.1**. For all 21 samples, Benzo(a)pyrene [B(a)P] toxic equivalents (TEQs) are computed for carcinogenic PAHs in the soil samples as shown in **Table A.2**. COPCs were first identified by comparing all 21 soil sample results from the RI with the lowest of (1) EPA November 2014 residential carcinogenic RSL (USEPA, 2014); (2) EPA November 2014 residential non-carcinogenic RSL (USEPA, 2014); (3) NC residential (NCDEQ, 2014); (4) NC industrial (NCDEQ, 2014); and (5) NC protection of groundwater (NCDEQ, 2014). As shown in **Tables A.1 and A.2**, a contaminant was identified as a COPC if at least one soil sample indicated exceedance above the RSL. COPCs identified in soil samples outside the property boundary include: PAHs, antimony, arsenic, cadmium, chromium (III+VI), manganese, and mercury.

3. Computing Exposure Point Concentrations (95% UCL)

95% UCL of the mean COPC concentration for each COPC is computed using all of the soil data (regardless of depth) using USEPA's ProUCL software version 5.0. in compliance with EPA guidance (EPA, 1989-2009). Exposure Point Concentrations (EPCs) are the Upper Confidence Limits (UCLs) on the mean COPC concentrations computed, with the exception of antimony. The EPC for antimony is the maximum detected concentration since statistically significant sample data was not available. EPCs for all COPCs are shown in **Table A.3**.

4. PRE for Present Condition

From the computed EPC values, a baseline PRE for the present site condition was first performed as shown in **Table A.3**. Two non-cancer hazard index (HI) and excess lifetime cancer risk (ELCR) estimates are computed for Chromium (III) and (VI) because the measured concentrations represent “total” chromium and relative proportion of chromium III and VI is unknown. However, it likely that the total chromium present is in the trivalent form (see

discussion of NCDEQ guidance for chromium speciation below). Baseline non-cancer HI estimates of 0.8 and 1.0 are computed. Both meet the EPA threshold for acceptable non-cancer hazard (HI≤1). Baseline ELCR estimates of 1.0E-4 and 2.5E-4 are computed. The higher ELCR estimate exceeds the high end of EPA's acceptable risk range of 1E-6 to 1E-4, and is driven by chromium VI. When chromium VI is excluded, the ELCR is at the high-end of EPA's acceptable risk range and is driven by PAHs (as B(a)P TEQ).

5. "Virtual Remediation" Scenario

Since the ELCR estimate for the present site condition was at the high-end of EPA's acceptable risk range, a second PRE was performed for a "virtual remediation" scenario as shown in **Table A.4**. This scenario simulated removal of soil at boring locations B70, 70A, two locations with the highest PAH sample concentrations. The EPC for all COPCs was then recomputed by replacing the data associated by the sample locations identified above (all depths) with background concentrations (inorganics) or estimated detection limits (PAHs). Site-specific background dataset are presented in **Table A.5** and, was established using background samples collected during the RI and EPA's ProUCL statistical software. The rationale behind this conservative approach is that the clean fill will have inorganic COPC concentrations similar to natural background and non-detect concentrations for PAHs. Revised non-cancer HI estimates of 0.8 and 1.0 are computed. Revised ELCR estimates of 5.5E-5 and 2.0E-4 are computed. When chromium VI is excluded, the ELCR is within EPA's acceptable risk range.

6. Summary

The results of this PRE indicate that computed HI and ELCR estimates for the area outside of the lease boundary are close to acceptable EPA hazard and risk thresholds. Hazard and risk estimates above these thresholds are based on the extremely unlikely assumption that all chromium is present in the hexavalent form. The NCDEQ *Inactive Hazardous Sites Guidance* (2014) states "*hexavalent chromium testing is only needed if: total non-speciated chromium concentrations (by totals analysis) in the Phase I samples exceed 2 times the site-specific natural background concentrations and the hexavalent chromium soil remedial goal and chromium is a known or suspected contaminant the site.*" The maximum detected chromium concentration (58 mg/kg) is only slightly higher than two-times the calculated background threshold value for chromium (2 × 28 mg/kg = 56 mg/kg).

The carcinogenic PAHs (as B(a)P TEQ) are considered the more significant risk driver. While the baseline PRE indicates that the cumulative ELCR estimate is at the upper limit of EPA's acceptable risk range, this estimate is associated with some uncertainty because the analytical method used for PAHs had elevated detection/reporting limits, likely resulting in higher B(a)P TEQ risk estimates. On the other hand, half of the samples (B71, 72, 73, 76, 77, 78, and 82) in which PAHs were target analytes, did not include results for all seven of the carcinogenic PAH constituents used to compute the B(a)P TEQ concentration. In these cases, a zero value was used in the calculation, potentially resulting in lower B(a)P TEQ risk estimates. Human health risk assessment guidance from EPA Region 4 indicates a preference for using B(a)P TEQ for calculating risks for the suite of carcinogenic PAH constituents. The NCDEQ

guidance does not address this topic; however, a footnote to NCDEQ Preliminary Soil Remediation Goal table states "*Remediation goals for carcinogenic PAHs can also be calculated as a toxic equivalency concentration (TEQ) by using the toxicity equivalence factor (TEF) methodology.*"

This analysis indicates that the baseline hazards/risks outside of the lease boundary are close to acceptable EPA hazard/risk thresholds. A limited number of additional samples will be needed to establish background concentrations.

Table A.1
Comparison of Soil Samples from the RI Located Outside Property Boundary

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Chemical Group	Analyte	Units	USEPA RSLc Residential	USEPA RSLnc Residential	NC Residential PSRG	NC Industrial PSRG	Soil Boring		B65	B66	B67	B68	B69	B70	B70A	B71	B72	B73
							Sample Depth Range (ft bgs)		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
							Sample Date		4/1/2009	4/1/2009	4/1/2009	4/1/2009	4/1/2009	4/1/2009	4/1/2009	5/19/2009	5/19/2009	5/19/2009
							NC Protection of Groundwater PSRG	Lowest of Standards										
Lead	Lead	mg/kg	-	400	400	800	270	270	160	24	26	36	58	38	38	-	-	-
Metals	Antimony	mg/kg	-	31	6.2	94	0.9	0.9	4.8	<0.53	<0.51	<0.26	0.73	0.48	0.87	-	-	-
	Arsenic	mg/kg	0.67	34	0.67	3	5.8	0.67	4.6	3.3	4.7	4	6.6	2.2	2.8	-	2.6	-
	Cadmium	µg/kg	2,100,000	70,000	14	200	3	3	1300	560	440	450	430	760	680	-	-	-
	Chromium (III+VI)	mg/kg	0.3	120,230	24,000	100,000	360,000	0.3	37	39	38	30	21	32	33	35	-	30
	Copper	mg/kg	-	3100	620	9400	700	620	78	32	32	30	45	38	39	-	-	-
	Manganese	mg/kg	-	1800	360	5200	65	65	840	1200	1000	790	450	710	690	790	720	680
	Mercury	µg/kg	-	9400	1.9	3.1	1	1	110	54	65	75	62	70	77	52	42	37
	Nickel	mg/kg	15,000	1500	300	4400	130	130	26	26	26	24	17	22	21	-	-	-
	Silver	µg/kg	-	390,000	78	1200	3.4	3.4	<98	<100	<98	<50	<51	<52	<57	-	-	-
	Zinc	mg/kg	-	23,000	4600	70,000	1200	1200	240	110	100	130	83	170	150	-	-	-
PAH/Phenols	2-methylnaphthalene	µg/kg	-	-	-	-	-	-	<230	<230	<24	<230	410	<260	<260	-	-	-
	Acenaphthylene	µg/kg	-	-	-	-	-	-	<230	<230	<24	250	35	<260	<260	-	-	-
	Benz(a)anthracene	µg/kg	150	-	150	2900	180	150	<450	<440	<46	790	84	1400	870	<43	-	820
	Benzo(a) pyrene	µg/kg	15	-	15	290	59	15	<230	<230	30	730	69	1900	1300	25	39	680
	Benzo(b)fluoranthene	µg/kg	150		150	2900	600	150	<230	<230	54	1200	110	2700	1800	30	-	1600
	Benzo(k)fluoranthene	µg/kg	1500	-	1500	29,000	5900	1500	<230	<230	<24	920	90	2100	1400	<22	-	-
	Chrysene	µg/kg	15,000		15,000	290,000	18,000	15,000	<230	<230	<24	1200	160	1800	1200	-	-	-
	Dibenz(a,h)anthracene	µg/kg	15		15	290	190	15	<330	<320	54	<320	<31	<360	430	<31	-	-
	Indeno(1,2,3-c,d)pyrene	µg/kg	150	-	150	2900	2000	150	<390	<390	61	400	47	960	690	<38	-	710
	Benzo(g,h,i)perylene	µg/kg	-	-	None	None	7800	7800	<330	<320	65	470	56	1100	730	-	-	-
	Fluoranthene	µg/kg	-	2,300,000	460	6000	330	330	<230	<230	37	1500	150	920	650	-	-	-
	Naphthalene	µg/kg	3800	130,000	3800	17,000	210	210	<230	<230	<24	<230	160	<260	<260	-	-	-
	Phenanthrene	µg/kg	-		68	None	None	68	<230	<230	27	430	200	<260	<260	-	-	-
	Pyrene	µg/kg	-	1,700,000	-	-	-	1,700,000	<230	<230	26	1900	150	2000	1300	-	-	-
Polychlorinated Biphenyls	Polychlorinated Biphenyls (high risk)	mg/kg	-	-	-	-	-	-	0.227	<0.0497	<0.0517	0.076	0.028	0.049	0.025	-	-	-
	Polychlorinated Biphenyls (low risk)	mg/kg	-	-	-	-	-	-	<0.0051	<0.0051	<0.0053	<0.005	<0.0048	<0.0057	<0.0057	-	-	-
	Arochlor 1254	µg/kg	240	1100	-	-	-	240	180	<3.1	<3.2	76	<2.9	25	<3.5	-	-	-
	Arochlor 1260	µg/kg	240	-	-	-	-	240	47	<6.4	<6.7	<6.4	28	24	25	-	-	-
SVOCs	Carbazole	µg/kg	-	-	-	-	-	-	<230	<230	<24	<230	28	<260	<260	-	-	-
	Dibenzofuran	µg/kg	-	-	-	-	-	-	<230	<230	<24	<230	110	<260	<260	-	-	-

Notes:
mg/kg - milligram per kilogram
µg/kg - microgram per kilogram
RSLc and RSLnc - Values shown are USEPA's Residential Soil Regional Sreening Level (RSL) for non-cancer or cancer endpoints, where applicable, taken from the RSL Resident Soil Table November 2014.
ft bgs - feet below ground surface
Only analytes with one or more detections included in table
Shaded values indicate an exceedance of the Lowest of Standards

Table A.1
Comparison of Soil Samples from the RI Located Outside Property Boundary

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Chemical Group	Analyte	Units	USEPA RSLc Residential	USEPA RSLnc Residential	NC Residential PSRG	NC Industrial PSRG	Soil Boring		B74	B74A	B75	B76	B77	B78	B79	B80	B81	B82	B83
							Sample Depth Range (ft bgs)		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
							Sample Date		5/19/2009	5/19/2009	5/19/2009	5/19/2009	5/19/2009	5/19/2009	5/19/2009	5/19/2009	5/19/2009	5/19/2009	5/19/2009
							NC Protection of Groundwater PSRG	Lowest of Standards											
Lead	Lead	mg/kg	-	400	400	800	270	270	-	-	-	-	34	-	-	-	-	-	180
Metals	Antimony	mg/kg	-	31	6.2	94	0.9	0.9	-	-	-	-	-	-	-	-	-	-	0.72
	Arsenic	mg/kg	0.67	34	0.67	3	5.8	0.67	5.9	20	-	-	8.4	3.5	6.1	4.8	5	3.3	2.9
	Cadmium	µg/kg	2,100,000	70,000	14	200	3	3	1400	3100	-	-	780	350	770	-	-	-	-
	Chromium (III+VI)	mg/kg	0.3	120,230	24,000	100,000	360,000	0.3	36	35	48	51	58	46	41	47	-	-	-
	Copper	mg/kg	-	3100	620	9400	700	620	-	-	-	-	-	-	-	-	-	-	-
	Manganese	mg/kg	-	1800	360	5200	65	65	1000	1000	1400	1100	950	1300	840	1100	-	-	-
	Mercury	µg/kg	-	9400	1.9	3.1	1	1	54	57	40	53	40	34	74	75	76	50	240
	Nickel	mg/kg	15,000	1500	300	4400	130	130	-	-	-	-	-	-	-	-	-	-	-
	Silver	µg/kg	-	390,000	78	1200	3.4	3.4	-	-	-	-	-	-	-	-	-	-	-
	Zinc	mg/kg	-	23,000	4600	70,000	1200	1200	-	-	-	-	150	-	-	-	-	-	-
PAH/Phenols	2-methylnaphthalene	µg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Acenaphthylene	µg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benz(a)anthracene	µg/kg	150	-	150	2900	180	150	-	-	-	-	-	-	-	-	-	-	-
	Benzo(a) pyrene	µg/kg	15	-	15	290	59	15	-	-	-	27	-	<22	-	-	-	<220	-
	Benzo(b)fluoranthene	µg/kg	150		150	2900	600	150	-	-	-	-	-	-	-	-	-	-	-
	Benzo(k)fluoranthene	µg/kg	1500	-	1500	29,000	5900	1500	-	-	-	-	-	-	-	-	-	-	-
	Chrysene	µg/kg	15,000		15,000	290,000	18,000	15,000	-	-	-	-	-	-	-	-	-	-	-
	Dibenz(a,h)anthracene	µg/kg	15		15	290	190	15	-	-	-	<31	<33	<30	-	-	-	-	-
	Indeno(1,2,3-c,d)pyrene	µg/kg	150	-	150	2900	2000	150	-	-	-	-	<40	<37	-	-	-	-	-
	Benzo(g,h,i)perylene	µg/kg	-	-	None	None	7800	7800	-	-	-	-	-	-	-	-	-	-	-
	Fluoranthene	µg/kg	-	2,300,000	460	6000	330	330	-	-	-	-	-	-	-	-	-	-	-
	Naphthalene	µg/kg	3800	130,000	3800	17,000	210	210	-	-	-	-	-	-	-	-	-	-	-
	Phenanthrene	µg/kg	-		68	None	None	68	-	-	-	-	-	-	-	-	-	-	-
	Pyrene	µg/kg	-	1,700,000	-	-	-	1,700,000	-	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls	Polychlorinated Biphenyls (high risk)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Polychlorinated Biphenyls (low risk)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Arochlor 1254	µg/kg	240	1100	-	-	-	240	-	-	-	-	-	-	-	-	-	-	-
	Arochlor 1260	µg/kg	240	-	-	-	-	240	-	-	-	-	-	-	-	-	-	-	-
SVOCs	Carbazole	µg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dibenzofuran	µg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
mg/kg - milligram per kilogram
µg/kg - microgram per kilogram
RSLc and RSLnc - Values shown are USEPA's Residential Soil Regional Sreening Level (RSL) for non-cancer or cancer endpoints, where applicable, taken from the RSL Resident Soil Table November 2014.
ft bgs - feet below ground surface
Only analytes with one or more detections included in table
Shaded values indicate an exceedance of the Lowest of Standards

Table A.2
Computed Benzo(a)pyrene Toxic Equivalents for Carcinogenic PAHs

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Sample ID		B65		B66		B67		B68		B69	
Analyte	TEF	Analyte Concentration (ug/kg)	B(a)P-TEQ Concentration (ug/kg)	Analyte Concentration (ug/kg)	B(a)P-TEQ Concentration (ug/kg)	Analyte Concentration (ug/kg)	B(a)P-TEQ Concentration (ug/kg)	Analyte Concentration (ug/kg)	B(a)P-TEQ Concentration (ug/kg)	Analyte Concentration (ug/kg)	B(a)P-TEQ Concentration (ug/kg)
Benzo(a)anthracene	0.1	450 U	22.5	440 U	22	46 U	2.3	790	79	84	8.4
Benzo(a)pyrene	1	230 U	115	230 U	115	30	30	730	730	69	69
Benzo(b)fluoranthene	0.1	230 U	11.5	230 U	11.50	54	5.4	1200	120	110	11
Benzo(k)fluoranthene	0.01	230 U	1.2	230 U	1.15	24 U	0.12	920	9.2	90	0.9
Chrysene	0.001	230 U	0.115	230 U	0.115	24 U	0.012	1200	1.2	160	0.16
Dibenz(a,h)anthracene	1	330 U	165	320 U	160.0	54	54	320 U	160	31 U	15.5
Indeno(1,2,3-cd)pyrene	0.1	390 U	19.5	390 U	19.5	61	6.1	400	40	47	4.7
Totals			**334.8**		**329.3**		**97.9**		**1139.4**		**109.7**

Notes:
RSL calculated from EPA Residential Soil Table November 2014
U - Result is below reported detection limit. 1/2 of the reported detection limit used in TEQ calculation.
B(a)P - Benzo(a)pyrene
TEQ - Toxic Equivalents
TEF - Toxicity Equivalence Factor

Table A.2
Computed Benzo(a)pyrene Toxic Equivalents for Carcinogenic PAHs

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Sample ID		B70		B70A		B71		B72		B73	
Analyte	TEF	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)
Benzo(a)anthracene	0.1	1400	140	870	87	43 U	2.15	0	0	820	82
Benzo(a)pyrene	1	1900	1900	1300	1300	25	25	39	39	680	680
Benzo(b)fluoranthene	0.1	2700	270	1800	180	30	3	0	0	1600	160
Benzo(k)fluoranthene	0.01	2100	21	1400	14	22 U	0.11	0	0	0	0
Chrysene	0.001	1800	1.8	1200	1.2	0	0	0	0	0	0
Dibenz(a,h)anthracene	1	360 U	180	430	430	31 U	15.5	0	0	0	0
Indeno(1,2,3-cd)pyrene	0.1	960	96	690	69	38 U	1.9	0	0	710	71
Totals			**2608.8**		**2081.2**		**47.7**		**39.0**		**993.0**

Notes:
RSL calculated from EPA Residential Soil Table November 2014
U - Result is below reported detection limit. 1/ 2 of the reported detection limit used in TEQ calculation.
B(a)P - Benzo(a)pyrene
TEQ - Toxic Equivalents
TEF - Toxicity Equivalence Factor

Table A.2
Computed Benzo(a)pyrene Toxic Equivalents for Carcinogenic PAHs

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Sample ID		B74		B74A		B75		B76		B77	
Analyte	TEF	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)
Benzo(a)anthracene	0.1	-	-	-	-	-	-	0	0	0	0
Benzo(a)pyrene	1	-	-	-	-	-	-	27	27	0	0
Benzo(b)fluoranthene	0.1	-	-	-	-	-	-	0	0	0	0
Benzo(k)fluoranthene	0.01	-	-	-	-	-	-	0	0	0	0
Chrysene	0.001	-	-	-	-	-	-	0	0	0	0
Dibenz(a,h)anthracene	1	-	-	-	-	-	-	31 U	15.5	33 U	16.5
Indeno(1,2,3-cd)pyrene	0.1	-	-	-	-	-	-	0	0	40 U	2
Totals			**-**		**-**		**-**		**42.5**		**18.5**

Notes:
RSL calculated from EPA Residential Soil Table November 2014
U - Result is below reported detection limit. 1/ 2 of the reported detection limit used in TEQ calculation.
B(a)P - Benzo(a)pyrene
TEQ - Toxic Equivalents
TEF - Toxicity Equivalence Factor

Table A.2
Computed Benzo(a)pyrene Toxic Equivalents for Carcinogenic PAHs

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Sample ID		B78		B79		B80		B81		B82		B83	
Analyte	TEF	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)	Analyte Concentration (ug/ kg)	B(a)P-TEQ Concentration (ug/ kg)
Benzo(a)anthracene	0.1	0	0	-	-	-	-	-	-	0	0	-	-
Benzo(a)pyrene	1	22 U	11	-	-	-	-	-	-	220 U	110	-	-
Benzo(b)fluoranthene	0.1	0	0	-	-	-	-	-	-	0	0	-	-
Benzo(k)fluoranthene	0.01	0	0	-	-	-	-	-	-	0	0	-	-
Chrysene	0.001	0	0	-	-	-	-	-	-	0	0	-	-
Dibenz(a,h)anthracene	1	30 U	15	-	-	-	-	-	-	0	0	-	-
Indeno(1,2,3-cd)pyrene	0.1	37 U	1.85	-	-	-	-	-	-	0	0	-	-
Totals			**27.9**		-		-		-		**110.0**		-

Notes:
RSL calculated from EPA Residential Soil Table November 2014
U - Result is below reported detection limit. 1/ 2 of the reported detection limit used in TEQ calculation.
B(a)P - Benzo(a)pyrene
TEQ - Toxic Equivalents
TEF - Toxicity Equivalence Factor

Table A.3
Preliminary Risk Evaluation for Current Site Condition

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Current Baseline Condition - No Remediation												
Exposure Medium	COPC	EPC[1] (mg/kg)	USEPA RSLnc[2] Residential (mg/kg)	USEPA RSLnc[3] Industrial (mg/kg)	Non-Cancer HQ Residential[4]	Non-Cancer HQ Industrial[4]	COPC	EPC[1] (mg/kg)	USEPA RSLc[2] Residential (mg/kg)	USEPA RSLc[3] Industrial (mg/kg)	ELCR Residential [5]	ELCR Industrial [3]
Soil	Antimony	-	31		NA		Antimony	-	NA		NA	
Soil	Arsenic	7.1	34		0.2		Arsenic	7.1	0.67		1.1E-05	
Soil	Cadmium	1.4	70		0.0		Cadmium	1.4	2100		6.8E-10	
Soil	Chromium (III)	42.5	120000		0.0		Chromium (III)	42.5	NA		NA	
Soil	Chromium (VI)	42.5	230		0.2		Chromium (VI)	42.5	0.3		1.4E-04	
Soil	Manganese	1019.0	1800		0.6		Manganese	1019.0	NA		NA	
Soil	Mercury	0.1	9		0.0		Mercury	0.1	NA		NA	
Soil	PAHs	1.4	NA		NA		PAHs	1.4	0.015		9.3E-05	

Calculated Hazard Index (CrIII):	**0.8**	**Calculated Excess Lifetime Cancer Risk (CrIII):**	**1.0E-04**
Calculated Hazard Index (CrVI):	**1.0**	**Calculated Excess Lifetime Cancer Risk (CrVI):**	**2.5E-04**

Notes:

(1) With the exception of Antimony, Exposure Point Concentrations (EPCs) are the Upper Confidence Limits (UCLs) on the mean Contiminantof Potential Concern (COPC) concentrations calculated using United States Environmental Protection Agency (USEPA) ProUCL software version 5.0. The EPC for antimony is the maximum detected concentration

(2) Values shown are USEPA's Residential Soil Regional Sreening Level (RSL) for non-cancer or cancer endpoints, where applicable, taken from the RSL Resident Soil Table November 2014

(3) Values shown are USEPA's Industrial Soil RSL for non-cancer or cancer endpoints, where applicable, taken from the RSL Industrial Soil Table November 2014

(4) Hazard Quotient (HQ) Estimate = (EPC / PRG)i , where:
- i - Non-carcinogenic COPC
- EPC - Exposure Point Concentration
- RSL - RSL for COPCi based on non-carcinogenic endpoints

(5) Excess Lifetime Cancer Risk (ELCR) Estimate = (EPC / RSLc)j $\times$ (10^{-6}), where:
- j - Carcinogenic COPCj
- EPC - Exposure Point Concentration
- RSL - RSL for COPCj based on carcinogenic endpoints

Table A.4
PAHs Virtual Remediation Preliminary Risk Evaluation

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Virtual Remediation Scenario with Remediation of B70, 70A PAHs												
Exposure Medium	COPC	EPC[1] (mg/kg)	USEPA RSLnc[2] Residential (mg/kg)	USEPA RSLnc[3] Industrial (mg/kg)	Non-Cancer HQ Residential[4]	Non-Cancer HQ Industrial[4]	COPC	EPC[1] (mg/kg)	USEPA RSLc[2] Residential (mg/kg)	USEPA RSLc[3] Industrial (mg/kg)	ELCR Residential [5]	ELCR Industrial [3]
Soil	Antimony	4.8	31		0.2		Antimony	4.8	NA		NA	
Soil	Arsenic	7.1	34		0.2		Arsenic	7.1	0.67		1.1E-05	
Soil	Cadmium	1.4	70		0.02		Cadmium	1.4	2100		6.7E-10	
Soil	Chromium (III)	42.2	120000		0.0004		Chromium (III)	42.2	NA		NA	
Soil	Chromium (VI)	42.2	230		0.2		Chromium (VI)	42.2	0.3		1.4E-04	
Soil	Manganese	1006.0	1800		0.6		Manganese	1006.0	NA		NA	
Soil	Mercury	0.1	9		0.01		Mercury	0.1	NA		NA	
Soil	PAHs	0.7	NA		NA		PAHs	0.7	0.015		4.5E-05	

Calculated Hazard Index (CrIII):	**1.0**	**Calculated Excess Lifetime Cancer Risk (CrIII):**	**5.5E-05**
Calculated Hazard Index (CrVI):	**1.1**	**Calculated Excess Lifetime Cancer Risk (CrVI):**	**2.0E-04**

Notes:

(1) With the exception of antimony, Exposure Point Concentrations (EPCs) are the Upper Confidence Limits (UCLs) on the mean Contaminant of Potential Concern (COPC) concentrations calculated using USEPA's ProUCL software version 5.0. The EPC for antimony is the maximum detected concentration.

(2) Values shown are USEPA's Residential Soil Regional Sreening Level (RSL) for non-cancer or cancer endpoints, where applicable, taken from the RSL Resident Soil Table November 2014

(3) Values shown are USEPA's Industrial Soil Regional Sreening Level (RSL) for non-cancer or cancer endpoints, where applicable, taken from the RSL Industrial Soil Table November 2014

(4) Hazard Quotient (HQ) Estimate = (EPC / PRG)i , where:
i - Non-carcinogenic COPC
EPC - Exposure Point Concentration
RSL - RSL for COPCi based on non-carcinogenic endpoints

(5) Excess Lifetime Cancer Risk (ELCR) Estimate = (EPC / RSLc)j x (10^{-6}), where:
j - Carcinogenic COPCj
EPC - Exposure Point Concentration
RSL - RSL for COPCj based on carcinogenic endpoints

Table A.5
Background Threshold Values

Shulimson Brothers Scrap Yard
70 Meadow Road
Asheville, North Carolina
NSRC Project # SA96036001
Site ID # 000407206

Exposure Medium	COPC[3]	BTVs[1] (mg/kg)[4]
Soil	Antimony	0.25
Soil	Arsenic	3.08
Soil	Cadmium	0.25
Soil	Chromium (total)	28.00
Soil	Manganese	421.3
Soil	Mercury	0.06
Soil	PAHs[2]	0.08

Notes:

(1) Background Threshold Values (BTVs) are calculated using only background samples with USEPA's ProUCL software version 5.0.

(2) BTVs for PAHs are assumed value based on Benzo(a)pyrene (BaP) toxic equivalent (TEQ) values

(3) COPC - Contaminant of Primary Concern

(4) mg/kg - milligram per kilogram

APPENDIX B

Community Health and Safety Plan

Norfolk Southern Railway Company
1200 Peachtree Road, NE
Atlanta, GA 30309-0013

COMMUNITY HEALTH AND SAFETY PLAN

FORMER SHULIMSON BROTHERS SCRAP YARD
ASHEVILLE, BUNCOMBE COUNTY, NC

Prepared by

Geosyntec consultants

engineers | scientists | innovators

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Project Number: KX5615

February 2016

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H&S Incident Response Procedures

CHOOSE THE RIGHT PATH

Life-Threatening Emergency → **Immediately dial 911 or the local emergency number** → **Transport to medical facility** → **Notify H&S team** → **Notify your manager** → **Manager completes and files Incident Report within 24 hours**

Non Life-Threatening Incident or Emergency → **Notify your manager and the H&S team** → **If H&S team cannnot be reached, notify WorkCare, 888-449-7787** → **H&S or WorkCare will help determine the appropriate level of care** → **Seek out care or apply first aid**

Near Miss Incident → **File Near Miss Report within 24 hours**

For more Information:
All work-related injuries, illnesses, and near-miss situations, to include vehicle accidents and general liability claims, must be documented and reported to the Health and Safety (H&S) team

Visit the H&S team on the intranet:
http://home.geosyntec.com/Corp/EHS/.

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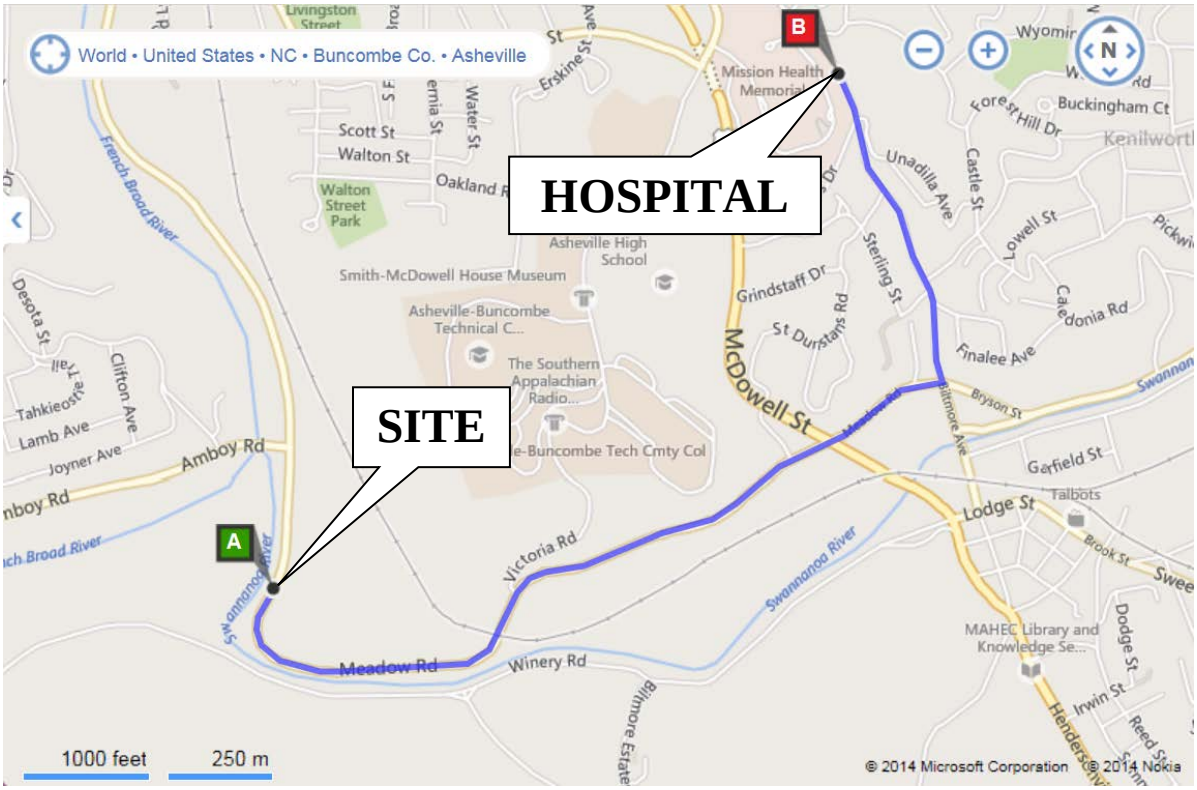
Southern Region

Mark Malchik
781-392-5440
North Region

Geosyntec consultants

ROUTE TO HOSPITAL



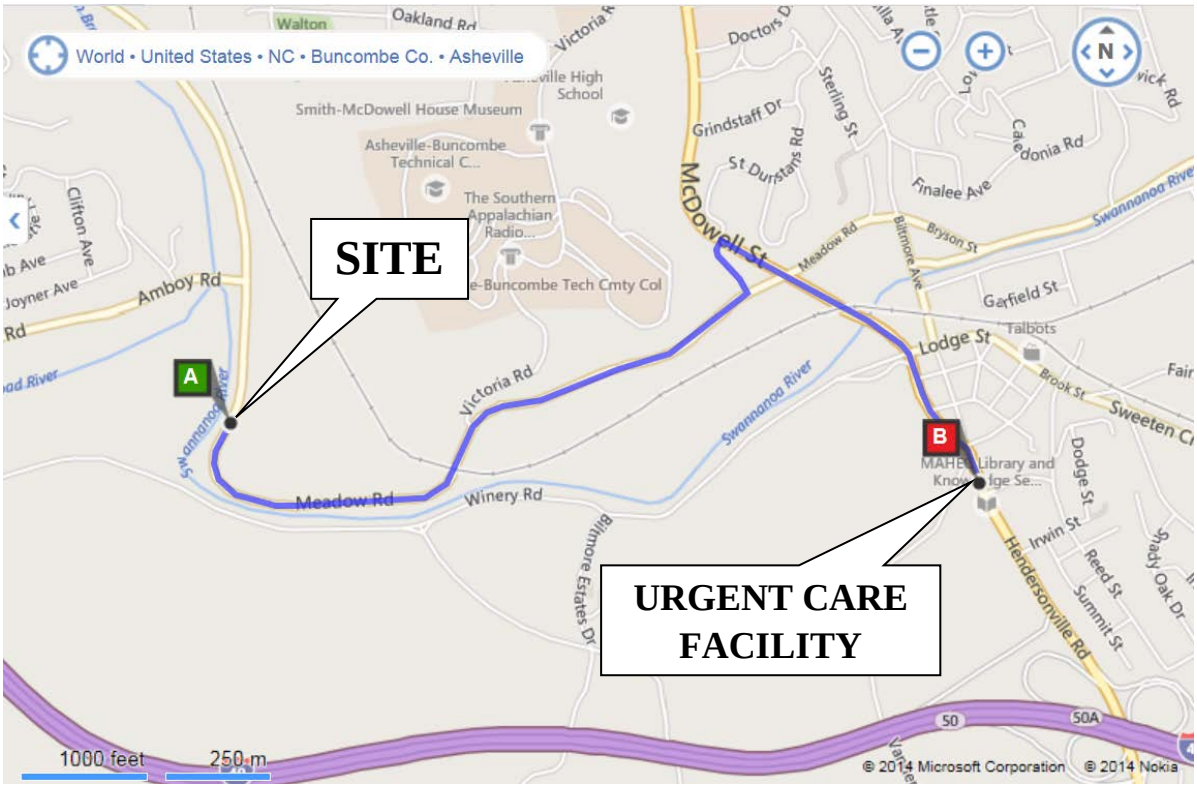
MISSION HOSPITALS
(828) 213-1111
509 Biltmore Avenue
Asheville, NC 28801

Written Directions to Hospital from Site:

1. Depart Meadow Rd toward Victoria Rd (1.3 mi)
2. Turn left onto Biltmore Ave (Shell on the corner; 0.5 mi)
3. Arrive at Mission Health Hospital at 509 Biltmore Ave, Asheville, NC. The last intersection is Doctors Dr. If you reach Forest Hill Dr, you've gone too far

Total distance to hospital 1.8 miles, travel time 3 minutes

ROUTE TO URGENT CARE FACILITY



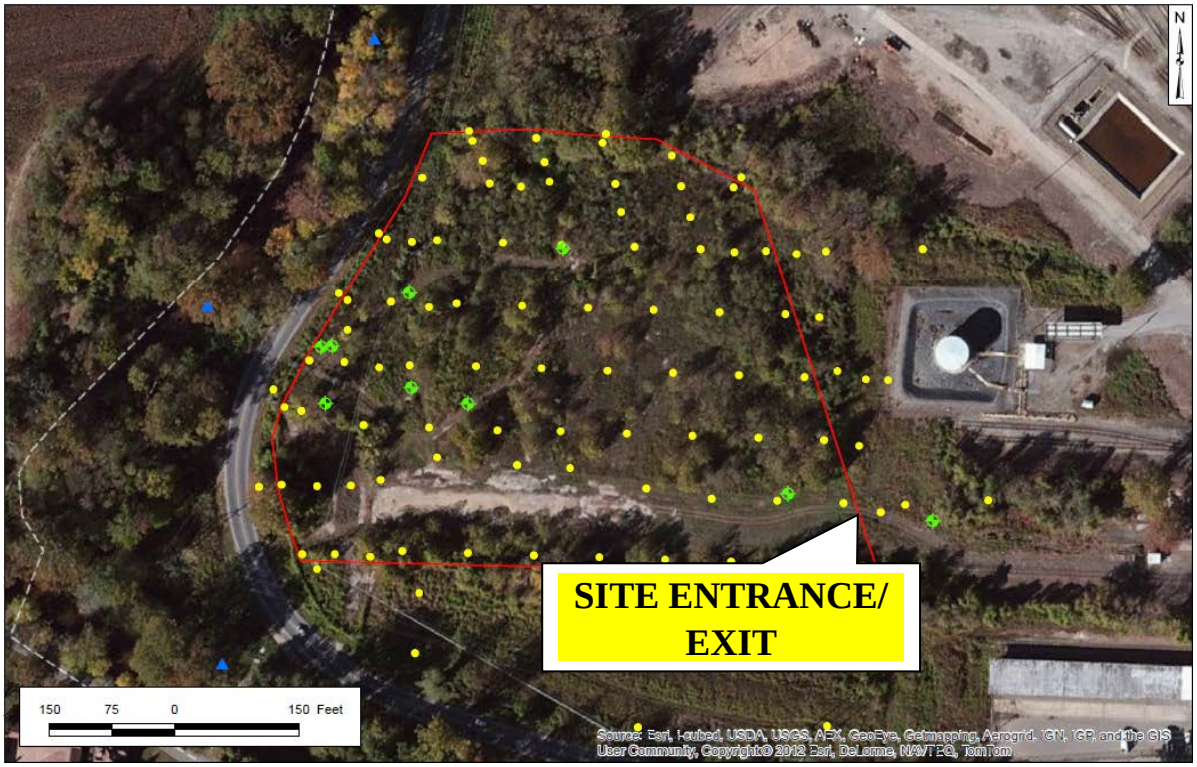
FastMed Urgent Care
828-210-2835
160 Hendersonville Rd
Asheville, NC 28803

Written Directions to Urgent care facility from Site:

1. Depart Meadow Rd toward Victoria Rd (1.0 mi)
2. Turn left onto Short MC Dowell St (0.1 mi)
3. Turn right onto US-25 / McDowell St (0.6 mi)
4. Arrive at 160 Hendersonville Rd, Asheville, NC

Total distance to hospital 1.7 miles, travel time 3 minutes

SITE MAP


N
SITE ENTRANCE/
EXIT
150 75 0 150 Feet
Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community, Copyright© 2012 Esri, DeLorme, NAVTEQ, TomTom

1. INTRODUCTION

This site-specific Health and Safety Plan (HASP) was prepared to address project-specific hazards known or suspected to be present associated with the existing conditions and work to be performed at the work site(s). This HASP was prepared to meet the requirements specified in Occupational Safety and Health (OSHA) Hazardous Waste Operations Emergency and Response (HAZWOPER) program, Geosyntec's Health and Safety (H&S) Procedure HS 301, and the H&S requirements of the client.

2. SIGNATURES

2.1 Preparers and Reviewers

This HASP must be maintained on site when field work is being performed. The Site Health and Safety Officer (SHSO) can change or amend this document, in agreement with the Health and Safety Coordinator (HSC) or Project Manager. Amendments (e.g., changes in personal protective equipment, addition of tasks, etc.) must be documented in Section 20 and in Appendix A. This HASP must be reviewed and amended on an annual basis for projects lasting more than one year.

Prepared by:	Rohit B. Warrier	08/06/15
	SHSO	Date
Reviewed by:		
	HSC	Date

Approved by: Leroy Leonard
Project Manager Date

This HASP has been given to the following H&S approved subcontractor(s).

Subcontractor: _____ Representative: _____ Date: _____

Subcontractor: _____ Representative: _____ Date: _____

Subcontractor: _____ Representative: _____ Date: _____

2.2 Site Workers

This HASP must be reviewed by personnel prior to site work. Workers not in attendance at the initial meeting must be trained by the SHSO on the information covered in the pre-entry briefing. After reading the HASP and attending a pre-entry briefing, Geosyntec employees and other parties covered under this HASP must sign the following acknowledgment statement.

"I have read, understand, and will perform my work in accordance with the information set forth in this HASP."

Signature	Printed Name	Date

3. EMERGENCY CONTACT INFORMATION

Contact	***Telephone Numbers***	
	Office	***Alternate (Type)***
Asheville Fire Department	828-259-5636	911
Asheville Police Department	828-252-1110	911
Mission Hospitals	828-213-1111	
Director of H&S– *Dale Prokopchak*	804-665-2811	804-349-8067 (Cell)
H&S Regional Manager – *Ersin Yalcin*	678-202-9552	404-435-4722 (Cell)
Project Manager – *Leroy Leonard*	865-291-4703	865-323-5683 (Cell)
Site Health & Safety Officer – *Rohit Warrier*	919-424-1829	734-834-7600 (Cell)
H&S Coordinator – *Michael Schott*	919-424-1824	919-324-2597 (Cell)
Principal- or Associate-in-Charge – *Beau Hodge*	919-424-1828	919-412-5118 (Cell)

Utility Emergencies	811	
Work Care	888-449-7877	714-978-7488
Client Contact – *Scott Pittenger*	404-582-4236	

4. APPLICABILITY OF THIS HASP

This HASP was prepared in accordance with Geosyntec Consultants' H&S Procedures for use by Geosyntec project staff and subcontractors. Subcontractors, at a minimum, shall ensure that their employees, and those of its lower tier subcontractors, comply with these procedures and other health, safety and security provisions in the Subcontract. Compliance with this HASP shall represent the minimum requirements to be met by subcontractors, who shall be responsible for examining all requirements and determining whether additional or more stringent health, safety and security provisions are appropriate for their portion of the work and implementing them accordingly. Therefore, for firms executing all or any portion of the work, this document and its contents should not be used without a thorough peer review by their health and safety managers. Prior to commencing work, such firms are responsible for reviewing and supplementing the HASP to add appropriate procedures specific to their portion of the work.

5. PROTECTION OF SURROUNDING COMMUNITY

Protection of the general public and the surrounding community focuses on two primary tasks: maintaining security of the work areas, and isolation of IDW from the general public. The Facility is surrounded by a chain link fence and access to the Facility is controlled. Work conducted outside of the fence may require cordoning off the work area to mitigate potential contact of the general public with the work area. Cordoning will be accomplished by using flexible tape marked with "Caution - Do Not Enter" tape. The general public will not be allowed into the area.

IDW generated on site will be moved daily to a secure area within the fence enclosure of the Facility and properly labeled in secure containers. IDW generated during the day in an area

outside of the secure fenced area will be contained and marked off with condoning tape as described above.

Vehicles leaving the site will be have tracks and tires inspected to reduce transport of on site materials off site. Dust, if generated during activities will be monitored and if necessary, the area will be wetted to reduce fugitive dust.

6. SITE/TASK/HAZARD DESCRIPTION

6.1 Site Background

The following is a brief description of the site, including information as to the location, approximate size, previous usage, and current usage. A description of the tasks to be performed is also presented.

- Site Location: 100-144 Meadow Road, Asheville, NC
- Approximate Size of Site: 6 acres
- Previous Site Usage: Shulimson Brothers Scrap Metal Yard
- Current Site Usage: Abandoned
- Description of Surrounding Property/Population:

North	Norfolk Southern Rail Yard	East	Norfolk Southern Rail Yard
South	Swannanoa River	West	Residential/Swannanoa River

- Summary of previous site investigations (if available/applicable):

Shulimson ceased their scrap and recycling operations in 1997. Following site abandonment, wastes and debris were inventoried and disposed off-site. Numerous remedial investigations (RI) have been conducted by Marshall Miller & Associates, Inc. since 1997. These RI investigations identified impacts of select semi-volatile organic compounds (SVOCs), polychlorinated bipenyls (PCBs), polyaromatic hydrocarbons (PAHs) and metals (lead, arsenic) above IHSB's preliminary soil remediation goals both on and offsite.

6.2 Task Descriptions

Task 1: Monitoring Well Installation

As part of the supplemental groundwater assessment, four new monitoring wells are proposed to be installed on site by a licensed drilling subcontractor. Two inch, schedule 40 PVC wells with a ten foot, 0.01-inch slotted screen will be installed using a drill rig. Physical hazards associated with the drill rig include pinch points, eye injury, loud noise and electrocution, overhead and underground utilities. Key safety steps include wearing PPE (protective clothing, hard hat, safety glasses, steel-toed boots, hearing protection, high-visibility vests, and nitrile gloves), utility clearance (hand augering to clear utilities) and maintaining a safe distance from the drill rig during drilling.

The wells will be sealed with bentonite, grouted and completed flush with the ground surface. Physical Hazards associated with this task include slips, trips and falls and may be mitigated by situational awareness. Exposure to bentonite and Portland cement could pose a chemical hazard. Avoid direct exposure to these chemical hazards and wear appropriate PPE as listed above (nitrile/work gloves).

Following well installation, well development will be performed by a combination of surging with a surge block followed by pumping. Biological Hazards such as snakes, ticks and poisonous plants may be present on site. Physical hazard for this task includes the dangers associated with the private railroad tracks and industrial processes present at the site and heat and cold stress due to the climate. High-visibility and climate-appropriate clothing should be worn at all times.

Task 2: Soil Delineation

Soil delineation at the site will initially be done by collecting surface samples (0 to 6 inches depth). Additional samples may be required to delineate the lateral and vertical extent of COCs. Individual grab samples will be collected in a manner consistent with previous remedial investigations and USEPA SESD's SOP for soil sampling. This may involve hand-augering and/or a DPT rig. Physical hazards associated with the drill rig include pinch points, eye injury, loud noise and electrocution, overhead and underground utilities. Key safety steps include wearing PPE (protective clothing, hard hat, safety glasses, steel-toed boots, hearing protection, high-visibility vests, and nitrile gloves), utility clearance (hand augering to clear utilities) and maintaining a safe distance from the drill rig during drilling. Other hazards include dangers associated with the private railroad tracks and industrial processes present at the site and, heat and cold stress due to the climate. High-visibility and climate-appropriate clothing should be worn at all times.

Task 3: Groundwater Sampling

Groundwater sampling involves purging stagant water from the well followed by sample collection. Preservatives such as nitric or sulfuric acid may be present in the sample bottles. Physical hazards include potential for electrocution and fire, dangers associated with the private railroad tracks and industrial processes present at the site, and heat and cold stress due to the climate. Key safety steps include wearing PPE (protective clothing, safety glasses, high-visibility vests, and nitrile gloves) and climate-appropriate clothing should be worn at all times.Biological Hazards such as snakes, ticks and poisonous plants may be present on site. Situational awareness is key to safely mitigating this hazard. Chemical hazards include exposure to potentially contaminated groundwater and exposure to preservatives in the sample bottles. Avoid contact with potentially contaminated water and sample preservatives and wear appropriate PPE (e.g., safety glasses and nitrile gloves).

Task Hazard Analyses (THAs) associated with these tasks are presented in Appendix B.

6.3 Chemical Hazards

The classes of chemicals that are known or suspected to be present that may be encountered while performing site work include the following:

- Chlorinated volatile organic compounds (VOCs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs)
- Acids/bases
- Hazardous metals

Controls for these hazards are presented in the THAs included in Appendix B. A summary of these chemical hazards is presented in Appendix C.

6.4 Physical Hazards

The following physical hazards have been identified associated with the work to be performed and the site conditions.

- Cold Stress
- Drilling (including Indoor)
- Electrocution
- Eye Injury
- Fall Protection
- Hand/Foot Injury
- Heat Stress
- Heavy Equipment
- Knives / Blades
- Loud Noise/Vibration
- Slips, Trips, and Falls
- Thoroughfares / Traffic
- Urban Environments
- Utility Protection

Controls for these hazards are presented in the THAs included in Appendix B.

6.5 Biological Hazards

The following biological hazards have been identified associated with the work to be performed and the site conditions.

- Allergic reaction to poisonous plants
- Biting/mauling animals (bears, dogs, alligators, mountain lions, etc.)
- Biting/stinging insects
- Lyme disease
- Snakes

Controls for these hazards are presented in the THAs included in Appendix B.

7. GENERAL SAFE WORK PRACTICES

The following general safe work practices must be adhered to while performing site work:

- Basic PPE shall be worn, including hard hats, safety glasses, hard-toed boots, and high-visibility vests. If conditions allow, the requirement for hard hats and hard-toed boots may be reduced with approval of the SHSO and Project Manager.
- Minimize contact with impacted materials. Do not place equipment on the ground. Do not sit or kneel on potentially contaminated surfaces.
- Smoking, eating, or drinking after entering the work zone and before personal decontamination is not allowed. Employees who are suspected of being under the influence of illegal drugs or alcohol will be removed from the site. Workers taking

prescribed medication that may cause drowsiness shall not operate heavy equipment and are prohibited from performing tasks where Level C or B personal protective equipment is required.

- Practice good housekeeping.
- Use of contact lenses is not allowed under certain hazardous working conditions.
- The following conditions must be observed when operating a motor vehicle:
    - Wearing of seat belts is mandatory
    - The use of headlights is mandatory during periods of rain, fog, or other adverse weather or low-light conditions
    - A backup warning system or use of vehicle horn is mandatory when the vehicle is engaged in a backward motion
    - Posted traffic signs and directions from flagmen must be observed
    - Equipment and/or samples transported in vehicles must be secured from movement
    - The use of vehicles acquired by Geosyntec by non-Geosyntec personnel is prohibited
- In an unknown situation, always assume the worst reasonable conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.

- Conflicting situations may arise concerning safety requirements and working conditions. These must be addressed and resolved rapidly by the SHSO and PM to relieve motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol are not allowed. Workers unwilling or unable to comply with established procedures will be asked to leave the work site.

8. EMERGENCY RESPONSE

This section discusses emergency response procedures and response equipment to be maintained on site. A table presenting a list of contacts and telephone numbers for the applicable local and off-site emergency responders is provided inside the front cover of this HASP (after figures).

8.1 Injury and Emergency Response Procedures

In the event of an **injury** to an employee, the instructions for injury response and reporting, located in the front of this HASP, must be implemented immediately. In the event that an **emergency** develops, the following procedures are to be implemented:

- The Site Health and Safety Officer (SHSO), or designated alternate, should be immediately notified via the on-site communication system. The SHSO assumes control of the emergency response.
- If applicable, the SHSO must immediately notify off-site emergency responders (e.g., fire department, hospital, police department, etc.) and must inform the response team of the nature and location of the emergency on site.

- If applicable, the SHSO may call for evacuation of the site. Site workers should move to their respective refuge stations using the evacuation routes provided on the Site Map.
- For small fires, flames should be extinguished using the appropriate type of fire extinguisher. Large fires should be handled by the local fire department.
- If a worker is injured, the procedures presented in "Instructions for Injury Response", located in the front of this HASP, must be implemented immediately.
- After an incident has stabilized, the procedures presented in "Instructions for Incident Reporting", located in the front of this HASP, must be followed.

8.2 Emergency Response Equipment

Emergency response equipment will be maintained in the work area as necessary for this project. Examples of emergency response equipment include first aid kits, fire extinguishers (Type ABC), and eyewash bottles.

9. KEY PERSONNEL AND HEALTH AND SAFETY RESPONSIBILITIES

Project personnel and their responsibilities in regard to health and safety concerns on this project are as follows:

Project Manager (PM): Leroy Leonard

- Approve this HASP and amendments, if any;
- Monitor the field logbooks for health and safety work practices employed;
- Coordinate with SHSO so that emergency response procedures are implemented;

- Check that corrective actions are implemented;
- Check and document that qualified personnel receive this plan and are aware of its provisions and potential hazards associated with site operations, and that they are instructed in safe work practices and familiar with emergency response procedures; and
- Provide for appropriate monitoring, personal protective equipment, and decontamination materials.

Site Health and Safety Officer (SHSO): Rohit Warrier

- Prepare and implement project HASP and amendments, if any, and report to the Project Manager for action if deviations from the anticipated conditions exist and authorize the cessation of work if necessary;
- Check that site personnel meet the training and medical requirements;
- Conduct pre-entry briefing and daily tailgate safety meetings;
- Check that monitoring equipment and personal protective equipment are operating correctly according to manufacturer's instructions and such equipment is utilized by on-site personnel. Calibrate or check calibration of monitoring equipment and record results;
- Check that decontamination procedures are being implemented;
- Implement site emergency response and follow-up procedures;
- Notify the HSC in the event an emergency occurs; and
- Perform and document weekly inspections.

Health and Safety Coordinator: Michael Schott

- Review and audit HASP and amendments;
- Notify Director of Health & Safety when an emergency occurs;
- Assist with the implementation of the corporate health and safety program; and
- Consult with staff on health and safety issues.

Site Workers

- Provide verification of required health and safety training and medical surveillance prior to arriving at the site;
- Notify supervisors of workplace accomodation requirements as the result of physical limitations or medical conditions;
- Attend pre-entry briefings and daily tailgate safety meetings;
- Immediately report accidents and/or unsafe conditions to the SHSO;
- Be familiar with and abide by the HASP; and
- Be ultimately responsible for his or her own safety.

10. WORKER TRAINING AND MEDICAL SURVEILLANCE

Personnel involved in field activities subject to OSHA HAZWOPER 29 CFR 1910.120 will be required to participate in both a health and safety training program that complies with criteria primarily set forth by the OSHA HAZWOPER in 29 CFR 1910.120(e) and a medical surveillance program covered under 29 CFR 1910.120(f), or equivalent regulations based on the jurisdiction in which the project is performed.

10.1 Pre-Assignment and Annual Refresher Training

Prior to arrival on site, the Geosyntec Project Manager will be responsible for monitoring that their staff meet the requirements of pre-assignment training (40/24 hours per Procedure HS 301). In addition, personnel must be able to document dates of attendance at an annual 8-hour refresher and three days of fieldwork under a qualified supervisor. Failure to provide this documentation will prohibit entry to the active work area(s) (i.e., Exclusion Zone).

10.2 Site Supervisor Training

Consistent with OSHA 29 CFR 1910.120 (e)(4), prior to arrival on site, individuals designated as site supervisors require an additional eight hours of specialized training.

10.3 Initial Site Safety Orientation and HASP Review

In addition to complying with 29 CFR 1910(e), site personnel will attend an initial safety orientation during which the HASP and applicable THAs will be reviewed prior to initiating field activities. This review will include the following:

- Understanding the lines of authority regarding health and safety and site personnel roles and responsibilities;
- Information of specific hazard agents related to the site and site operations will be discussed, such as health hazards of site chemicals and specific safety hazards of processes, tools, and equipment;
- Training in the proper use, maintenance, and decon protocol of PPE and Level(s) of Protection;
- Appropriate work practices and engineering controls to reduce/eliminate exposures to site hazards will be reviewed;
- Personnel will be informed of means for normal site and emergency communication(s);
- Air monitoring strategies will be discussed to include the frequency/types, action levels, sampling techniques, pre/post calibration techniques;
- Unique/site specific medical surveillance requirements that need to be considered based on site contaminants;
- Understanding site control measures, work zones, and proper decontamination procedures for personnel/tools/vehicles, etc. to reduce the potential for both on/off site contamination;
- Personnel will be trained to respond quickly and properly in the event of an emergency; and

- Personnel involved in specific hazardous activities, such as confined space entry, drum handling, sampling unknowns, etc. will receive specialized training in the appropriate techniques to employ prior to commencing these operations.

10.4 Baseline Medical Surveillance Exam

The baseline medical examination is used to identify physical capabilities and certain medical limitations that may have an impact on the candidate's ability to perform in the position and/or job activity for which he/she is being considered, as well as to establish certain baseline medical parameters. The initial test results can then be compared against future periodic or project-specific monitoring results.

10.5 Periodic/Annual/Biennial Medical Exam

The periodic medical examination is used to evaluate an employee's continued fitness for duty and to assess possible impact(s) occupational exposures may have had on their health status. The periodic examination includes an update to the medical and work history, results of previous occupational exposure assessments, and a detailed medical exam tailored to the job description.

The Medical Director from WorkCare determines the frequency of the periodic medical exams based on regulatory requirements, the position/work activities of the employee, and the level of exposure to physical, chemical, and biological agents.

10.6 Exposure/Activity/Project-Specific Medical Testing

Exposure-specific medical tests and/or evaluation of biological indices may be conducted to establish a baseline for certain project-specific parameters, to monitor the effectiveness of hazard controls, and/or to assess the impact of occupational exposures associated with a particular work activity or project. The Medical Director, in coordination with the EHS Department, will require or recommend an exposure-specific exam when deemed appropriate based on knowledge of project hazards, occurance of employee health symptoms, or an unexpected exposure event. Requests for exposure-specific examinations will be forwarded to the EHS Department, who will process the requests in collaboration with the Medical Director. The Medical Director will determine the type and frequency of the exposure-specific medical exams for employees designated to participate based on sound medical practice, latest toxicology information, and current regulatory requirements.

10.7 Exit Exam

An exit medical examination is offered when an employee leaves the medical surveillance program, either because of termination of employment with Geosyntec or because of reassignment to a position not designated or identified to participate in the medical surveillance program. This optional exit examination may be used to assess potential changes in medical status that have occurred during the course of employees' previous work activities, and to establish a medical baseline at the time of departure.

10.8 Exit/Termination

An exit medical examination is offered when an employee leaves the medical surveillance program, either because of termination of employment with Geosyntec or because of reassignment to a position not designated or identified to participate in the medical surveillance program. This optional exit examination assesses potential adverse impacts occupational exposures may have contributed to the employee's health status.

11. PROTECTION OF SURROUNDING COMMUNITY

Protection of the general public and the surrounding community focuses on two primary tasks; maintaining security of the work areas, and isolation of IDW from the general public. The Facility is surrounded by a chain link fence and access to the Facility is controlled. Work conducted outside of the fence may require cordoning off the work area to mitigate potential contact of the general public with the work area. Cordoning will be accomplished using flexible tape marked with "Caution – Do Not Enter". The general public will not be allowed into the area.

IDW generated on site will be moved daily to a secure area within the fence enclosure of the Facility and properly labeled in secure containers. IDW generated during the day in an area outside of the secure fenced area will be contained and marked off with cordoning tape as described above.

Vehicles leaving the site will have tracks and tires inspected to reduce transport of on site materials off site. Dust, if generated during activities will be monitored and if necessary, the area will be wetted to reduce fugitive dust.

12. MAPS AND SITE CONTROL

12.1 Routes to Hospital and Urgent Care Facility

A hospital and an urgent care facility near the site have been identified. Maps to the hospital and urgent care are included after the Table of Contents of this HASP. Both figures also include the facility name and phone number.

12.2 Site Map

A site map is located inside the cover of this HASP. The site map is intended to show the location of the work zone(s), to provide on-site orientation, and to delineate evacuation routes. Changes may be made to the site map by the SHSO based on changing site conditions. The site map should be accessible in the work area.

12.3 Buddy System

The buddy system is required when work is performed in hazardous areas. The buddy system includes maintaining regular contact with one or more onsite Geosyntec personnel, clients, and/or contractors to periodically check on the condition of site workers such that each employee in the work group is observed by (or in verbal contact with) at least one other employee in the work group. For field visits with only one employee onsite, the buddy system shall be implemented via periodic telephone contact with offsite Geosyntec personnel.The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

12.4 Controlled Work Zones

APPLIES TO TASK: ☒① ☒② ☒③ ☐④ ☐⑤ ☐⑥ ☐⑦ ☐⑧ ☐ Not Applicable

Three controlled work zones, including an Exclusion Zone, a Contaminant Reduction Zone (CRZ), and a Support Zone, are required for the task(s) indicated above. Geosyntec employees must not be allowed into the CRZ or Exclusion Zone or the Work Zone until they have received the proper personal protective equipment (PPE) and they have read, understand, and meet the requirements outlined in this HASP. The Exclusion Zone is defined as the area on site where contamination is suspected and tasks are to be performed. The CRZ is defined as the area where equipment and workers are to be decontaminated as they leave the Exclusion Zone. The Support Zone is defined as the command area and may serve as a staging and storage area for supplies. The location and extent of the work zones may be modified as necessary as site investigation information becomes available. For sites that do not require the three controlled work zones, the area(s) where work is to be performed shall be called the Work Zone.

Visitors to the site may need to be continually escorted for safety purposes. Visitors under Geosyntec's direction need to check in with the SHSO upon visiting the site.

For the tasks identified above, the boundaries of the Exclusion Zone, CRZ, and Support Zone, or the Work Zone, shall be marked using appropriate methods, including but not limited to warning tape, signs, traffic cones, fencing, or other appropriate means.

12.5 Site Access

Certain sites require controlled access to the work area. Examples of access controls include sign in/sign out logs, checking in with guards, and donning identification badges. Geosyntec personnel will adhere to the site-specific access requirements and monitor that subcontractors and other Geosytnec visitors abide by site-specific access control requirements.

12.6 Inspections

☐ APPLICABLE ☒ NOT APPLICABLE

Based on the hazards identified for the project, periodic health and safety inspections may be performed. The Health & Safety Inspection Checklist records should be kept on file at the project site. The frequency for periodic inspections is:

☐ Weekly
☐ Monthly
☐ Other: _____

13. TAILGATE MEETINGS

Tailgate meetings must be held daily prior to starting work to discuss important health and safety issues concerning tasks to be performed during that shift. Non-Geosyntec site workers should also communicate health and safety concerns associated with the tasks they will be performing. Topics discussed in the tailgate meetings must be documented.

14. STOP WORK AUTHORITY

In accordance with the Company's Procedure HS 203 - Stop Work Authority, Geosyntec personnel and subcontractor personnel have the authority and responsibility to issue a Stop Work Order if unsafe actions and/or conditions are identified. The Stop Work Authority (SWA) process involves a stop, notify, correct, and resume approach for resolving observed unsafe work actions or conditions. The person issuing the work stoppage will first notify workers engaged in or affected by the unsafe activity or condition and require that associated work be stopped. After this Stop Work Order is issued, the Geosyntec project manager and the supervisors for affected or concerned contractors will also be notified. The Geosyntec project manager will document the issuance of the Stop Work Order on the form provided in Procedure HS 203. Work will not resume until the issues and concerns of the Stop Work Order have been adequately addressed.

15. AIR MONITORING

APPLIES TO TASK: ☐① ☐② ☐③ ☐④ ☐⑤ ☐⑥ ☐⑦ ☐⑧ ☒ Not Applicable

Air monitoring will be performed to evaluate airborne chemical and/or dust exposure levels within the breathing zone of site workers. Hazardous conditions may include concentrations that may cause acute or chronic illness, potential oxygen deficient environments, or potential explosive environments. Air monitoring may also be performed to evaluate the adequacy of engineering, administrative, and/or PPE controls. Air monitoring may be "real-time" (e.g., the instrument provides immediate results at the project), using multi-gas meters, photoionization detectors (PIDs), or colorimetric tubes. Personal monitoring may also be performed by collecting samples and forwarding to a laboratory for analysis and quantification.

The type(s) of air monitoring equipment required and associated action levels are outlined in Appendix D. Monitoring equipment must be calibrated based on the manufacturer's requirements. Calibration results and air monitoring measurements must be documented. Based on the results noted and site activities or scope of work changes, the frequency of air monitoring may be adjusted on site by the SHSO with the consent of the Project Manager and communication with the HSC.

16. PERSONAL PROTECTIVE EQUIPMENT

The levels of PPE required for each task are presented in Appendix E. Required equipment and types of protective clothing materials, as well as an indication of the initial level of protection to be utilized, are listed. The level of protection may be upgraded or downgraded by the SHSO according to controls requirements in Appendix Eor according to action levels provided in Appendix D.

If respirators are worn, workers must abide by the company's Respiratory Protection Program in accordance with company's Respiratory Protection Program (EHS 112).

17. DECONTAMINATION

The SHSO and Project Manager will determine the type and level of decontamination procedures for both personnel and equipment based on evaluation of specific work activities in the controlled work zones. Medical treatment will take precedence over decontamination in the event of a life threatening and/or serious injury/illness. Personnel will perform decontamination in designated and identified areas upon leaving "hot zones" where the potential exists for exposure to hazardous chemical, biological, or environmental conditions.

Decontamination of personnel in Level D (modified) will consist of proper containerization and disposal of coveralls, disposable boots, and gloves (if applicable).

Decontamination of personnel in Level C, if applicable, will consist, at a minimum, of:

- Removal and cleaning/disposal of boot covers, coveralls, and outer gloves;
- Removal, cleaning, and storage of respiratory protection;
- Washing of non-disposable PPE suspected of being contaminated using a soap solution followed by a water rinse; and
- Removal and disposal of inner gloves.

Hand tools and sampling equipment shall be decontaminated as needed by washing in decontamination basins with appropriate solutions, or, if possible, by dry decontamination. Wash solutions and PPE may require disposal at a licensed waste facility.

18. SPILL CONTAINMENT

The task(s) for this project may involve the handling of drums and/or containers that contain stored chemicals, hazardous materials, and/or wastes. The drums and/or containers may have been spilled/dislodged during site activities due to compromised construction of the drum/container, transportation accidents, improper packaging practices, and improper handling of hazardous materials during on/off loading. Containers shall be inspected and their integrity assured prior to being moved and/or handled. If the integrity of the container is in question, the container shall be over packed or its contents transferred. Operations shall be organized and coordinated to minimize movement of such containers. Where spills, leaks, or ruptures may potentially occur, a supply of sorbents shall be located in the immediate area. Additional preventative measures include:

- UN-approved 55-gallon drums, bins, and/or Baker tanks will be inspected for visible defects upon delivery to the site;
- UN-approved 55-galon drums will also be inspected to ensure each drum includes a resealable lid with a small resealable sampling port near the top, or on the side of the drum and that the enclosure is not deformed and/or distorted;
- Drums will not be completely filled to allow for possible expansion of liquid and will be set on wooden pallets to facilitate transport by forklift;
- The storage area will be inspected to check for leaks weekly while the containers are being filled and immediately after a relocation to a temporary on-site storage area; and
- Flat areas will be selected for temporary storage away from high-traffic work areas/zones and storm/sewer drains.

In the event of an unplanned release or spill of unknown or hazardous substances, the site supervisor will designate personnel who will support the spill containment, control, and/or clean-up procedures. The team will request additional off-site emergency response assistance if necessary based on the type of spill, volume, potential toxicity, etc.

The spill area will be isolated and restricted to only authorized personnel designated to assist with the containment, control, or clean-up activity. Authorized personnel will be trained to contain and clean spills from typical materials and quantities used at the project location. Physical barriers will be set up to warn unauthorized personnel to stay clear and evacuate the affected area. The spill, leak, or incident will be assessed by the team and characterized to determine the appropriate course(s) of action(s) to consider:

- Small spills (i.e., maximum volume of 55 gallons of a liquid or 100 pounds of a solid) may be remediated using absorbent materials by designated personnel;
- Large spills (i.e., liquid volumes > 55 gallons or solid weights > 100 pounds) and/or spills of highly toxic materials may require assistance by off-site hazardous materials (HAZMAT) teams;
- Attempts shall be made to identify and stop the source(s) of spillage immediately while donning proper PPE (based on action levels and the air monitoring program) and performing air monitoring;
- The site supervisor will direct spill-response operations and stay at the spill area until it has been cleaned, inspected, and cleared for re-entry; and
- The site supervisor will prepare a spill incident and clean-up report and will communicate findings to the Project and Branch Manager and EHS Department.

19. CONFINED SPACE ENTRY

☐ APPLICABLE ☒ NOT APPLICABLE

The task(s) for this project involve confined-space entry. Workers must abide by the company's Confined Space Entry Program (Procedure HS 118).

20. GLOBALLY-HARMONIZED SYSTEM FOR HAZARD COMMUNICATION

☐ APPLICABLE ☒ NOT APPLICABLE

The following procedures must be followed for chemicals brought onto the site by Geosyntec personnel or by subcontractors (i.e., decontamination solution, sampling preservatives, KB-1 solution, sodium permanganate, etc.) while performing the tasks of this project:

- Labels on primary chemical containers must not be defaced;
- Chemicals must be stored in appropriate storage containers;
- Secondary containers and storage cabinets must be correctly and clearly labeled;
- Chemicals incompatible with each other must not be stored together;
- Workers must receive training on the chemical hazards; and
- Safety Data Sheets (SDSs) must be added to Appendix F.

When chemicals are used on site, workers must abide by Geosyntec's GHS Hazard Communication Program (Procedure HS 115).

21. HASP AMENDMENTS

Over the course of this project, it is possible that the project-specific hazards and working conditions will change. This HASP may be reviewed and amended as necessary to effectively describe the changing working conditions and measures to mitigate the potential health and safety issues that may arise during the project. Amendments to the HASP should be briefly described in the following spaces provided. The full text of the amendments should be provided in Appendix A and/or additional THAs should be added to Appendix B.

AMENDMENT 1:

Date: _____ Project Manager: _____ HSC: _____
Brief description of amendment:
_____
_____
_____
_____
_____

AMENDMENT 2:

Date: _____ Project Manager: _____ HSC: _____
Brief description of amendment:

_____
_____
_____
_____
_____

AMENDMENT 3:

Date: _____ Project Manager: _____ HSC: _____
Brief description of amendment:

_____
_____
_____
_____
_____

Appendix A: HASP Amendments

Discuss details of amendments to this HASP here. Include amendment number, date, and details of amendments.

Appendix B: Task Hazard Analyses

TASKS	
①	⑤
②	⑥
③	⑦
④	⑧

THAs for these tasks are presented in the following pages.

Appendix C: Summary of Chemical Hazards

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are produced during combustion events due to inadequate oxidation of fuel. PAHs in the pure state are yellowish crystalline solids. They are found in coal tar and in products of incomplete combustion. These chemicals have varying degrees of potency for causing cancer, with benzo(a)pyrene being among the most potent. The PAHs are evaluated collectively as COAL TAR PITCH VOLATILES. Coal tar pitch volatiles may cause photo-sensitization and a rash where sunlight strikes the skin. Exposure may also cause cancer of lungs, skin, bladder or kidneys. Benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3,c,d)pyrene have been identified as carcinogenic.

This information on PAH compounds is presented for site contaminant awareness. While the potential for site personnel sustaining significant inhalation exposures to volatilized PAH compounds during the site activities of this project is minimal, there is the potential for inhalation of PAH-contaminated dust, and handling of contaminated soils presents skin exposure hazards. Use of dust suppression techniques (as appropriate) and the proper use of the PPE will adequately protect personnel. Some significant PAH compounds include:

- Anthracene
- Benzo(a)pyrene Benzo(a)anthracene
- Chrysene Benzo(b)fluoranthene
- Fluoranthene Benzo(k)fluoranthene
- Fluorene Benzo(g,h,i)perylene
- Indeno(1,2,3,c,d)pyrene Benzo(d,e,f)phenanthrene
- Phenanthrene

OSHA PEL for coal tar pitch volatiles is 0.2 mg/m3 and NIOSH REL is 0.1 mg/m^3 , TLV 0.2 mg/m3 is for 8 hour time weighted average (TWA).

PCBs

PCBs are carcinogenic chlorinated hydrocarbons. Potential exposure routes are through inhalation, skin absorption, ingestion and skin or eye contact and may irritate eyes, cause acne, cause liver damage or have reproductive effects. Carcinogenic effects such as tumors and leukemia have been observed in animals. The OSHA permissible exposure limit (PEL) for 8-hour time-weighted average (TWA) is 1 mg/m^3 (skin). The NIOSH PEL is 0.001 mg/m^3.

RCRA Metals

These metals include arsenic, barium, cadmium, chrome, mercury, selenium, and silver. Heavy metals are known to cause neurologic effects (lead, mercury), kidney damage (cadmium), and respiratory damage (arsenic, cadmium). Oral and respiratory exposures should be minimized. The table below summarizes exposure limits.

Chemical Name	PEL[1]	TLV[2]
Arsenic	0.01	0.01
Lead	0.05	0.05
Mercury	0.01	0.25

[1] OSHA Permissible Exposure Limit (PEL) in parts per million
[2] ACGIH Threshold Limit Value (TLV) in parts per million

Chlorinated Solvents/Volatile Organic Compounds (VOCs)

Chlorinated VOCs are widely used as solvents in industrial operations such as degreasing, manufacturing, cleaning and dry cleaning, and are also present in household products and automotive fluids. They readily form vapors which can accumulate in indoor air spaces (i.e., via migration through the subsurface) and react with ozone to form sub-micron sized particles with the potential to cause adverse respiratory health effects. Free product releases (via surface or subsurface discharges or inadequate disposal) can migrate downward to significant depths and through fine-grained deposits to groundwater, and can persist as wide-scale sources of vapor plumes for long periods of time.

Several chlorinated hydrocarbons have been identified in soil, indoor air vapor, and groundwater at the site including perchloroethylene (PCE), trichloroethylene (TCE), and 1,2-dichloroethane (DCA). The likely routes of exposure to chlorinated solvents include inhalation, ingestion and direct contact with the skin or eye. The toxicity of chlorinated solvents varies; many affect the CNS and some are identified as carcinogens. PCE can affect the CNS and cause irritation of the skin, eyes, and upper respiratory tract. TCE can depress the CNS, affect kidneys, liver,

and lungs and can cause rapid and irregular heartbeat. Toxic effects are increased when combined with alcohol, caffeine, and other drugs. DCA can cause CNS depression and damage to the liver, kidneys, heart, and digestive system. Eye contact with DCA can cause irritation and serious injury if not removed promptly. DCA and TCE are flammable liquids; the LEL of both solvents are approximately 6% and their flash points are less than 100°F. PCE is not considered flammable. These chlorinated solvents are only slightly soluble in water.

Exposure levels will be maintained below OSHA PEL or NIOSH REL as shown in the table below.

Chemical Name	PEL[1]	REL[2]
1,2 DCA	50	1
TCE	100	Ca
PCE	100	Ca

[1] OSHA Permissible Exposure Limit (PEL) in parts per million
[2] ACGIH Threshold Limit Value (TLV) in parts per million
Ca - Carcinogenic

Acids/Bases

Strong acids and bases (such as hydrochloric acid, nitric acid, sodium hydroxide, potassium hydroxide) are potentially present at the site.

Such substances expose the personnel to the following risks:

(i) Irritations and caustic injuries (chemical burns).

Acids and bases, have a noxious power which varies in strength with the tissue these substances come in contact with. Some compounds (for example sodium hydroxide) may be responsible for very bad injuries to the skin, the eyes and, in case of accidental ingestion, to the upper digestive system. Furthermore, irritating gases and vapors (such as gaseous chlorine) may develop during different reactions.

(ii) Acute intoxications. Intoxication may occur as a result of accidental ingestion or inhalation or, less frequently, as a result of skin contact.

(iii) Chronic intoxications.

These may arise as a consequence of prolonged exposure to relatively small doses, unable to

produce acute effects. The most frequently reported toxic effects include liver disease, nephropathy, coagulation disorders and nervous system disorders.

Geosyntec consultants

Appendix D: Air Monitoring

Applies to Task: ☐ ① ☐ ② ☐ ③ ☐ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

☐ *Photoionization Detector (PID)*

Brand/Model No.:_____ **eV:**_____

Monitoring Frequency:_____

Breathing Zone Reading (ppm)	**Action**
_____ to _____	Level D PPE
_____ to _____	Level C PPE
Greater than _____	Stop work. Evacuate the area. If upon return, levels still exceed the action level, stop work and implement engineering controls.

Note: _____

☐ *Oxygen (O_2) Meter*

Brand/Model No.:_____

Monitoring Frequency:_____

Reading (%)	**Action**
Less than 19.5	Stop work. Evacuate the area.
19.5 to 23.5	Continue to work with caution.
Greater than 23.5	Stop work. Evacuate the area.

Note: _____

☐ *Explosimeter*

Brand/Model No.:_____

Monitoring Frequency:_____

Source (% LEL)

Reading	**Action**
1 to 10	Continue with caution.
Greater than 10	Stop work. Evacuate the area. If upon return, if concentration still exceeds 10% LEL, ventilate until concentration is back to <10% LEL.

Note: _____

☐ *Flame Ionization Detector (FID)*

Brand/Model No.: _____

Monitoring Frequency: _____

Breathing Zone Reading (ppm)	**Action**
_____ to _____	Level D PPE
_____ to _____	Level C PPE
Greater than _____	Stop work. Evacuate the area. If upon return, levels still exceed ____, stop work and implement engineering controls.

Note: _____

☐ *Chemical Detector Tube*

Brand/Model No.:_____

Monitoring Frequency:_____

Breathing Zone Reading (ppm)	**Action**
_____ to _____	Level D PPE
_____ to _____	Level C PPE
Greater than _____	Stop work. Evacuate the area. If upon return, levels still exceed ____, stop work and implement engineering controls.

Note: _____

☐ *Other*

Brand/Model No.:_____

Monitoring Frequency:_____

Breathing Zone Reading	**Action**
_____ to _____	Level D PPE
_____ to _____	Level C PPE
Greater than _____	Stop work. Evacuate the area. If upon return, levels still exceed ____, stop work and implement engineering controls.

Note: _____

Appendix E: Personal Protective Equipment

	Task ①	Task ②	Task ③	Task ④	Task ⑤	Task ⑥	Task ⑦	Task ⑧
Potential PPE Level per Task:	☒ D ☐ C	☒ D ☐ C	☒ D ☐ C	☐ D ☐ C	☐ D ☐ C	☐ D ☐ C	☐ D ☐ C	☐ D ☐ C

Modified Level D		***Level C***	
Equipment	***Material/Type***	***Equipment***	***Material/Type***
☒ Safety glasses		☐ Full-face air-purifying respirator	Cartridge Type:
☒ Hard-toed boots		☐ Half-mask air-purifying respirator	Cartridge Type:
☒ Protective clothing		☐ Safety glasses	
☒ Hard hat*		☐ Hard-toed boots	
☒ Hearing protection*		☐ Protective clothing	
☒ High-visibility vest*		☐ Hard hat	
☐ Outer boots*		☐ Hearing protection*	
☒ Outer gloves*		☐ High-visibility vest*	
☐ Other:		☐ Outer boots*	
		☐ Outer gloves*	
		☐ Inner gloves*	
		☐ Other:	

* PPE items may be downgraded (only with concurrence of SHSO and PM)

Appendix F: Safety Data Sheets

Included in this HASP	Chemical
☐	Acetone
☐	Alconox
☐	Ammonia
☒	Bentonite
☒	Diesel Fuel Oil No. 2-D
☒	Gasoline
☐	Helium
☐	Hexane
☐	Hydrochloric Acid
☐	Hydrogen
☒	Isobutylene Calibration Gas
☒	Isopropyl Alcohol
☐	KB-1
☐	Methane Calibration Gas
☒	Nitric Acid
☐	Permanganate
☒	Portland Cement
☒	Sulfuric Acid

☒	Other: Liquinox
☐	Other: _____
☐	Other: _____
☐	Other: _____

Note: SDSs are for chemicals that used to perform project work, not site contaminants.