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May 4, 2016

Ms. Dianne Thomas
Registered Environmental Consultant Program
Inactive Hazardous Sites Branch
Superfund Section
Division of Waste Management
North Carolina Department of Environment and Natural Resources
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

RE: Proposed Remedial Action Plan
Swannanoa DJJDP Property
Swannanoa, Buncombe County, North Carolina
Site I.D. No. NONCD0002801

Dear Ms. Thomas:

Enclosed is the *Proposed Remedial Action Plan* (RAP), dated April 30, 2016, for the Swannanoa DJJDP property in Swannanoa, Buncombe County, North Carolina. Also enclosed are the corresponding Document Certification Forms No. DC-I and DC-II. Piedmont Geologic will initiate the RAP public notice process upon receipt of the site-specific public notice document from IHSB.

If you have any questions or would like any additional information, please do not hesitate to call.

Sincerely,

Peter J. Dressel

Peter J. Dressel, P.G.
Project Manager

cc: Bill Sessoms, North Carolina Department of Administration

enclosure

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 1 OF 2
IHSB SITE NAME Swannanoa DJJDP Property - NONCD0002801
DATE & NAME OF DOCUMENT April 30, 2016 Proposed Remedial Action Plan
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."

William D. Sessoms
Name of Remediating Party

William Sessoms
Signature of Remediating Party

5-3-2016
Date

NOTARIZATION

NC (Enter State)

GRANVILLE COUNTY

I, Jim R Yancey, a Notary Public of said County and State, do hereby certify that Williams Sessoms did personally appear and sign before me this day, produced proper identification in the form of Drivers Lic., 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 3 day of May, 2016

(OFFICIAL SEAL)

Notary Public (signature)

My commission expires: 6-30-19

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 2 OF 2
IHSB SITE NAME SWANNANOA DJJDP PROPERY - NONCD 0002801
DATE & NAME OF DOCUMENT APRIL 30 2016 PROPOSED REMEDIAL ACTION PLAN
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.

PETER J. DRESSEL
Name of Registered Site Manager

Peter J. Dressel
Signature of Registered Site Manager

5-4-2016
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."

PETER J. DRESSEL
Name of Registered Site Manager

Peter J. Dressel
Signature of Registered Site Manager

5-4-2016
Date

NOTARIZATION

NORTH CAROLINA (Enter State)

WAKE **COUNTY**

I, PAUL F. ROACHE, a Notary Public of said County and State, do hereby certify that PETER J. DRESSEL did personally appear and sign before me this day, produced proper identification in the form of NCDL 3548457, 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 4th day of May, 2016.

Notary Public (signature)

(OFFICIAL SEAL)

PAUL F ROACHE
MY COMMISSION EXPIRES
NOTARY
PUBLIC
SEPTEMBER 12, 2016
IREDELL CO. NC

My commission expires: Sept. 12 2016

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

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PROPOSED REMEDIAL ACTION PLAN
SWANNANOA DJJDP PROPERTY

Swannanoa, Buncombe County, North Carolina
IHSB Inventory No. NONCD0002801

Prepared for:

State of North Carolina
Department of Administration
301 N. Wilmington Street, Suite 450
Raleigh, North Carolina 27601

Prepared by:

Piedmont Geologic, P.C.
6003 Chapel Hill Road, Suite 145
Raleigh, North Carolina 27607

April 30, 2016

PROFESSIONAL CERTIFICATION

The Proposed Remedial Action Plan for the Swannanoa DJJDP Property in Swannanoa, North Carolina has been prepared under the responsible charge of the following Professional Geologist registered in the State of North Carolina.

Peter J. Dressel, P.G.
Printed Name

Peter J. Dressel
Signature

April 30, 2016
Date

Seal

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1.0 INTRODUCTION AND STATEMENT OF PURPOSE

This document presents a Proposed Remedial Action Plan (RAP) for the State of North Carolina, Department of Juvenile Justice and Delinquency Prevention (DJJDP) property in Swannanoa, North Carolina (the "site"). The RAP has been prepared in accordance with the Administrative Agreement (AA) between the State of North Carolina, Department of Administration (DOA) and the North Carolina Department of Environmental Quality (NCDEQ), Division of Waste Management (DWM), Superfund Section, dated July 15, 2014, the provisions of the Registered Environmental Consultant (REC) program as defined under N.C.G.S. 130A-310.9(c) and 15A NCAC 13C .0300, and the Superfund Section, Inactive Hazardous Sites Branch (IHSB) *Registered Environmental Consultant Program Implementation Guidance* ("REC Guidance"), dated October 2015.

The RAP provides a plan for achievement of remediation goals for contaminated soil, sediment, and surface water, resulting from historical site use, in accordance with the requirements of the REC program.

The approximately 5-acre site is part of an approximately 268± acre State-owned assemblage of contiguous property parcels. The site contains remnants of an incinerator/crematorium that was originally utilized by the former Moore General Hospital, a U.S. Army hospital and training facility that operated from 1942-47. The site also contains an unpermitted solid waste landfill of undocumented origin and assorted surface refuse/debris resulting from undocumented dumping activities apparently spanning decades.

A site Remedial Investigation (RI) was completed in 2014-2015 to finalize the characterization of the nature, extent, and magnitude of historical waste disposal at the site and related contamination in site soils, groundwater, surface water, sediment, and air resulting from the historical waste disposal. The RI was conducted in accordance with the site *Remedial Investigation Plan*, dated August 15, 2014, prepared by Piedmont Geologic, which was certified and submitted to IHSB in August 2014. The RI also incorporated the results of previous site assessment activities that were completed in 2010-2013. The certified *Final Remedial Investigation Report,* dated August 31, 2015, was submitted to IHSB on September 3, 2015.

Results of the RI indicate that site soil, sediment, and surface water contain constituents of concern (COCs), primarily consisting of metals, but also including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), dioxins, and polychlorinated biphenyls (PCBs), at concentrations above IHSB unrestricted-use standards. Site groundwater does not contain COCs at concentrations above North Carolina groundwater standards, based on 2014-2015 groundwater sampling/analysis.

Site soil remediation to IHSB unrestricted-use standards (i.e., Residential Health-Based Preliminary Soil Remediation Goals) is determined to be infeasible due to the widespread lateral and vertical distributions of

metals, primarily manganese, in site soils, which would require excavation, and associated deforestation, of a large area of the site to potential depths of more than 20 feet, without reasonable assurance of meeting unrestricted-use standards. Remediation to Industrial Health-Based PSRGs is rejected as an alternative approach due to land-use requirements that are incompatible with the State's vision of the character of the property moving forward.

For the above reasons, risk-based remediation to alternate soil cleanup levels, in accordance with appropriate land-use restrictions, was selected as the appropriate site solution. Accordingly, a *Proposal for Containment Remedy*, dated November 19, 2015, was submitted to IHSB in November 2015. Based on comments received regarding the November 2015 document in a December 7, 2015 e-mail from IHSB to Piedmont Geologic, a *Revised Proposal for Containment Remedy* (PCR), dated December 28, 2015, was prepared and submitted to IHSB. IHSB concurrence of the PCR was received via a February 29, 2016 e-mail to Piedmont Geologic, a copy of which is provided in Appendix A.

The PCR specifies selected site remedial actions to render the site suitable for an "open space" land-use classification, as supported by site-risk calculations completed by IHSB. Remedial actions include excavation and offsite disposal of the unpermitted landfill and incinerator/crematorium contents plus selected areas/depths of surrounding soil and drainage-swale sediment, collection and offsite disposal of surface refuse/debris, and demolition and offsite disposal of the incinerator/crematorium. In conjunction with the site remedial actions, a separate individual deeded property will be created for the site and recorded with the Buncombe County Register of Deeds. The deed will incorporate a Notice of an Inactive Hazardous Substance or Waste Disposal Site and a Declaration of Perpetual Land-Use Restrictions (DPLUR).

The remainder of this document provides general site information, a summary of site contaminant distributions, a summary of the IHSB-approved containment remedy, a description of the site remedial action process, a post-excavation soil/sediment sampling and analysis plan, permits required for the remedial action process, and a project schedule. Supporting information is provided in Appendices.

The RAP includes all the relevant components of a Preconstruction Report under Rule .0306(m). Therefore, in accordance with REC Guidance, because site remedial action will involve only soil/sediment excavation, submittal of a separate Pre-Construction Report is not required, and will not be completed.

Upon approval of this Proposed RAP by IHSB, the 30-day RAP public notice process will be initiated in accordance with the REC rules. Following incorporation of any revisions/amendments prompted through the public notice process, a certified Work Phase Completion Form No. WPC-III will be submitted to IHSB.

2.0 GENERAL SITE INFORMATION

2.1 Site Location and Description

A portion of the United States Geological Survey (USGS) 7.5-minute quadrangle map containing the site, and illustrating site and area topography, land-use, and roadways, is provided in Figure 1. The site layout is shown in Figures 2 through 4. Site photographs are provided in Appendix B. The site is located off of Clover Lane in Swannanoa, Buncombe County, North Carolina 28711 (no specific street address). The latitude and longitude of the center of the site are 35.61921ºN and -82.37660ºW, respectively.

The site is located within an approximately 268± acre assemblage of contiguous property parcels owned by the State of North Carolina that historically have been used for a variety of functions. There are two main State-owned properties that comprise the assemblage, referred to as the "northern" property (PIN 9699-67-4268; Deed Book/Page 0946/0527) and the "southern" property (PIN 9699-74-4844; Deed Book/Page 0946/0527). The site is located within a portion of both properties, at the southeast corner of the northern property and the northeast corner of the southern property. An aerial image showing the combined State properties, provided by the DOA, State Property Office, is provided as Figure 5. The image in Figure 5 shows additional property divisions that are labeled as "deeded acres." According to the State Property Office, these are not actually deeded and recorded properties but unofficial parcel allotments assigned to various agencies within State government. There is no zoning designation for these State-owned properties.

The site contains a former hospital crematorium/incinerator (hereinafter referred to as "incinerator"), an unpermitted solid-waste landfill, and assorted surface refuse/debris, which are the subjects of site investigation and remediation. The total area encompassing the landfill, former incinerator, and surface refuse/debris measures approximately 2.2 acres. This area is currently enclosed by a 6-feet tall security fence, topped with barbed wire, preventing access by the public. Access to the site is via an asphalt drive through a locked gate.

For the purposes of site assessment and remediation under the July 15, 2014 AA, the DJJDP site "property" has been officially designated as an approximately 5-acre parcel containing the former incinerator, associated landfill, and all delineated areas of surface dumping and associated contamination. Most of the site (approximately 85%) is part of the southern State property identified above and contains the former incinerator, most of the landfill, and most of the delineated areas of surface refuse/debris and associated contamination. The remaining site portion is part of the northern State property and contains a small portion of the landfill and a small area of surface refuse/debris and associated contamination.

A camp operated by the Black Mountain Home for Children, Youth, and Families (BMHC), formerly the Swannanoa 4-H camp, is located directly to the north and west of the site, on the northern State-owned property and a portion of the southern State-owned property. Because the transition from the Swannanoa 4-H camp to the BMHC camp occurred within the past few months, some of the site figures provided in this report, which are reproduced from previous site reports, continue to reflect the disposition of the land to the north and west of the site as the Swannanoa 4-H camp.

The North Carolina Juvenile Evaluation Center (JEC) and the Black Mountain Correctional Center for Women (BMCC) are located to the south of the site, on the southern State-owned property. The North Carolina State Veterans Home is located southwest of the site, also on the southern State-owned property. Residences are situated west of the State-property complex along Woodland Drive. Charles D. Owen (Owen) High School property is located directly east of the site. A portion of the eastern fence line at the DJJDP site encroaches on the Owen High School property.

The site is situated in a mountainous terrain typical of the Blue Ridge Geological Province. Topographic profiles of the site are provided in Figure 6. The site topography slopes generally from high points on the north and west sides of the site to low points on the south side of the site, with an overall topographic relief of approximately 45 feet. The surface of the unpermitted landfill forms a topographic plateau in the approximate center of the site. A thick growth of kudzu covers the surface of the landfill and adjacent areas during the growing season. The remainder of the site contains primarily brush and pine/hardwood trees. An asphalt circle drive is situated around the perimeter of the former incinerator structure.

The site is in a Class C watershed in accordance with 15A NCAC 2B. A drainage swale is located along the eastern boundary of the site, running generally from north to south. This conveys water only during rainfall events. The swale joins a narrow intermittent stream that originates, at what has been coined a "wet-weather spring" (MEG/SynTerra, 2010), at the base of the unpermitted landfill near the southwest corner of the site fence and flows generally south and southwest, crossing under Clover Lane south of the site (Figure 2). A separate drainage swale/intermittent stream joins the main intermittent stream, running south-southwest from the Owen High School property. No water was observed in intermittent stream channels during site visits by Piedmont Geologic from August through October 2011. Surface water was observed periodically during site visits from November 2014 to July 2015.

Five groundwater monitoring wells installed in September 2011 are located at the site. Locations of site monitoring wells are shown in Figure 4, and monitoring well construction details are listed in Table 1. Monitoring well depths range from 15-feet below grade in the topographically low area in the southeast corner of the site to approximately 40-feet below grade in the topographically high areas in the northern and southwest site areas and the interior area of the unpermitted landfill.

2.2 Site History

The State-owned properties that contain the site were acquired by the U.S. government from the State of North Carolina in 1943. The properties were utilized by the U.S. Army for the Moore General Hospital, as well as a field hospital unit for the training of officers, nurses, and enlisted men. In 1947, the hospital lands and improvements were transferred to the Veterans Administration (VA) for use as a VA hospital. The properties were transferred from the U.S. government back to the State of North Carolina in 1955 and 1961. The VA hospital was closed in 1959. The northern property was developed into a 4H camp by North Carolina State University (NCSU) and the southern property was transitioned into the JEC and BMCC by the North Carolina Department of Justice (DOJ). The North Carolina State Veterans Home, a nursing-home facility for wounded veterans, was constructed on the southern property, southwest of the site, in 2011-2012.

The former incinerator at the DJJDP site was originally part of the Moore General Hospital facility, and was apparently used both by the Moore General Hospital and the subsequent VA hospital. It is concluded that the unpermitted landfill at the site was used for disposal of ash from the incinerator as well as for disposal of trash/refuse from the hospital facilities to the south. No historical records regarding the origin or operation of either the incinerator or unpermitted landfill were found as part of the RI.

Site assessment efforts were initiated in the late 1990s by the Army Corps of Engineers, who primarily evaluated site groundwater conditions and recommended no further action (USACE, 1999). Additional site investigation activities were prompted following the discovery of abandoned industrial transformers at the site and issuance of a Notice of Regulatory Requirements (NORR) to DJJDP in 2008. These commenced with a preliminary RI completed in 2010 and 2011 by Mountain Environmental Group (MEG)/SynTerra (2010) and Piedmont Geologic (2011), respectively. Following entry of the site into the REC program in July 2014, and submittal of the RI Workplan to IHSB in August 2014, the RI was completed by Piedmont Geologic from November 2014 to July 2015, as documented in the *Final Remediation Investigation Report*, dated August 31, 2015.

3.0 SUMMARY OF SITE CONTAMINANT DISTRIBUTIONS

The primary goals of the site RI process were to: 1) identify all releases of hazardous substances to the environment; 2) characterize the chemical nature of releases; 3) delineate the lateral and vertical distributions of contamination; 4) identify potential contaminant exposure pathways; and 5) characterize site conditions sufficiently to conduct a feasibility study of remediation alternatives and to support a proposed remedy. As documented in the RI report (Piedmont Geologic, 2015), these goals have been met for the site, as outlined in the following summary of findings.

For reference, site maps depicting results of laboratory analysis of site soil, sediment, and surface-water samples are presented as Figures 10 through 12. Depictions of the lateral/vertical configurations of the unpermitted landfill are provided in Figures 13 and 14. Summaries of laboratory analysis results for site soil, sediment, surface-water, and groundwater samples collected from 2010 to 2015 are provided in Table 3-27. Additional information regarding methods and results of historical site assessments may be found in reports listed in Section 8.0.

3.1 Identification of Hazardous Substance Releases and Chemical Nature of Releases

Site releases appear to be threefold in nature, described as follows.

- The primary mode of releases of hazardous substances at the site was the operation of the former incinerator and associated unpermitted landfill by the U.S. Army and, subsequently, the U.S. Veterans Administration, as part of the management of the Moore General Hospital and subsequent VA hospital during the 1940s to 1950s. The interior of the former incinerator, which appears to have handled typical hospital wastes and human remains (although none of the latter reportedly observed during site assessments) continues to contain ash, plus associated slag and coal, from its former operation. The unpermitted landfill was apparently created for disposal of ash from the incinerator, then other hospital waste streams, the residuals of which are composed of glass, tile, and metal fragments, as well as other materials, which were mixed with the incinerator/crematorium wastes. Near the end of the operating life of the landfill, demolition debris was apparently added to the top of the landfill, and the landfill surface was capped with soil ranging in thickness from approximately 2 inches to 18 inches (MEG/SynTerra, 2010). The non-incinerator-related components of the landfill appear to be of a predominantly domestic or institutional nature as opposed to industrial nature. Primary contaminants in the landfill are metals, including arsenic, lead, and manganese. Secondary contaminants, at minor concentrations,

may include VOCs, SVOCs, pesticides, and dioxins (although not all of the latter were detected at concentrations above PSRGs).

- The secondary mode of site releases was the "moonlight" dumping of surface refuse/debris, most likely by area residents and businesses. The surface refuse/debris includes rusted 55-gallon drum skeletons, metal cans (primarily paint-can-type), automobile parts, appliances, children's toys, demolition debris, wooden pallets, and scrap metal. These materials are exposed around the perimeter of the landfill. Much of the material is innocuous in nature. However, samples of apparent residual paint waste, or similar chemical waste, materials in exposed paint-can-type containers, primarily along the southern landfill margin, contained substantial concentrations of metals, including antimony, arsenic, copper, lead, mercury, and zinc, with some secondary concentrations of VOCs and SVOCs. Based on the nature of the waste debris and date stamps on product labels, the waste debris dumping appears to have occurred prior to the mid-1990s.
- The tertiary mode of site releases is related to the eight abandoned 1-2 ton electrical transformers that were discovered south of the former incinerator in 2008 and removed from the site, along with approximately 84 tons of soil excavated from beneath the transformers, in 2009. Subsequent to the transformer and soil excavation/disposal, PCBs were detected in soil samples collected from a depth of 0-12 inches below grade at one location in the former area of the transformers.

3.2 Contaminant Inventory and Lateral/Vertical Distributions of Contaminants

3.2.1 Incinerator and Unpermitted Landfill Contents

The following analytes were detected at concentrations above Residential Health-Based and/or Protection-of-Groundwater PSRGs, plus site statistical background concentrations for metals, in incinerator-waste and landfill-waste composite samples (Tables 8-9).

- Arsenic.
- Lead.
- Silver.
- PCE.
- Total hexachlorodibenzo-p-dioxin.

The landfill and incinerator waste materials do not meet the definitions of listed hazardous waste under 40 CFR 261. The waste materials are not classified as characteristically hazardous waste based on waste characterization analysis.

Apparent asbestos-containing materials (ACMs), in the form of building siding/tile (whole pieces and fragments), are present in the landfill materials, with the greatest amount in the mid-northern landfill area. Laboratory analysis of a tile fragment indicated the presence of 15% chrysotile, a variety of asbestos

The lateral/vertical distributions of the contaminants associated with the incinerator waste and landfill waste are controlled by the physical confinements of the incinerator and the lateral/vertical limits of the landfill, respectively. The incinerator waste is confined within the interior of the former incinerator. The volume of ash/slag within the incinerator is not known but is estimated to be less than 20 cubic yards.

The delineated lateral and vertical distribution of the landfill is shown in Figures 4 and 6. The surface area of the landfill is estimated to be approximately 26,762 square feet (0.6 acres). The volume of landfill materials is estimated to be between approximately 5,683 and 6,385 cubic yards (Piedmont Geologic, 2011).

Distributions of residual incinerator-waste and landfill-waste materials outside of the limits of the incinerator and landfill are discussed with respect to site soils below.

3.2.2 Surface Refuse/Debris

The following analytes were detected at concentrations above Residential Health-Based and/or Protection-of-Groundwater PSRGs, plus site statistical background concentrations for metals, in April 2010 samples of residual wastes in exposed containers (paint-can-type) present amongst the surface refuse/debris along the southern margin of the unpermitted landfill (Table 3).

- Antimony.
- Arsenic.
- Cadmium.
- Copper.
- Lead.
- Manganese.
- Mercury.
- Selenium.
- Zinc.
- Isopropylbenzene.
- Benzo (a) anthracene.
- Chrysene.

According to MEG (personal communication, 2013), the exposed waste was residual material, with a thick or hardened consistency, such as paint of similar material, found in the interior of exposed and open metal cans.

The surface refuse/debris does not meet the definitions of listed hazardous waste under 40 CFR 261. TCLP metals analysis of an exposed-waste sample indicated that the material did not meet the classification of characteristically hazardous waste based on metals toxicity (MEG, 2010).

As discussed above, other surface refuse/debris materials include rusted 55-gallon drum skeletons, metal cans (primarily paint-can-type), automobile parts, a pickup truck chassis, appliances, children's toys, demolition debris, wooden pallets, and scrap metal, which appears mostly innocuous in nature. Areas of exposed ash, slag, and coal are situated to the north of the former incinerator. Contaminants associated with these materials are discussed below in Section 3.2.5.

The lateral distributions of the surface refuse/debris is shown in various site figures (e.g., Figure 4). The materials rest on the ground surface and are not buried to any significant depth.

3.2.3 Groundwater

Based on the results of 2011-2015 site groundwater sampling/analysis, site groundwater is not impacted by site contaminants at concentrations that would constitute any violation of 2L standards or are above natural background concentrations for metals. Based on these results, no further action with respect to site groundwater is warranted.

3.2.4 Sediment and Surface Water

The following analytes were detected in sediment samples from the site intermittent stream at concentrations above U.S. EPA screening values and/or the IHSB Residential Health-Based PSRG (i.e., for analytes with no U.S. EPA screening value) (Tables 6 and 23).

- Antimony.
- Arsenic.
- Cadmium.
- Copper.
- Lead.
- Mercury.

- Nickel.
- Zinc.
- 4,4-DDT.
- Dioxins (based on TEQ).

As for the surface-water samples, the above analytes were detected at concentrations above U.S. EPA screening values only in the sediment sample collected from the wet-weather spring at the base of the landfill near the southwest corner of the site fence. No analytes were detected in sediment samples collected from the downstream sample location.

The following analytes were detected in surface water samples from the site intermittent stream at concentrations above U.S. EPA screening values and/or North Carolina 2B standards (Tables 7 and 24).

- Copper.
- Lead.
- Zinc.

The above metals were detected at concentrations above U.S. EPA screening values and/or North Carolina 2B standards only in the surface-water sample collected from the wet-weather spring at the base of the landfill near the southwest corner of the site fence. No analytes were detected in surface-water samples collected from the downstream sample location.

3.2.5 Soil

The following analytes were detected in site landfill-perimeter soil samples at concentrations above PSRGs (Residential Health-Based and/or Protection of Groundwater) and statistical background concentrations (for metals). The list excludes contaminants in exposed-waste samples, which are discussed above in Section 3.2.2.

Soil Contaminants Detected at Concentrations above Residential Health-Based and Protection-of-Groundwater PSRGs

>Residential Health-Based PSRG	>Protection-of Groundwater PSRG
Antimony	Antimony
Arsenic	Arsenic
Cadmium	Cadmium
Lead	Lead
Manganese	Manganese
Thallium	Selenium
Hexavalent chromium	Silver
Benzo (a) anthracene	Thallium
Benzo (a) pyrene	Zinc
Chrysene	Benzo (a) anthracene
Pentachlorophenol	Benzo (a) pyrene
4,4-DDT	1-Methylnaphthalene
PCB-1242	Naphthalene
	Pentachlorophenol
	PCB-1242
	PCB-1260
	2,3,7,8-TCDD

Manganese is the most prevalent, and laterally distributed, site soil contaminant, with soil concentrations above Residential Health-Based PSRGs and the statistical site background concentration covering much of the area within the site fence, and two small areas outside of the site fence. Based on the results of subsurface (i.e., >6-inches below grade) soil sampling/analysis, soil manganese concentrations above the Residential Health-Based PSRG and statistical site background concentration are limited to the upper 6-inches of soil over the majority of the site. Deeper distributions of soil manganese concentrations above the Residential Health-Based PSRG, down to approximately 24-feet below grade, are present in soils adjacent to the former incinerator.

Antimony, arsenic, cadmium, and lead distributions, at concentrations above Residential Health-Based PSRGs and statistical site background concentrations, are situated in the area of surface refuse/debris at the southern perimeter of the landfill and the area of exposed ash and slag along the northeast perimeter of the landfill. Arsenic and lead are also distributed in the area surrounding the former incinerator. Silver is distributed in the area surrounding the former incinerator and the area of exposed ash and slag along the northeast perimeter of the landfill. Selenium is distributed in the area of surface refuse/debris at the southern landfill perimeter and the area surrounding the former incinerator. Zinc is distributed in four small areas along the southern and eastern perimeter of the landfill. Detections of most of these metals are consistent with the detections of metals in September 2011 incinerator and landfill waste samples.

Thallium, benzo (a) pyrene, DDD, DDE, and DDT were detected at concentrations above Residential Health-Based PSRGs (and the statistical site background concentration for thallium) in only one location adjacent to the north side of the former incinerator. Naphthalene was detected at a concentration above the Residential Health-Based PSRG in only one soil sample located east of the former incinerator, and

chrysene was detected at a concentration above the Residential Health-Based PSRG in only one soil sample located at the southeast landfill perimeter. Based on the results of subsurface-soil sampling/analysis, all of the above contaminants occur at concentrations above the Residential Health-Based PSRG and statistical site background concentration in only the upper 6-inches of soil.

PCBs were detected at concentrations above Residential Health-Based PSRGs in only one location (LPS-37), in the area where transformers were abandoned. PCB-1242 was detected at concentrations above the Residential Health-Based PSRG and Protection-of-Groundwater PSRG to depths of 24-inches below grade at that location. Pentachlorophenol was detected at concentrations above Residential Health-Based PSRGs in only one location (LPS-36), in the area of exposed ash and slag along the northeast landfill perimeter, to a depth of 36-inches below grade.

4.0 SUMMARY OF APPROVED CONTAINMENT REMEDY

4.1 Introduction

Based on results of the RI, it is apparent that remediation of site soils to the levels of Residential Health-Based PSRGs (i.e., unrestricted IHSB standards) is impracticable primarily due to the ubiquitous distribution of elevated manganese concentrations both laterally and vertically across the site, which would necessitate the removal of a large area (>51,000 square feet), and associated volume/mass, of soil to depths up to 20+ feet below grade, without reasonable assurance that results of post-remediation confirmation sampling would indicate successful achievement of remediation standards. Site remediation under an Industrial land-use classification was also not desirable due to the physical site barriers that such an approach would require, as such barriers would detract from the natural aspect of the site and surrounding properties, and the existing site fence has proven to require frequent maintenance. Adjustments of PSRGs through averaging did not provide relief, again due primarily to the aforementioned distribution of manganese and other COC concentrations.

In addition to the above, with the exception of PCBs, the RI concluded that the Protection-of-Groundwater PSRGs do not apply to the site due to the following.

- Results of site groundwater sampling/analysis, including monitoring wells within and immediately downgradient of the unpermitted landfill and landfill perimeter soils have indicated concentrations of site COC below North Carolina 2L standards.
- On-site waste disposal/releases occurred more than 15-years ago.

Because it cannot be demonstrated that the electrical transformers that were discovered at the site in 2008 were placed on site more than 15 years ago, remediation of site soils containing PCBs at concentrations above Protection-of-Groundwater PSRGs was considered relevant.

Based on the above information, a containment remedy for site contamination, in accordance with 15A NCAC 13C .0306(i)(2) was pursued. The *Final Proposal for Containment Remedy*, dated December 28, 2015 (Piedmont Geologic, 2015) was submitted to IHSB on December 28, 2015. IHSB approval of the proposal was received via an e-mail to Piedmont Geologic dated February 29, 2016.

4.2 Proposed Site Remediation Goals and Actions

The site soil remediation goal for lead contamination is the Residential Health-Based PSRG (400 mg/kg). The soil remediation goals for PCB congeners are the Protection-of-Groundwater PSRGs. The soil remediation goals for remaining site soil COCs are listed as follows. These remediation goals are based on site risk calculations completed by the IHSB staff toxicologist as part of the PCR development (Piedmont Geologic, 2015). The risk calculations are based on an open-land site use classification, utilizing a calculator spreadsheet developed by U.S. EPA, utilizing the highest-detected concentrations of all site COCs, excluding areas of soil to be remediated as described below.

Soil Remediation Goals

Soil Contaminant	Highest Concentration (mg/kg)	Soil Contaminant	Highest Concentration (mg/kg)
Acenaphthylene	0.011	4,4-DDD	0.34
Acetone	0.622	4,4-DDE	1.0
Antimony	124	4,4-DDT	3.3
Arsenic	10	Di-n-Octylphthalate	0.028
Benzene	0.0028	p-Isopropyltoluene	0.0073
Benzo(a)anthracene	0.0073	Manganese	2,400
Benzo(a)pyrene	0.0088	Mercury	0.87
Beryllium	2.2	Methyl acetate	0.278
Bis(2-ethylhexyl)phthalate	0.56	Naphthalene	0.24
2-Butanone	0.040	Nickel	54.9
Butyl benzyl phthalate	1.3	Pentachlorophenol	21
Cadmium	37.9	Selenium	6.9
2-Chloronaphthalene	0.049	Silver	4.4
Chromium (III)	62	Thallium	5.6
Chromium (VI)	1.2	Zinc	2,370
Copper	110	2,3,7,8-TCDD	3.1×10^{-6}

Based on detected soil lead and PCB concentrations, plus concentrations of other metals, limited site soil remediation is required, in addition to removal of the unpermitted landfill and former incinerator contents.

Site cleanup goals for sediment are the U.S. EPA Region 4 Waste Management Division Sediment Screening Values for Hazardous Waste Sites (November 2001) and the Residential Health-Based PSRGs. Based on these cleanup goals, remediation of sediment in the drainage swale/intermittent stream at the base of the unpermitted landfill is required.

A summary of proposed site remedial actions, based on the above remediation goals, is presented as follows. A map illustrating the proposal remedial actions is provided as Figure 15.

1. The unpermitted landfill contents, along with partially and fully exposed containers along the southern margin of the landfill, will be excavated and transported offsite for disposal at a permitted landfill.
2. The former incinerator structure, which represents a potential attraction to potential site visitors, will be demolished and transported offsite for disposal at a permitted facility, along with the residual ash within the structure.
3. The areas at and around landfill-perimeter samples LPS-1, LPS-3, and LPS-13 (Areas 1 and 4, Figure 15) will be excavated to a depth of 6-inches below grade to remove concentrations of lead greater-than 400 mg/kg at those locations. Excavated soils will be transported offsite for disposal at a permitted landfill.
4. The areas at and around soil samples E-1/LPS-37 (Area 2) will be excavated to a depth of 2-feet below grade to remove concentrations of PCBs at those locations. Excavated soils will be transported offsite for disposal at a permitted landfill.
5. The area at and around landfill-perimeter sample E-10 (Area 3) will be excavated to a depth of 1-foot below grade to remove high concentrations of metals (antimony, arsenic, lead, and zinc) at that location. Excavated soils will be transported offsite for disposal at a permitted landfill.
6. Sediments in the wet-weather spring at the southeast base of the unpermitted landfill (Area 5), which is part of the drainage swale/intermittent stream along the eastern perimeter of the site, will be excavated and transported offsite for disposal at a permitted landfill.
7. Site surface refuse/debris outside of the permitted landfill will be collected and transported offsite for disposal at a permitted landfill or recycling/scrap facility, as appropriate.

Following completion of site remedial actions, the site be left as undeveloped, partially wooded, open land. The existing site security fence will be removed and a vegetative barrier will be put in place to prevent vehicle access via the current asphalt drive.

The site is an approximately 5-acre surveyed portion of the two properties totaling approximately 268 acres that are owned by the State of North Carolina, as discussed in Section 2.1. The approximately 5-acre property survey plat, in Appendix C, will be recorded with the Buncombe County Register of Deeds as a subdivision. The survey plat will receive a unique PIN and will be cross-referenced to the approximately 268-acre properties. The plat will also reference the 268-acre properties PINs. The new PIN recordation will incorporate the Notice of an Inactive Hazardous Substance or Waste Disposal Site shown in the survey plat and a Declaration of Perpetual Land-Use Restrictions (DPLUR), as provided in Appendix D. Annual site inspections will be conducted to ensure that all LURs remain in compliance. The Buncombe County Register of Deed's office site PIN recordation will be checked annually to ensure that the DPLUR and Notice of an Inactive Hazardous Substance or Waste Disposal Site are still recorded. An annual report of LUR compliance will be submitted to IHSB.

5.0 DESCRIPTION OF REMEDIAL ACTION PROCESS

5.1 Overview

Following is the generalized approach to be used for implementation of the site remedial actions listed above in Section 4.2. Details regarding the post-excavation soil sampling/analysis plan are provided in Section 6.0. Sequence and timing of individual activities are subject to revisions in the field due to various factors, such as weather conditions, equipment availability, access limitations, contractor preferences, etc.

1. Site preparation for remedial actions will be completed, including: removal of trees/brush as necessary to allow for site preparation and subsequent activities; removal of portions of the security fence necessary to facilitate site ingress/egress and soil excavation/loading, plus installation of temporary security barriers; installation of sediment fencing; installation of the equipment/personnel decontamination station; and installation of a public water supply line.
2. To accommodate the installation of the sediment trap specified in the *Erosion and Sedimentation Control Plan* (Section 5.2), sediments in Area 5 will be excavated for offsite transportation and disposal. Post-excavation sediment samples will be collected for laboratory analysis. The sediment trap will then be installed.
3. Soils around the perimeter of the incinerator (Area 1, Figure 15) will be excavated to a depth of 6-inches below grade for offsite transportation/disposal. Post-excavation soil samples will be collected for laboratory analysis.
4. The concrete shell of the former incinerator will be razed and the residual ash contents removed for offsite transportation/disposal.
5. The equipment staging area will be graded at the location of the former incinerator location and Area 1 excavation;
6. Surface refuse/debris in Area A and Areas C through F will be collected for offsite transportation and disposal/recycling.
7. The access road on the west side of the landfill will be installed.
8. Soils in Area 2 will be excavated to a depth of 2-feet below grade for offsite transportation/disposal. Post-excavation soil samples will be collected for laboratory analysis.
9. Soils in Area 3 and Area 4 will be excavated to depths of 1-foot and 6-inches below grade, respectively, for offsite transportation/disposal. Post-excavation soil samples will be collected for laboratory analysis.
10. Results of laboratory analysis of post-excavation soil samples collected during Steps 3, 8, and 9 will be reviewed. If necessary, additional soil excavation for offsite transportation/disposal, and post-excavation soil sampling/analysis, will be completed to achieve soil remediation goals. This step will be repeated as necessary until soil remediation goals are met.

11. Site monitoring wells will be decommissioned by a North Carolina licensed well driller by tremie grouting with cement slurry. Monitoring-well stick-up casings will be removed for disposal/recycling.
12. The landfill contents, as well as previously excavated sediment, soil, and ash staged on the landfill as part of Steps 2, 3, 8, and 9, will be excavated and transported offsite for disposal. Post-excavation samples from native soil at the base of the landfill will be collected for laboratory analysis.
13. Exposed waste and surface debris/refuse in Area B will be collected for offsite transportation and disposal/recycling.
14. Results of laboratory analysis of post-excavation soil samples collected during Step 12 will be reviewed. If necessary, additional soil excavation and offsite transportation/disposal, and post-excavation soil sampling/analysis, will be completed to achieve remediation goals. This step will be repeated as necessary until soil remediation goals are met.
15. Following confirmation that soil remediation goals are achieved, site restoration activities will be completed; including, seeding and/or other stabilization of landfill excavation slopes; seeding of other excavation areas; removal of erosion-control measures; restoration/stabilization of disturbed sections of drainage swale; removal of temporary security barriers and remaining portions of security fence; removal/disposal of equipment/personnel decontamination station; decommissioning of water supply line; and installation of a vegetative barrier to prevent unauthorized vehicle access.

Additional details regarding the above tasks are discussed as follows.

5.2 Site Preparation

As part of the initial stages of RAP implementation, selected site trees will be removed, as necessary, to accommodate the incinerator demolition, soil and landfill excavations, and other site preparation activities. Cut trees may be burned on the surface of the landfill prior to excavation, if permitted, transported offsite for disposal at a local stump dump, donated to the BMHC camp for use as firewood, or recycled on site or offsite in some other manner that complies with local, State, and Federal regulations. Root structures in contact with contaminated soils will be burned on site as described below for wooden surface refuse/debris, or mulched and transported offsite for disposal with contaminated soils as described below.

The RAP implementation is anticipated to be initiated in the late fall, when the typical thick growth of kudzu covering the landfill is dormant. This cover will be cut and mulched to the extent possible to reduce the volume mixed with the landfill materials that are transported offsite for disposal.

Site sediment and erosion control measures will be constructed in accordance with the site *Erosion and Sedimentation Control Plan* provided in Appendix E. Sediment/erosion control measures, shown in Figure 16, will include installation of sediment fencing around the perimeter of the work area, plus installation of a sediment trap at the location of the wet-weather spring at the southeastern base of the landfill. As discussed in Section 2.1, Area 5 sediment at the wet-weather spring location will be excavated for offsite transportation and disposal prior to the sediment trap installation.

An equipment staging and truck-loading area will be established in and around the former incinerator location (i.e., following removal), retaining the existing asphalt pavement (Figure 16). The staging area will be extended to the north along the west side of the landfill as necessary to accommodate loading of trucks during the landfill excavation. The site staging area and access drive are sized accordingly to allow for tandem trucks to turn around on site and to make the turn to and from Clover Lane.

An approximately 100-feet section of existing security fence at the southeast site corner will be removed to accommodate installation of the sediment trap and excavation of sediments in Area E (Figure 16). Knitted polyethylene barrier fencing (e.g., PolyBarrier™), or similar product, will be used to replace the removed portion of security fence for the duration of the RAP implementation.

An equipment decontamination station will be installed at the location shown in Figure 16, in accordance with the drawing provided in Figure 17. The decontamination station will be supplied via a public water main line that runs along the east side of Clover Lane at the site entrance. A temporary service line will be installed utilizing a fire hydrant located directly northwest of the site access drive. The decontamination is positioned such that the ground slope is toward the interior of the site. All portions of excavation equipment, loading equipment, etc., that come in contact with contaminated site soils will be rinsed of soil before leaving the site. Low amounts of water are expected to be used such that rinse water will infiltrate into soils beneath the decontamination station and runoff will not occur.

5.3 Landfill, Soil/Sediment, and Surface Refuse/Debris Excavation and Disposal

A summary of areas, volumes, and masses of soil/sediment excavations proposed to achieve site remediation goals is provided as follows. Referenced volumes/masses of soil/sediment for excavation and disposal are estimated, and subject to change based on actual field conditions encountered, results of post-excavation soil/sediment sampling and analysis, or other factors. Soil-volume references are based on soil-volumes in-place within the ground, and are not adjusted for potential expansion factors associated with excavation.

Landfill Contents

As discussed in Section 3.2.1, the surface area of the landfill is estimated to be approximately 26,762 square feet (0.6 acres). The volume of landfill materials is estimated to be between approximately 5,683 and 6,385 cubic yards (Piedmont Geologic, 2011). This volume range represents an estimated mass ranging from approximately 8,500 tons to 9,600 tons. The maximum thickness of the landfill is estimated to be approximately 22 feet.

Incinerator Contents

The mass of residual ash in the incinerator structure is estimated at 20 tons at most.

Area 1 Soil Excavation

Area 1 is situated within the asphalt circle-drive surrounding the incinerator. The estimated area is approximately 2,854 square feet. The 6-inch excavation targeted for this area will generate approximately 1,427 cubic feet, or approximately 53 cubic yards of soil. This volume represents a mass of approximately 80 tons.

Area 2 Soil Excavation

Area 2 is estimated to encompass approximately 1,117 square feet. The 2-foot excavation targeted for this area will generate approximately 2,234 cubic feet, or approximately 83 cubic yards of soil. This volume represents a mass of approximately 124 tons.

Area 3 Soil Excavation

Area 3 is estimated to encompass approximately 1,993 square feet. The 1-foot excavation targeted for this area will generate approximately 1,993 cubic feet, or approximately 74 cubic yards of soil. This volume represents a mass of approximately 111 tons.

Area 4 Soil Excavation

Area 4 is estimated to encompass approximately 1,326 square feet. The 6-inch excavation targeted for this area will generate approximately 663 cubic feet, or approximately 25 cubic yards of soil. This volume represents a mass of approximately 37 tons.

Area 5 Sediment Excavation

Area 5 is estimated to encompass approximately 377 square feet. The 6-inch excavation targeted for this area will generate approximately 189 cubic feet, or approximately 7 cubic yards of soil. This volume represents a mass of approximately 10 tons.

The total estimated mass of soil/sediment expected to be generated through the soil/sediment excavations is tallied as follows.

- Landfill = 9,600 tons (high end of estimated range)
- Incinerator ash = 20 tons
- Area 1 = 80 tons
- Area 2 = 124 tons
- Area 3 = 111 tons
- Area 4 = 37 tons
- Area 5 = 10 tons

Total 9,982 tons

Soil in each area listed above will be excavated and loaded into trucks for transportation to the permitted landfill utilizing standard excavators, backhoes, and loaders. The only excavation of any substantial depth will be for the unpermitted landfill, which will reach depths of approximately 22 feet. Excavators of sufficient size will be selected such that substantial terracing to achieve excavation depths can be avoided. The site ingress/egress road network and staging areas (Section 5.2) are designed such that the excavators and loaders can stay within the landfill area while loading trucks outside of the landfill area, thus minimizing the potential for cross-contamination of site soils outside the landfill perimeter through the landfill excavation/loading process.

It is anticipated that the landfill will be excavated progressing from the north side to the south side. The landfill contents will be excavated until underlying native soils are observed. These native soils were highly apparent in soil borings advanced through the landfill, as well as the landfill test pits. The resulting landform following removal of the landfill contents will approximate the ravine that existed prior to the landfill creation, in conjunction with the corresponding east wall of the ravine descending from the Owen High School property, as illustrated in Figure 14. By this manner, backfilling of the landfill area following excavation will not be necessary or desired. Grading of the resulting west wall of the ravine, and the ravine base, will be conducted as warranted to achieve positive drainage through the ravine valley and to accommodate the selected stabilization method for the west wall of the ravine.

Areas 1 through 5 are to be excavated prior to the landfill area. Due to the smaller soil masses to be generated relative to the landfill excavation, the soil/sediment excavated from Areas 1 through 5 may be temporarily staged on the landfill surface pending initiation of the landfill excavation, when a larger number of transport trucks will be mobilized and cost savings may be realized through economy of scale.

Due to their very shallow depths (i.e., 1 foot and less), the excavations in Areas 1, 3, and 4, will not be filled per se, but instead regraded to conform with the surrounding topography. It is anticipated that the

completed excavation in Area 2 (2-feet depth) will be filled with excess native soil generated through the final grading of the sub-landfill surface.

The site landfill and incinerator contents, exposed wastes, and soils do not meet the definitions of listed hazardous waste, and are not classified as characteristically hazardous waste based on waste characterization analysis, under 40 CFR 261. As such, the materials are eligible to be disposed of as non-hazardous waste in a Subtitle D landfill. The Buncombe County Subtitle D landfill has refused to accept the site materials. However, the Foothills Regional Landfill (Subtitle D) in Caldwell County, North Carolina, operated by Republic Services of North Carolina, LLC (Republic Services) has agreed to accept site wastes, for a standard fee. The Republic Services landfill permit certificate issued by DWM, Solid Waste Section is provided in Appendix F along with an acceptance letter. It is anticipated that the excavated landfill contents, incinerator contents, Areas 1 through 5 soil/sediments, exposed waste materials, and any other site wastes that are not suitable for disposal at a construction and demolition landfill, or for reclamation at a scrap facility, will be disposed at the Republic Services landfill.

As discussed in Section 3.2.2, surface refuse/debris materials in Areas A through F (Figure 15) include rusted 55-gallon drum skeletons, metal cans, automobile parts, a pickup truck chassis, appliances, children's toys, demolition debris, wooden pallets, scrap metal, power poles, and scrap wood, which, with the exception of residual wastes in some exposed containers, are innocuous in nature. If permitted, wood debris may be burned on the unpermitted landfill surface prior to its excavation. Metal refuse/debris that can be reclaimed at a local scrap facility will be disposed of in that manner, at the discretion of the site remediation contractor. Demolition debris that cannot be scrapped may be disposed at a local construction and demolition (C&D) landfill, as selected by the site remediation contractor.

Residual wastes in exposed containers (paint-can-type) is present amongst the surface refuse/debris along the southern margin of the unpermitted landfill, within Area B. These materials will be disposed at the Republic Services landfill. Any other surface refuse/debris that is not suitable for recycling, burning (if allowed), or disposal at a C&D landfill will also be disposed at the Republic Services Landfill.

The surface refuse/debris will be loaded onto trucks using backhoes/loaders or by hand. Care will be taken to avoid the accumulation of contaminated site soils with the refuse/debris. Any refuse/debris selected for reclamation at a scrap facility will be cleaned of residual contaminated soils in the site decontamination station (discussed in Section 5.2) prior to offsite transport.

5.4 Site Restoration

In conjunction with offsite transportation of the final load(s) of excavated material from the site, the equipment/personnel decontamination station will be excavated and transported offsite for disposal with the landfill material/soil. The temporary public water connection and service line will be removed.

Remaining site restoration procedures will commence in conjunction with the completion of site soil/sediment excavations and related offsite disposal, and confirmation that site remedial goals are met through the post-excavation soil sampling/analysis. Site restoration will include seeding of areas disturbed through the soil excavations and stabilization of the newly created ravine wall in the former landfill area. Since the latter is expected to conform with the natural landform that existed prior to the landfill creation, it is expected that the final grade will be stabilized and seeded utilizing a permanent soil reinforcement matting/blanket or similar product. If final slopes are inconsistent with this approach, then rip-rap, gabions, or similar approach will be utilized as necessary.

The drainage swale at the southeast corner of the site will be re-graded as necessary to conform with the final topographic configuration of that area following excavation of the landfill materials. Stone/gravel will be added, as necessary, to stabilize the swale.

The temporary security fencing at the southeast site corner described in Section 5.2 will be removed, along with the remaining security fence around the site perimeter. The sediment fencing will be removed. The sediment trap will be left in place. In addition, the gravel access drive and staging area will be left in place since it is likely these areas will be reclaimed by vegetation in a relatively swift time frame. A vegetative barrier, utilizing Leyland cypress or other fast-growing evergreen tree variety, will be planted across the site access drive to prevent future motor vehicle access.

5.5 Permits and Plans

Due to an area greater-than one acre being expected to be disturbed through the site remediation activities and related site preparation procedures, an erosion-control permit is required from NCDEQ, Division of Energy, Mineral, and Land Resources, in accordance with GS 113A-50 through GS-113A-66. The Sediment and Erosion Control Plan in Appendix E has been submitted to the NCDEQ Asheville Regional Office for review and approval. However, due to NCDEQ financial responsibility requirements, the NCDEQ permit Certificate of Approval will not be issued until the site remediation contractor is selected and the NCDEQ *Financial Responsibility/Ownership Form* is executed. Sediment/erosion control measures will include installation of sediment fencing and a sediment trap, as discussed in Section 5.2.

Excavation of materials containing friable asbestos is regulated under National Emissions Standards for Hazardous Air Pollutants (NESHAP) and under the State of North Carolina, Department of Health & Human Services, Health Hazard Control Unit. The Buncombe County Western North Carolina Regional Air Quality Agency monitors and regulates air quality in Buncombe County, and issues air quality permits for asbestos excavation projects, as proposed for the site. The air permit application requires information regarding the contractor to complete the site work, who has not yet been selected. As a result, the permit acquisition will be delayed until contractor selection is made (See project schedule in Section 7.0). The permit application notification form is provided in Appendix G. Buncombe County permitting officials met with Piedmont Geologic on site on April 14, 2016 and confirmed the permitting process.

An Asbestos-Contaminated Soil Removal Design is required by IHSB due to the presence of ACMs in the landfill material to be excavated. The plan, provided in Appendix H, prepared by an accredited asbestos abatement designer, provides references to the pertinent regulations to be followed, personal protective equipment to be used, engineering controls to be put in place, protective measures for the public, a monitoring plan, disposal plan, and documentation plan.

5.6 Health and Safety Plan

In accordance with Rule .0306(l)(10), a site-specific project health and safety plan (HASP) has been prepared, provided in Appendix I. The HASP prescribes measures to be enacted to ensure preservation of health and maintenance of safety for on-site workers as well as the surrounding community, including the BMHC camp and Owen H.S. students/staff. In addition to site contaminants discussed in Section 3.2, the HASP includes provisions for health/safety measures due to the presence of ACMs in the landfill materials, including air and personnel monitoring, and contingencies for dust suppression, provided by the accredited asbestos abatement designer referenced above.

5.7 Offsite Property Access

Access to a very limited portion of the west side of the Owen High School property, on the east side of the site, will be necessary for the Area 5 sediment excavation and installation of the sediment trap. Entry onto the school property will also be necessary for removal of the existing security fence, which encroaches onto the school property. Permission to enter the school property for site assessment/remediation activities was granted in September 2014 by Mr. Tim Fierle, Directors of Facilities and Planning for Buncombe County Schools. Documentation of access permission is provided in Appendix J.

6.0 POST-EXCAVATION SOIL/SEDIMENT SAMPLING AND ANALYSIS PLAN

Following completion of soil/sediment excavation in each site area targeted for soil/sediment remediation (i.e., Areas 1 through 5, Figure 15), and following excavation of the unpermitted landfill contents, post-excavation soil/sediment sampling and analysis will be completed to evaluate if site remediation goals are met. If not, then additional soil/sediment excavation and post-excavation sampling/analysis will be completed, and the process repeated as necessary, until site soil remediation goals are met.

The post-excavation sampling/analysis plan for the landfill area, and the five areas targeted for soil/sediment excavation outside of the landfill area, is presented as follows. Sampling procedures are in accordance with Appendix B, Section B.2.2.1 (Post-excavation sampling) of the REC Guidance. Excavation-base and excavation-sidewall samples will be collected from 0-3 inches into the base/sidewall of the excavation. Post-excavation sidewall samples are not deemed necessary for excavations with depths of 1 foot or less.

Soil sampling/analysis procedures will be conducted in accordance with procedures provided in the August 2014 RI Workplan. All soil/sediment samples will be analyzed by North Carolina certified laboratories.

Landfill Area

Sub-landfill soil samples were previously collected for laboratory analysis as part of 2011 preliminary RI soil sampling/analysis. Results of laboratory analysis of the sub-landfill soil samples (Figure 12), indicated no COC concentrations above Residential Health-Based PSRGs, with the exception of manganese. Detected manganese concentrations, however, were below the risk-based site soil remediation goal listed in Section 4.2.

The September 2011 sub-landfill soil samples were not analyzed for pesticides or dioxins/furans. Therefore, following excavation of the landfill contents, sub-landfill grab soil samples will be collected from twelve locations, based on a 50 feet by 50 feet sampling grid (Figure 18). Grab samples will be grouped into four adjacent sample-grid nodes, with each group of four grab samples combined into three composite soil samples. The soil samples will be analyzed for pesticides by EPA Method 8081 and dioxins/furans by EPA Method 8290. Because the sub-landfill surface will conform to the original shape of the ground prior to landfilling (Figure 14), landfill excavation-sidewall samples are not applicable.

Area 1 Soil Excavation

Following excavation of soils to a depth of approximately 6-inches below grade, four grab soil samples will be collected at evenly spaced locations from the excavation base and combined into one composite sample. The composite sample will be analyzed for arsenic, lead, and thallium by EPA Method 6010C,

benzo(a)pyrene by EPA Method 8270, and 4,4-DDT by EPA Method 8081, which represent the COCs detected at concentrations above site remediation goals in Area 1 soil.

Area 2 Soil Excavation

Following excavation of soils to a depth of approximately 2-feet below grade, four grab soil samples will be collected at evenly spaced locations from the excavation base and combined into one composite sample. In addition, four grab soil samples will be collected at evenly spaced locations across each excavation sidewall and combined into one composite sample for each sidewall (i.e., total of four sidewall composite samples). The excavation-sidewall samples will be collected from the mid-depth of the excavation (i.e., approximately 1-foot below grade). The composite samples will be analyzed for PCBs by EPA Method 1668, which represents the COC detected at concentrations above site remediation goals in Area 2 soil.

Area 3 Soil Excavation

Following excavation of soils to a depth of approximately 1-foot below grade, four grab soil samples will be collected at evenly spaced locations from the excavation base and combined into one composite sample. The composite sample will be analyzed for antimony, arsenic, cadmium, lead, and zinc by EPA Method 6010C, which represent the COCs detected at concentrations above site remediation goals in Area 3 soil.

Area 4 Soil Excavation

Following excavation of soils to a depth of approximately 6-inches below grade, four grab soil samples will be collected at evenly spaced locations from the excavation base and combined into one composite sample. The composite sample will be analyzed for lead by EPA Method 6010C, which represents the COCs detected at concentrations above site remediation goals in Area 4 soil.

Area 5 Sediment Excavation

Following excavation of sediment to a depth of approximately 1-foot below grade, four grab sediment samples will be collected at evenly spaced locations from the excavation base and combined into one composite sample The composite sample will be analyzed for antimony, arsenic, cadmium, copper, lead, nickel, and zinc by EPA Method 6010C, mercury by EPA Method 7471, 4,4-DDT by EPA Method 8081, and dioxins/furans by EPA Method 8290, which represent the COCs detected at concentrations above site remediation goals in Area 5 sediments.

With respect to remediation-confirmation sampling/analysis for site surface water, the only analytes detected in site surface water samples at concentrations above U.S. EPA screening values and/or North Carolina 2B standards are copper, lead, and zinc. These metals were detected at such concentrations only in the surface water sample collected from the wet-weather spring at the base of the landfill near the southwest corner of the site fence. These same metals were detected in sediment samples collected from

that same location, and were also detected in the landfill-contents sample. The metals were not detected in 2014-2015 groundwater samples collected from the site. Accordingly, the detected metals concentrations in surface water samples are attributed to the landfill contents, through runoff or leaching, or related sediments. With excavation of the landfill contents and sediments at the wet-weather spring location, the source(s) of metals concentrations above screening levels and 2B standards will be eliminated. Furthermore, with removal of the landfill the spring itself will probably be eliminated. As a result, no post-remediation surface-water sampling/analysis is proposed as being necessary.

Summaries of the post-excavation soil and sediment sampling/analysis specifications, and associated quality assurance/quality control (QA/QC) sampling/analysis specifications, are provided as follows.

Post-Excavation Composite Soil/Sediment Samples

Excavation Area	Pesticides	Dioxins/ Furans	PCBs	Metals
Landfill	3	3	--	--
Area 1	--	--	--	1
Area 2	--	--	5	--
Area 3	--	--	--	1
Area 4	--	--	--	1
Area 5	1	1		1
Duplicate	1	1	1	1
Rinseate Blank	1	1	1	1
TOTALS	**6**	**6**	**7**	**6**

7.0 PROJECT SCHEDULE

Following is a preliminary schedule for the RAP implementation process. Final schedule completion dates may be adjusted based on actual dates of regulatory approvals, the public notice process, or other factors out of the control of DOA.

1. Submittal of Proposed RAP to IHSB: May 4, 2016
2. Receipt of site Public Notice from IHSB: May 9, 2016
3. Start of RAP 30-day Public Notice period: May 15, 2016
4. Completion of RAP 30-day Public Notice period: June 14, 2016
5. Incorporation of revisions/additions into RAP, if required: June 30, 2016
6. Submittal of RAP Work Phase Completion form WPC-III to IHSB: July 15, 2016
7. Completion of bidding and contracting process for RAP implementation:
    a. Completion of bid specs and contract documents: June 30, 2016
    b. Completion of SCO design review: July 31, 2016
    c. Bid advertisements: August 15, 2016
    d. Receive bids from contractors: September 15, 2016
    e. Review contractor bids and issue Notice to Proceed: October 1, 2016
8. Start of site remediation and restoration: November 15, 2016
9. Completion of site remediation and restoration: February 28, 2017
10. Submittal to IHSB of combined Remedial Action Construction Completion Report and Remedial Action Completion Report: April 30, 2017

8.0 REFERENCES

Mountain Environmental Group/SynTerra, July 15, 2010, *Phase I Remedial Investigation Report for the Solid Waste Landfill/Former Transformer Area Located on the DJJDP Property, Swannanoa, Buncombe County.*

Piedmont Geologic, P.C., December 14, 2011, *Phase II Remedial Investigation Report, Department of Juvenile Justice and Delinquency Prevention Property.*

Piedmont Geologic, P.C., August 15, 2014, *Remedial Investigation Plan, Swannanoa DJJDP Property.*

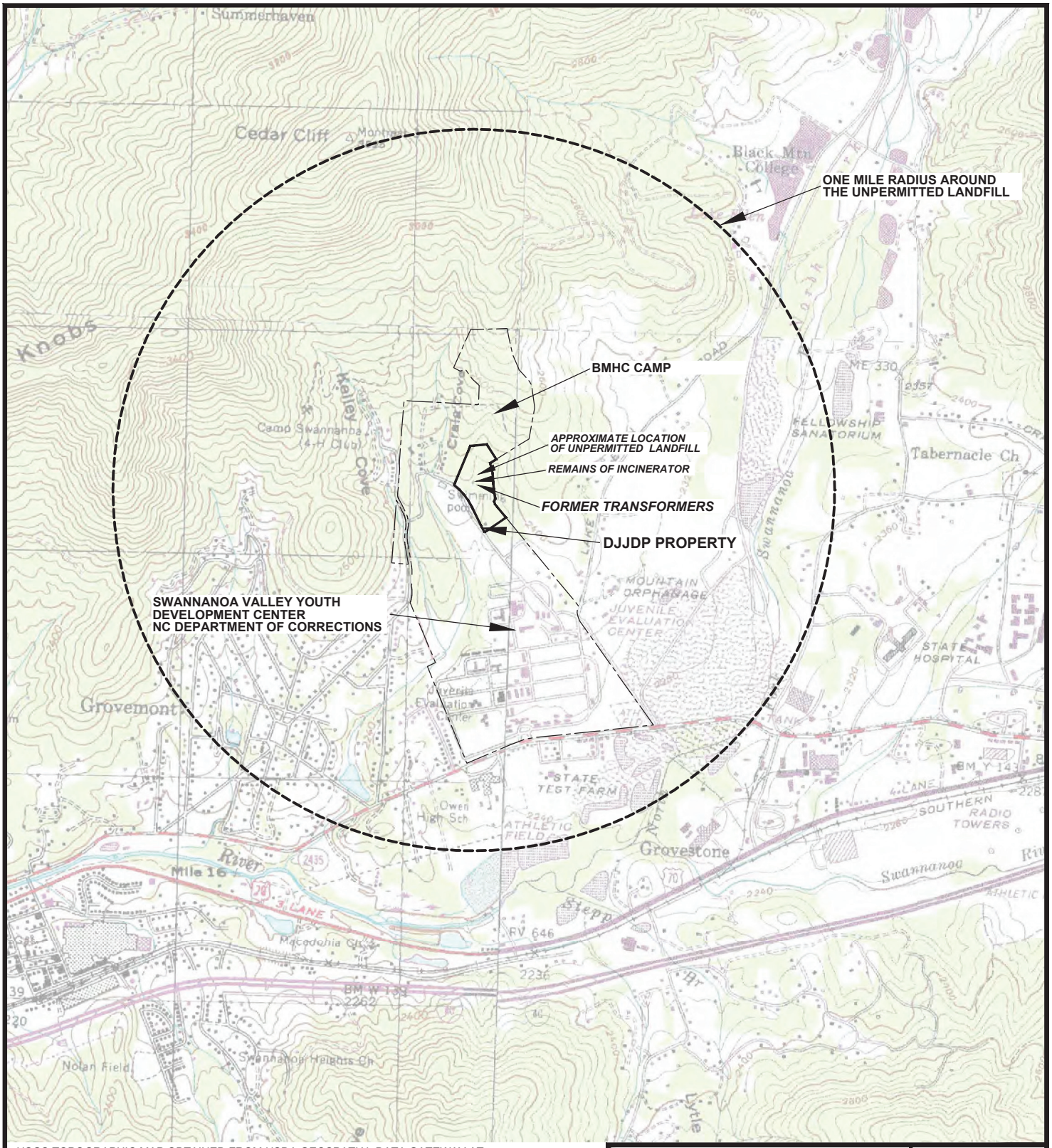
Piedmont Geologic, P.C., August 31, 2015, *Final Remedial Investigation Report, Swannanoa DJJDP Property.*

Piedmont Geologic, P.C., November 19, 2015, *Proposal for Containment Remedy, Swannanoa DJJDP Property.*

Piedmont Geologic, P.C., December 28, 2015, *Revised Proposal for Containment Remedy, Swannanoa DJJDP Property.*

United States Army Corps of Engineers (USACE), November 1999, *Preliminary Site Investigation Report, Former Moore General Hospital Landfill, Swannanoa, North Carolina.*

FIGURES



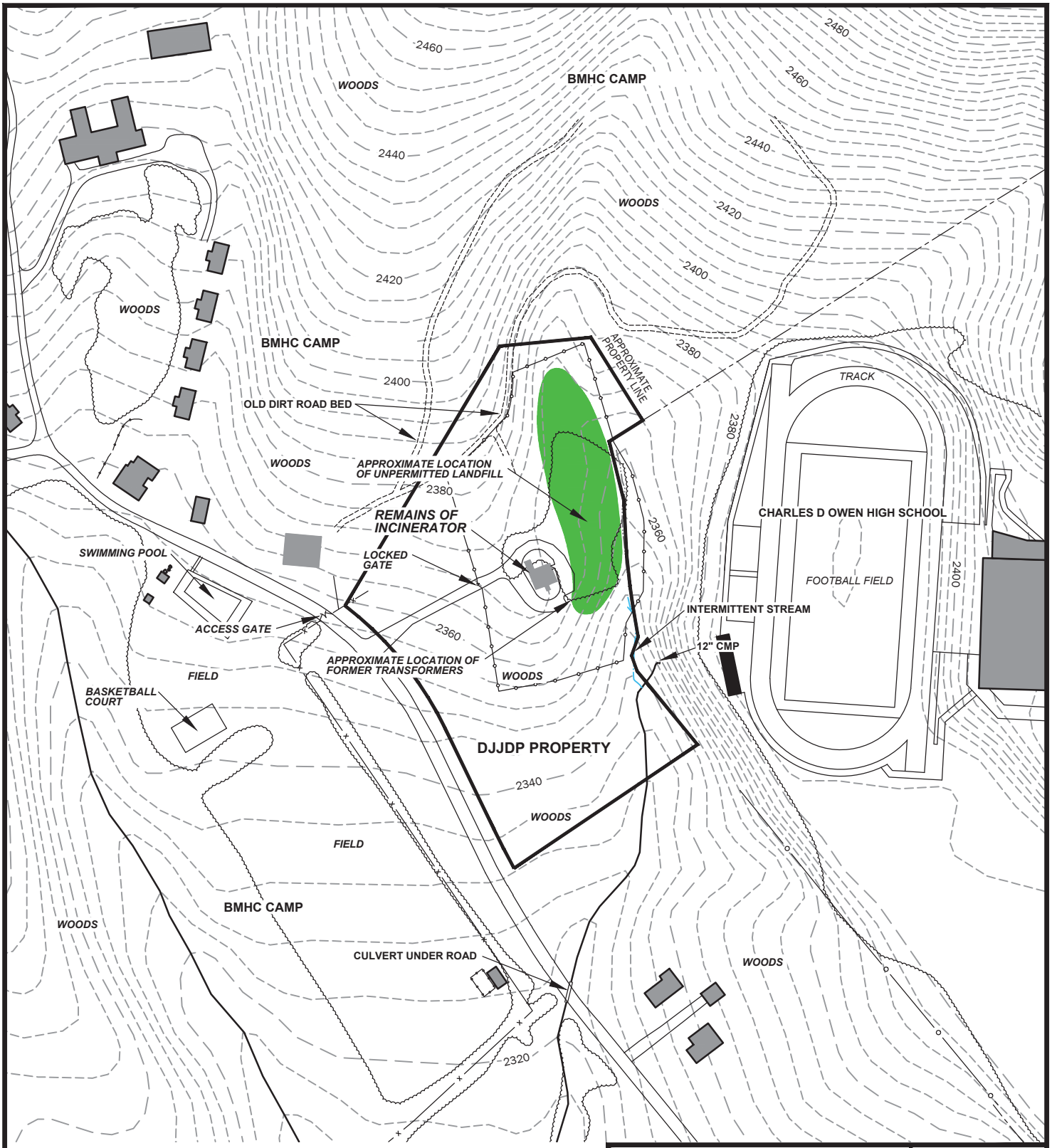
USGS TOPOGRAPHIC MAP OBTAINED FROM USDA GEOSPATIAL DATA GATEWAY AT
http://datagateway.nrcs.usda.gov/

Scale (ft.)

0 2000 4000

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 1.dwg		
Designed: PD	Site Location Map	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: PD	Location: Swannanoa, North Carolina	Figure: 1



Map based on 2006 aerials obtained from Buncombe County Geographical Information System at: http://www.buncombecounty.org/governing/depts/GIS/dataDownload.asp

Scale (ft.)

0 200 400

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 2.dwg		
Designed: PD	Site and Vicinity Map	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: PD	Location: Swannanoa, North Carolina	Figure: 2

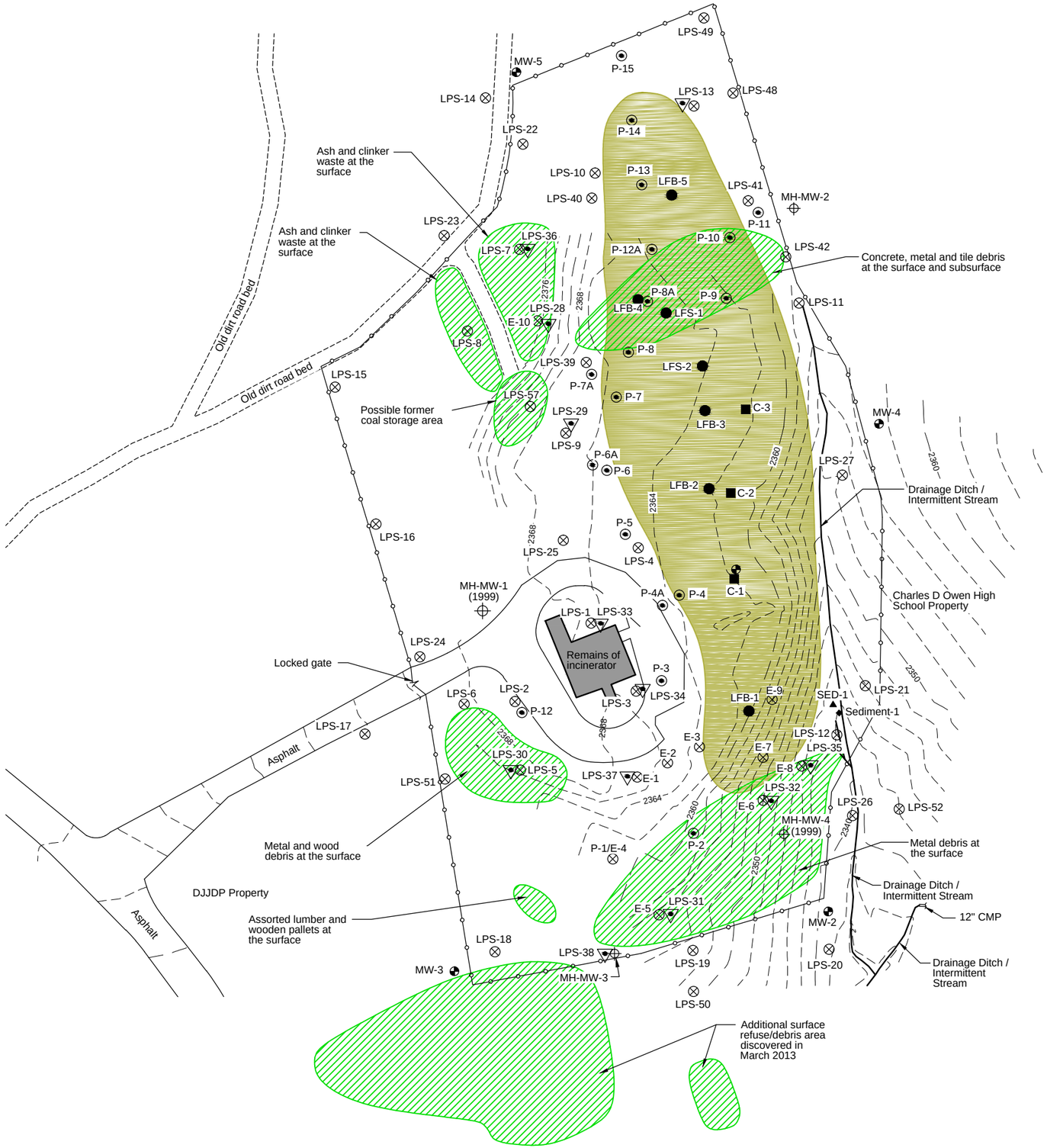
SOURCES:
PROPERTY LINE BASED ON SURVEY BY DENNIS CLINKSCALES, PLS - DATED SEPTEMBER 18, 2009
2006 AERIAL PHOTOGRAPHS OBTAINED FROM BUNCOMBE COUNTY GIS AT
http://www.buncombecounty.org/governing/depts/GIS/dataDownload.asp

Figure provided courtesy of MEG (2010)

Scale (ft.)
0 300 600

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 3.dwg		
Designed: PD	Aerial Photograph of Site Area	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: PD	Location: Swannanoa, North Carolina	Figure: 3



LEGEND:

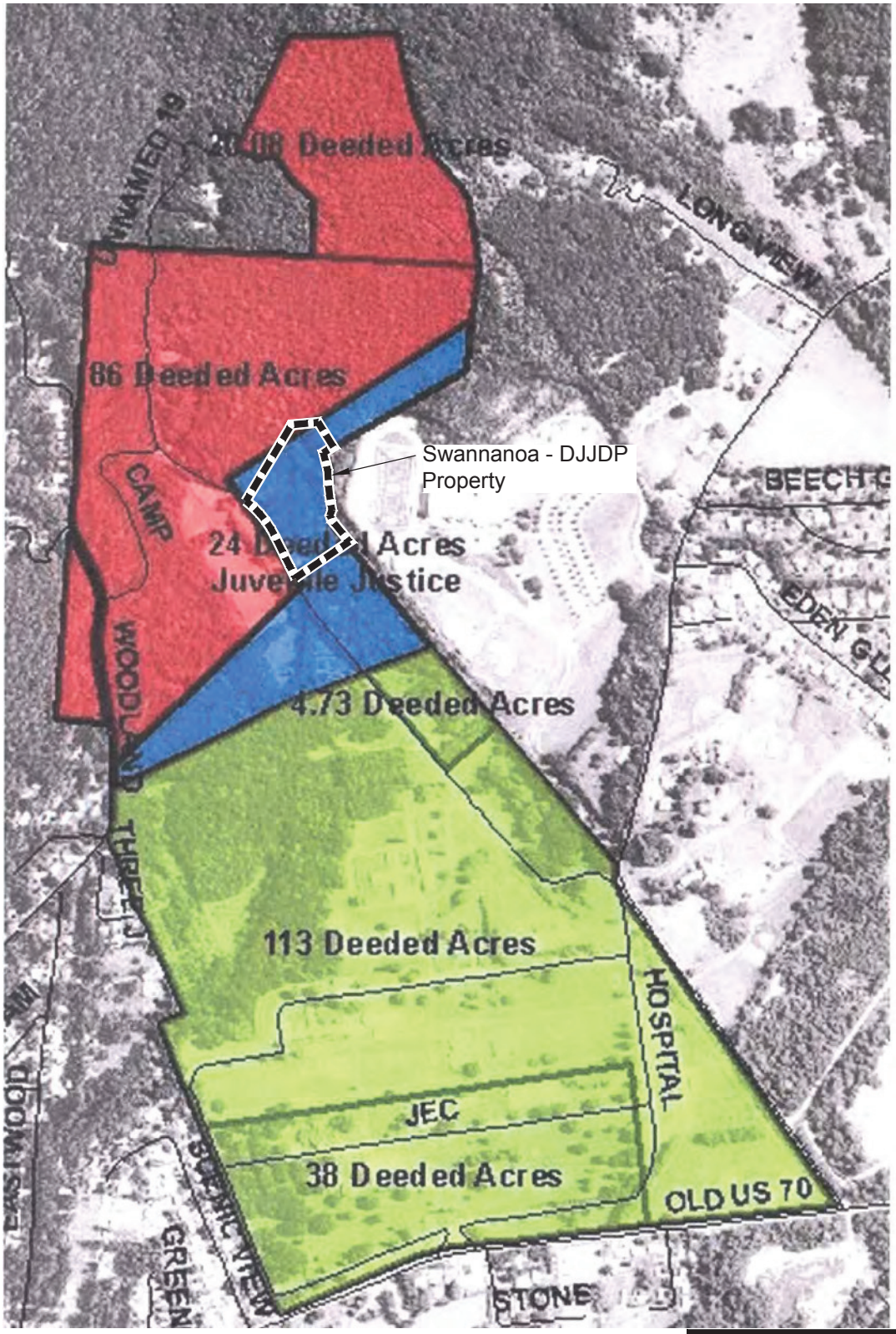
P-10	Landfill Perimeter Exploratory Boring
LFB-1	Landfill Interior Boring/Sample
C-1	Landfill Cap-Thickness Boring
LPS-1	Surface Soil Sample
	Subsurface Soil Sample
SED-2	Sediment Sample
MW-1	Monitoring Well
MH-MW-1	Monitoring Well - Decommissioned
	Approximate Extent Of Landfill
	Surface Refuse/Debris Area
	Fence Line
2360	Topographic Contour (ft. rel. MSL)

Scale (ft.)

0 60 120

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 12/28/15		
ACAD File: Fig 4.dwg		
Designed: PD	Site Map	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina	Figure: 4



Note:

Blue and green shaded area is "southern" State of North Carolina property (PIN 9699-74-4844).

Red shaded area is "northern" State of North Carolina property (PIN 9699-67-4268).

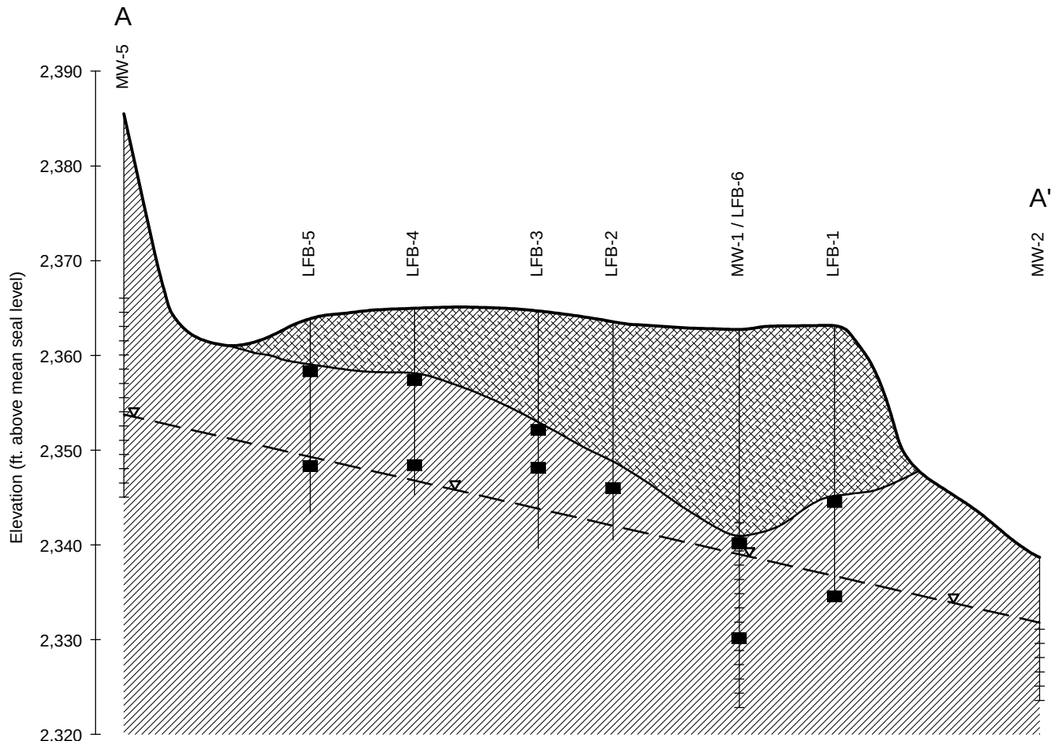
Image provided by DOA - State Property Office

Estimated Scale (ft.)

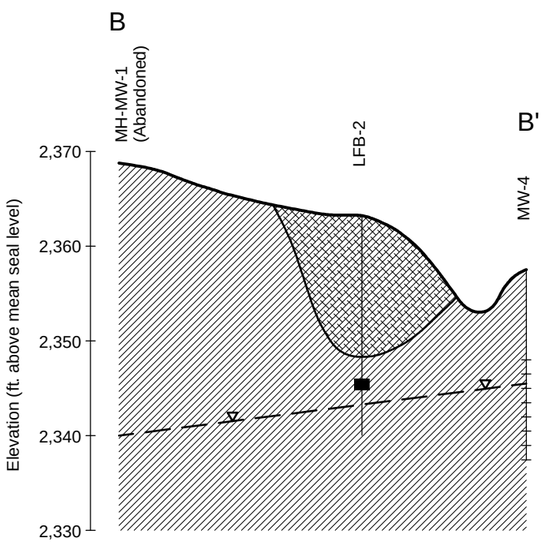
0 800 1600

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 5.dwg		
Designed: PD	State Property Parcel Designations	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: PD	Location: Swannanoa, North Carolina	Figure: 5



Section A-A'



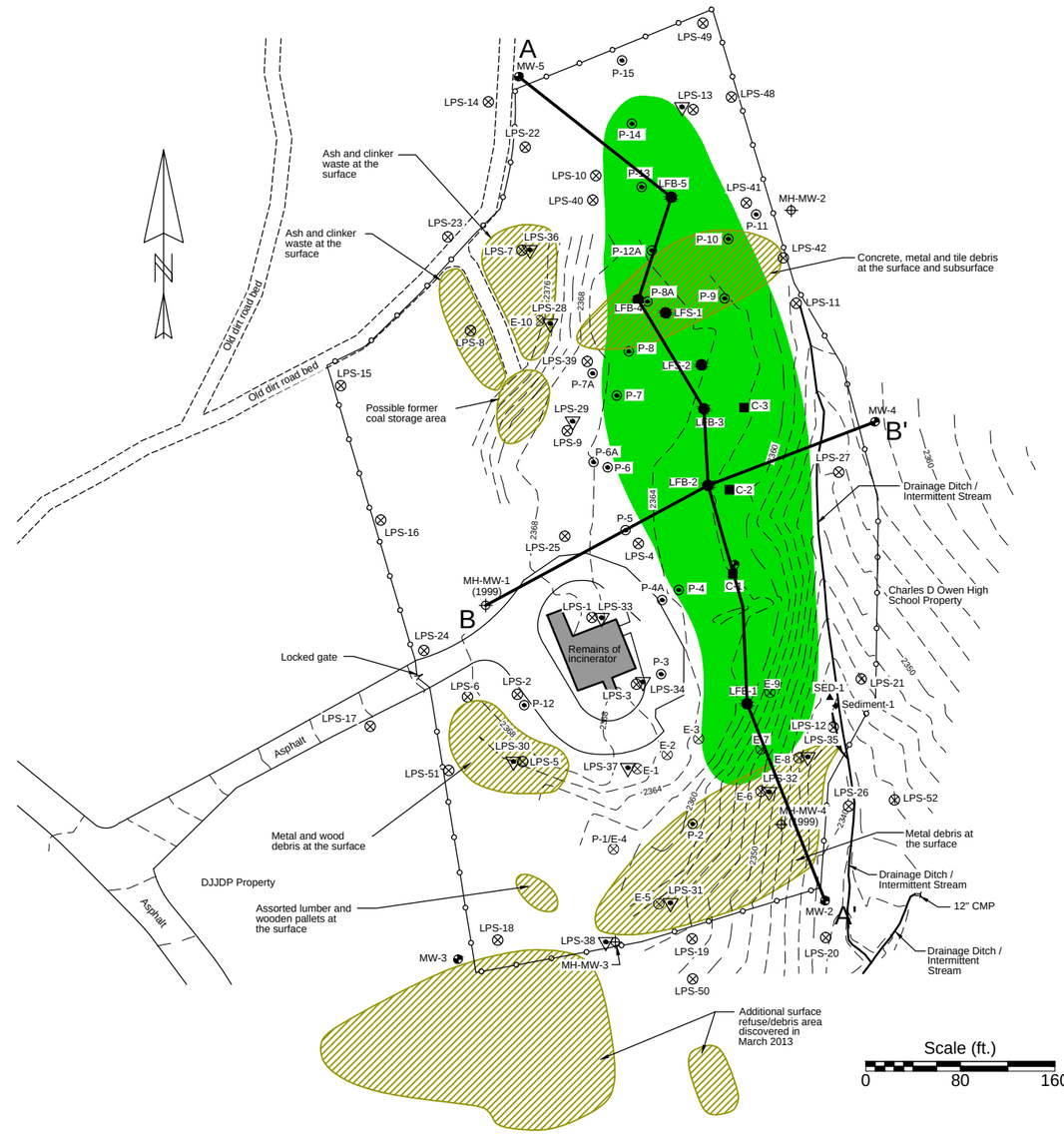
Section B-B'

Legend:

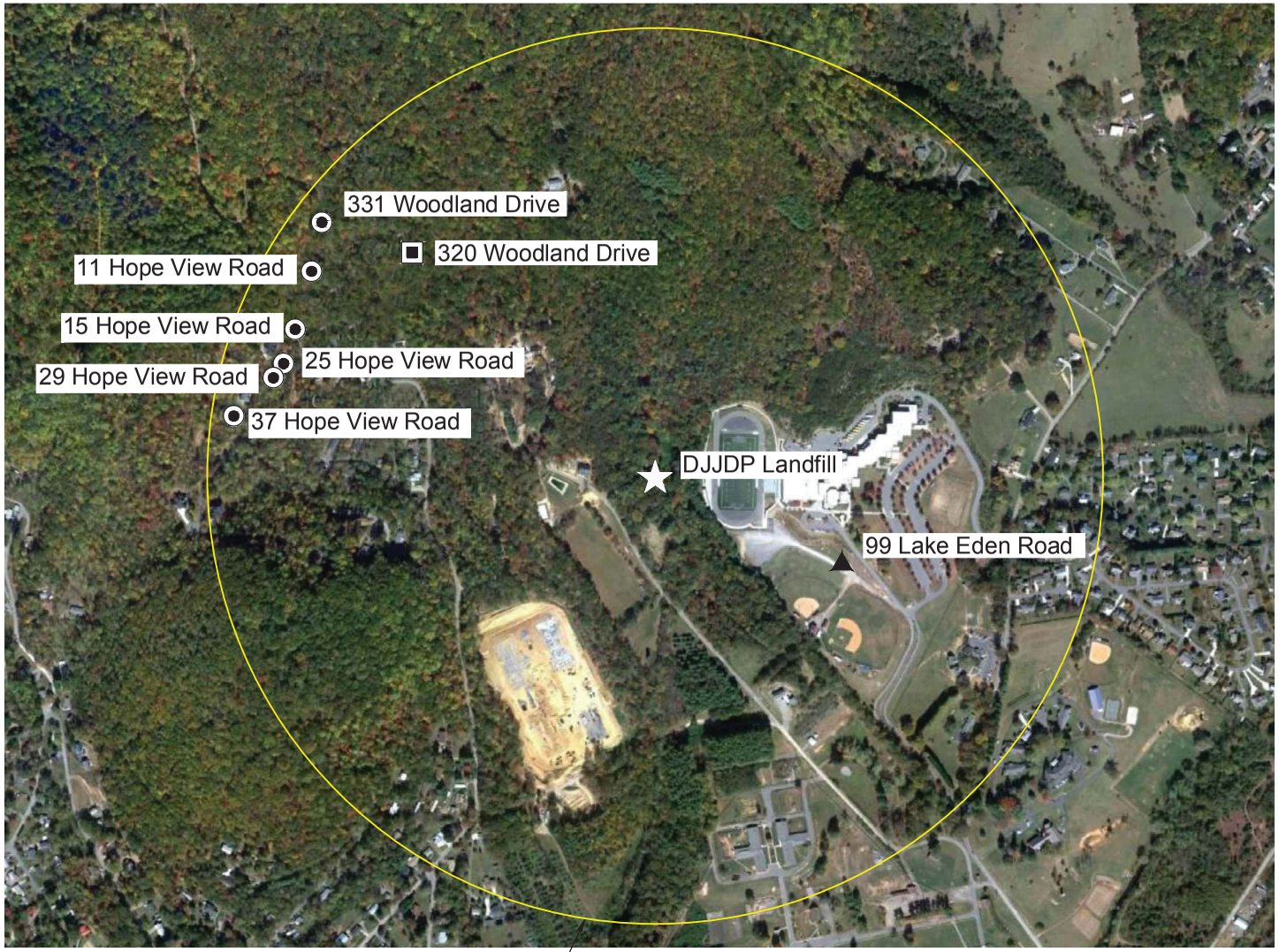
- Landfill Material
- Native Soil: micaceous silty / clayey sand and sandy silt / clay; saprolitic in lower sections
- Groundwater surface - Sept. 19, 2011
- Landfill soil boring with soil sample depth
- Monitoring well casing screen and interval

Scale (ft.)
0 80 160

Horizontal scale: 1" = 80'
Vertical scale: 1" = 8
Vertical Exaggeration = 10x



PIEDMONT GEOLOGIC SMART EARTH SOLUTIONS		Gauging Date:
		Drawing Date: 6/30/15
		ACAD File: Fig 6.dwg
Designed: PD	Topographic Profiles and Geologic Cross Sections	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina	Figure: 6



Legend

- Confirmed water supply well
- Probable water supply well
- Out-of-service (capped) water supply well

Scale (ft.)

0 1000 2000

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 7.dwg		
Designed: GM	Results of Water Supply Survey	
Detailed: GM	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: GM	Location: Swannanoa, North Carolina	Figure: 7

LEGEND:

P-10	Landfill Perimeter Exploratory Boring
LFB-1	Landfill Interior Boring/Sample
C-1	Landfill Cap-Thickness Boring
LPS-1	Surface Soil Sample
	Subsurface Soil Sample
SED-2	Sediment Sample
MW-1 2,339.66	Monitoring Well
MH-MW-1	Monitoring Well - Decommissioned
	Approximate Extent Of Landfill
	Surface Refuse/Debris area
	Fence Line
2360	Topographic Contour (ft. rel. MSL)
2,350	Water-Table Contour (Feet Above MSL)
	Direction of Groundwater Flow

Potentiometric Gradient A-A':

$$i = \frac{15 \text{ ft.}}{292 \text{ ft.}} = 0.05 \text{ ft. / ft.}$$

Figure based on survey by Dennis Clinkscales,
PLS plat dated September 18, 2009

Scale (ft.)

0 60 120

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:	9/19/11
Drawing Date:	6/30/15
ACAD File:	Fig 8.dwg
Designed: PD	Water-Table Contour Map: 9/19/11
Detailed: PD	Client: Swannanoa - DJJDP Property
Project No.:	1404
Checked: PD	Location: Swannanoa, North Carolina
Figure:	8

LEGEND:

P-10	Landfill Perimeter Exploratory Boring
LFB-1	Landfill Interior Boring/Sample
C-1	Landfill Cap-Thickness Boring
LPS-1	Surface Soil Sample
	Subsurface Soil Sample
SED-2	Sediment Sample
MW-1	Monitoring Well
MH-MW-1	Monitoring Well - Decommissioned
	Approximate Extent Of Landfill
	Surface Refuse/Debris area
	Fence Line
2360	Topographic Contour (ft. rel. MSL)
2,350	Water-Table Contour (Feet Above MSL)
	Direction of Groundwater Flow

Potentiometric Gradient A-A':

$$i = \frac{15 \text{ ft.}}{286 \text{ ft.}} = 0.05 \text{ ft. / ft.}$$

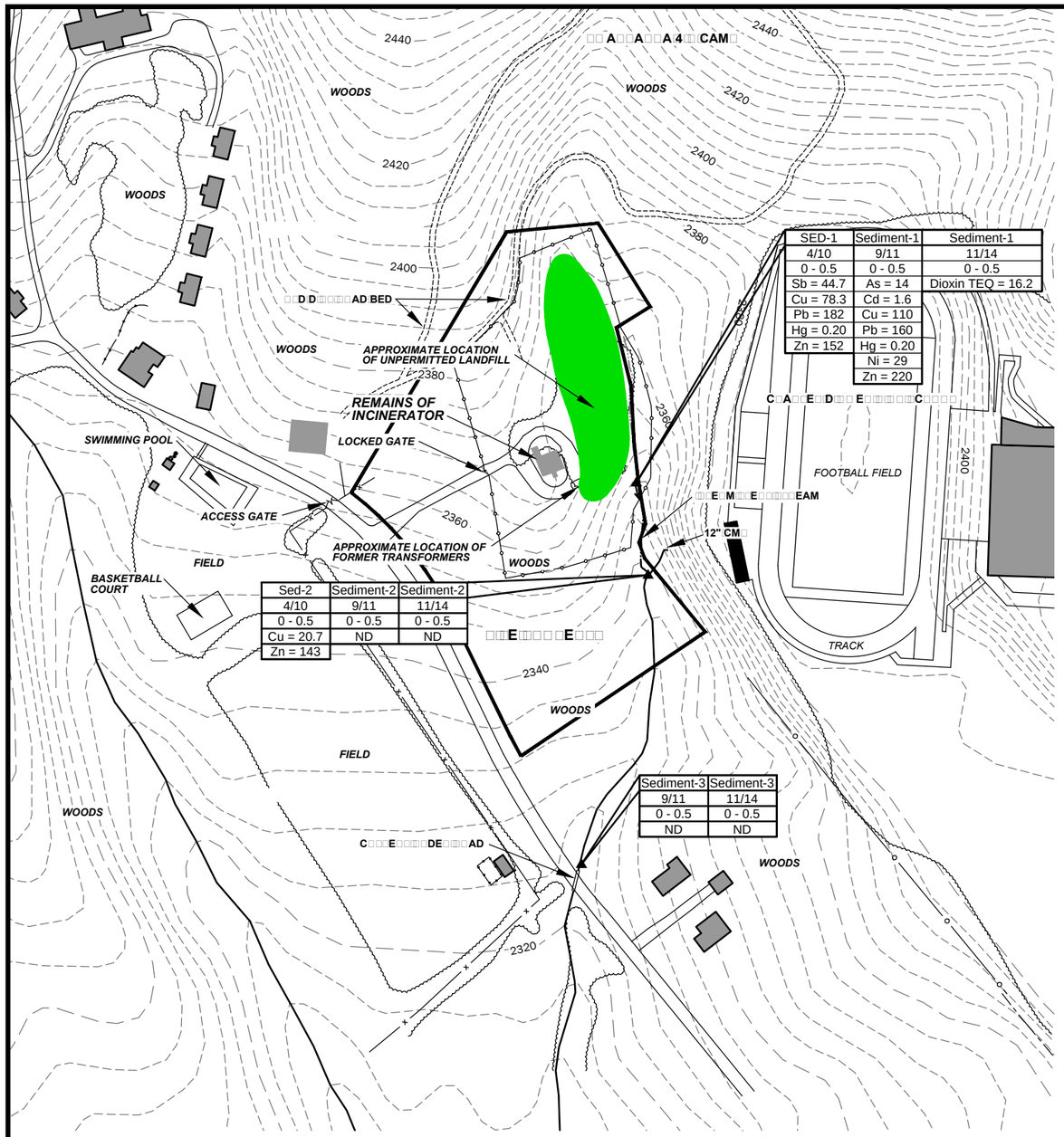
Scale (ft.)

0 60 120

Figure based on survey by Dennis Clinkscales, PLS plat dated September 18, 2009

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

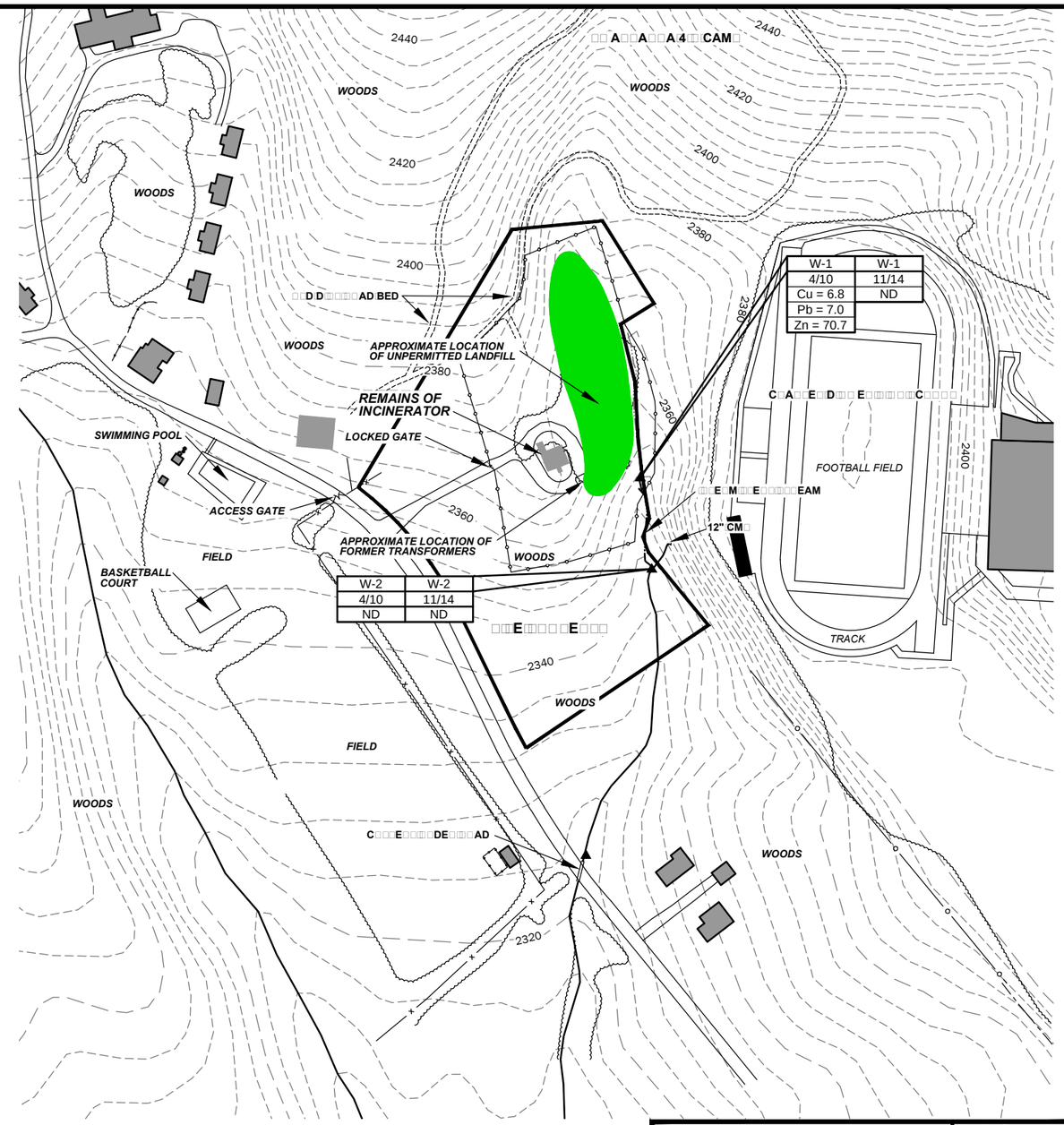
Gauging Date:		
Drawing Date: 6/30/15		
ACAD File: Fig 9.dwg		
Designed: PD	Water-Table Contour Map: 11/12/14	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina	Figure: 9



SED-1	Sediment-1	Sediment-1
4/10	9/11	11/14
0 - 0.5	0 - 0.5	0 - 0.5
Sb = 44.7	As = 14	Dioxin TEQ = 16.2
Cu = 78.3	Cd = 1.6	
Pb = 182	Cu = 110	
Hg = 0.20	Pb = 160	
Zn = 152	Hg = 0.20	
	Ni = 29	
	Zn = 220	

Sed-2	Sediment-2	Sediment-2
4/10	9/11	11/14
0 - 0.5	0 - 0.5	0 - 0.5
Cu = 20.7	ND	ND
Zn = 143		

Sediment-3	Sediment-3
9/11	11/14
0 - 0.5	0 - 0.5
ND	ND



W-1	W-1
4/10	11/14
Cu = 6.8	ND
Pb = 7.0	
Zn = 70.7	

W-2	W-2
4/10	11/14
ND	ND

LEGEND

▲ SED-3 Sediment Sample Locations

SED-1	Sample I.D.
9/11	Sample Date
0 - 0.5	Sample Depth (ft. below grade)
As = 2.66	Results of Analysis (mg/kg)*

*Compounds detected at concentrations above U.S. EPA Region 4 Screening Values are listed.

ND = No compounds detected at concentrations above U.S. EPA Region 4 Screening Values

N

Scale (ft.)

0 100 200

LEGEND

▲ W-3 Surface Water Sample Location

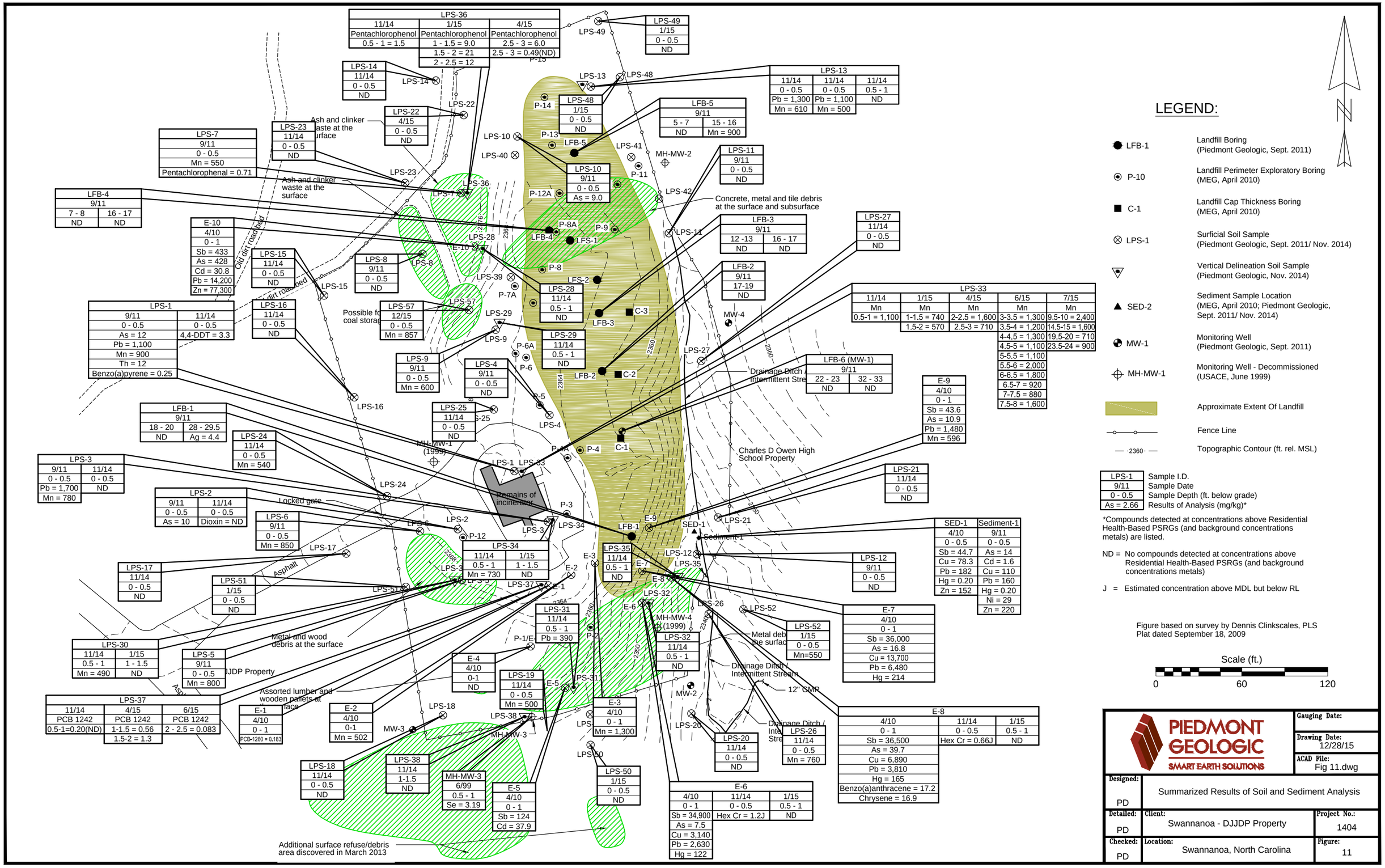
W-1	Sample I.D.
4/10	Sample Date
Cu = 6.8	Results of Analysis (ug/L)*

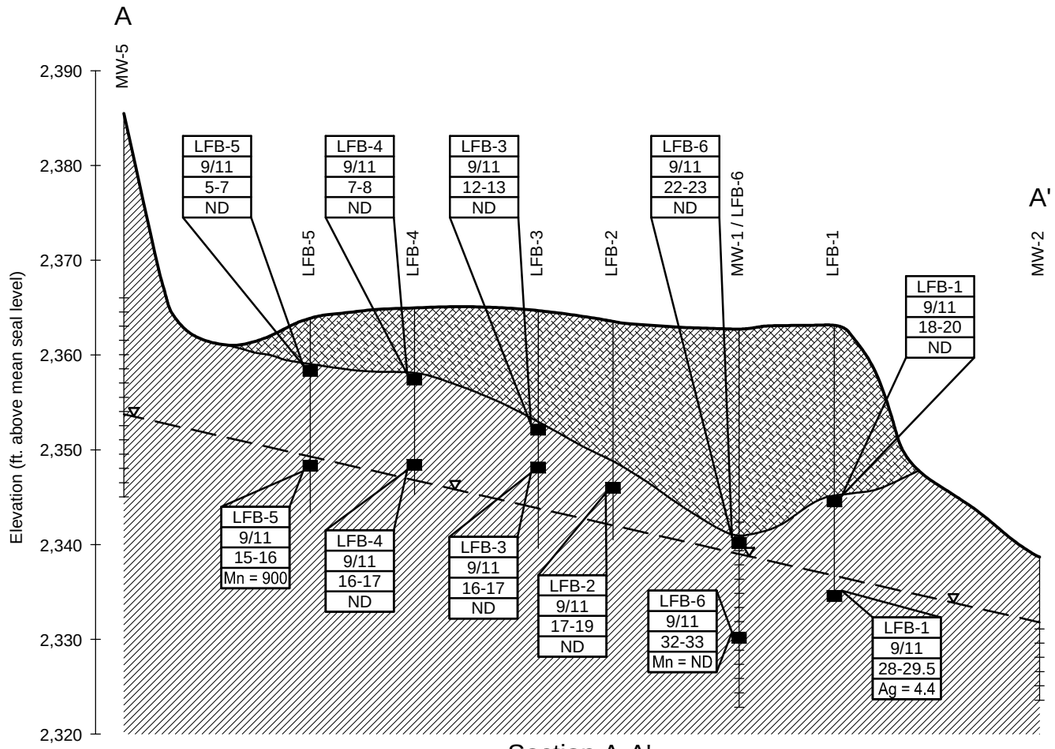
*Compounds detected at concentrations above U.S. EPA Region 4 Screening Values are listed.

ND = No compounds detected at concentrations above U.S. EPA Region 4 Screening Values

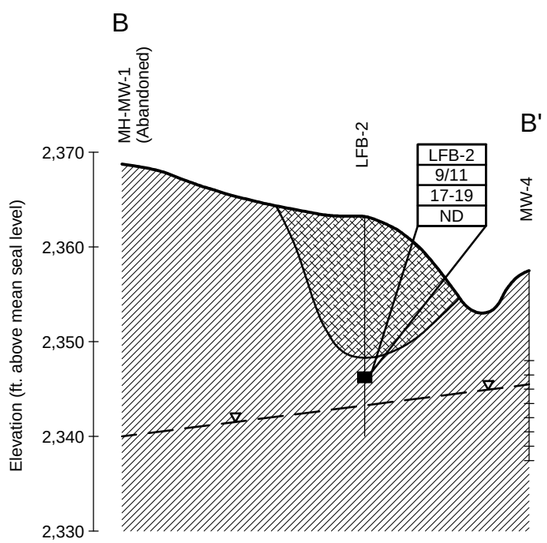
PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:	
Drawing Date:	11/9/15
ACAD File:	Fig 10.dwg
Designed: PD	Summarized Results of Surface Water & Sediment Analysis
Detailed: PD	Client: Swannanoa - DJJDP Property; Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina; Figure: 10


LEGEND:
LFB-1 Landfill Boring (Piedmont Geologic, Sept. 2011)
P-10 Landfill Perimeter Exploratory Boring (MEG, April 2010)
C-1 Landfill Cap Thickness Boring (MEG, April 2010)
LPS-1 Surficial Soil Sample (Piedmont Geologic, Sept. 2011/ Nov. 2014)
Vertical Delineation Soil Sample (Piedmont Geologic, Nov. 2014)
SED-2 Sediment Sample Location (MEG, April 2010; Piedmont Geologic, Sept. 2011/ Nov. 2014)
MW-1 Monitoring Well (Piedmont Geologic, Sept. 2011)
MH-MW-1 Monitoring Well - Decommissioned (USACE, June 1999)
Approximate Extent Of Landfill
Fence Line
2360 Topographic Contour (ft. rel. MSL)
LPS-1 Sample I.D.
9/11 Sample Date
0 - 0.5 Sample Depth (ft. below grade)
As = 2.66 Results of Analysis (mg/kg)*
*Compounds detected at concentrations above Residential Health-Based PSRGs (and background concentrations metals) are listed.
ND = No compounds detected at concentrations above Residential Health-Based PSRGs (and background concentrations metals)
J = Estimated concentration above MDL but below RL
Figure based on survey by Dennis Clinkscales, PLS
Plat dated September 18, 2009
Scale (ft.)
0 60 120
LPS-36 11/14 Pentachlorophenol 0.5 - 1 = 1.5 | 1/15 Pentachlorophenol 1 - 1.5 = 9.0, 1.5 - 2 = 21, 2 - 2.5 = 12 | 4/15 Pentachlorophenol 2.5 - 3 = 6.0, 2.5 - 3 = 0.49(ND)
LPS-49 1/15 0 - 0.5 ND
LPS-13 11/14 0 - 0.5 Pb = 1,300 Mn = 610 | 11/14 0 - 0.5 Pb = 1,100 Mn = 500 | 11/14 0.5 - 1 ND
LPS-14 11/14 0 - 0.5 ND
LPS-22 4/15 0 - 0.5 ND
LPS-48 1/15 0 - 0.5 ND
LFB-5 9/11 5 - 7 ND | 15 - 16 Mn = 900
LPS-23 11/14 0 - 0.5 ND
LPS-7 9/11 0 - 0.5 Mn = 550 Pentachlorophenal = 0.71
LPS-10 9/11 0 - 0.5 As = 9.0
LPS-11 9/11 0 - 0.5 ND
LFB-4 9/11 7 - 8 ND | 16 - 17 ND
E-10 4/10 0 - 1 Sb = 433 As = 428 Cd = 30.8 Pb = 14,200 Zn = 77,300
LPS-15 11/14 0 - 0.5 ND
LPS-8 9/11 0 - 0.5 ND
LFB-3 9/11 12 -13 ND | 16 - 17 ND
LPS-27 11/14 0 - 0.5 ND
LFB-2 9/11 17-19 ND
LPS-28 11/14 0.5 - 1 ND
LPS-33 11/14 Mn 0.5-1 = 1,100 | 1/15 Mn 1-1.5 = 740, 1.5-2 = 570 | 4/15 Mn 2-2.5 = 1,600, 2.5-3 = 710 | 6/15 Mn 3-3.5 = 1,300, 3.5-4 = 1,200, 4-4.5 = 1,300, 4.5-5 = 1,100, 5-5.5 = 1,100, 5.5-6 = 2,000, 6-6.5 = 1,800, 6.5-7 = 920, 7-7.5 = 880, 7.5-8 = 1,600 | 7/15 Mn 9.5-10 = 2,400, 14.5-15 = 1,600, 19.5-20 = 710, 23.5-24 = 900
LPS-1 9/11 0 - 0.5 As = 12 Pb = 1,100 Mn = 900 Th = 12 Benzo(a)pyrene = 0.25 | 11/14 0 - 0.5 4,4-DDT = 3.3
LPS-16 11/14 0 - 0.5 ND
LPS-57 12/15 0 - 0.5 Mn = 857
LPS-29 11/14 0.5 - 1 ND
LFB-6 (MW-1) 9/11 22 - 23 ND | 32 - 33 ND
LPS-9 9/11 0 - 0.5 Mn = 600
LPS-4 9/11 0 - 0.5 ND
E-9 4/10 0 - 1 Sb = 43.6 As = 10.9 Pb = 1,480 Mn = 596
LFB-1 9/11 18 - 20 ND | 28 - 29.5 Ag = 4.4
LPS-25 11/14 0 - 0.5 ND
LPS-24 11/14 0 - 0.5 Mn = 540
LPS-21 11/14 0 - 0.5 ND
LPS-3 9/11 0 - 0.5 Pb = 1,700 Mn = 780 | 11/14 0 - 0.5 ND
LPS-2 9/11 0 - 0.5 As = 10 | 11/14 0 - 0.5 Dioxin = ND
LPS-6 9/11 0 - 0.5 Mn = 850
SED-1 4/10 0 - 0.5 Sb = 44.7 Cu = 78.3 Pb = 182 Hg = 0.20 Zn = 152 | Sediment-1 9/11 0 - 0.5 As = 14 Cd = 1.6 Cu = 110 Pb = 160 Hg = 0.20 Ni = 29 Zn = 220
LPS-34 11/14 0.5 - 1 Mn = 730 | 1/15 1 - 1.5 ND
LPS-35 11/14 0.5 - 1 ND
LPS-12 9/11 0 - 0.5 ND
LPS-17 11/14 0 - 0.5 ND
LPS-51 1/15 0 - 0.5 ND
LPS-31 11/14 0.5 - 1 Pb = 390
LPS-32 11/14 0.5 - 1 ND
LPS-52 1/15 0 - 0.5 Mn=550
E-7 4/10 0 - 1 Sb = 36,000 As = 16.8 Cu = 13,700 Pb = 6,480 Hg = 214
LPS-30 11/14 0.5 - 1 Mn = 490 | 1/15 1 - 1.5 ND
LPS-5 9/11 0 - 0.5 Mn = 800
E-4 4/10 0-1 ND
LPS-19 11/14 0 - 0.5 Mn = 500
E-3 4/10 0 - 1 Mn = 1,300
LPS-37 11/14 PCB 1242 0.5-1=0.20(ND) | 4/15 PCB 1242 1-1.5 = 0.56, 1.5-2 = 1.3 | 6/15 PCB 1242 2 - 2.5 = 0.083
E-1 4/10 0 - 1 PCB-1260 = 0.183
E-2 4/10 0-1 Mn = 502
LPS-20 11/14 0 - 0.5 ND
LPS-26 11/14 0 - 0.5 Mn = 760
E-8 4/10 0 - 1 Sb = 36,500 As = 39.7 Cu = 6,890 Pb = 3,810 Hg = 165 Benzo(a)anthracene = 17.2 Chrysene = 16.9 | 11/14 0 - 0.5 Hex Cr = 0.66J | 1/15 0.5 - 1 ND
LPS-18 11/14 0 - 0.5 ND
LPS-38 11/14 1-1.5 ND
MH-MW-3 6/99 0.5 - 1 Se = 3.19
E-5 4/10 0 - 1 Sb = 124 Cd = 37.9
LPS-50 1/15 0 - 0.5 ND
E-6 4/10 0 - 1 Sb = 34,900 As = 7.5 Cu = 3,140 Pb = 2,630 Hg = 122 | 11/14 0 - 0.5 Hex Cr = 1.2J | 1/15 0.5 - 1 ND
Ash and clinker waste at the surface
Concrete, metal and tile debris at the surface and subsurface
Old dirt road bed
Drainage Ditch / Intermittent Stream
Charles D Owen High School Property
Remains of incinerator
Locked gate
Asphalt
Metal and wood debris at the surface
DJJDP Property
Assorted lumber and wooden pallets at surface
12" CMP
Additional surface refuse/debris area discovered in March 2013
PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS
Gauging Date:
Drawing Date: 12/28/15
ACAD File: Fig 11.dwg
Designed: PD
Summarized Results of Soil and Sediment Analysis
Detailed: PD
Client: Swannanoa - DJJDP Property
Project No.: 1404
Checked: PD
Location: Swannanoa, North Carolina
Figure: 11



Section A-A'



Section B-B'

Legend:

- Landfill Material
- Native Soil: micaceous silty / clayey sand and sandy silt / clay; saprolitic in lower sections
- Groundwater surface - Sept. 19, 2011
- Landfill soil boring with soil sample depth
- Monitoring well casing screen and interval

LFB-1	Sample I.D.
9/11	Sample Date
28-29.5	Sample Depth (ft. below grade)
Ag = 4.4	Results of Analysis (mg/kg)*

*Compounds/Metals detected at concentrations above PSRGs and background concentrations (metals) are listed.

ND = No compounds/metals detected at concentrations above PSRGS and background concentrations (metals)

Scale (ft.)
0 80 160

Horizontal scale: 1" = 80'
Vertical scale: 1" = 8
Vertical Exaggeration = 10x

PIEDMONT GEOLOGIC SMART EARTH SOLUTIONS		Gauging Date:
		Drawing Date: 6/30/15
		ACAD File: Fig 12.dwg
Designed: PD	Geologic Cross Sections with Results of Soil Analysis	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina	Figure: 12

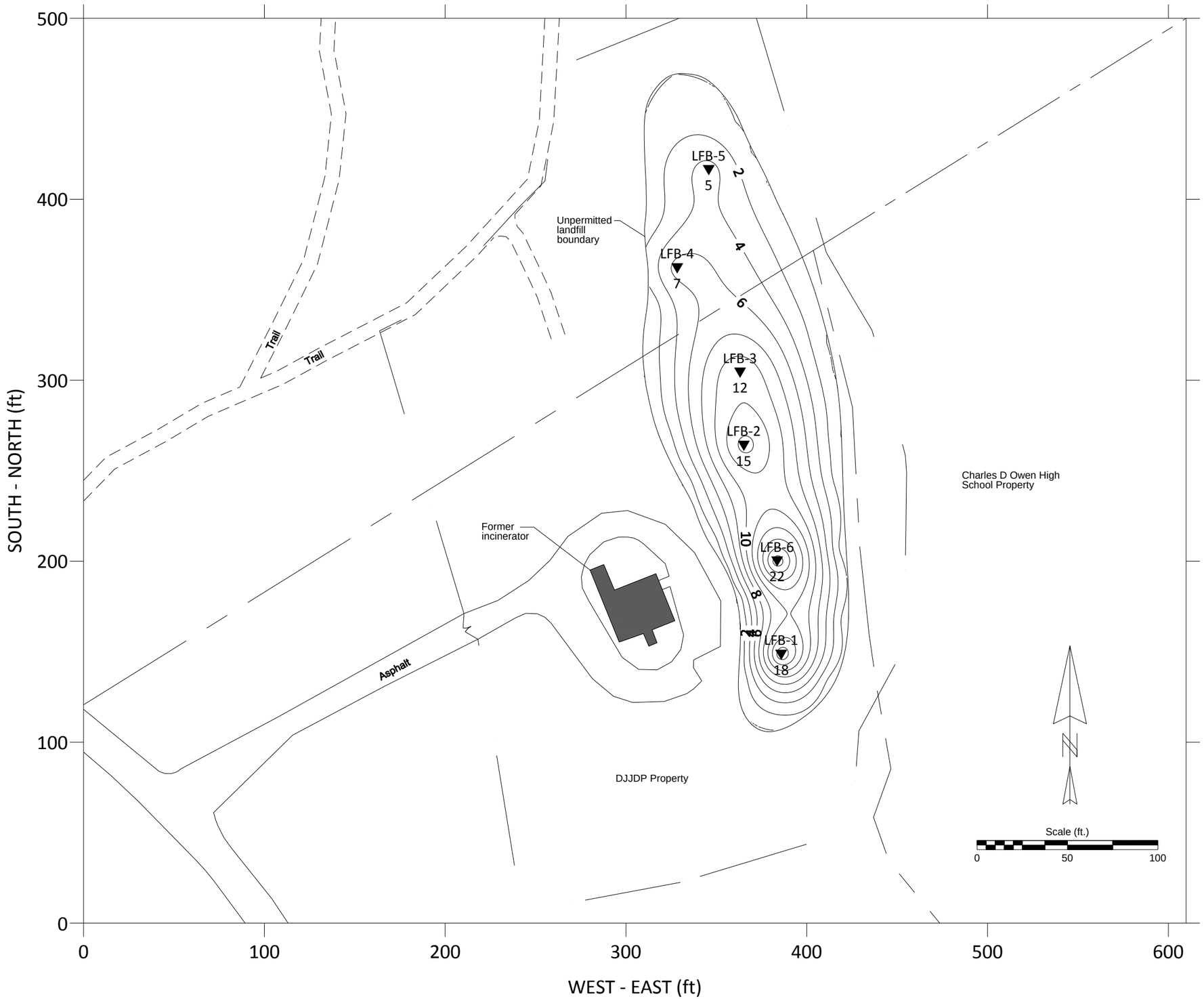
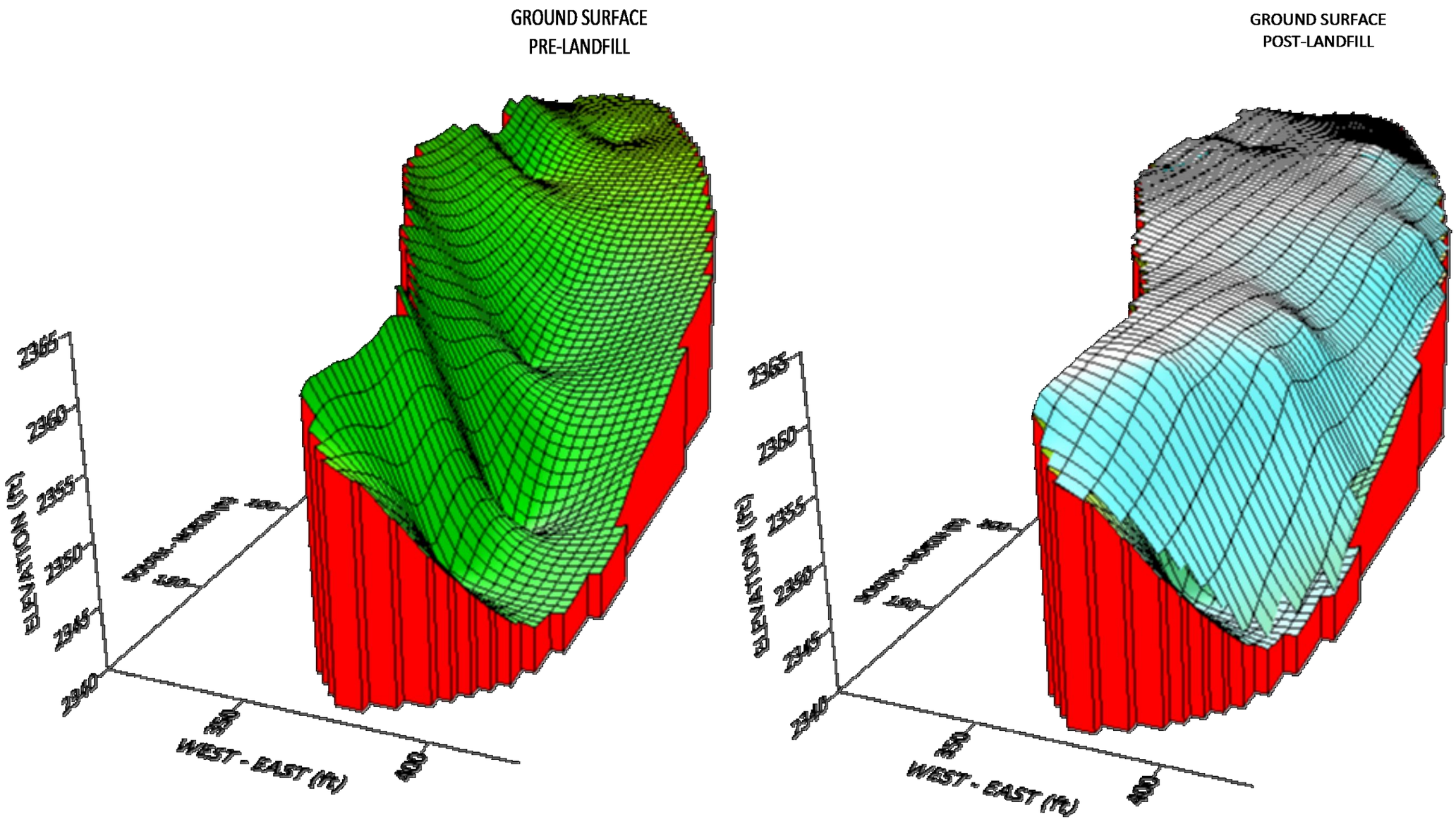


FIGURE 13
LANDFILL THICKNESS CONTOUR MAP
DJJDP - SWANNANOA PROPERTY
SWANNANOA, NORTH CAROLINA

Contours in feet of landfill thickness



VIEW FROM SOUTH-SOUTHEAST LOOKING NORTH-NORTHWEST.
GREEN SURFACE (LEFT) REPRESENTS GROUND SURFACE PRIOR TO LANDFILL.
LIGHT-BLUE SURFACE (RIGHT) REPRESENTS PRESENT GROUND SURFACE AFTER LANDFILL.

FIGURE 14
COMPARISON OF PRE-LANDFILL AND POST-LANDFILL GROUND SURFACE
SWANNANOA - DJJDP PROPERTY

LEGEND:

P-10	Landfill Perimeter Exploratory Boring
LFB-1	Landfill Interior Boring/Sample
C-1	Landfill Cap-Thickness Boring
LPS-1	Surface Soil Sample
	Subsurface Soil Sample
SED-2	Sediment Sample
MW-1	Monitoring Well
MH-MW-1	Monitoring Well - Decommissioned
	Approximate Extent Of Landfill
A	Surface Refuse/Debris Area
	Fence Line
2360	Topographic Contour (ft. rel. MSL)
1	Landfill-Perimeter Area to be Excavated

Scale (ft.)

0 60 120

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 3/15/16		
ACAD File: Fig 15.dwg		
Designed: PD	Summary of Proposed Site Remedial Action	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina	Figure: 15

Map based on 2006 aerials obtained from Buncombe County Geographical Information System at: http://www.buncombecounty.org/governing/depts/GIS/dataDownload.asp

2400
2380
2360
2340

Access road for loading
Staging/ loading area
Decontamination station (Figure 17)
Incinerator
Asphalt Drive
Sediment trap (Appendix D)
Chain-link fence to be removed and replaced with temporary barrier.
Area to be incorporated into staging area following incinerator removal and soil excavation

1 2 3 4 5
A B C D E F

Legend:

Approximate Extent Of Landfill

Surface Refuse/Debris Area

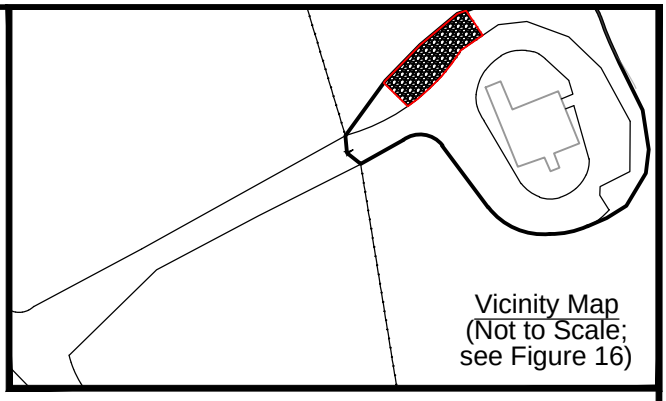
Landfill-Perimeter Area to be Excavated

Sediment Fence (Appendix D)

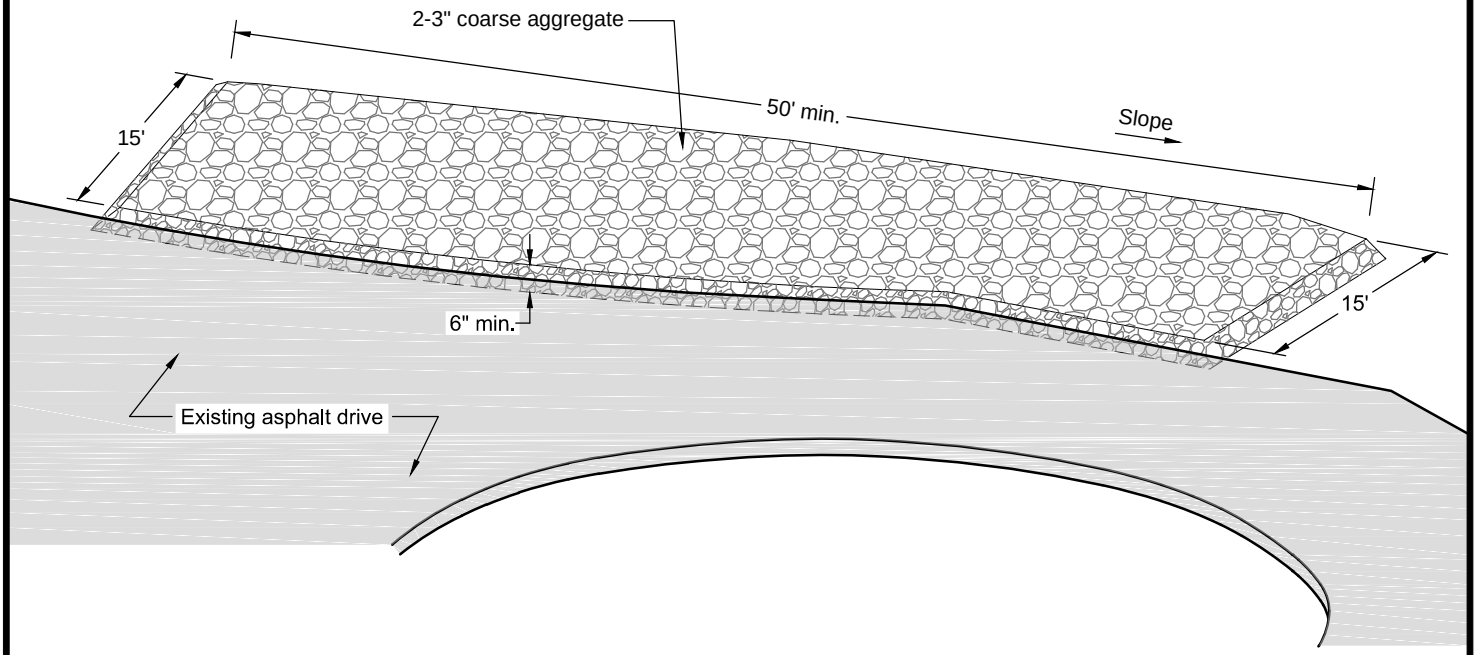
Scale (ft.)
0 60 120

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 3/15/16		
ACAD File: Fig 16.dwg		
Designed: JBL	Pre-Excavation Site Preparation Details	
Detailed: JBL	Client: Swannanoa - DJJDP Property	Project No.: 1632
Checked: JBL	Location: Swannanoa, North Carolina	Figure: 16

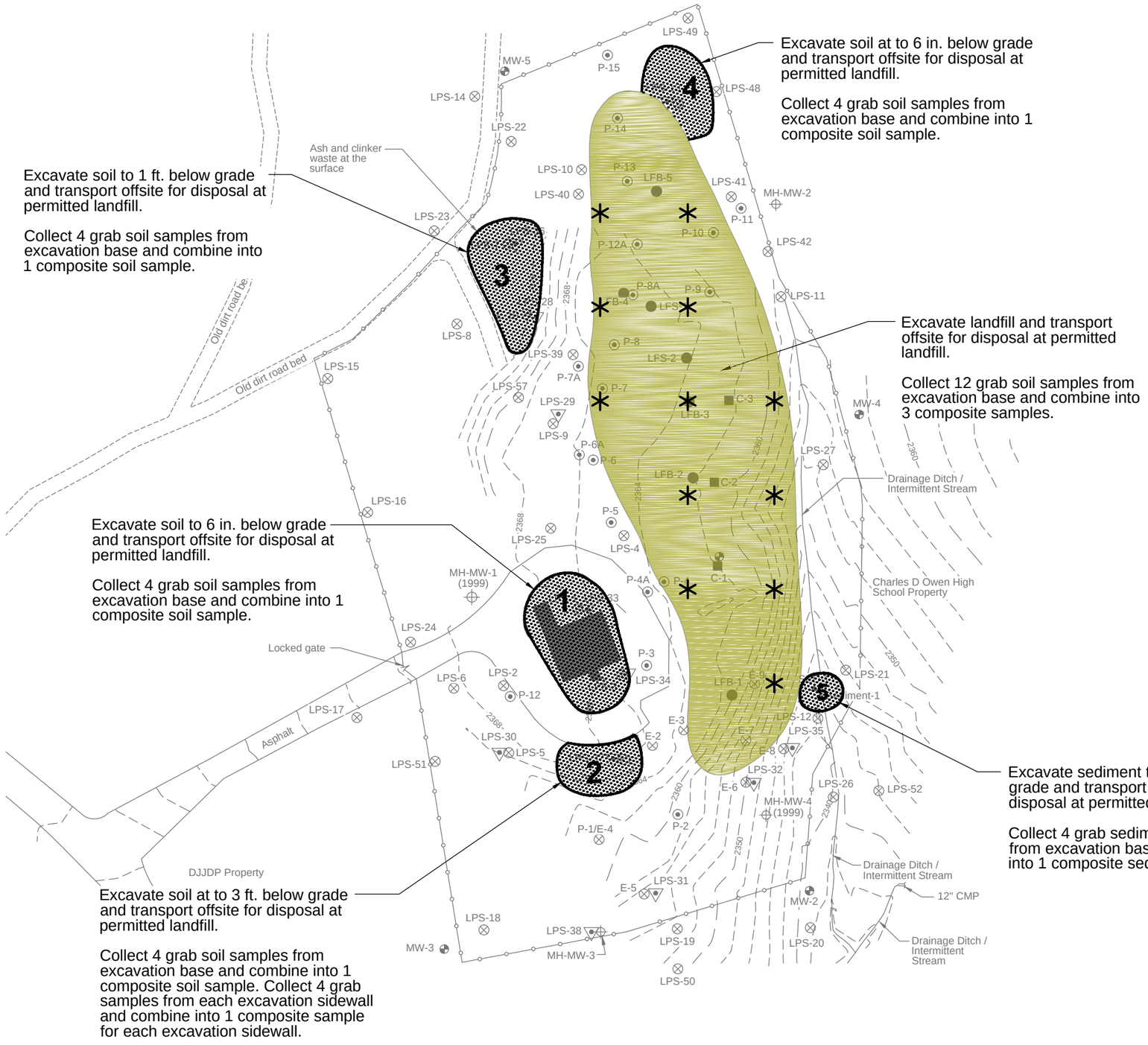


Vicinity Map
(Not to Scale;
see Figure 16)



Decontamination Station

PIEDMONT GEOLOGIC SMART EARTH SOLUTIONS		Gauging Date:
		Drawing Date: 3/18/16
		ACAD File: Fig 17.dwg
Designed: JBL	Decontamination Station Details	
Detailed: JBL	Client: Swannanoa - DJJDP Property	Project No.: 1632
Checked: JBL	Location: Swannanoa, North Carolina	Figure: 17



LEGEND:

P-10	Landfill Perimeter Exploratory Boring
LFB-1	Landfill Interior Boring/Sample
C-1	Landfill Cap-Thickness Boring
LPS-1	Surface Soil Sample
	Subsurface Soil Sample
SED-2	Sediment Sample
MW-1	Monitoring Well
MH-MW-1	Monitoring Well - Decommissioned
	Approximate Extent Of Landfill
	Fence Line
2360	Topographic Contour (ft. rel. MSL)
1	Landfill-Perimeter Area to be Excavated
*	Landfill-base grab soil sample location (approximate)

Scale (ft.)

0 60 120

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 3/15/16		
ACAD File: Fig 16.dwg		
Designed: PD	Post-Excavation Soil/Sediment Sampling Plan	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina	Figure: 18

TABLES

TABLE 1
GROUNDWATER MONITORING WELL CONSTRUCTION DETAILS

Swannanoa DJJDP Property
Swannanoa, North Carolina

Well I.D.	Well Location	Date Installed	Total Depth (1)	Well Screen/ Casing I.D.	Well Screen/ Casing Material	Screen Interval (1)	Screen Slot Size	TOC Elev. (2)
MW-1	Onsite	9/15/2011	40	2"	Sch 40 PVC	20-40	0.010"	2,366.04
MW-2	Onsite	9/15/2011	15	2"	Sch 40 PVC	10-15	0.010"	2,342.13
MW-3	Onsite	9/15/2011	40	2"	Sch 40 PVC	20-40	0.010"	2,354.09
MW-4	Onsite	9/15/2011	20	2"	Sch 40 PVC	10-20	0.010"	2,361.42
MW-5	Onsite	9/16/2011	40	2"	Sch 40 PVC	20-40	0.010"	2,388.88
MW-6	Offsite	11/11/2014	20	2"	Sch 40 PVC	10-20	0.010"	NS
MW-7	Offsite	11/11/2014	15	2"	Sch 40 PVC	5-15	0.010"	NS
MW-8	Offsite	11/11/2014	20	2"	Sch 40 PVC	10-20	0.010"	NS

(1) Measured in feet below grade.
(2) Measured in feet relative to mean sea level.
TOC = Top of casing
NS = Not surveyed.

TABLE 2
MONITORING-WELL GAUGING DATA

Swannanoa DJJDP Property
Swannanoa, North Carolina

Well	Date	TOC Elevation (ft) (1)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft) (1)
MW-1	9/19/2011	2,366.04	26.38	2,339.66
	11/12/2014	2,366.04	19.49	2,346.55
	4/29/2015	2,366.04	18.49	2,347.55
MW-2	9/19/2011	2,342.13	9.27	2,332.86
	11/12/2014	2,342.13	5.39	2,336.74
	4/29/2015	2,342.13	5.05	2,337.08
MW-3	9/19/2011	2,354.09	23.79	2,330.30
	11/12/2014	2,354.09	19.58	2,334.51
	4/29/2015	2,354.09	17.85	2,336.24
MW-4	9/19/2011	2,361.42	15.71	2,345.71
	11/12/2014	2,361.42	9.97	2,351.45
	4/29/2015	2,361.42	8.49	2,352.93
MW-5	9/19/2011	2,388.88	35.93	2,352.95
	11/12/2014	2,388.88	31.59	2,357.29
	4/29/2015	2,388.88	29.27	2,359.61
MW-6	11/12/2014	NS	7.42	NA
MW-7	11/12/2014	NS	4.99	NA
MW-8	11/12/2014	NS	8.31	NA

(1) = Relative to site datum
TOC = Top of casing
NS = Not surveyed.
NA = Not applicable.

TABLE 3
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: METALS, VOCs, SVOCs, AND PCBs
LANDFILL-PERIMETER SOIL AND EXPOSED-WASTE SAMPLES COLLECTED APRIL 2010 (1)

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.: **Sample Date:**	**E-1** **4/15/10**	**E-2** **4/15/10** **4/21/10***	**E-3** **4/15/10** **4/21/10***	**E-4** **4/20/10**	**E-5** **4/20/10**	**E-6** **4/20/10**	**E-7** **4/20/10**	**E-8** **4/15/10** **4/20/10***	**E-9** **4/15/10** **4/20/10***	**E-10** **4/16/10** **4/20/10****	**Statistical Background (3)**	**PSRG (2)** **Residential Health-Based**	**Industrial Health-Based**	**Protection of Groundwater**
Hazardous Substance List Metals EPA Method 6010B/7471 (mg/kg)														
Antimony	**1.5**	**2.9**	<3.0	0.63	**124**	**34,900**	**36,000**	**36,500**	**43.6**	**433**	1.3	6.2	94	0.9
Arsenic	<0.48	3.0	3.7	6.1	2.5	**7.5**	**16.8**	**39.7**	**10.9**	**428**	7.4	0.68	3	5.8
Beryllium	0.98	**1.9**	**1.9**	0.35	0.35	0.26	<0.12	0.36	0.99	0.51	1.6	32	460	63
Cadmium	**2.0**	<0.56	<0.61	<0.093	**37.9**	**0.61**	**0.59**	**1.9**	**3.4**	**30.8**	0.55	14	200	3.0
Chromium	24.6	33.2	28.0	4.2	26.1	**1,560**	**16,800**	**4,340**	43.4	**67.2**	57	24,000	100,000	360,000
Copper	27.4	40.0	**47.8**	19.0	**77.5**	**3,140**	**13,700**	**6,890**	**134**	21.0	47	620	9,400	700
Lead	16.8	29.1	21.7	10.6	**285**	**2,630**	**6,480**	**3,810**	**1,480**	**14,200**	47	400	800	270
Manganese	124	**502**	**1,300**	81.6	471	281	83.6	372	**596**	134	482	360	5,200	65
Mercury	0.033	0.038	0.028	0.015	**0.55**	**122**	**214**	**165**	**0.21**	0.017	0.081	1.9	3.1	1.0
Nickel	10.4	15.0	**54.9**	6.8	**39.5**	9.2	18.0	**40.1**	22.2	4.4	26	300	4,400	130
Selenium	1.3	<5.6	<6.1	<0.93	<1.2	1.3	**6.1**	**3.1**	<1.9	<0.88	2.8	78	1,200	2.1
Silver	<0.48	<2.8	<3.0	<0.46	<0.58	**0.62**	**1.1**	<0.54	**7.0**	**3.6**	0.60	78	1,200	3.4
Thallium	<0.97	<5.6	<6.1	<0.93	<1.2	<1.0	**2.9**	<1.1	<1.9	<0.88	1.4	0.16	2.4	0.28
Zinc	22.6	64.0	72.7	16.1	**2,370**	**124**	**184**	**420**	**1,540**	**77,300**	78	4,600	70,000	1,200
Volatile Organic Compounds EPA Method 8260B (mg/kg) (4)														
Acetone	<0.113	<0.109	0.138	0.622	0.502	<17.7	<38.9	<7.09	0.324	0.323	--	12,000	100,000	24
Isopropylbenzene	<0.0057	<0.0055	<0.0058	<0.0149	<0.0104	<0.885	3.06	<0.355	<0.0078	<0.0075	--	270	270	1.3
Methyl acetate	<0.0113	<0.0109	<0.0116	0.278	<0.0208	4.16	<3.89	<0.709	<0.0156	<0.015	--	16,000	29,000	NG
o-Xylene	<0.0057	<0.0055	<0.0058	<0.0149	<0.0104	<0.885	4.0	<0.355	<0.0078	<0.0075	--	130	434	NG
Toluene	<0.0057	<0.0055	<0.0058	<0.0149	<0.0104	<0.885	<1.95	<0.355	<0.0078	0.0162	--	820	820	5.5
Semivolatile Organic Compounds EPA Method 8270D (mg/kg) (4)														
Benzo (a) anthracene	<0.429	<0.419	<2.08	<0.398	<2.25	<43.2	<122	17.2	<26.2	<0.422	--	0.16	2.9	0.18
Chrysene	<0.429	<0.419	<2.08	<0.398	<2.25	<43.2	<122	16.9	<26.2	<0.422	--	16	29	18
Pyrene	<0.429	<0.419	<2.08	<0.398	<2.25	<43.2	<122	12.4	<26.2	<0.422	--	360	4,600	220
Polychlorinated Biphenyls EPA Method 8082 (mg/kg) (3)														
PCB-1260	0.183	<0.0419	<0.0416	<0.797	0.107	<0.432	<0.975	<2.25	<2.10	<0.0422	--	1		0.14

(1) Samples E-6 through E-9 were exposed-waste samples. The remaining samples were surface-soil samples collected from 0-12 inches below grade.
(2) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (September 2015).
(3) Derived from background soil samples collected in September 2011.
(4) Method compounds detected in one or more samples are listed.
* Sample for volatile organic compound analysis collected on latter date. Sample for all other analysis methods collected on earlier date.
** Sample for metals analysis collected on earlier date. Sample for all other analysis methods collected on latter date.
Concentrations listed in bold type are above statistical background concentration (metals).
Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.
Concentrations listed in green-shaded cells are above Residential-Health-Based PSRG and Protection-of-Groundwater PSRG.
Concentrations listed in orange-shaded cells are above Residential Health-Based PSRG and Industrial Health-Based PSRG.
Concentrations listed in red-shaded cells are above Residential Health-Based PSRG, Industrial Health-Based PSRG, and Protection-of-Groundwater PSRG.
NG = No PSRG exists.

TABLE 4
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS
LANDFILL-PERIMETER SOIL AND EXPOSED-WASTE SAMPLES COLLECTED APRIL 2010

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**E-1**	**E-2**	**E-3**	**E-7**	**E-8**	**E-9**	**PSRG (1)**		
Sample Date:	**4/15/10**	**4/15/10 4/21/10***	**4/15/10 4/21/10***	**4/20/10**	**4/15/10 4/20/10***	**4/15/10 4/20/10***	**Residential Health-Based**	**Industrial Health-Based**	**Protection of Groundwater**
Tentatively Identified Compounds by EPA Methods 8260 and 8270 (mg/kg)									
1,1' - (1,3 Propanediyel) bis-benzene	ND	ND	ND	ND	ND	0.118	NG	NG	NG
1,2,3,5-Tetramethyl-benzene	ND	ND	ND	51.2	ND	ND	NG	NG	NG
16-Hentriacontanone	ND	0.399	ND	ND	ND	ND	NG	NG	NG
1-Ethyl-3,5-dimethyl-benzene	ND	ND	ND	46.4	ND	ND	NG	NG	NG
1-Methyl-4-propylbenzene	ND	ND	ND	11	ND	ND	NG	NG	NG
1-Methylnaphthalene	ND	ND	ND	ND	ND	0.114	18	73	0.055
1-Phenanthrene carboxylic acid	ND	ND	ND	ND	1.28	ND	NG	NG	NG
2,4a,8,8-Tetramethyldecahyd	ND	3.5	ND	ND	ND	ND	NG	NG	NG
2,7,10-Trimethyl-dodecane	ND	ND	ND	ND	ND	0.174	NG	NG	NG
3-Methyl-decane	ND	ND	ND	24.8	ND	ND	NG	NG	NG
4,6-Dimethyl-dodecane	ND	ND	ND	ND	3.85	ND	NG	NG	NG
5-Bromo-4-oxo-4,5,6,7-tetrahydro-2,1,3-benzoxadiazol-4-one	0.621	ND	ND	ND	ND	ND	NG	NG	NG
5-Methyl-decane	ND	ND	ND	9.52	ND	ND	NG	NG	NG
Decahydro-1,6-dimethyl-4'(1-methylethyl)-naphthalene	ND	0.0177	ND	ND	ND	ND	NG	NG	NG
Decahydro-2-Napthalenol	ND	ND	ND	ND	1.69	ND	NG	NG	NG
Decahydro-4,4,8,9,10-pentamethylnaphthalene	ND	0.752	ND	ND	ND	ND	NG	NG	NG
Decahydro-8a-ethyl-1,1,4a,6	ND	8.25	ND	ND	ND	ND	NG	NG	NG
Eicosanoic acid	ND	ND	ND	ND	6.89	ND	NG	NG	NG
Friedelan-3-one	ND	ND	2.5	ND	ND	ND	NG	NG	NG
Hexadecanoic acid	ND	ND	ND	ND	36	ND	NG	NG	NG
n-Hexadecanoic acid	ND	ND	ND	45.6	ND	ND	NG	NG	NG
Octadecanoic acid	ND	ND	ND	ND	19.8	ND	NG	NG	NG
Stigmast-4-en-3-one	ND	0.311	ND	ND	ND	ND	NG	NG	NG
Styrene	ND	ND	ND	ND	ND	0.308	870	870	0.92
Tetradecanoic acid	ND	ND	ND	ND	7.66	ND	NG	NG	NG

(1) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (September 2015).
NG = No PSRG exists. ND = Not detected.
* Sample for EPA Method 8260 analysis collected on latter date. Sample for EPA Method 8270 analysis collected on earlier date.
Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.
Concentrations listed in green-shaded cells are above Residential-Health-Based PSRG and Protection-of-Groundwater PSRG.
Concentrations listed in orange-shaded cells are above Residential Health-Based PSRG and Industrial Health-Based PSRG.
Concentrations listed in red-shaded cells are above Residential Health-Based PSRG, Industrial Health-Based PSRG, and Protection-of-Groundwater PSRG.

TABLE 5
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
TOXICITY CHARACTERISTIC LEACHING PROCEDURE
EXPOSED-WASTE SAMPLE COLLECTED MAY 2010

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.: **Sample Date:**	**Exposed Surface Waste (E-7)** **5/26/10**	**RCRA Hazardous Waste Criteria (1)**
TCLP Metals **EPA Method 6010B/7470A (mg/L)**		
Arsenic	<0.050	5.0
Barium	1.9	100
Cadmium	<0.0050	1.0
Chromium	0.090	5.0
Lead	0.96	5.0
Mercury	0.0936	0.2
Selenium	<0.050	1.0
Silver	<0.025	5.0
TCLP Volatile Organics **EPA Method 8260B (mg/L)**		
Benzene	<0.165	0.5
Carbon tetrachloride	<0.165	0.5
Chlorobenzene	<0.165	100
Chloroform	<0.165	6.0
1,2-Dichloroethane	<0.165	0.5
1,1-Dichloroethene	<0.165	0.7
2-Butanone (MEK)	<0.165	200
Tetrachloroethene	<0.165	0.7
Trichloroethene	<0.165	0.5
Vinyl chloride	<0.165	0.2
TCLP Semivolatile Organics **EPA Method 8270C (mg/L)**		
1,4-Dichlorobenzene	<0.050	7.5
2,4-Dinitrotoluene	<0.050	0.13
Hexachlorobenzene	<0.050	0.13
Hexachloro-1,3-butadiene	<0.050	0.5
Hexachloroethane	<0.050	3.0
Nitrobenzene	<0.050	2.0
Pyridine	<0.050	5.0
3&4-Methyl Phenol	<0.050	400
2-Methylphenol	<0.050	200
Pentachlorophenol	<0.050	100
2,4,5-Trichlorophenol	<0.050	400
2,4,6-Trichlorophenol	<0.050	2.0

(1) 40 CFR 261.24.

TABLE 6
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
SEDIMENT SAMPLES COLLECTED APRIL 2010

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.: **Sample Date:**	**SED-1** **4/15/10** **4/21/10***	**SED-2** **4/15/10** **4/21/10***	**EPA Screening Value** **(1)**
Hazardous Substance List Metals **EPA Method 6010B/7471 (mg/kg)**			
Antimony	**44.7**	1.9	12
Arsenic	1.8	2.0	7.24
Beryllium	0.54	1.5	32 (2)
Cadmium	0.37	<0.32	1
Chromium	13.7	27.8	52.3
Copper	**78.3**	**20.7**	18.7
Lead	**182**	19.1	30.2
Manganese	141	297	360 (2)
Mercury	**0.20**	0.025	0.13
Nickel	11.1	13.7	15.9
Selenium	1.4	<3.2	78 (2)
Silver	<0.55	<1.6	2
Thallium	<1.1	<3.2	0.16 (2)
Zinc	**152**	**143**	124
Volatile Organics **EPA Method 8260B (mg/kg)**			
Volatile organics	ND	ND	NA
Semi-Volatile Organics **EPA Method 8270D (mg/kg) (3)**			
Di-n-butyl phthalate	0.979	<0.532	1,200 (2)
Polychlorinated Biphenyls **EPA Method 8082 (mg/kg)**			
Polychlorinated biphenyls	ND	ND	33
Tentatively Identified Compounds **EPA Methods 8260 and 8270 (mg/kg)**			
1,1,2,2-Tetrachloroethane	ND	0.395	NS
1-Bromo-3-methyl-2-butene	0.871	ND	NS
2,3-Dimethyl-1-pentene	ND	0.745	NS
3,3-Dimethyl-1-pentene	ND	0.876	NS
Bromo-cyclopentane	0.688	ND	NS
Friedelan-3-one	0.211	ND	NS
p,p-DDT	**0.378**	ND	0.0033

(1) U.S. EPA Region 4 Waste Mgt. Division Sediment Screening Values for Hazardous Waste Sites (Nov. 2001).
(2) No EPA screening value exists. Value listed is IHSB Residential Health-Based PSRG (March 2015).
(3) Method compounds detected in one or more samples are listed.
* Sample for volatile organic compound analysis collected on latter date.
Sample for all other analysis methods collected on earlier date.
NS = No EPA screening level or PSRG exists.
ND = Not detected.
NA = Not applicable.
Concentrations listed in bold type are above EPA screening level or PSRG.

TABLE 7
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
SURFACE-WATER SAMPLES COLLECTED APRIL 2010

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**W-1**	**W-2**	**NC 2B**	**EPA Screening Value (2)**	
Sample Date:	**4/20/10**	**4/20/10**	**Standard (1)**	**Acute Screening Value**	**Chronic Screening Value**
Hazardous Substance List Metals EPA Method 6010/7470 (ug/L)					
Antimony	<5.0	<5.0	NS	1,300	160
Arsenic	<5.0	<5.0	50 (a)	360	190
Beryllium	<1.0	<1.0	6.5 (a)	16	0.53
Cadmium	<1.0	<1.0	2 (a)	1.79	0.66
Chromium	<5.0	<5.0	50 (a)	984.32	117.32
Copper	**6.8**	<5.0	7 (a)	9.22	6.54
Lead	**7.0**	<5.0	25 (a)	33.78	1.32
Manganese	<5.0	21.5	NS	NS	NS
Mercury	<0.20	<5.0	0.012 (a)	2.4	0.012
Nickel	<5.0	<5.0	88 (a)	789	87.71
Selenium	<10.0	<10.0	5 (a)	20	5
Silver	<5.0	<5.0	0.06 (a)	1.23	0.012
Thallium	<10.0	<10.0	0.47	140	4.0
Zinc	**70.7**	58.7	50 (a)	65.04	58.91
Volatile Organics EPA Method 8260B (ug/L) (3)					
Tetrachloroethene	1.5	1.6	3.3 (b)	528	84
Semi-Volatile Organics EPA Method 8270D (ug/L)					
Semivolatile organics	ND	ND	NA	NA	NA
Polychlorinated Bipenyls EPA Method 8082 (ug/L)					
Polychlorinated biphenyls	ND	ND	NA	NA	NA
Tentatively Identified Compounds EPA Methods 8260 and 8270 (mg/kg)					
Tentatively identified compounds	ND	ND	NA	NA	NA

(1) North Carolina surface water standard under 15A NCAC 2B (May 2007).
(a) Freshwater aquatic life criteria. (b) human health criteria.
(2) U.S. EPA Region 4 Waste Mgt. Division Freshwater Screening Values for Hazardous Waste Sites (November 2001).
(3) Method compounds detected in one or more samples are listed.
NS = No 2B standard or EPA screening level exists.
ND = No method compounds detected.
NA = Not applicable.
Concentrations listed in bold type are above NC 2B standard or EPA screening level.

TABLE 8
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
VOCs, SVOCs, METALS, PESTICDES, PCBs, AND WET CHEMISTRY
INCINERATOR-WASTE AND LANDFILL-WASTE COMPOSITE SAMPLES COLLECTED SEPTEMBER 2011

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**Incinerator-Waste Composite**	**Landfill-Waste Composite**	**Statistical Background (1)**	**PSRG (2)**	
Sample Date:	**9/13/11**	**9/15/11**		**Residential Health-Based**	**Protection of Groundwater**
EPA Method 9056 (mg/kg)					
Nitrate	64	8.6	--	26,000	NG
Sulfate	4,100	210	--	NG	NG
EPA Method 350.1 (mg/kg)					
Ammonia	<5.5	<6.4	--	NG	6.4
EPA Method 8315 (mg/kg)					
Formaldehyde	<1.8	<2.0	--	2,400	2.4
EPA Method 9045D (mg/kg)					
Corrosivity	Non-Corrosive	Non-Corrosive	--	--	--
EPA Method D93/1010A (mg/kg)					
Ignitability (at 170 deg. F)	Did Not Ignite	Did Not Ignite	--	--	--
EPA Method 9012B (mg/kg)					
Reactive Cyanide	<0.140	<0.125	--	NG	NG
EPA Method 9034/9030B (mg/kg)					
Reactive Sulfide	<28	<25	--	NG	NG
Hazardous Substance List Metals					
EPA Method 6010B/7471 (mg/kg)					
Antimony	<1.1	<13	1.3	6.2	0.9
Arsenic	1.5	**11**	7.4	0.67	5.8
Beryllium	0.22	<1.3	1.6	32	63
Cadmium	0.55	**0.65**	0.55	14	3.0
Chromium (total)	30	45	57	24,000	360,000
Copper	**60**	**220**	47	620	700
Lead	**330**	**1,300**	47	400	270
Manganese	160	360	482	360	65
Mercury	**0.17**	**0.23**	0.081	1.9	1.0
Nickel	**27**	26	26	300	130
Selenium	<1.1	<13	2.8	78	2.1
Silver	**1.8**	**9.4**	0.60	78	3.4
Thallium	<5.5	<13	8.0	0.16	0.28
Zinc	**700**	**880**	78	4,600	1,200
Volatile Organics					
EPA Method 8260B (mg/kg) (3)					
Acetone	<0.062	0.19	--	12,000	24
Benzene	0.0052	0.010	--	1.2	0.0073
2-Butanone (MEK)	<0.012	0.014	--	5,400	16
Tetrachloroethene	<0.0012	0.025	--	16	0.005
Semivolatile Organics					
EPA Method 8270D (mg/kg)					
Semivolatile Organics	ND	ND	--	--	--
Pesticides/PCBs					
EPA Method 8081/8082 (mg/kg) (3)					
4,4-DDE	0.052	0.077	--	1.6	0.24
4,4-DDT	0.15	0.074	--	1.9	0.34

(1) Derived from background soil samples collected September 2011.
(2) PSRG = Inactive Hazardous Sites Branch - Prelim. Soil Remediation Goal (March 2015).
(3) Method compounds detected in one or more samples are listed.

NG = PSRG not established.
ND = No method analytes detected.

Concentrations listed in bold type are above statistical background concentration (metals).
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.
Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in green-shaded cells are above Residential-Health-Based PSRG and Protection-of-Groundwater PSRG.

TABLE 9
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: DIOXINS/FURANS
CINERATOR-WASTE AND LANDFILL-WASTE COMPOSITE SAMPLES COLLECTED SEPTEMBER 20

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**Incinerator-Waste Composite**	**Landfill-Waste Composite**	**PSRG (1)**	
Sample Date:	**9/13/11**	**9/15/11**	**Residential Health-Based**	**Protection of Groundwater**
Dioxins/Furans EPA Method 8290 (pg/g)				
2,3,7,8-TCDD	1.54 J	4.3	4.8	1.1
1,2,3,7,8-PeCDD	7.63 J	4.44 J	NG	NG
1,2,3,4,7,8-HxCDD	6.61 J	4.17 J	NG	NG
1,2,3,6,7,8-HxCDD	16.2	12.1	NG	NG
1,2,3,7,8,9-HxCDD	12.3	7.1	NG	NG
1,2,3,4,6,7,8-HpCDD	231	378	NG	NG
1,2,3,4,6,7,8,9-OCDD	1,560	9,780 (4)	NG	NG
Total Tetrachlorodibenzo-p-dioxin	108	88.5	NG	NG
Total Pentachlorodibenzo-p-dioxin	140	86.4	NG	NG
Total Hexachlorodibenzo-p-dioxin	209	126	100	NG
Total Heptachlorodibenzo-p-dioxin	432	734	NG	NG
2,3,7,8-TCDF	83 U (2)	73.7	NG	NG
1,2,3,7,8-PeCDF	25.7	14.6	NG	NG
2,3,4,7,8-PeCDF	47.1	22.8	NG	NG
1,2,3,4,7,8-HxCDF	65.9 (3)	19.2	NG	NG
1,2,3,6,7,8-HxCDF	26.8	18.5	NG	NG
2,3,4,6,7,8-HxCDF	26.7	19.6	NG	NG
1,2,3,7,8,9-HxCDF	1.78 J	0.781 J	NG	NG
1,2,3,4,6,7,8-HpCDF	76.0	141	NG	NG
1,2,3,4,7,8,9-HpCDF	6.25 J	7.6	NG	NG
1,2,3,4,6,7,8,9-OCDF	53	283	NG	NG
Total Tetrachlorodibenzofuran	469	464	NG	NG
Total Pentachlorodibenzofuran	443	332	NG	NG
Total Hexachlorodibenzofuran	244	217	NG	NG
Total Heptachlorodibenzofuran	123	327	NG	NG
Total Toxic Equivalency (TEQ) World Health Organization, 2005				
TEQ, WHO 2005, ND=0, pg/g	45.3	34.5	51	--

(1) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (September 2015).
(2) Peak detected exceeds retention time by (from internal standard) by greater than 3 seconds.
(3) EMPC/Merged peak.
(4) EMCL - exceeds maximum calibration limit.

NG = No PSRG exists.
J = Estimated value.
U = Not detected.

Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.

TABLE 10
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: TENTATIVELY IDENTIFIED COMPOUNDS
INCINERATOR-WASTE AND LANDFILL-WASTE COMPOSITE SAMPLES COLLECTED SEPTEMBER 2011

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**Incinerator-Waste Composite**	**Landfill-Waste Composite**	**PSRG (1)**		
Sample Date:	**9/13/11**	**9/15/11**	**Residential Health-Based**	**Industrial Health-Based**	**Protection of Groundwater**
Tentatively Identified Compounds					
EPA Method 8260 and 8270 (mg/kg)					
Benzene, 1,4-difluoro-	0.055	ND	NG	NG	NG
Benzene, methyl-, trifluoro deriv.	0.061	ND	NG	NG	NG
Benzene, 1-bromo-2-fluoro	0.049	ND	NG	NG	NG
C6D5CD3	0.075	ND	NG	NG	NG
1,4-Dichlorobenzene-d4	0.062	ND	2.6	11	0.07
1,1-Dichloro-2,2-bis(p-chlorophenyl)ethane; Benzene	0.0574	ND	NG	NG	NG
Eicosane	0.0825	ND	NG	NG	NG
Methane, dibromofluoro	0.024	ND	NG	NG	NG
10-Methylnonadecane	ND	0.5289	NG	NG	NG
Naphthalene, 1,2,3,4-tetrahydro-1,4-dimethyl	0.024	ND	NG	NG	NG
Naphthalene, 6-ethyl-1,2,3,4-tetrahydro	0.027	ND	NG	NG	NG
Naphthalene, 1,2,3,4-tetrahydro-1,5,7-trimethyl	0.017	ND	NG	NG	NG
Octadecanal	0.2097	ND	NG	NG	NG
Propane, 2-bromo-1-chloro	0.026	ND	NG	NG	NG
Tetradecanal	0.171	ND	NG	NG	NG

(1) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (September 2015).
NG = No PSRG exists. ND = Not detected.

TABLE 11
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
TOXICITY CHARACTERISTIC LEACHING PROCEDURE
INCINERATOR-WASTE AND LANDFILL-WASTE COMPOSITE SAMPLES COLLECTED SEPTEMBER 2011

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.: **Sample Date:**	**Incinerator-Waste Composite** **9/13/11**	**Landfill-Waste Composite** **9/15/11**	**RCRA Hazardous Waste Criteria** **(1)**
TCLP Metals **EPA Method 6010B/7470A (mg/L)**			
Arsenic	<0.050	<0.050	5.0
Barium	0.16	1.6	100
Cadmium	<0.050	<0.050	1.0
Chromium	<0.050	<0.050	5.0
Lead	0.12	1.1	5.0
Mercury	<0.0010	<0.0010	0.2
Selenium	<0.050	<0.050	1.0
Silver	<0.050	<0.050	5.0
TCLP Volatile Organics **EPA Method 8260B (mg/L)**			
Benzene	<0.050	<0.050	0.5
Carbon tetrachloride	<0.050	<0.050	0.5
Chlorobenzene	<0.050	<0.050	100
Chloroform	<0.25	<0.25	6.0
1,2-Dichloroethane	<0.050	<0.050	0.5
1,1-Dichloroethene	<0.050	<0.050	0.7
2-Butanone (MEK)	<0.50	<0.50	200
Tetrachloroethene	<0.050	<0.050	0.7
Trichloroethene	<0.050	<0.050	0.5
Vinyl chloride	<0.050	<0.050	0.2
TCLP Semivolatile Organics **EPA Method 8270C (mg/L)**			
1,4-Dichlorobenzene	<0.10	<0.10	7.5
2,4-Dinitrotoluene	<0.10	<0.10	0.13
Hexachlorobenzene	<0.10	<0.10	0.13
Hexachloro-1,3-butadiene	<0.10	<0.10	0.5
Hexachloroethane	<0.10	<0.10	3.0
Nitrobenzene	<0.10	<0.10	2.0
Pyridine	<0.10	<0.10	5.0
3&4-Methyl Phenol	<0.10	<0.10	400
2-Methylphenol	<0.10	<0.10	200
Pentachlorophenol	<0.10	<0.10	100
2,4,5-Trichlorophenol	<0.10	<0.10	400
2,4,6-Trichlorophenol	<0.10	<0.10	2.0

(1) 40 CFR 261.24.

TABLE 12
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
SUB-LANDFILL SOIL SAMPLES COLLECTED SEPTEMBER 2011

Swannanoa DJJDP Property
Swannanoa, North Carolina

Boring I.D.:	**LFB-1**	**LFB-1**	**LFB-2**	**LFB-3**	**LFB-3**	**LFB-4**	**LFB-4**	**LFB-5**	**LFB-5**	**LFB-5**	**LFB-6**	**LFB-6**	**Statistical**	**PSRG (1)**		
Sample Depth (feet):	**18-20**	**28-29.5**	**17-19**	**12-13**	**16-17**	**7-8**	**16-17**	**5-7**	**5-7 (duplicate)**	**15-16**	**22-23**	**32-33**	**Background**	**Residential Health-Based**	**Industrial Health-Based**	**Protection of Groundwater**
Sample Date:	**9/14/11**	**9/14/11**	**9/14/11**	**9/14/11**	**9/14/11**	**9/14/11**	**9/14/11**	**9/14/11**	**9/14/11**	**9/14/11**	**9/15/11**	**9/15/11**	**(2)**			
Hazardous Substance List Metals EPA Method 6010B/7471 (mg/kg)																
Antimony	<12	<7.2	<1.2	<1.3	<1.3	<1.2	<1.4	<1.2	<1.2	<1.2	<1.3	<6.8	1.3	6.2	94	0.9
Arsenic	<1.2	<7.2	2.4	4.6	2.6	3.5	3.0	4.2	3.5	3.3	3.7	<6.8	7.4	0.68	3	5.8
Beryllium	0.15	<0.72	<0.12	<0.13	<0.13	<0.12	0.33	0.36	0.36	0.13	0.15	<1.4	1.6	32	460	63
Cadmium	<0.30	**2.7**	<0.30	**0.81**	<0.32	**0.72**	**1.1**	**1.3**	**1.1**	**0.98**	**1.2**	<1.7	0.55	14	200	3.0
Chromium	34	**61**	21	35	23	48	50	47	36	49	42	26	57	24,000	100,000	360,000
Copper	31	**53**	23	46	20	30	29	**54**	**48**	20	40	20	47	620	9,400	700
Lead	22	19	11	**60**	13	21	17	**70**	41	16	26	18	47	400	800	270
Manganese	270	350	28	87	79	260	100	260	230	**900**	380	640	815	360	5,200	65
Mercury	0.027	<0.029	0.050	0.041	0.059	0.072	0.046	0.073	**0.084**	0.026	0.030	<0.027	0.081	1.9	3.1	1.0
Nickel	14	26	10	15	10	11	13	14	12	10	13	**28**	26	300	4,400	130
Selenium	<12	<7.2	<1.2	<1.3	<1.3	<1.2	<1.4	<1.2	<1.2	<1.2	<1.3	<6.8	2.8	78	1,200	2.1
Silver	**0.82**	**4.4**	<0.59	**1.8**	<0.63	**1.2**	**1.4**	**1.5**	**1.3**	**1.4**	**1.5**	<3.4	0.60	78	1,200	3.4
Thallium	<12	<7.2	<1.2	<1.3	<1.3	<1.2	<1.4	<1.2	<1.2	<6.1	<1.3	<6.8	1.4	0.16	2.4	0.28
Zinc	38	**160**	18	53	21	24	20	46	38	24	31	**100**	78	4,600	70,000	1,200
Volatile Organics EPA Method 8260B (mg/kg) (3)																
Acetone	0.11	0.094	<0.059	<0.063	<0.063	<0.059	<0.072	<0.058	NA	<0.061	<0.067	<0.068	--	12,000	100,000	24
Benzene	0.0013	<0.0014	<0.0012	0.0028	<0.0013	<0.0012	<0.0014	<0.0012	NA	<0.0012	<0.0013	<0.0014	--	1.2	5.1	0.0073
p-Isopropyltoluene	<0.0012	<0.0014	<0.0012	<0.0013	<0.0013	<0.0012	<0.0014	0.0028	NA	<0.0012	<0.0013	<0.0014	--	NG	NG	0.68
Semivolatile Organics EPA Method 8270D (mg/kg) (3)																
Bis (2-ethylhexyl) phthalate	<0.40	<0.48	0.56	<0.42	<0.42	<0.39	<0.48	<0.39	<1.9	<0.40	<0.44	<0.45	--	39	160	7.2

(1) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (September 2015).
(2) Derived from background soil samples collected in September 2011 and November 2014.
(3) Method compounds detected in one or more samples are listed.
NG = No PSRG exists.
Concentrations listed in bold type are above statistical background concentration (metals).
Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.
Concentrations listed in green-shaded cells are above Residential-Health-Based PSRG and Protection-of-Groundwater PSRG.
Concentrations listed in orange-shaded cells are above Residential Health-Based PSRG and Industrial Health-Based PSRG.
Concentrations listed in red-shaded cells are above Residential Health-Based PSRG, Industrial Health-Based PSRG, and Protection-of-Groundwater PSRG.

TABLE 13
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
LANDFILL-PERIMETER SOIL SAMPLES COLLECTED SEPTEMBER 2011 (1)

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**LPS-1**	**LPS-2**	**LPS-3**	**LPS-4**	**LPS-5**	**LPS-6**	**LPS-7**	**LPS-8**	**LPS-9**	**LPS-10**	**LPS-11**	**LPS-12**	**LPS-12 dup**	**Statistical**	**PSRG (2)**		
Sample Date:	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11**	**9/13/11 (duplicate)**	**Background (3)**	**Residential Health-Based**	**Industrial Health-Based**	**Protection of Groundwater**
Hazardous Substance List Metals EPA Method 6010B/7471 (mg/kg)																	
Antimony	<6.4	<1.4	<12	<32	<12	<12	<12	<12	<24	<6.2	<14	<7.9	**2.4**	1.3	6.2	94	0.9
Arsenic	**12**	**10**	7.3	<1.6	<1.2	<1.2	4.4	<1.2	<1.2	**9.0**	3.9	2.4	3.6	7.4	0.68	3	5.8
Beryllium	**2.3**	**2.2**	<1.2	0.92	<0.12	<0.12	0.31	<0.12	0.54	1.2	<1.4	<0.16	<0.16	1.6	32	460	63
Cadmium	<1.6	<0.35	**3.0**	<0.40	<0.29	<0.31	**0.67**	<0.30	<0.30	<0.31	<0.34	<0.40	0.45	0.55	14	200	3.0
Chromium	34	14	33	**62**	15	38	28	25	40	9.9	34	40	39	57	24,000	100,000	360,000
Copper	**210**	**53**	47	**110**	34	**50**	**53**	**56**	**76**	35	35	25	28	47	620	9,400	700
Lead	**1,100**	**120**	**1,700**	**51**	32	**52**	**230**	35	**48**	**150**	**160**	**56**	**53**	47	400	800	270
Manganese	**900**	350	**780**	210	**800**	**850**	**550**	350	**600**	170	400	61	50	482	360	5,200	65
Mercury	**0.26**	0.070	**0.28**	0.069	0.049	0.058	**0.87**	0.056	0.068	0.056	**0.75**	**0.13**	**0.14**	0.081	1.9	3.1	1.0
Nickel	**44**	15	18	18	16	22	13	13	16	13	26	16	14	26	300	4,400	130
Selenium	**26**	**6.9**	<12	<16	<12	<12	<12	<12	<12	<1.2	<14	<1.6	<1.6	2.8	78	1,200	2.1
Silver	**18**	**0.92**	**3.7**	**2.1**	**0.76**	**1.0**	**1.0**	**1.0**	**1.4**	<0.62	**1.1**	<0.79	<0.79	0.60	78	1,200	3.4
Thallium	**12**	**3.1**	<12	<16	<12	<12	<12	<12	<12	<6.2	<14	<7.9	<1.6	1.4	0.16	2.4	0.28
Zinc	**1,700**	**100**	**470**	52	65	75	**830**	31	59	57	**160**	**130**	**110**	78	4,600	70,000	1,200
Volatile Organics EPA Method 8260B (mg/kg) (4)																	
Acetone	0.72	0.46	0.82	0.39	<4.0	0.50	0.53	0.38	0.24	0.32	0.53	0.17	NA	--	12,000	100,000	24
Benzene	<0.0017	<0.0015	<0.0014	<0.0016	<0.080	<0.0015	<0.0014	<0.0013	<0.0012	<0.0018	0.0016	<0.0016	NA	--	1.2	5.1	0.0073
p-Isopropyltoluene	0.0024	0.0073	0.0016	<0.0016	<0.080	<0.0015	0.0019	<0.0013	<0.0012	<0.0018	<0.0015	0.0023	NA	--	NG	NG	0.68
2-Butanone (MEK)	0.040	0.034	0.036	0.027	<0.80	0.040	0.033	0.023	0.015	0.027	0.022	<0.016	NA	--	5,400	38,000	16
Semivolatile Organics EPA Method 8270D (mg/kg) (4)																	
Acenaphthylene	0.25	<0.23	<0.21	<0.053	<0.039	<0.041	<0.041	<0.040	<0.039	<0.041	<0.22	<0.052	<0.26	--	NG	NG	21
Benzo (a) pyrene	0.25	<0.23	<0.21	<0.053	<0.039	<0.041	<0.041	<0.040	<0.039	<0.041	<0.22	<0.052	<0.26	--	0.016	0.29	0.059
2-Chloronaphthalene	<0.21	<0.23	<0.21	<0.053	<0.039	<0.041	<0.041	<0.040	<0.039	0.049	<0.22	<0.052	<0.26	--	960	12,000	NG
Naphthalene	<0.21	0.24	<0.21	<0.053	<0.039	<0.041	<0.041	<0.040	<0.039	0.046	<0.22	<0.052	<0.26	--	3.8	17	0.21
Pentachlorophenol	<2.1	<2.3	<2.1	<0.53	<0.39	<0.41	0.71	<0.40	<0.40	<0.42	<2.3	<0.53	<2.6	--	1.0	4.0	0.031

(1) Samples for volatile organics analysis collected from 6-12 inches below grade. Samples for all other analysis collected from 0-6 inches below grade.
(2) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (September 2015).
(3) Derived from background soil samples collected in September 2011. NA = Not analyzed
(4) Method compounds detected in one or more samples are listed. NG = No PSRG exists.

Concentrations listed in bold type are above statistical background concentration (metals).

Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.
Concentrations listed in green-shaded cells are above Residential-Health-Based PSRG and Protection-of-Groundwater PSRG.
Concentrations listed in orange-shaded cells are above Residential Health-Based PSRG and Industrial Health-Based PSRG.
Concentrations listed in red-shaded cells are above Residential Health-Based PSRG, Industrial Health-Based PSRG, and Protection-of-Groundwater PSRG.

TABLE 14
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
SEDIMENT SAMPLES COLLECTED SEPTEMBER 2011

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.: **Sample Date:**	**Sediment-1** **9/20/11**	**Sediment-2** **9/20/11**	**Sediment-3** **9/20/11**	**EPA Screening Value** **(1)**
Hazardous Substance List Metals **EPA Method 6010B/7471 (mg/kg)**				
Antimony	7.0	<1.3	<1.4	12
Arsenic	**14**	3.0	2.4	7.24
Beryllium	<0.20	<0.13	<0.14	32 (2)
Cadmium	**1.6**	0.34	<0.36	1
Chromium	39	23	13	52.3
Copper	**110**	11	8.5	18.7
Lead	**160**	8.9	8.3	30.2
Manganese	120	94	150	360 (2)
Mercury	**0.20**	<0.027	<0.029	0.13
Nickel	**29**	8.9	7.9	15.9
Selenium	<2.0	<1.3	<1.4	78 (2)
Silver	<0.98	<0.67	<0.72	2
Thallium	<2.0	<1.3	<1.4	0.16 (2)
Zinc	**220**	94	68	124
Volatile Organics **EPA Method 8260B (mg/kg) (3)**				
Acetone	0.12	<0.067	<0.72	12,000 (2)
Semi-Volatile Organics **EPA Method 8270D (mg/kg) (3)**				
Di-n-butyl phthalate	5.2	<0.44	<0.48	1,200 (2)

(1) U.S. EPA Region 4 Waste Mgt. Div. Sediment Screening Value for Hazardous Waste Sites (Nov. 2001).
(2) No EPA screening value exists. Value listed is IHSB Residential Health-Based PSRG.
(3) Method compounds detected in one or more samples are listed.
Concentrations listed in bold type are above EPA screening value.

TABLE 15
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
VOCs, SVOCs, and METALS
GROUNDWATER SAMPLES COLLECTED SEPTEMBER 2011

Swannanoa DJJDP Property
Swannanoa, North Carolina

Well I.D.: **Sample Date:**	**MW-1** **9/19/11**	**MW-1** **9/19/11** **(duplicate)**	**MW-2** **9/19/11**	**MW-3** **9/19/11**	**MW-4** **9/20/11**	**MW-5** **9/20/11**	**NC 2L** **Standard** **(1)**
Hazardous Substance List Metals **EPA Method 6010B/6020/7470A (ug/L)**							
Antimony	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1 (2)
Arsenic	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Beryllium	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	4 (2)
Cadmium	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2
Chromium	<10	<10	<10	<10	<10	<10	10
Copper	<20	<20	<20	<20	<20	<20	1,000
Lead	1.2	2.4	<1.0	<1.0	<1.0	<1.0	15
Manganese	41	**55**	**280**	31	39	**140**	50
Mercury	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1
Nickel	<20	<20	<20	<20	<20	<20	100
Selenium	<20	<20	<20	<20	<20	<20	20
Silver	<10	<10	<10	<10	**40**	<10	20
Thallium	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.2 (2)
Zinc	<30	<30	<30	<30	<30	<30	1,000
Volatile Organics **EPA Method 8260B (ug/L)**							
Volatile organic compounds	ND	ND	ND	ND	ND	ND	NA
Semivolatile Organics **EPA Method 8270D (ug/L) (3)**							
Di-n-butyl phthalate	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	700

(1) North Carolina groundwater standard per 15A NCAC 2L .0202 (April 2013).
(2) Value listed is NCDENR Interim Maximum Allowable Concentration (IMAC).
(3) Method compounds detected in one or more samples are listed.
ND = No method analytes detected.
NA = Not applicable.
Concentrations listed in bold type are above NC 2L groundwater standard or IMAC.

TABLE 16
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
RADIOCHEMISTRY
GROUNDWATER SAMPLES COLLECTED SEPTEMBER 2011

Swannanoa DJJDP Property
Swannanoa, North Carolina

Well I.D.: **Sample Date:**	**MW-1** **9/19/11**	**MW-2** **9/19/11**	**MW-3** **9/19/11**	**MW-4** **9/20/11**	**MW-5** **9/20/11**
Bi-214					
Mean Activity (pCi/L)	227.0	248.0	173.0	187.0	241.0
Uncertainty (pCi/L) (1)	6.6	5.7	5.5	4.8	5.7
K-40					
Mean Activity (pCi/L)	72.70	24.70	--	--	29.10
Uncertainty (pCi/L) (1)	21	13	--	--	13
Pb-212					
Mean Activity (pCi/L)	24.60	8.860	8.140	10.70	7.160
Uncertainty (pCi/L) (1)	1.7	1.0	1.1	1.0	1.0
Pb-214					
Mean Activity (pCi/L)	229.0	252.0	168.0	182.0	233.0
Uncertainty (pCi/L) (1)	5.7	5.5	4.6	4.4	5.3
Ti-208					
Mean Activity (pCi/L)	8.570	--	2.450	4.010	3.380
Uncertainty (pCi/L) (1)	1.6	--	1.2	0.98	0.98

(1) Uncertainty quoted at one sigma.

TABLE 17
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: METALS, VOCs, AND SVOCs
TEST-PIT SOIL SAMPLES COLLECTED NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**TP-10**	**TP-11**	**TP-12**	**TP-13**	**TP-14**	**TP-15 (duplicate of TP-12)**	**Statistical Background (2)**	**PSRG (1)**	
								Residential Health-Based	**Protection of Groundwater**
Test Pit Area:	**Area 1**	**Area 1**	**Area 5**	**Area 2**	**Area 6**				
Sample Date:	**11/11/14**	**11/11/14**	**11/11/14**	**11/11/14**	**11/11/14**	**11/11/14**			
Hazardous Substance List Metals EPA Method 6010B/7471 (mg/kg)									
Antimony	<2.3	<2.9	<2.7	<2.4	<2.7	NA	1.3	6.2	0.9
Arsenic	<2.3	<2.9	<2.7	<2.4	<2.7	NA	7.4	0.67	5.8
Beryllium	0.96	0.30	0.27	0.55	0.60	NA	1.6	32	63
Cadmium	**0.62**	<0.73	<0.69	<0.60	<0.68	NA	0.55	14	3.0
Chromium	43	30	13	24	**60**	NA	57	24,000	360,000
Copper	**52**	39	41	17	20	NA	47	620	700
Lead	30	**60**	16	12	15	NA	47	400	270
Manganese	200	22	58	83	120	NA	482	360	65
Mercury	<0.023	0.032	<0.027	<0.024	0.078	NA	0.081	1.9	1.0
Nickel	14	**83**	4.7	7.7	6.1	NA	26	300	130
Selenium	<2.3	<2.9	<2.7	<2.4	<2.7	NA	2.8	78	2.1
Silver	<1.1	<1.4	<1.4	<1.2	<1.4	NA	0.60	78	3.4
Thallium	<2.3	<2.9	<2.7	<2.4	<2.7	NA	8.0	0.16	0.28
Zinc	52	28	32	23	30	NA	78	4,600	1,200
Volatile Organics EPA Method 8260B (mg/kg) (3)									
Acetone	0.12	<0.073	0.086	0.11	0.12	0.070	--	12,000	24
Semivolatile Organics EPA Method 8270D (mg/kg) (3)									
Semivolatile organics	ND	ND	ND	ND	ND	NA	--	--	--

(1) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (March 2015).
(2) Derived from background soil samples collected September 2011.
(3) Method compounds detected in one or more samples are listed.
Concentrations listed in bold type are above statistical background concentration (metals).
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.
Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in green-shaded cells are above Residential-Health-Based PSRG and Protection-of-Groundwater PSRG.

TABLE 18
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: TENTATIVELY IDENTIFIED COMPOUNDS
TEST-PIT SOIL SAMPLES COLLECTED NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**TP-10**	**TP-11**	**TP-12**	**TP-13**	**TP-14**	**PSRG (1)**	
Test Pit Area:	**Area 1**	**Area 1**	**Area 5**	**Area 2**	**Area 6**	**Residential**	**Protection of**
Sample Date:	**11/11/14**	**1/11/14**	**1/11/14**	**1/11/14**	**1/11/14**	**Health-Based**	**Groundwater**
Tentatively Identified Compounds by EPA Methods 8260 and 8270 (mg/kg)							
2,6,10-Dodecatrien-1-ol-3,7,11-tr	ND	ND	0.027	ND	ND	NG	NG
Tetradecanoic acid	ND	ND	ND	0.027	ND	NG	NG
Octadecanamide	ND	ND	ND	0.028	ND	NG	NG
1-1'-(6-hydroxy-2,5-benz) Ethanone	ND	ND	ND	ND	0.055	NG	NG
Hexadecanoic acid	0.023	ND	ND	ND	ND	NG	NG
9-Nonadecene	0.024	ND	ND	ND	ND	NG	NG
Octadecanoic acid	0.024	ND	ND	ND	ND	NG	NG
Cyclotrisiloxane, hexamethyl	0.045	ND	ND	ND	ND	NG	NG
Cyclopentasiloxane, decamethyl	0.251	ND	ND	ND	ND	NG	NG
Cyclohexasiloxane, dodecamethyl	0.255	ND	ND	ND	ND	NG	NG

(1) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (March 2015).
NG = No PSRG exists.
ND = Not detected.

TABLE 19
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
BACKGROUND SOIL SAMPLES COLLECTED SEPTEMBER 2011 AND NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**BGS-1**	**BGS-2**	**BGS-3**	**BGS-4**	**BGS-5**		**Statistical Evaluation (1)**		
Sample Depth (ft below grade):	**0.5-1.0**	**0.5-1.0**	**0.5-1.0**	**0.5-1.0**	**0.5-1.0**		**Mean**	**Standard Deviation**	**Mean + 2X Std. Dev.**
Sample Date:	**9/20/11**	**9/20/11**	**9/20/11**	**9/20/11**	**9/20/11**				
HSL Metals									
EPA Method 6010B/7471 (mg/kg)									
Antimony	<1.2	<1.2	<1.1	<1.1	<1.2		1.2	0.06	1.3
Arsenic	3.6	3.4	4.6	6.4	4.8		4.6	1.2	7.4
Beryllium	0.12	<0.12	<1.1	<1.1	<0.59		0.6	0.5	1.6
Cadmium	0.32	<0.29	0.48	0.40	0.44		0.39	0.080	0.55
Chromium	39	15	33	32	46		33	12	57
Copper	15	41	32	15	22		25	11	47
Lead	16	44	17	14	16		21	13	47
Manganese	160	230	430	280	130		246	118	482
Mercury	0.031	<0.023	0.036	0.031	0.076		0.039	0.021	0.081
Nickel	9.4	6.1	18	18	18		14	6	26
Selenium	2.3	<1.2	<1.1	<1.1	2.1		1.6	0.6	2.8
Silver	<0.58	<0.58	<0.56	<0.57	<0.59		0.58	0.011	0.60
Thallium	<5.8	<1.2	<5.6	<1.1	<1.2		1.2	0.06	1.4
Zinc	35	59	56	57	24		46	16	78
Sample I.D.:	**MW-6-1**	**MW-6-2**	**MW-7-1**	**MW-7-2**	**MW-8-1**	**MW-8-2**	**Statistical Evaluation (1)**		
Sample Depth (ft below grade):	**15**	**20**	**10**	**15**	**15**	**20**	**Mean**	**Standard Deviation**	**Mean + 2X Std. Dev.**
Sample Date:	**11/11/14**	**11/11/14**	**11/11/14**	**11/11/14**	**11/11/14**	**11/11/14**			
EPA Method 6010C (mg/kg)									
Arsenic	<2.6	<2.8	<17	<18	<2.6	<13	9.3	7.5	24.3
Manganese	140	180	120	820	130	230	270	272	815
Silver	<1.3	<1.4	<1.7	<1.8	<1.3	<6.7	2.4	2.1	6.6

(1) Non-detected concentrations are assumed to be equal to detection limit for the statistical evaluation.

Outlier not used in statistical evaluation.

TABLE 20
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
BACKGROUND GROUNDWATER SAMPLES NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Well I.D.: **Sample Date:**	**MW-6** **11/13/14**	**MW-7** **11/13/14**	**MW-8** **11/13/14**	**NC 2L** **Standard** **(1)**
Hazardous Substance List Metals **EPA Method 6010B/6020/7470A (ug/L)**				
Antimony	<2.0	<2.0	<2.0	1 (2)
Arsenic	<2.0	<2.0	<2.0	10
Beryllium	<2.0	<2.0	<2.0	4 (2)
Cadmium	<5.0	<5.0	<5.0	2
Chromium	<10	<10	<10	10
Copper	<20	<20	<20	1,000
Lead	<2.0	2.6	<2.0	15
Manganese	**110**	36	**64**	50
Mercury	<0.20	<0.20	<0.20	1
Nickel	<20	<20	<20	100
Selenium	<20	<20	<20	20
Silver	<10	<10	<10	20
Thallium	<2.0	<2.0	<2.0	0.2 (2)
Zinc	<50	<50	<50	1,000

(1) North Carolina groundwater standard per 15A NCAC 2L .0202 (April 2013).
(2) Value listed is NCDENR Interim Maximum Allowable Concentration (IMAC).
Concentrations listed in bold type are above NC 2L groundwater standard.

TABLE 21
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
METALS, VOCs, SVOCs, PESTICIDES, PCBs, AND DIOXINS/FURANS
GROUNDWATER SAMPLES COLLECTED FROM ON-SITE MONITORING WELLS
NOVEMBER 2014 AND APRIL 2015

Swannanoa DJJDP Property
Swannanoa, North Carolina

Well I.D.: **Sample Date:**	**MW-1** **11/13/14**	**MW-1** **11/13/14** **(dupl.*)**	**MW-2** **11/13/14**	**MW-3** **11/13/14**	**MW-4** **11/13/14**	**MW-5** **11/13/14**	**NC 2L Std.** **(1)**
Hazardous Substance List Metals **EPA Method 6010B/6020/7470A (ug/L)**							
Antimony	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	1 (2)
Arsenic	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	10
Beryllium	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	4 (2)
Cadmium	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2
Chromium	<10	<10	<10	<10	<10	<10	10
Copper	<20	<20	<20	<20	<20	<20	1,000
Lead	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	15
Manganese	<10	<10	11	<10	<10	16	50
Mercury	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1
Nickel	<20	<20	<20	<20	<20	<20	100
Selenium	<20	<20	<20	<20	<20	<20	20
Silver	<10	<10	<10	<10	<10	<10	20
Thallium	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0.2 (2)
Zinc	<50	<50	<50	<50	<50	<50	1,000
Volatile Organics **EPA Method 8260B (ug/L)**							
Volatile organic compounds	ND	ND	ND	ND	ND	ND	NA
Semivolatile Organics **EPA Method 8270D (ug/L)**							
Semivolatile organic compounds	ND	ND	ND	ND	ND	ND	NA
Pesticides/PCBs **EPA Method 8082 (ug/L)**							
Pesticides/PCBs	ND	ND	ND	ND	ND	ND	NA
Dioxins/Furans **EPA Method 8290 (pg/L) (4)**							
1,2,3,4,6,7,8-HpCDD	<6.46	<6.54	5.49 J	<4.69	<4.38	<6.19	NS
1,2,3,4,6,7,8,9-OCDD	9.00 J	119	27.5 J	10.8 JK	16.0 JK	52.9 J	NS
Total Heptachlorodibenzo-p-dioxin	<6.46	<6.54	5.49 J	<4.69	<4.38	<6.19	NS
TEQ WHO 2005, ND=0	0.0027	0.0357	0.0632	0.00324	0.00479	0.0159	0.2 (3)
Well I.D.: **Sample Date:**		**MW-1** **4/29/15**	**MW-2** **4/29/15**	**MW-3** **4/29/15**	**MW-4** **4/29/15**	**MW-5** **4/29/15**	**NC 2L Std.** **(1)**
Hazardous Substance List Metals **EPA Method 6010B/6020/7470A (ug/L)**							
Lead		<5.0	<5.0	<5.0	<5.0	<5.0	15
Manganese		<10	<10	<10	<10	<10	50
Silver		<10	<10	<10	<10	<10	20

(1) North Carolina groundwater standard per 15A NCAC 2L .0202 (April 2013).
(2) Value listed is NCDENR Interim Maximum Allowable Concentration (IMAC).
(3) Value represents NC 2L standard for 2,3,7,8-TCDD.
(4) Laboratory method compounds detected in one or more samples are listed.
* Duplicate of sample MW-1, identified as sample "MW-9" in laboratory report.
NS = North Carolina groundwater standard not established.
ND = No laboratory method compounds detected.
NA = Not applicable.
J = estimated value.
K = estimated maximum possible concentration (EMPC).
Concentrations listed in bold type are above NC 2L groundwater standard or IMAC.

TABLE 22
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS
GROUNDWATER SAMPLES COLLECTED NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Well I.D.: **Sample Date:**	**MW-1** **11/13/14**	**MW-1** **11/13/14** **(duplicate)**	**MW-2** **11/13/14**	**MW-3** **11/13/14**	**MW-4** **11/13/14**	**MW-5** **11/13/14**	**NC 2L** **Standard** **(1)**
Volatile Organics **EPA Method 8260B (ug/L)** Volatile organic compounds	ND	ND	ND	ND	ND	ND	NA
Semivolatile Organics **EPA Method 8270D (ug/L)** 3-Eicosene	ND	ND	ND	43	10	ND	NA
1-Octadecene	ND	ND	ND	ND	ND	10	NS

(1) North Carolina groundwater standard per 15A NCAC 2L .0202 (April 2013).
(2) Value listed is NCDENR Interim Maximum Allowable Concentration (IMAC).
ND = Not detected.
NA = Not applicable.
NS = No NC 2L standard exists.
Concentrations listed in bold type are above NC 2L groundwater standard or IMAC.

TABLE 23
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
SEDIMENT SAMPLES COLLECTED NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.: **Sample Depth (feet):** **Sample Date:**	**Sediment-1** **0-0.25** **11/10/14**	**Sediment-2** **0-0.25** **11/10/14**	**Sediment-3** **0-0.25** **11/10/14**	**Sediment-3 (1)** **0-0.25** **11/10/14**	**EPA Screening Value (2)**
Pesticides/PCBs **EPA Method 8081 (mg/kg) (3)**					
4,4-DDT	**0.10**	<0.025	<0.026	<0.026	0.0033
Dioxins/Furans **EPA Method 8290 (pg/g)**					
2,3,7,8-TCDD	<0.181	<0.214	<0.15	<0.161	--
1,2,3,7,8-PeCDD	<0.391	<0.241	<0.233	<0.297	--
1,2,3,4,7,8-HxCDD	<1.37	<0.469	<0.368	<0.507	--
1,2,3,6,7,8-HxCDD	19.6	<0.456	<0.359	<0.492	--
1,2,3,7,8,9-HxCDD	1.72 J	<0.49	<0.387	<0.529	--
1,2,3,4,6,7,8-HpCDD	735	2.17 J	7.41	12.1	--
1,2,3,4,6,7,8,9-OCDD	7,520 E	212	214	341	--
2,3,7,8-TCDF	0.726 J	0.326 J	0.259 J	0.272 J	--
1,2,3,7,8-PeCDF	<0.379	<0.199	<0.151	<0.132	--
2,3,4,7,8-PeCDF	<0.373	<0.196	<0.148	<0.13	--
1,2,3,4,7,8-HxCDF	3.38 J	<0.243	<0.157	<0.156	--
1,2,3,6,7,8-HxCDF	2.36 J	<0.221	<0.142	<0.141	--
2,3,4,6,7,8-HxCDF	3.37 J	<0.235	<0.152	<0.151	--
1,2,3,7,8,9-HxCDF	<1.45	<0.275	<0.178	<0.177	--
1,2,3,4,6,7,8-HpCDF	274	<0.283	0.338 J	0.383 J	--
1,2,3,4,7,8,9-HpCDF	18.6	<0.376	<0.298	<0.267	--
1,2,3,4,6,7,8,9-OCDF	1,880	<0.906	0.459 J	0.650 K	--
Total Tetrachlorodibenzo-p-dioxin	<0.181	<0.214	<0.15	<0.161	--
Total Pentachlorodibenzo-p-dioxin	1.32 J	<0.241	<0.233	0.524 J	--
Total Hexachlorodibenzo-p-dioxin	74.7	<0.456	3.62 J	4.24 J	--
Total Heptachlorodibenzo-p-dioxin	1,270	4.74 J	14.7	24.5	--
Total Tetrachlorodibenzofuran	0.726 J	0.326 J	0.681 J	0.653 J	--
Total Pentachlorodibenzofuran	12.1	<0.196	0.312 J	<0.0626	--
Total Hexachlorodibenzofuran	212	<0.221	0.215 J	<0.141	--
Total Heptachlorodibenzofuran	1,410	<0.283	0.781 J	1.01 J	--
TEQ WHO 2005 ND = 0	**16.2**	0.118	0.168	0.254	2.5

(1) Duplicate sample for Sediment-3, labeled "Sediment-4" in chain of custody and laboratory report.
(2) U.S. EPA Region 4 Waste Management Division Sediment Screening Value for Hazardous Waste Sites (November 2001).
(3) Method compounds detected in one or more samples are listed.
J = Estimated value.
K = Estimated maximum possible concentration.
E = Concentration exceeds instrument calibration range.
Concentrations in bold type are above U.S. EPA Region 4 Waste Management Division Sediment Screening Values.

TABLE 24
SUMMARIZED RESULTS OF LABORATORY ANALYSIS
SURFACE-WATER SAMPLES COLLECTED NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**W-1**	**W-2**	**W-2 (2)**	**EPA Screening Value (1)**	
Sample Date:	**11/10/14**	**11/10/14**	**11/10/14**	**Acute Screening Value**	**Chronic Screening Value**
Volatile Organic Compounds					
EPA Method 8260 (ug/L)					
1,4-Dioxane	<3.0	<3.0	NA	NS (3)	NS (3)
Pesticides/PCBs					
EPA Method 8081 (ug/L)					
Pesticides/PCBs	ND	ND	ND	--	--
Dioxins/Furans					
EPA Method 8290 (pg/L)					
2,3,7,8-TCDD	<5	<3.67	<3.31	100,000	10
1,2,3,7,8-PeCDD	<2.45	<3.3	<1.87	--	--
1,2,3,4,7,8-HxCDD	<4.9	<3.43	<2.65	--	--
1,2,3,6,7,8-HxCDD	6.76 J	<3.33	<2.57	--	--
1,2,3,7,8,9-HxCDD	<5.14	<3.59	<2.77	--	--
1,2,3,4,6,7,8-HpCDD	164	<7.5	<5.16	--	--
1,2,3,4,6,7,8,9-OCDD	1,640	91.1 J	86.0 J	--	--
2,3,7,8-TCDF	<5.83	<4.09	<3.76	--	--
1,2,3,7,8-PeCDF	<2.81	<2.1	<1.65	--	--
2,3,4,7,8-PeCDF	<2.77	<2.06	<1.62	--	--
1,2,3,4,7,8-HxCDF	<3.7	<2.32	<2.03	--	--
1,2,3,6,7,8-HxCDF	<3.36	<2.1	<1.85	--	--
2,3,4,6,7,8-HxCDF	<3.58	<2.24	<1.97	--	--
1,2,3,7,8,9-HxCDF	<4.21	<2.64	<2.31	--	--
1,2,3,4,6,7,8-HpCDF	73.8	<3.18	<2.25	--	--
1,2,3,4,7,8,9-HpCDF	<9.27	<4.19	<2.99	--	--
1,2,3,4,6,7,8,9-OCDF	344	<11.9	<7.25	--	--
Total Tetrachlorodibenzo-p-dioxin	<5	<3.67	<3.31	--	--
Total Pentachlorodibenzo-p-dioxin	<2.45	<3.3	<1.87	--	--
Total Hexachlorodibenzo-p-dioxin	21.2 J	<3.33	<2.57	--	--
Total Heptachlorodibenzo-p-dioxin	344	<7.5	<5.16	--	--
Total Tetrachlorodibenzofuran	<5.83	<4.09	<3.76	--	--
Total Pentachlorodibenzofuran	<1.9	<2.06	<1.62	--	--
Total Hexachlorodibenzofuran	59.6	<2.1	<1.85	--	--
Total Heptachlorodibenzofuran	292	<3.18	<2.25	--	--
TEQ WHO 2005 ND = 0	3.64	0.0273	0.0258	100,000	10

(1) U.S. EPA Region 4 Waste Management Division Freshwater Screening Value for Hazardous Waste Sites (November 2001).
(2) Duplicate sample for W-2, labeled "W-2" in chain of custody and laboratory report.
(3) North Carolina 2B standard is 80 ug/L for Class C surface waters.
J = Estimated value.
NA = Not analyzed.
NS = No screening value exists.

TABLE 25
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: METALS, PESTICIDES, PCBs, AND SVOCs
LANDFILL-PERIMETER SOIL SAMPLES COLLECTED NOVEMBER 2014 TO DECEMBER 2015

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**E-6-1114**	**E-6-0115**	**E-8-1114**	**E-8-0115**	**LPS-1-1114**	**LPS-2-1114**	**LPS-3-1114**	**LPS-13**	**LPS-13**	**LPS-13-0115**	**LPS-14**	**LPS-14**	**LPS-15**	**LPS-16**	**LPS-17**	**LPS-18**	**LPS-19**
Sample Depth (inches):	**0-6**	**6-12**	**0-6**	**6-12**	**0-6**	**0-6**	**0-6**	**0-6**	**0-6 (2)**	**6-12**	**0-6**	**0-6 (3)**	**0-6**	**0-6**	**0-6**	**0-6**	**0-6**
Sample Date:	**11/19/14**	**1/22/15**	**11/19/14**	**1/22/15**	**11/19/14**	**11/19/14**	**11/19/14**	**11/12/14**	**11/12/14**	**1/21/15**	**11/12/14**	**11/12/14**	**11/12/14**	**11/13/14**	**11/13/14**	**11/13/14**	**11/14/14**
Hazardous Substance List Metals																	
EPA Method 6010B/7471 (mg/kg)																	
Antimony	NA	NA	NA	NA	NA	NA	NA	<3.0	<3.0	NA	<2.6	<2.6	<2.4	<2.5	<2.2	<2.8	<2.6
Arsenic	NA	NA	NA	NA	NA	NA	NA	2.1 J	1.8 J	NA	<2.6	<2.6	2.4 J	2.2 J	4.5	2.8	2.1 J
Lead	NA	NA	NA	NA	NA	NA	NA	**1,300**	**1,100**	**74**	22	25	16	21	**62**	**56**	**120**
Manganese	NA	NA	NA	NA	NA	NA	NA	**610**	**500**	180	170	200	48	54	160	450	**500**
Selenium	NA	NA	NA	NA	NA	NA	NA	<3.0	<3.0	NA	1.1 J	<2.6	<2.4	<2.5	0.98 J	<2.8	<2.6
Silver	NA	NA	NA	NA	NA	NA	NA	<1.5	<1.5	NA	<1.3	<1.3	<1.2	<1.2	<1.1	<1.4	<1.3
Thallium	NA	NA	NA	NA	NA	NA	NA	<3.0	<3.0	NA	<2.6	<2.6	<2.4	<2.5	<2.2	<2.8	<2.6
Zinc	NA	NA	NA	NA	NA	NA	NA	41	35	NA	27	28	15	17	64	**180**	**160**
EPA Method 7471 (mg/kg)																	
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA Method 7199 (mg/kg)																	
Hexavalent chromium	1.2 J	<0.26	0.66 J	<0.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																	
EPA Method 8081 (mg/kg) (1)																	
4,4-DDD	NA	NA	NA	NA	0.34	<0.030	<0.032	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4-DDE	NA	NA	NA	NA	1.0	<0.030	0.036	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4-DDT	NA	NA	NA	NA	3.3	<0.030	0.082	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																	
EPA Method 8082 (mg/kg) (1)																	
PCB 1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB 1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organics																	
EPA Method 8270D (mg/kg) (1)																	
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (a) anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (a) pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzylbutyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis (2-ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 25 (continued)
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: METALS, PESTICIDES, PCBs, AND SVOCs
LANDFILL-PERIMETER SOIL SAMPLES COLLECTED NOVEMBER 2014 TO DECEMBER 2015

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**LPS-20**	**LPS-21**	**LPS-22**	**LPS-22**	**LPS-22-0415**	**LPS-22-0415**	**LPS-23**	**LPS-24**	**LPS-24-0415**	**LPS-25**	**LPS-25**	**LPS-26**	**LPS-27**	**LPS-28**	**LPS-29**	**LPS-30**	**LPS-30-0115**
Sample Depth (inches):	**0-6**	**0-6**	**0-6**	**0-6**	**6-12**	**6-12**	**0-6**	**0-6**	**6-12**	**0-6**	**0-6**	**0-6**	**0-6**	**6-12**	**6-12**	**6-12**	**12-18**
				(4)		**(5)**					**(6)**						
Sample Date:	**11/14/14**	**11/14/14**	**11/14/14**	**11/14/14**	**4/28/15**	**4/28/15**	**11/18/14**	**11/18/14**	**4/28/15**	**11/18/14**	**11/18/14**	**11/18/14**	**11/18/14**	**11/19/14**	**11/19/14**	**11/19/14**	**1/22/15**
Hazardous Substance List Metals																	
EPA Method 6010B/7471 (mg/kg)																	
Antimony	<4.0	<2.6	<2.8	<2.8	NA	NA	<2.7	<2.9	NA	<3.0	<2.9	<4.8	<2.7	<2.6	<2.5	<2.6	NA
Arsenic	2.6 J	2.0 J	3.1	2.9	NA	NA	1.3 J	3.4	NA	4.3	4.0	2.3 J	2.3 J	1.4 J	<2.5	1.2 J	NA
Lead	36	40	40	24	NA	NA	29	**74**	NA	**370**	31	43	30	29	26	23	NA
Manganese	280	97	340	**490**	430	310	130	**540**	170	280	250	**760**	340	400	230	**490**	100
Selenium	<4.0	<2.6	1.1 J	<2.8	NA	NA	<2.7	<2.9	NA	<3.0	<2.9	<4.8	<2.7	<2.6	<2.5	<2.6	NA
Silver	<2.0	<1.3	<1.4	<1.4	NA	NA	<1.4	<1.4	NA	0.49 J	0.54 J	<2.4	<1.3	<1.3	<1.2	0.60 J	NA
Thallium	<4.0	<2.6	<2.8	<2.8	NA	NA	<2.7	<2.9	NA	<3.0	<2.9	<4.8	<2.7	<2.6	**1.8 J**	**2.3 J**	NA
Zinc	40	34	**610**	**1,700**	NA	NA	22	**96**	NA	**210**	**180**	60	42	32	33	36	NA
EPA Method 7471 (mg/kg)																	
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA Method 7199 (mg/kg)																	
Hexavalent chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																	
EPA Method 8081 (mg/kg) (1)																	
4,4-DDD	NA	<0.026	NA	NA	NA	NA	NA	NA	NA	<0.030	<0.029	NA	<0.027	NA	NA	NA	NA
4,4-DDE	NA	<0.026	NA	NA	NA	NA	NA	NA	NA	<0.030	<0.029	NA	<0.027	NA	NA	NA	NA
4,4-DDT	NA	<0.026	NA	NA	NA	NA	NA	NA	NA	<0.030	<0.029	NA	<0.027	NA	NA	NA	NA
PCBs																	
EPA Method 8082 (mg/kg) (1)																	
PCB 1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB 1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organics																	
EPA Method 8270D (mg/kg) (1)																	
Acenaphthylene	NA	NA	<0.47	<0.46	NA	NA	<0.045	<0.48	NA	<0.49	<0.48	<0.078	<0.044	NA	NA	NA	NA
Benzo (a) anthracene	NA	NA	<0.47	<0.46	NA	NA	<0.045	<0.48	NA	<0.49	<0.48	<0.078	<0.044	NA	NA	NA	NA
Benzo (a) pyrene	NA	NA	<0.47	<0.46	NA	NA	<0.045	<0.48	NA	<0.49	<0.48	<0.078	<0.044	NA	NA	NA	NA
Benzylbutyl phthalate	NA	NA	1.3 J	1.2 J	NA	NA	<0.45	<4.8	NA	<4.9	<4.9	<0.79	<0.45	NA	NA	NA	NA
Bis (2-ethylhexyl) phthalate	NA	NA	<4.7	<4.7	NA	NA	<0.45	<4.8	NA	<4.9	<4.9	<0.79	0.12 J	NA	NA	NA	NA
Di-n-octyl phthalate	NA	NA	<4.7	<4.7	NA	NA	<0.45	<4.8	NA	<4.9	<4.9	0.028 J	<0.45	NA	NA	NA	NA
Pentachlorophenol	NA	NA	<4.7	<4.7	NA	NA	<0.45	<4.8	NA	<4.9	<4.9	<0.79	<0.45	NA	NA	NA	NA

TABLE 25 (continued)
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: METALS, PESTICIDES, PCBs, AND SVOCs
LANDFILL-PERIMETER SOIL SAMPLES COLLECTED NOVEMBER 2014 TO DECEMBER 2015

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**LPS-31**	**LPS-32**	**LPS-33**	**LPS-33-0115**	**LPS-33-0115**	**LPS-33-0415**	**LPS-33-0415**	**LPS-33-0615**	**LPS-33-0615**	**LPS-33-0615**	**LPS-33-0615**	**LPS-33-0615**	**LPS-33-0615**	**LPS-33-0615**	**LPS-33-0615**	**LPS-33-0615**	**LPS-33-0615**
Sample Depth (inches):	**6-12**	**6-12**	**6-12**	**12-18**	**18-24**	**24-30**	**30-36**	**36-42**	**36-42 (7)**	**42-48**	**48-54**	**54-60**	**60-66**	**66-72**	**72-78**	**78-84**	**84-90**
Sample Date:	**11/19/14**	**11/19/14**	**11/19/14**	**1/22/15**	**1/22/15**	**4/28/15**	**4/28/15**	**6/10/15**	**6/10/15**	**6/10/15**	**6/10/15**	**6/10/15**	**6/10/15**	**6/10/15**	**6/10/15**	**6/10/15**	**6/10/15**
Hazardous Substance List Metals																	
EPA Method 6010C (mg/kg)																	
Antimony	<2.6	<2.8	<2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	<2.6	2.3 J	<2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	**390**	21	**120**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	250	340	**1,100**	**740**	**570**	**1,600**	**710**	**1,300**	**1,200**	**1,200**	**1,300**	**1,100**	**1,100**	**2,000**	**1,800**	**920**	**880**
Selenium	<2.6	<2.8	<2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	<1.3	**0.92 J**	**0.79 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	**5.6**	<2.8	**2.0 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	**610**	33	**300**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA Method 7471 (mg/kg)																	
Mercury	NA	0.052	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPA Method 7199 (mg/kg)																	
Hexavalent chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																	
EPA Method 8081 (mg/kg) (1)																	
4,4-DDD	NA	NA	NA	<0.0016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4-DDE	NA	NA	NA	0.0035 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4-DDT	NA	NA	NA	0.0046 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																	
EPA Method 8082 (mg/kg) (1)																	
PCB 1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB 1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organics																	
EPA Method 8270D (mg/kg) (1)																	
Acenaphthylene	NA	NA	<0.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (a) anthracene	NA	NA	<0.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (a) pyrene	NA	NA	<0.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzylbutyl phthalate	NA	NA	<4.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis (2-ethylhexyl) phthalate	NA	NA	<4.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octyl phthalate	NA	NA	<4.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	<4.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 25 (continued)
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: METALS, PESTICIDES, PCBs, AND SVOCs
LANDFILL-PERIMETER SOIL SAMPLES COLLECTED NOVEMBER 2014 TO DECEMBER 2015

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**LPS-33-0615**	**LPS-33-0715**	**LPS-33-0715**	**LPS-33-0715**	**LPS-33-0715**	**LPS-33-0715**	**LPS-34**	**LPS-34-0115**	**LPS-35**	**LPS-36**	**LPS-36-0115**	**LPS-36-0115**	**LPS-36-0415**	**LPS-36-0415**	**LPS-36-0415**	**LPS-37**	**LPS-37-0415**
Sample Depth (inches):	**90-96**	**114-120**	**114-120 (8)**	**174-180**	**234-240**	**282-288**	**6-12**	**12-18**	**6-12**	**6-12**	**12-18**	**18-24**	**24-30**	**30-36**	**36-42**	**6-12**	**12-18**
Sample Date:	**6/10/15**	**7/21/15**	**7/21/15**	**7/21/15**	**7/21/15**	**7/21/15**	**11/20/14**	**1/22/15**	**11/20/14**	**11/20/14**	**1/21/15**	**1/21/15**	**4/28/15**	**4/28/15**	**4/28/15**	**11/20/14**	**4/28/15**
Hazardous Substance List Metals																	
EPA Method 6010C (mg/kg)																	
Antimony	NA	NA	NA	NA	NA	NA	<2.7	NA	**3.6**	<2.5	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	<2.7	NA	2.1 J	1.7 J	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	**220**	NA	**110**	20	NA	NA	NA	NA	NA	NA	NA
Manganese	**1,600**	**2,400**	**2,200**	**1,600**	**710**	**900**	**730**	390	190	320	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	<2.7	NA	<3.5	<2.5	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	**0.82 J**	NA	0.49 J	**0.67 J**	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	<2.7	NA	1.3 J	**1.7 J**	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	63	NA	**130**	76	NA	NA	NA	NA	NA	NA	NA
EPA Method 7471 (mg/kg)																	
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	0.82	NA	NA	NA	NA	NA	NA	NA	NA
EPA Method 7199 (mg/kg)																	
Hexavalent chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides																	
EPA Method 8081 (mg/kg) (1)																	
4,4-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																	
EPA Method 8082 (mg/kg) (1)																	
PCB 1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20	0.56
PCB 1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.14	<0.023
Semivolatile Organics																	
EPA Method 8270D (mg/kg) (1)																	
Acenaphthylene	NA	NA	NA	NA	NA	NA	0.011 J	NA	<0.057	<0.041	NA	NA	NA	NA	NA	NA	NA
Benzo (a) anthracene	NA	NA	NA	NA	NA	NA	0.0073 J	NA	<0.057	<0.041	NA	NA	NA	NA	NA	NA	NA
Benzo (a) pyrene	NA	NA	NA	NA	NA	NA	0.0088 J	NA	<0.057	<0.041	NA	NA	NA	NA	NA	NA	NA
Benzylbutyl phthalate	NA	NA	NA	NA	NA	NA	<0.46	NA	<0.58	<0.41	NA	NA	NA	NA	NA	NA	NA
Bis (2-ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	<0.46	NA	<0.58	<0.41	NA	NA	NA	NA	NA	NA	NA
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	<0.46	NA	<0.58	<0.41	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	<0.46	NA	<0.58	1.5	9.0	21	12	6.0	0.49	NA	NA

TABLE 25 (continued)
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: METALS, PESTICIDES, PCBs, AND SVOCs
LANDFILL-PERIMETER SOIL SAMPLES COLLECTED NOVEMBER 2014 TO DECEMBER 2015

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**LPS-37-0415**	**LPS-37-0615**	**LPS-38**	**LPS-48**	**LPS-48**	**LPS-49**	**LPS-50**	**LPS-51**	**LPS-52**	**LPS-57**	**Statistical**	**PSRG (11)**		
Sample Depth (inches):	**18-24**	**24-30**	**12-18**	**0-6**	**0-6 (9)**	**0-6**	**0-6**	**0-6**	**0-6**	**0-6**	**Background**	**Residential-Health Based**	**Industrial Health Based**	**Protection of Groundwater**
Sample Date:	**4/28/15**	**6/10/15**	**11/20/14**	**1/21/15**	**1/21/15**	**1/21/15**	**1/22/15**	**1/22/15**	**1/22/15**	**12/16/15**	**(10)**			
Hazardous Substance List Metals														
EPA Method 6010C (mg/kg)														
Antimony	NA	NA	<2.4	NA	NA	NA	NA	NA	NA	<2.62	1.3	6.2	94	0.9
Arsenic	NA	NA	<2.4	NA	NA	NA	NA	NA	NA	<2.62	7.4	0.68	3	5.8
Lead	NA	NA	13	**67**	**72**	42	NA	NA	NA	44.3	47	400	800	270
Manganese	NA	NA	140	310	270	310	140	220	**550**	**857**	482	360	5,200	65
Selenium	NA	NA	<2.4	NA	NA	NA	NA	NA	NA	<2.62	2.8	78	1,200	2.1
Silver	NA	NA	0.54 J	NA	NA	NA	NA	NA	NA	<1.31	0.60	78	1,200	3.4
Thallium	NA	NA	<2.4	NA	NA	NA	NA	NA	NA	<2.62	1.4	0.16	2.4	0.28
Zinc	NA	NA	23	NA	NA	NA	NA	NA	NA	18.5	78	4,600	70,000	1,200
EPA Method 7471 (mg/kg)														
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.032	--	1.9	3.1	1.0
EPA Method 7199 (mg/kg)														
Hexavalent chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	0.3	6.3	3.8
Pesticides														
EPA Method 8081 (mg/kg) (1)														
4,4-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	2.3	9.6	0.24
4,4-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	2.0	9.3	0.24
4,4-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	1.9	8.5	0.34
PCBs														
EPA Method 8082 (mg/kg) (1)														
PCB 1242	1.3	0.083	NA	NA	NA	NA	NA	NA	NA	NA	--	1.0		0.14
PCB 1254	<0.022	<0.026	NA	NA	NA	NA	NA	NA	NA	NA	--	1.0		0.14
Semivolatile Organics														
EPA Method 8270D (mg/kg) (1)														
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0432	--	NG	NG	21
Benzo (a) anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0432	--	0.16	2.9	0.18
Benzo (a) pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0432	--	0.016	0.29	0.059
Benzylbutyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.436	--	290	1,200	150
Bis (2-ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.436	--	39	160	7.2
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.436	--	130	1,600	280
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.436	--	1.0	4.0	0.031

(1) Method compounds detected in one or more samples are listed.
(2) Duplicate sample for LPS-13, labeled "LPS-46" in chain of custody and laboratory report.
(3) Duplicate sample for LPS-14, labeled "LPS-47" in chain of custody and laboratory report.
(4) Duplicate sample for LPS-22, labeled "LPS-45" in chain of custody and laboratory report.
(5) Duplicate sample for LPS-22, labeled "LPS-54" in chain of custody and laboratory report.
(6) Duplicate sample for LPS-25, labeled "LPS-44" in chain of custody and laboratory report.
(7) Duplicate sample for LPS-33, labeled "LPS-55" in chain of custody and laboratory report.
(8) Duplicate sample for LPS-33, labeled "LPS-56" in chain of custody and laboratory report.
(9) Duplicate sample for LPS-48, labeled "LPS-53" in chain of custody and laboratory report.
(10) Statistical background concentration, derived from background soil samples collected September 2011.
(11) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (September 2015).
J = Estimated concentration; above method detection limit but below reporting limit.
NG = No PSRG exists.
NA = Not analyzed.

Concentrations listed in bold type are above statistical background concentration (metals).
Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.
Concentrations listed in green-shaded cells are above Residential-Health-Based PSRG and Protection-of-Groundwater PSRG.
Concentrations listed in orange-shaded cells are above Residential Health-Based PSRG and Industrial Health-Based PSRG.
Concentrations listed in red-shaded cells are above Residential Health-Based PSRG, Industrial Health-Based PSRG, and Protection-of-Groundwater PSRG.

TABLE 26
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: DIOXINS/FURANS
LANDFILL-PERIMETER SOIL SAMPLES COLLECTED NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Sample I.D.:	**LPS-1-1114**	**LPS-2-1114**	**LPS-3-1114**	**LPS-21**	**LPS-25**	**LPS-25 (1)**	**LPS-27**	**PSRG (2)**	
Sample Depth (inches below grade):	**0-6**	**0-6**	**0-6**	**0-6**	**0-6**	**0-6**	**0-6**		
Sample Date:	**11/19/2014**	**11/19/2014**	**11/19/2014**	**11/14/2014**	**11/18/2014**	**11/18/2014**	**11/18/2014**	**Residential HB**	**Protection of GW**
Dioxins/Furans									
EPA Method 8290 (pg/g)									
2,3,7,8-TCDD	<0.461	1.95	3.1	<0.232	0.440 J	<0.355	<0.235	4.8	1.1
1,2,3,7,8-PeCDD	1.58 J	1.58 J	9.16	0.463 JK	1.34 JK	1.48 J	<0.454	NG	NG
1,2,3,4,7,8-HxCDD	1.45 J	1.28 J	4.82 J	0.476 J	1.83 J	1.77 J	<0.72	NG	NG
1,2,3,6,7,8-HxCDD	3.92 J	4.65 J	7.96	1.10 J	4.17 J	5.26 J	0.814 J	NG	NG
1,2,3,7,8,9-HxCDD	2.91 J	2.79 J	7.17 J	0.831 J	2.30 J	3.53 J	0.806 J	NG	NG
1,2,3,4,6,7,8-HpCDD	79.0	122	80.2	21.0	129	145	33.7	NG	NG
1,2,3,4,6,7,8,9-OCDD	2,030	6,200 E	3,580	1,070	10,200 E	11,700 E	3,630	NG	NG
2,3,7,8-TCDF	4.48	5.99	27.4	1.6	3.47	4.20	0.903 J	NG	NG
1,2,3,7,8-PeCDF	1.78 J	2.07 J	19.8	1.13 J	3.14 J	3.67 J	0.597 J	NG	NG
2,3,4,7,8-PeCDF	6.58 J	4.01 J	20.2	1.25 J	5.08 J	6.51 J	0.624 J	NG	NG
1,2,3,4,7,8-HxCDF	2.76 J	2.17 J	15.0	0.677 J	4.21 J	5.19 J	0.618 J	NG	NG
1,2,3,6,7,8-HxCDF	3.50 J	1.45 J	12.5	0.674 J	3.44 J	4.55 J	<0.36	NG	NG
2,3,4,6,7,8-HxCDF	5.04 J	2.04 J	13.4	0.806 J	5.07 J	6.16 J	0.500 J	NG	NG
1,2,3,7,8,9-HxCDF	<0.491 Q	<0.439	2.65 J	<0.401	1.18 J	1.34 J	<0.449	NG	NG
1,2,3,4,6,7,8-HpCDF	33.2	29.3	40.1	3.57 J	25.1	34.4	1.90 J	NG	NG
1,2,3,4,7,8,9-HpCDF	1.93 J	0.820 J	2.50 J	<0.411	1.73 J	2.42 J	<0.613	NG	NG
1,2,3,4,6,7,8,9-OCDF	79.7	19.3	26.3	4.83 J	39.8	53.8	1.56 J	NG	NG
Total Tetrachlorodibenzo-p-dioxin	12.0	69.2	82.6	1.20 J	5.58	11.5	0.280 J	NG	NG
Total Pentachlorodibenzo-p-dioxin	17.7 Q	95.1	94.5	1.65 J	11.9	14.2	0.648 J	NG	NG
Total Hexachlorodibenzo-p-dioxin	41.0 Q	63.8	96.1	9.01	39.4	49.7	8.14	100	NS
Total Heptachlorodibenzo-p-dioxin	171	242	166	40.0	298	330	70.2	NG	NG
Total Tetrachlorodibenzofuran	75.1	77.4	430	6.58	54.2	74.2	4.12	NG	NG
Total Pentachlorodibenzofuran	107	61.1	273	10.1	65.8	81.7	4.77 J	NG	NG
Total Hexachlorodibenzofuran	85.3 Q	42.9	139	7.44	55.1	73.0	3.75 J	NG	NG
Total Heptachlorodibenzofuran	88.3	55.6	70.5	6.42 J	61.4	81.2	1.90 J	NG	NG
Total Toxic Equivalency (TEQ)									
World Health Organization, 2005									
ND = 0; pg/g	7.79	10.2	30.3	1.59	9.25	12.1	2.02	51	--

(1) Duplicate sample for LPS-25, labeled "LPS-44" in chain of custody and laboratory report.
(2) PSRG = Inactive Hazardous Sites Branch - Preliminary Soil Remediation Goal (September 2015).
J = Estimated value.
K = Estimated maximum possible concentration.
E = Concentration exceeds instrument calibration range.
Q = Quantitative interference.
NG = No PSRG exists.
Concentrations listed in yellow-shaded cells are above Residential-Health-Based PSRG.
Concentrations listed in blue-shaded cells are above Protection-of-Groundwater PSRG.
Concentrations listed in green-shaded cells are above Residential-Health-Based PSRG and Protection-of-Groundwater PSRG.

TABLE 27
SUMMARIZED RESULTS OF LABORATORY ANALYSIS: SPLP EXTRACTION
LANDFILL-PERIMETER SOIL SAMPLES COLLECTED NOVEMBER 2014

Swannanoa DJJDP Property
Swannanoa, North Carolina

Boring I.D.: **Sample Depth (feet):** **Sample Date:**	**E-2-1114** **0-0.5** **11/18/14**	**E-3-1114** **0-0.5** **11/18/14**	**E-6-1114** **0-0.5** **11/19/14**	**E-8-1114** **0-0.5** **11/19/14**	**E-10-1114** **0-0.5** **11/19/14**	**E-10-1114 (1)** **0-0.5** **11/19/14**	**LPS-1-1114** **0-0.5** **11/19/14**	**LPS-3-1114** **0-0.5** **11/19/14**	**NC 2L** **Standard** **(2)**
SPLP Metals **EPA Method 6010C (µg/L)**									
Antimony	<20	<20	<20	45	<20	<20	12 J	<20	NS
Arsenic	<20	<20	<20	<20	<20	<20	<20	<20	10
Lead	7.5	**20**	15	**25**	5.4	5.6	**61**	**410**	15
Manganese	15	**110**	58	41	15	17	49	41	50
Selenium	<20	<20	<20	<20	<20	<20	<20	<20	20
Silver	<10	<10	<10	<10	<10	<10	<10	<10	20
Thallium	<20	<20	<20	<20	<20	<20	<20	<20	NS
Zinc	170	49 J	140	180	210	170	220	300	1,000

(1) Duplicate sample for E-10-1114, labeled "E-11-1114" in chain of custody and laboratory report.
(2) North Carolina groundwater standard under 15A NCAC 2L (April 2013). NS = No NC 2L standard exists.
J = Estimated concentration; above method detection limit but below reporting limit.
Concentrations in bold type are above North Carolina groundwater standard.

APPENDIX A

IHSB CONCURRENCE OF PROPOSED CONTAINMENT REMEDY

Peter Dressel

From: Thomas, Dianne <dianne.thomas@ncdenr.gov>
Sent: Monday, February 29, 2016 10:56 AM
To: Peter Dressel
Subject: Swannanoa DJJDP (NONCD0002801): Revised Proposal for Containment Remedy
Attachments: SwannanoaDPLURdraft.pdf

Mr. Dressel,

The Inactive Hazardous Sites Branch (Branch) is in receipt of the Revised Proposal for Containment Remedy for the roughly 2.5 acre portion of the 5 acre above-referenced site (the Site). This document was dated and was received via email on December 28, 2015. This document was revised based on comments provided to you by Matt Aufman of the Branch via email on December 7, 2015. Your December 28, 2015 submittal appears to address all of the Branch's concerns that were laid out by Matt Aufman. Based on the above-referenced submittal, the Branch concurs with the proposed containment remedy provided that the land-use restrictions are agreed upon and the two documents described below are properly recorded following the RAP public notice period. In addition, property demarcation issues will need to be worked out (would be more clear if this were discussed by telephone).

Be aware that, when the Branch provides concurrence as required by 15A NCAC 13C .0306(i)(2) for an on-site containment remedy that is part of a Remedial Action Plan (RAP), the Branch does not review and approve the entire RAP and all data associated with the Site. Compliance with the REC rules, including completion of all potions of the RAP, and all other applicable laws from other agencies is the responsibility of the RSM.

For a proposed containment remedy, two documents will ultimately be recorded at the Register of Deeds: a Notice of Inactive Hazardous Substance or Waste Disposal Site (Notice) and a Declaration of Perpetual Land Use Restrictions (DPLUR) document. Instructions for the Notice can be found under 'Guidance' on the Branch website, http://portal.ncdenr.org/c/document_library/get_file?uuid=4107ab0f-23a7-45af-827a-d5fb3f255765&groupId=38361. I have attached a draft version of the DPLUR document (some issues are highlighted). After we have agreed upon the restrictions for the DPLUR document and the draft Notice is complete, draft versions of each document should be included as an appendix of the proposed RAP for public notice. These two documents can be finalized while the proposed RAP is undergoing public notice. Additional details regarding the procedures for completing and implementing a RAP for a containment remedy can be found in Appendix F.7 of the REC Program Implementation Guidance.

If you have any questions please feel free to contact me.

Dianne Thomas

Dianne Thomas
Inactive Hazardous Sites Branch – Registered Environmental Consultant Program
North Carolina Department of Environmental Quality

919 707-8348 office
dianne.thomas@ncdenr.gov

217 West Jones Street
1601 Mail Service Center
Raleigh, NC 27699

Nothing Compares

APPENDIX B

SITE PHOTOGRAPHS

Photo 1. Surface of unpermitted landfill – looking south (May 7, 2009)

Photo 2. Surface of unpermitted landfill – looking north (May 7, 2009)

Photo 3. Exterior of former incinerator/crematorium (May 29, 2008)

Photo 4. Interior of former incinerator/crematorium (June 3, 2010)

Photo 5. Surface waste debris on southeast side of landfill (June 3, 2010)

Photo 6. Surface waste debris in southern site area (June 3, 2010)

Photo 7. Slag waste on surface in northwest site area (June 3, 2010)

Photo 8. Scrap metal in western site area (May 29, 2008)

Photo 9. Wood pallets in western site area (May 29, 2008)

Photo 10. Abandoned transformers – removed from site in 2009 (May 29, 2008)

Photo 11. Exterior of former incinerator/crematorium (March 14, 2013)

Photo 12. “Wet weather spring” at southeast landfill margin (April 28, 2015)

Photo 13. Rock scree at southeast site perimeter - intermittent stream is in foreground (April 28, 2015)

APPENDIX C

SITE PROPERTY SURVEY PLAT/ NOTICE OF AN INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE

APPROVED FOR THE PURPOSES OF N.C.G.S. 130A-310.8.

_____
JIM BATESON, LG
CHIEF, SUPERFUND SECTION
DIVISION OF WASTE MANAGEMENT

NORTH CAROLINA
WAKE COUNTY

I, _____, A NOTARY PUBLIC OF SAID COUNTY AND STATE, DO HEREBY CERTIFY THAT _____ DID PERSONALLY APPEAR AND SIGN BEFORE ME THIS THE _____ DAY OF _____, _____.

_____
NOTARY PUBLIC (SIGNATURE)

MY COMMISSION EXPIRES _____, _____.

NOTES:

1) THIS SURVEY DOES NOT REPRESENT A FULL BOUNDARY SURVEY OF THE PROPERTY ILLUSTRATED. LINES SHOWN HEREON AS DASHED ARE COMPOSITE IN NATURE (TAKEN FROM RECORD DATA) AND HAVE NOT BEEN SURVEYED IN THE FIELD. LINES SHOWN AS SOLID HAVE BEEN FIELD SURVEYED AND VERIFIED. (SEE THE LEGEND FOR A LINE-TYPE KEY ON SURVEYED AND COMPOSITE LINES)

2) ALL BUILDINGS, SURFACE AND SUBSURFACE IMPROVEMENTS ON AND ADJACENT TO THE PROPERTY SHOWN HEREON ARE NOT NECESSARILY SHOWN. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT SURVEYED OR CONSIDERED AS PART OF THIS SURVEY. NO EVIDENCE OR STATEMENT IS MADE CONCERNING THE EXISTENCE OF UNDERGROUND CONDITIONS, CONTAINERS, OR FACILITIES THAT MAY AFFECT THE USE OR DEVELOPMENT OF THIS PROPERTY.

3) AREAS BY COORDINATE COMPUTATION.

4) ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES. THE COMBINED GRID FACTOR FOR THIS SURVEY IS 0.99978614.

5) THE AREAS AND TYPES OF CONTAMINATION DEPICTED UPON THE MAP ARE APPROXIMATIONS DERIVED FROM THE BEST AVAILABLE INFORMATION AT THE TIME OF FILING.

6) UPON NORTH CAROLINA SUPERFUND SECTION APPROVAL AND RECORDATION IN ACCORDANCE WITH N.C.G.S. 130A-310.8 (b). THIS NOTICE SUPERSEDES ANY PREVIOUSLY RECORDED NOTICE(S) OF INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE FOR THIS PROPERTY.

7) A DECLARATION OF PERPETUAL LAND USE RESTRICTIONS, LIMITING THE USES OF THIS PROPERTY, IS BEING RECORDED CONCURRENTLY WITH THIS NOTICE.

8) LIST OF HAZARDOUS SUBSTANCES KNOWN TO BE PRESENT IN SOIL
ANTIMONY
ARSENIC
BENZO (A) ANTHRACENE
BENZO (A) PYRENE
CADMIUM
CHRYSENE
HEXAVALENT CHROMIUM
LEAD
MANGANESE
PENTACHLOROPHENOL
THALLIUM

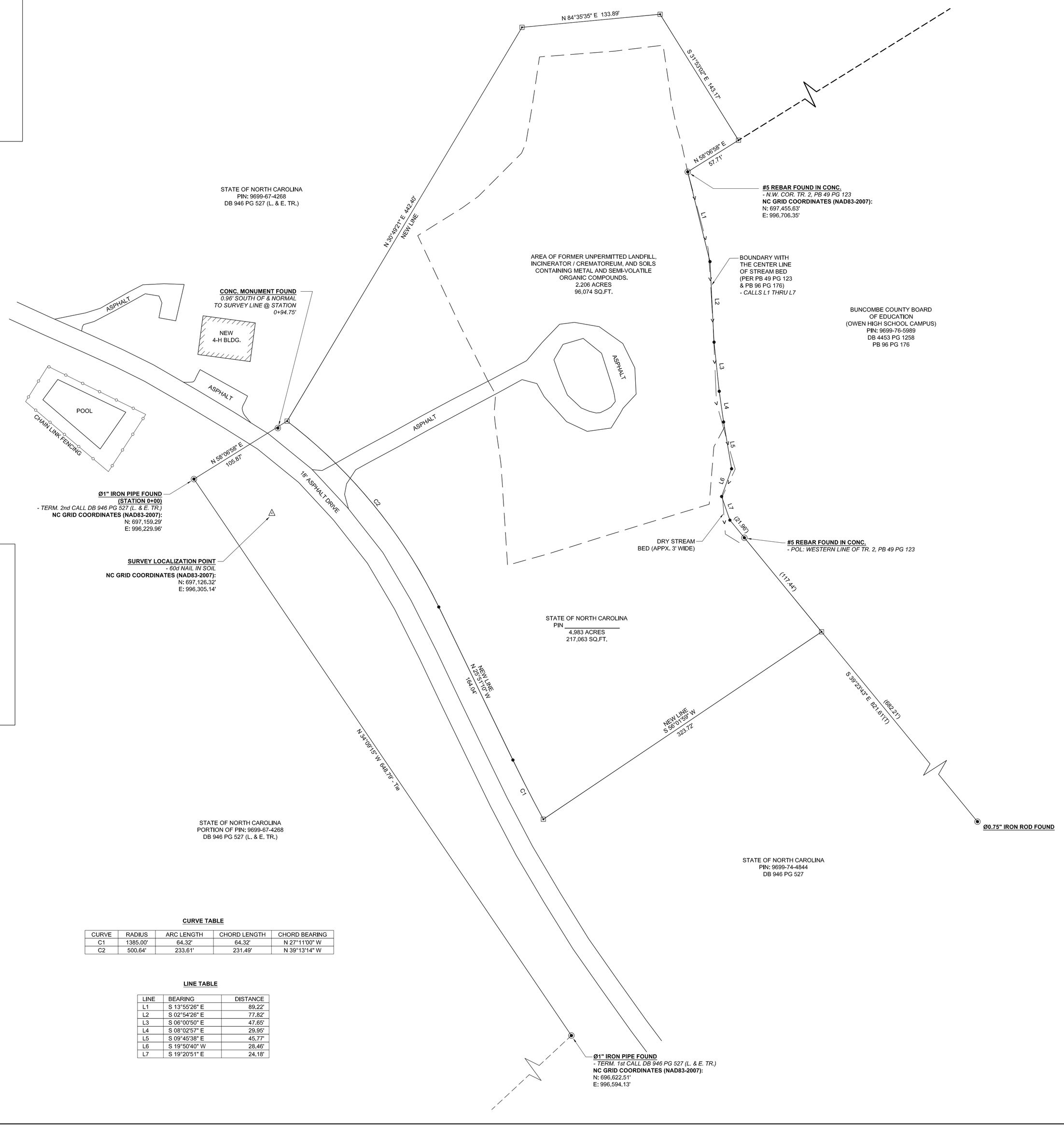
I, B. KENT JACKSON, DIRECTOR, STATE CONSTRUCTION OFFICE, CERTIFY THAT THE NC DEPARTMENT OF ADMINISTRATION, STATE CONSTRUCTION OFFICE AUTHORIZED THE PREPARATION OF THIS "NOTICE OF INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE".

NORTH CAROLINA
WAKE COUNTY

I, _____, A NOTARY PUBLIC OF SAID COUNTY AND STATE, DO HEREBY CERTIFY THAT _____ DID PERSONALLY APPEAR AND SIGN BEFORE ME THIS THE _____ DAY OF _____, _____.

_____
NOTARY PUBLIC (SIGNATURE)

MY COMMISSION EXPIRES _____, _____.



LEGEND & ABBREVIATIONS :

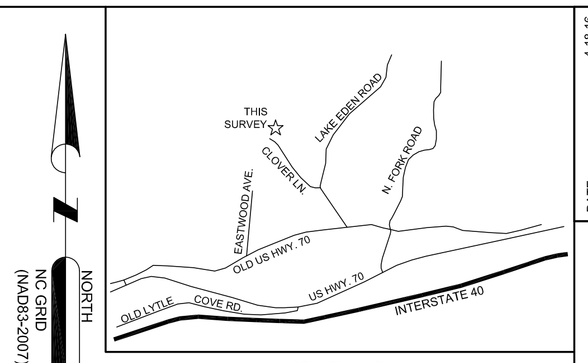
PB . . PLAT BOOK
DB. . DEED BOOK
PG . . PAGE
R/W . . RIGHT OF WAY
PIN . . PARCEL IDENTIFICATION NUMBER
● CALCULATED POINT (NOT SET IN FIELD)
◉ RECOVERED MONUMENT (SIZE AND TYPE AS NOTED)
⊡ #4 REBAR W/ "McAbee" ID CAP SET
APPX. . . APPROXIMATELY
BLDG. . . BUILDING
BOUNDARY LINE (FIELD VERIFIED)
COMPOSITE BOUNDARY LINE (PLOTTED FROM RECORD DATA)
CONC. . . CONCRETE
COR. . . CORNER
L. & E. . . LESS & EXCEPTING
POL . . POINT ON LINE
(T) . . TOTAL DISTANCE
TERM. . . TERMINUS
TR. . . TRACT

CURVE TABLE

CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING
C1	1385.00'	64.32'	64.32'	N 27°11'00" W
C2	500.64'	233.61'	231.49'	N 39°13'14" W

LINE TABLE

LINE	BEARING	DISTANCE
L1	S 13°55'26" E	89.22'
L2	S 02°54'26" E	77.82'
L3	S 06°00'50" E	47.65'
L4	S 08°02'57" E	29.95'
L5	S 09°45'38" E	45.77'
L6	S 19°50'40" W	28.46'
L7	S 19°20'51" E	24.18'



VICINITY MAP
NOT TO SCALE

REFERENCES:

- DB 946 PG 527
- PB 49 PG 123
- PB 96 PG 176
- UNRECORDED SURVEY BY FREELAND - CLINKSCALES & ASSOCIATES OF NC, INC, BEARING DRAWING # S09093 AND BEING DATED 9-19-09.
- UNTITLED MAP PROVIDED BY THE STATE OF NC

"WHEN THIS PROPERTY OR ANY PART OF IT IS SOLD, LEASED, CONVEYED OR TRANSFERRED, N.C.G.S. 130A-310(e) REQUIRES THAT THE FOLLOWING LANGUAGE BE PLACED IN THE DESCRIPTION SECTION OF THE DEED OR OTHER INSTRUMENT OF TRANSFER IN NO SMALLER TYPE THAN THAT USED IN THE BODY OF THE DEED:

THIS PROPERTY HAS BEEN USED AS A HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE. A NOTICE OF INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE IS RECORDED IN THE BUNCOMBE COUNTY REGISTER OF DEED'S OFFICE FOR PIN _____, A SUBDIVISION OF PIN 9699-74-4844 AND PIN 9699-67-4268. QUESTIONS CONCERNING THIS MATTER MAY BE DIRECTED TO THE NORTH CAROLINA DIVISION OF WASTE MANAGEMENT, SUPERFUND SECTION, INACTIVE HAZARDOUS SITES BRANCH, 1646 MAIL SERVICE CENTER, RALEIGH, NC 27699-1646."

I, **ERIC S. MCABEE**, CERTIFY THIS SURVEY CREATES A SUBDIVISION OF LAND WITHIN AN AREA OF THE COUNTY THAT HAS AN ORDINANCE THAT REGULATES PARCELS OF LAND.

I, **ERIC S. MCABEE**, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY PERFORMED UNDER MY SUPERVISION: DEED DESCRIPTION RECORDED IN BOOK **946** PAGE **527**; THAT THE RATIO OF PRECISION AS CALCULATED BY LATITUDES AND DEPARTURES IS **1: 10,000+** FOR TRADITIONAL SURVEYING METHODS; THAT THE GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS WERE PERFORMED TO THE GEOSPATIAL POSITIONING ACCURACY STANDARDS, PART 2; STANDARDS FOR GEODETIC NETWORKS AT THE **0.04' HOR. & 0.08' VERT.** ACCURACY CLASSIFICATION (95% CONFIDENCE) USING **RTK NETWORK SOLUTIONS**; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 (F)(11)**(A)** AS AMENDED. WITNESS MY ORIGINAL SIGNATURE AND SEAL THIS THE **18TH** DAY OF **APRIL, 2016.**

FOR REVIEW L-4095

GLOBAL POSITIONING SYSTEM CERTIFICATION

I, **ERIC S. MCABEE**, HEREBY CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION; THAT THIS GPS SURVEY WAS PERFORMED TO **CLASS 1** FGDC SPECIFICATIONS AND THAT I USED **THE NCGS VRS RTK NETWORK**; GPS FIELD PROCEDURES AND COORDINATES WERE OBTAINED BY **THE RTK NETWORK SOLUTIONS**; THAT THIS SURVEY WAS PERFORMED ON **10/8/10** USING **A TRIMBLE 5800 DUAL FREQUENCY RECEIVER** AND ALL COORDINATES ARE BASED ON THE **NORTH AMERICAN DATUM OF 1983 - 2007 UPGRADED POSITIONS.**

SCALE 1" = 50'
50' 25' 0 50' 100' 150'

DATE: 4-18-16
PROJECT NO.: 11798 / 10754
DRAWING NO.: G-13-3113
DRAWN BY: JBW/ESM
SCALE: 1" = 50'

NOTICE OF INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE :

SWANNANOA - DJJDP PROPERTY

IDENTIFICATION NUMBER : NONCD0002801

PROPERTY OF:
STATE OF NORTH CAROLINA

BLACK MOUNTAIN TOWNSHIP
BUNCOMBE COUNTY, N.C.

PIN: _____

NO.	DATE	DESCRIPTION	BY

NORTH CAROLINA PROFESSIONAL SEAL L-4095 LAND SURVEYOR ERIC S. McABEE

McABEE & ASSOCIATES, P.A.
PROFESSIONAL LAND SURVEYING
Eric S. McAbee, PLS
J. Barry West, PLS
Wallace S. McAbee, PLS (Emeritus)
Fax (828) 628-1294
Telephone (828) 628-1295
3 McAbee Lane, Fairview, North Carolina 28730
www.mcabeesurvey.com Firm License Number: C-694

APPENDIX D

DECLARATION OF PERPETUAL LAND-USE RESTRICTIONS

Above left blank intentionally.

DECLARATION OF PERPETUAL LAND USE RESTRICTIONS

For Property Owned By: the State of North Carolina, Department of Juvenile Justice and Delinquency Prevention **[*insert owner name as exactly as appears on the deed; accuracy is very critical here*]**

The real property which is the subject of this Declaration of Perpetual Land Use Restrictions ("Declaration") is contaminated with hazardous substances, and is an INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE ("the Site") as defined by North Carolina's Inactive Hazardous Sites Response Act of 1987, which consists of Section 130A-310 through Section 130A-310.19 of the North Carolina General Statutes ("N.C.G.S). This Declaration is part of a Remedial Action Plan for the Site that has been approved by the Secretary of the North Carolina Department of Environmental Quality, Division of Waste Management, Superfund Section (or its successor in function), or his/her delegate, as authorized by N.C.G.S. Section 130A-310.3(f). The North Carolina Department of Environmental Quality shall hereafter be referred to as "DEQ." Hereafter, the Division of Waste Management, Superfund Section shall be referred to as "Superfund Section".

The State of North Carolina, Raleigh, NC is the owner in fee simple of the Property ("the Property"), which is located near Woodland Drive in the County of Buncombe, City of Swannanoa,

State of North Carolina, and is the real property legally described in Deed Book 0946, Page 527 in the Office of the Register of Deeds for Buncombe County. The Property is also shown on a Notice of Inactive Hazardous Substance or Waste Disposal Site, in the form of a survey plat ("Survey Plat"), which has been recorded prior to the recordation of this Declaration in Map Book ____ Page_____ in the Office of the Register of Deeds for Buncombe County. A copy of the Survey Plat is included as Exhibit A to this Declaration.

For the purpose of protecting public health and the environment, The State of North Carolina hereby declares that all of the Property shall be held, sold and conveyed subject to the following perpetual land use restrictions, which shall run with the land; shall be binding on all parties having any right, title or interest in the Property or any part thereof, their heirs, successors and assigns; and shall, as provided in N.C.G.S. Section 130A-310.3(f), be enforceable without regard to lack of privity of estate or contract, lack of benefit to particular land, or lack of any property interest in particular land. These restrictions shall continue in perpetuity and cannot be amended or canceled unless and until the Buncombe County Register of Deeds receives and records the written concurrence of the Secretary of DEQ (or its successor in function), or his/her delegate. If any provision of this Declaration is found to be unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions shall not in any way be affected or impaired.

PERPETUAL LAND USE RESTRICTIONS

1. The Property shall be used for open space only and for no other purpose. "Open space" for purposes of this restriction means an undeveloped, natural area where the sole human use shall be non-dermal recreational activities such as biking, hiking, running, hunting, fishing, and bird watching. The Property shall not be developed or utilized for residential, commercial or industrial purposes.

2. No above- or below-ground construction or improvements (including, but not limited to, utilities, roads, sidewalks, greenways, structures, and landscaping) are allowed without prior written approval by the Superfund Section or its successor in function.

3. No alteration or disturbance of the existing soil, landscape and contours shall occur other than erosion control measures without prior written approval by the Superfund Section or its successor in function.

4. Mowing of vegetation and tree pruning is allowed on the Property.

5. Surface water or underground water (groundwater) shall not be used for any purpose.

6. The installation of groundwater wells or other devices for access to groundwater for any purpose other than monitoring groundwater quality is prohibited without prior written approval by the Superfund Section or its successor in function.

7. No activities that encounter, expose, remove or use groundwater, including but not limited to, installation of water supply wells, fountains, ponds, lakes or swimming pools that use groundwater, or construction or excavation activities that encounter or expose groundwater may occur on the Property without prior approval of Superfund Section or its successor in function.

8. No surface or subsurface native or fill earthen materials may be removed from the Property without prior written approval by the Superfund Section or its successor in function.

9. Each person who owns any portion of the Property shall submit a letter report, containing the notarized signature of the owner, in January of each year on or before January 31st, to the Superfund Section, or its successor in function, confirming that this Declaration is still recorded in the Office of the Buncombe County Register of Deeds, that activities and conditions at the Property remain in compliance with the land use restrictions herein, and that the Property has not been subdivided since the last letter report submitted to the Superfund Section.

10. No person conducting environmental assessment or remediation at the Site, or involved in determining compliance with applicable land use restrictions at the Property, at the direction of, or pursuant to a permit or order issued by the Superfund Section or its successor in function may be denied access to the Property for the purpose of conducting such activities.

11. Each person who owns any portion of the Property shall cause the instrument of any sale, lease, grant, or other transfer of any interest in the Property to include a provision expressly requiring the lessee, grantee, or transferee to comply with this Declaration. The failure to include such provision shall not affect the validity or applicability of any land use restriction in this Declaration.

REPRESENTATIONS AND WARRANTIES

The owner of the Property hereby represents and warrants to the other signatories hereto:

that the owner of the Property is the sole owner of the Property holding fee simple title to the Property free, clear and unencumbered, or that the owner of the Property has provided to the Superfund Section the names of all other persons that own an interest in or hold an encumbrance on the Property and has notified such persons of the owner's intention to enter into this Declaration;

that the owner of the Property has the power and authority to enter into this Declaration, to grant the rights and interests herein provided and to carry out all obligations hereunder;

that this Declaration will not materially violate or contravene or constitute a material default under any other agreement, document or instrument to which the owner of the Property is a party or by which the owner of the Property may be bound or affected.

ENFORCEMENT

Adherence to the above land use restrictions is necessary to protect public health and the environment. The restrictions are an integral part of the remedy for the contamination at the Site and shall be enforceable without regard to lack of privity of estate or contract, lack of benefit to particular land, or lack of any property interest in particular land. These land use restrictions shall be enforced by any owner, operator, or other party responsible for any part of the Site. The above land use restrictions may also be enforced by the Superfund Section through the remedies provided in N.C.G.S. Chapter 130A, Article 1, Part 2 or by means of a civil action, and may also be enforced by any unit of local government having jurisdiction over any part of the Site. Any attempt to cancel this Declaration without the approval of the Superfund Section or its successor in function shall constitute noncompliance with the Remedial Action Plan approved by the Superfund Section for the Site, and shall be subject to enforcement by the Superfund Section to the full extent of the law. Failure by any party required or authorized to enforce any of the above restrictions shall in no event be deemed a waiver of the right to do so thereafter as to the same violation or as to one occurring prior or subsequent thereto.

FUTURE SALES, LEASES, CONVEYANCES AND TRANSFERS

When any portion of the Property is sold, leased, conveyed or transferred, pursuant to N.C.G.S. Section 130A-310.8(e) the deed or other instrument of transfer shall contain in the description section, in no smaller type than that used in the body of the deed or instrument, a statement that the real property being sold, leased, conveyed, or transferred has been used as a hazardous substance or waste disposal site and a reference by book and page to the recordation of the Notice of Inactive Hazardous Substance or Waste Disposal Site referenced in this Declaration.

OWNER SIGNATURE

IN WITNESS WHEREOF, I, exercising power of attorney? for The State of North Carolina execute these presents on this ___ day of _____, 20___.

Signatory's name typed or printed: _____

Signatory's title typed or printed: _____

Owner name typed or printed:_____

Signature:_____

STATE OF NORTH CAROLINA
COUNTY OF _____

I, _____, a Notary Public, do hereby certify that _____ personally appeared before me this day, produced proper identification in the form of _____, and declared that he *or* she is the *insert title of signatory* of *insert owner company name* and that by authority duly given, and as the act of *insert owner company name* he *or* she has signed this Declaration.

WITNESS my hand and official seal this ___ day of _____, 20___.

_____
Notary Public

My Commission expires: _____

[SEAL]

APPROVAL AND CERTIFICATION OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY

The foregoing Declaration of Perpetual Land Use Restrictions is hereby approved and certified.

By: _____

Jim Bateson, Chief
Superfund Section
Division of Waste Management
North Carolina Department of Environmental Quality

STATE OF NORTH CAROLINA
COUNTY OF _____

I, _____, a Notary Public, do hereby certify that _____ personally appeared before me this day, produced proper identification in the form of _____, and signed this Declaration.

WITNESS my hand and official seal this ___ day of _____, 20___.

_____
Notary Public

My Commission expires: _____

[SEAL]

REGISTER OF DEEDS CERTIFICATION

The foregoing Declaration of Perpetual Land Use Restrictions is certified to be duly recorded at the date and time, and the Book and Page, shown on the first page hereof.

Register of Deeds for Buncombe County

By: _____
Signature

_____
Type or print name and title

APPENDIX E

SEDIMENT AND EROSION CONTROL PLAN

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

6003-145 Chapel Hill Rd.
Raleigh, NC 27607
P: 919-854-9700 F: 919-854-9532
www.piedmontgeologic.com

April 4, 2016

Alison Davidson
North Carolina Division of Environmental Quality
Asheville Regional Office
2090 US 70 Highway
Swannanoa, North Carolina 28778-8211

RE: Erosion and Sedimentation Control Plan
Swannanoa DJJP Property
Buncombe County, North Carolina

Dear Ms. Davidson:

Please find attached a preliminary Erosion and Sedimentation Control Plan for the landfill remediation project at the referenced site. We are in the process of developing a Remedial Action Plan (RAP) for the site remediation activities, and wanted to get the permitting process started. This will be a short-term project where the work schedule will be dictated by the weather in order to minimize erosion and sediment runoff. The attached plan describes temporary measures to be implemented as part of the RAP for erosion and sedimentation control. If you have any questions or require any additional information, please do not hesitate to call.

Sincerely,

Joseph B. Lee, III, PE
Project Manager

cc: Bill Sessoms, NC Department of Administration

enclosure

EROSION AND SEDIMENTATION CONTROL PLAN

SWANNANOA DJJP PROPERTY

BUNCOMBE COUNTY, NC

APRIL 2016

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- 1.2 Adjacent Properties…… 2
- 1.3 Site Soils…… 3

2.0 Scope of Remediation Work…… 3
3.0 Sediment and Erosion Control Features…… 4
4.0 Maintenance Plan…… 5
5.0 Construction Schedule…… 5

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Figure 1 Site Location Map

Figure 2 Site and Vicinity Map

Figure 3 Summary of Proposed Site Remedial Action

Figure 4 Sediment Fence Detail

Figure 5 Temporary Sediment Trap Detail

Figure 6 Construction Entrance Detail

Figure 7 Temporary Diversion Channel Detail

Financial Responsibility/Ownership Form

Checklist

1.0 Narrative

This plan was prepared to outline the erosion and sediment control measures to be employed for the DOA-Swannanoa landfill remediation project. Erosion and sediment control measures are designed for protection of surface water at the site in order to manage and minimize on-site hazards and potential environmental effects. The intent of surface water control is also to protect adjacent properties and watercourses from any drainage related impacts originating from the site.

The objectives include the following:

- Control surface water coming onto site and discharging from the site;
- Flooding control;
- Surface water quality control;
- Surface water quantity control; and
- Erosion and sediment control

1.1 Site Location and Description

A portion of the United States Geological Survey (USGS) 7.5-minute quadrangle map containing the site, and illustrating site and area topography, land-use, and roadways, is provided on Figure 1. The site layout is shown on Figure 2. The site is located off of Clover Lane in Swannanoa, Buncombe County, North Carolina 28711 (no specific street address). The latitude and longitude of the center of the site are 35.61921°N and -82.37660°W, respectively.

The site is located within an approximately 268± acre assemblage of contiguous property parcels owned by the State of North Carolina that historically have been used for a variety of functions. There are two main State-owned properties that comprise the assemblage, referred to as the "northern" property (PIN 9699-67-4268; Deed Book/Page 0946/0527) and the "southern" property (PIN 9699-74-4844; Deed Book/Page 0946/0527). The site is located within a portion of both properties, at the southeast corner of the northern property and the northeast corner of the southern property. There is no zoning designation for these State-owned properties.

The site contains a former hospital crematorium/incinerator (hereinafter referred to as "incinerator"), an unpermitted solid-waste landfill, and assorted surface refuse/debris, which are the subjects of site investigation and remediation. The total area encompassing the landfill, former incinerator, and surface refuse/debris measures approximately 2.5 acres. This area is currently enclosed by a 6-feet tall security

fence, topped with barbed wire, preventing access by the public. Access to the site is via an asphalt drive through a locked gate.

The site is situated in a mountainous terrain typical of the Blue Ridge Geological Province. The site topography slopes generally from high points on the north and west sides of the site property to low points on the south side of the site property, with an overall topographic relief of approximately 45 feet. The surface of the unpermitted landfill forms a topographic plateau in the approximate center of the site. A thick growth of kudzu covers the surface of the landfill and adjacent areas during the growing season. The remainder of the site contains primarily brush and pine/hardwood trees. An asphalt circle drive is situated around the perimeter of the former incinerator structure.

The site is located within the French Broad River basin. The site is in a Class C watershed in accordance with 15A NCAC 2B. A drainage swale is located along the eastern boundary of the site, running generally from north to south. This conveys water only during rainfall events. The swale joins a narrow intermittent stream that originates at the base of the unpermitted landfill near the southwest corner of the site fence and flows generally south and southwest, crossing under Clover Lane south of the site (Figure 2). A separate drainage swale/intermittent stream joins the main intermittent stream, running south-southwest from the Owen High School property. No water was observed in intermittent stream channels during site visits by Piedmont Geologic from August through October 2011. Surface water was observed periodically during site visits from November 2014 to July 2015.

1.2 Adjacent Properties

A camp operated by the Black Mountain Home for Children, Youth, and Families (BMHC), formerly the Swannanoa 4-H camp, is located directly to the north and west of the site, on the northern State-owned property and a portion of the southern State-owned property. The North Carolina Juvenile Evaluation Center (JEC) and the Black Mountain Correctional Center for Women (BMCC) are located to the south of the site, on the southern State-owned property. The North Carolina State Veterans Home is located southwest of the site, also on the southern State-owned property. Residences are situated west of the State-property complex along Woodland Drive. Charles D. Owen (Owen) High School property is located directly east of the site. A portion of the eastern fence line at the DJJDP site encroaches on the Owen High School property.

1.3 Site Soils

Based on soil boring logs generated during previous assessment activities, native site soils and saprolite, to the explored depth of approximately 45-feet below grade, consist of micaceous silty/clayey sand mixtures to depths of around 10 to 15-feet below grade, underlain by saprolitic micaceous sandy silt/clay. Competent bedrock has not been penetrated by any site borings to the explored depth of 45-feet below grade. The soil that will be excavated, and surrounding soils are

2.0 Scope of Remediation Work

Following is the generalized approach to be used for implementation of the site remedial actions. Sequence and timing of individual activities are subject to revisions in the field due to various factors, such as weather conditions, equipment availability, access limitations, contractor preferences, etc. The proposed remediation areas are shown on Figure 3.

- Site preparation for subsequent remedial actions will be completed, including removal of portions of the security fence necessary to facilitate site ingress/egress and soil excavation/loading, plus installation of temporary security barriers; removal of trees/brush as necessary to allow for site preparation and subsequent activities; preparation of site ingress/egress routes and equipment staging areas; installation of erosion and sediment control measures; installation of the equipment/personnel decontamination station; and installation of a public water supply line.
- The concrete shell of the former incinerator will be razed and the residual ash contents removed for offsite transportation/disposal.
- Soils around the perimeter of the incinerator (Area 1) will be excavated to a depth of 6-inches below grade for offsite transportation/disposal. Post-excavation soil samples will be collected for laboratory analysis.
- Soils in Area 2 will be excavated to a depth of 2-feet below grade for offsite transportation/disposal. Post-excavation soil samples will be collected for laboratory analysis.
- Soils in Area 3 and Area 4 will be excavated to depths of 1-foot and 6-inches below grade, respectively, for offsite transportation/disposal.
- Surface debris/refuse in Area A will be collected for offsite transportation and disposal/recycling.
- Surface refuse/debris in Areas C through F will be collected for offsite transportation and disposal/recycling.

- Surface debris/refuse in Area B will be collected for offsite transportation and disposal/recycling.
- Exposed waste in Area B and the landfill contents, as well as any previously excavated ash/soil staged on the landfill, will be excavated and transported offsite for disposal.
- Sediments in Area 5 will be excavated and transported offsite for disposal.
- Following confirmation that soil/sediment soil remediation goals are achieved, site restoration activities will be completed; including, grading; seeding; removal of erosion-control measures; removal of temporary security barriers and remaining portions of security fence; removal/disposal of equipment/personnel decontamination station; decommissioning of water supply line; and installation of a vegetative barrier to prevent unauthorized vehicle access.

3.0 Sediment and Erosion Control Features

In order to achieve these objectives, the proposed stormwater management system was designed to include several features as follows:

- Sediment fencing
- Sediment basin
- Temporary gravel construction entrance/exit
- Temporary diversion channels
- Surface stabilization

A sediment fence will be constructed along the eastern and southern boundaries of the remediation area to prevent sediment from entering drainage ditches and the intermittent stream. Sediment fence specifications are shown on Figure 4.

A sediment basin will be constructed at the existing drainage ditch at southeast end of the remediation area as shown on Figure 5. Any water from the disturbed areas will be directed to the basin before leaving the site.

A temporary gravel/construction entrance/exit will be installed at the entrance from the driveway on the west side of the site as shown of Figure 3. It may be necessary to wash vehicle tires at this location. The entrance will be graded so that runoff water will be directed away from the excavation areas. The entrance/exit specifications are shown on Figure 6.

It is recommended that concentrated flow over cut or fill slopes be prevented as much as possible Temporary diversions may be constructed, as necessary, to prevent erosion in excavated areas. Sediment-free water may be diverted away from the sediment basin. A typical temporary diversion specification is shown on Figure 7.

Upon completion of excavation activities, and receipt of confirmatory soil sampling, the site will be graded to minimize erosion and runoff. The site will be seeded with 120 pounds per acre with rye grain.

4.0 Maintenance Plan

All erosion and sediment control features will be checked for stability and operation following every runoff-producing rainfall but in no case less once every week. Any needed repairs will be made immediately to maintain all practices as designed.

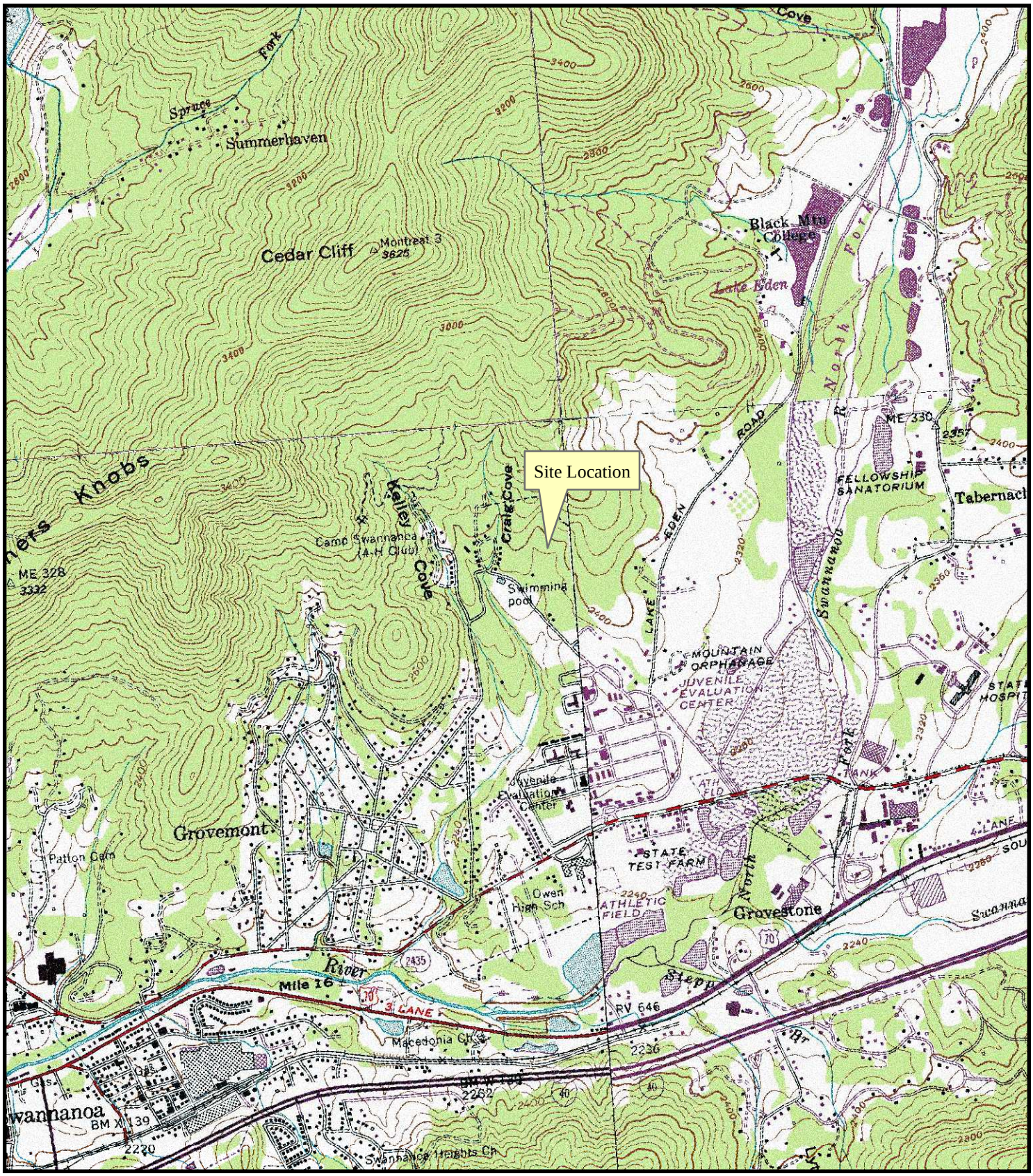
The sediment basin will be cleaned out when the level of sediment reaches 2 feet below the top of the riser. Gravel will be cleaned or replaced when the sediment basin no longer drains properly.

Sediment will be removed from behind the sediment fence when it becomes 0.5 feet deep at the fence. The sediment fence will be repaired as necessary to maintain a barrier.

5.0 Construction Schedule

We anticipate that site activities will begin in November 2016, and will be completed by February 2017. The anticipated schedule includes the following activities related to erosion and sediment control, in order.

- Obtain plan approval and other applicable permits.
- Hold preconstruction meeting at least one week prior to starting construction.
- Install sediment fence.
- Install sediment basin.
- Install temporary gravel construction entrance/exit.
- Remove surface debris and sort for offsite disposal/recycling and burning on site.
- Excavate soil and complete confirmation sampling.
- Construct temporary diversions, as necessary, during excavation activities.
- Complete final grading, seed and straw.



PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Figure 1 - Site Location Map

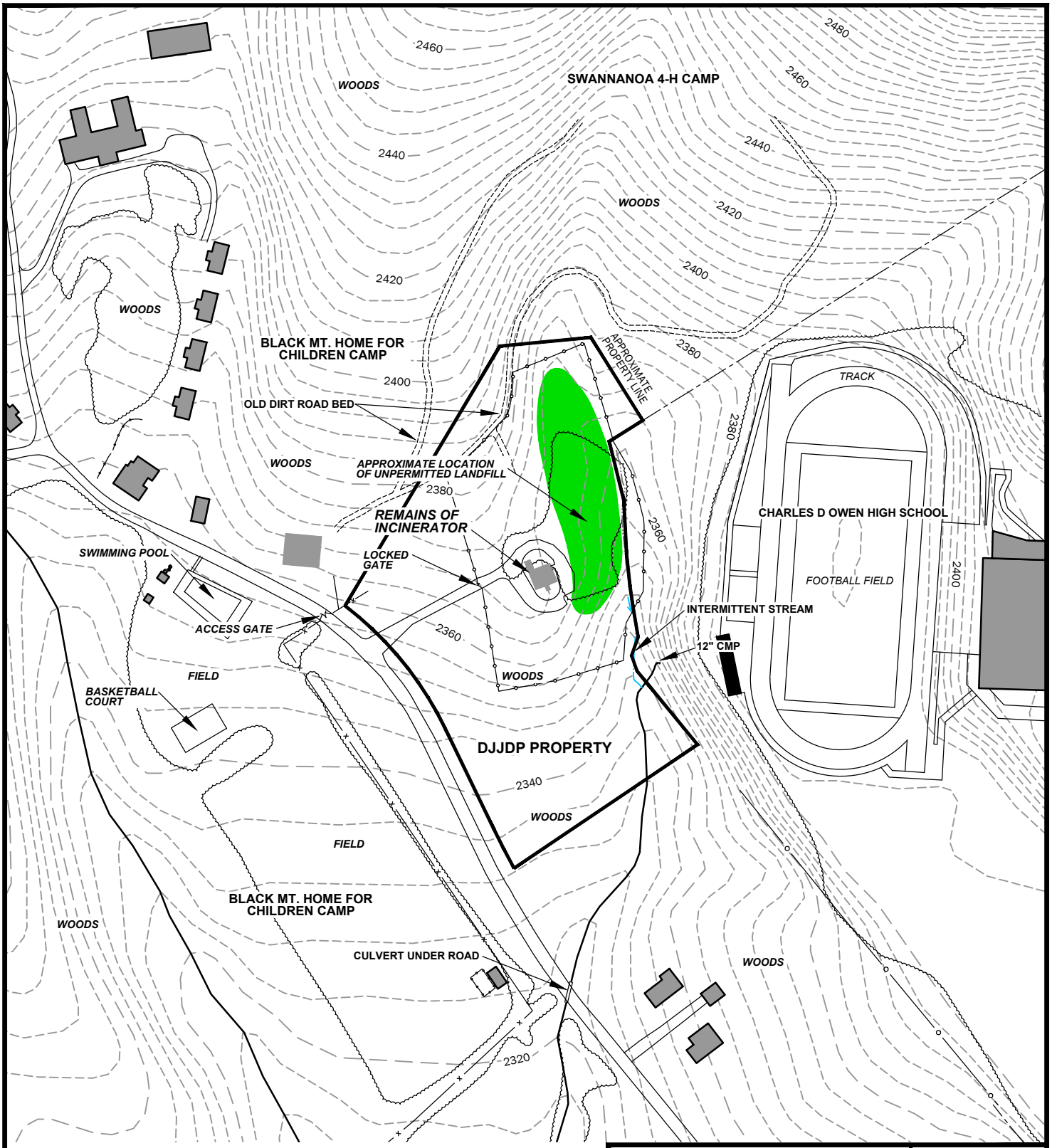
DJJDP Landfill Property
170 Woodland Drive
Swannanoa, North Carolina

N
W E
S

0 1,000 2,000 4,000
1 Inch = 2,000 Feet

Data Source: Oteen quadrangle, USGS, 1997

Map Data: October 2011.



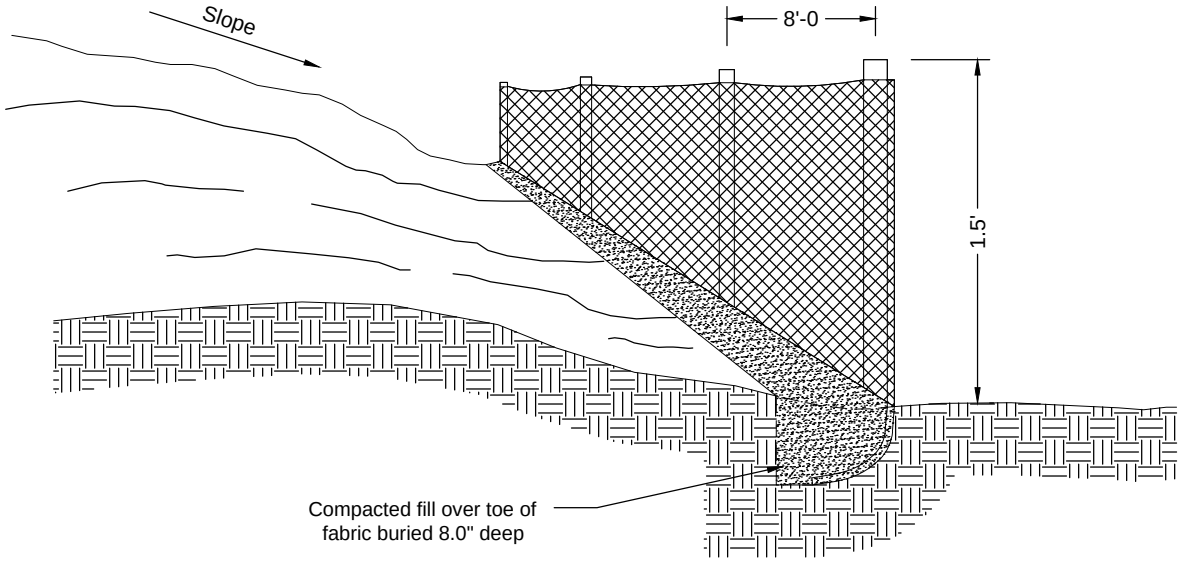
Map based on 2006 aerials obtained from Buncombe County Geographical Information System at: http://www.buncombecounty.org/governing/depts/GIS/dataDownload.asp

Scale (ft.)

0 200 400

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 2.dwg		
Designed: PD	Site and Vicinity Map	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: PD	Location: Swannanoa, North Carolina	Figure: 2



Sediment Fence Detail (NTS)

Construction Specifications

1. Construct sediment fence on low sides of excavations to prevent sediment from being wahed into the existing drainage ditch.
2. Locate posts downslope of fabric to help support fencing.
3. Bury toe of fence approximately 8 inches deep to prevent undercutting.
4. When joints are necessary, securely fasten the fabric at a support post with overlap to the next post.
5. Filter fabric to be 36-inch wide extra strength wire back polypropylene woven geotextile fabric (14 gauge 4-inch by 4-inch wire back), and will contain stabilizers and inhibitors that make it resistant to deterioration caused by ultraviolet light, heat and soil conditions.
6. Posts to be 5 feet self-fastener angle steel.

PIEDMONT GEOLOGIC SMART EARTH SOLUTIONS		Gauging Date:
		Drawing Date: 3/18/16
		ACAD File: Fig 4.dwg
Designed: JBL	Sediment Fence Detail	
Detailed: JBL	Client: Swannanoa - DJJDP Property	Project No.: 1632
Checked: JBL	Location: Swannanoa, North Carolina	Figure: 4

Map based on 2006 aerials obtained from Buncombe County Geographical Information System at: http://www.buncombecounty.org/governing/depts/GIS/dataDownload.asp

Excavate soil at LPS-13 to 6 in. below grade.

Collect surface refuse/debris.

Excavate soil at E-10 to 1 ft. below grade.

Excavate soil at LPS-1/LPS-3 to 6 in. below grade.

Excavate soil at E-1/LPS-37 to 3 ft. below grade.

Demolish incinerator and transport offsite.

Excavate sediment to 6 in. below grade.

Temporary construction entrance/exit

Collect surface refuse/debris and exposed waste.

Proposed temporary sediment trap

2400

2380

2360

2340

1 2 3 4 5

A B C D E F

Legend:

Approximate Extent Of Landfill

Surface Refuse/Debris Area

Landfill-Perimeter Area to be Excavated

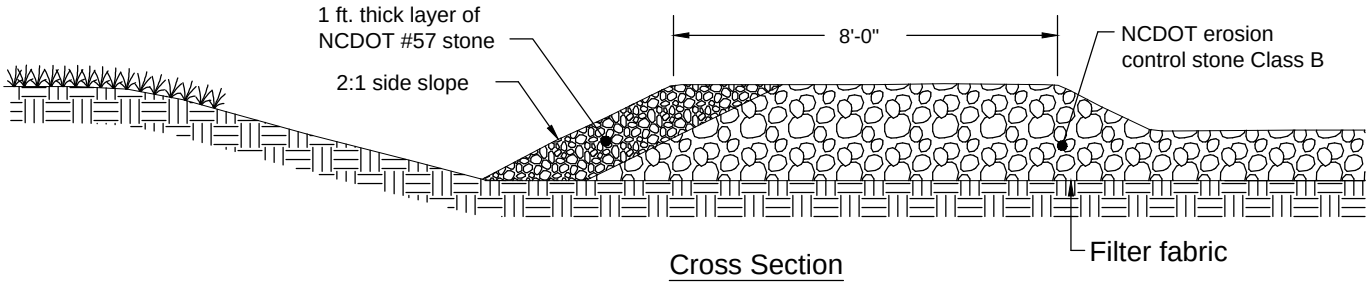
Proposed Sediment Fence

Scale (ft.)

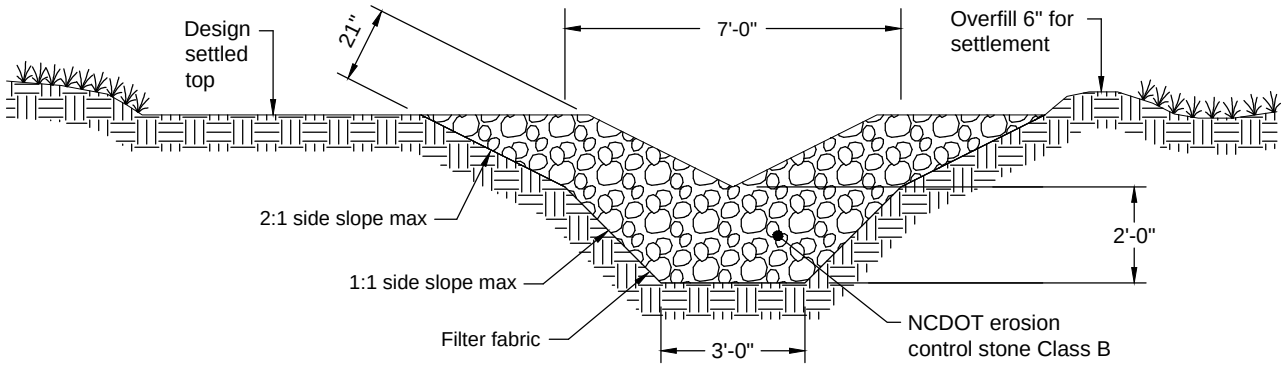
0 60 120

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:	
Drawing Date:	3/15/16
ACAD File:	Fig 3.dwg
Designed: JBL	Summary of Proposed Site Remedial Action and Erosion and Sediment Control Features
Detailed: JBL	Client: Swannanoa - DJJDP Property
Project No.:	1632
Checked: JBL	Location: Swannanoa, North Carolina
Figure:	3



Cross Section



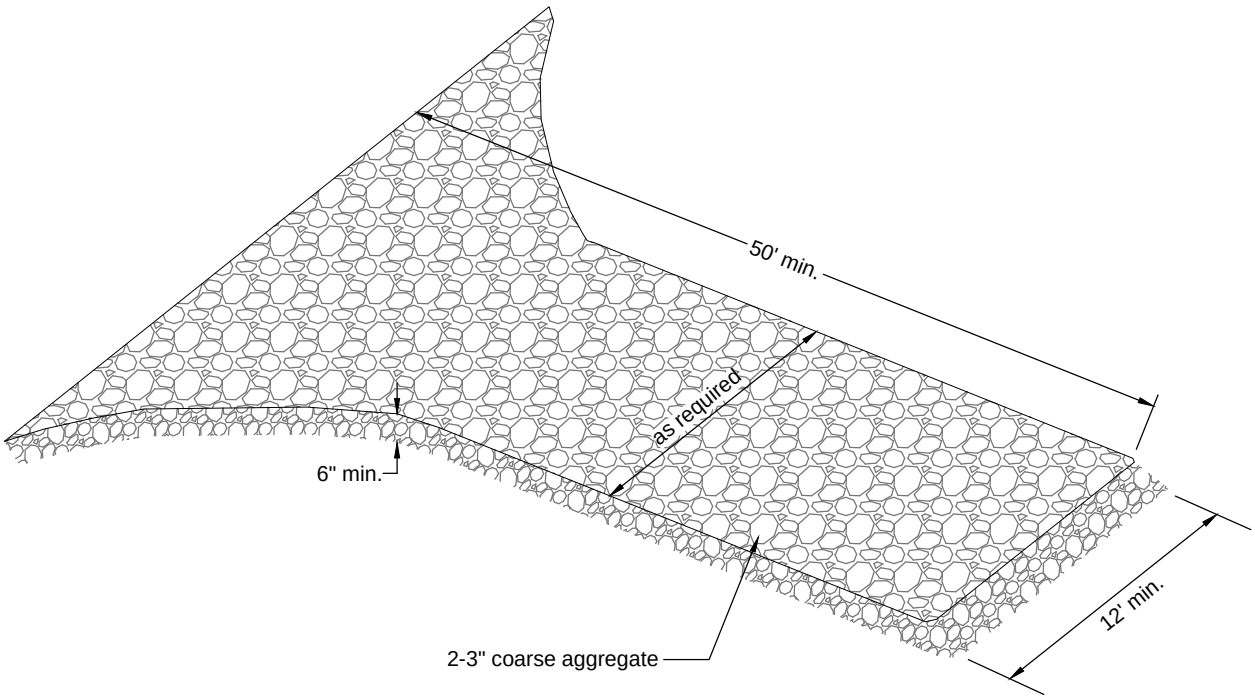
Stone Section

Sediment Trap Detail (NTS)

Construction Specifications

1. Clear, grub and strip the area of all vegetation and root mat.
2. Use fill material free of roots, woody vegetation and organic matter. Place fill in lifts not to exceed 9 inches and machine compact.
3. Construct dam and stone spillway to dimensions and slopes.
4. Ensure that the spillway crest is level and at least 1.5 feet below the top of the dam at all points.
5. Class “B” erosion control stone is to be used for spillway section.
6. DOT #57 washed stone is to be used on inside spillway face to control drainage.
7. Ensure that the top of the dam at all points is 0.5 feet above natural surrounding ground.

PIEDMONT GEOLOGIC SMART EARTH SOLUTIONS		Gauging Date:
		Drawing Date: 3/18/16
		ACAD File: Fig 5.dwg
Designed: JBL	Sediment Trap Detail	
Detailed: JBL	Client: Swannanoa - DJJDP Property	Project No.: 1632
Checked: JBL	Location: Swannanoa, North Carolina	Figure: 5

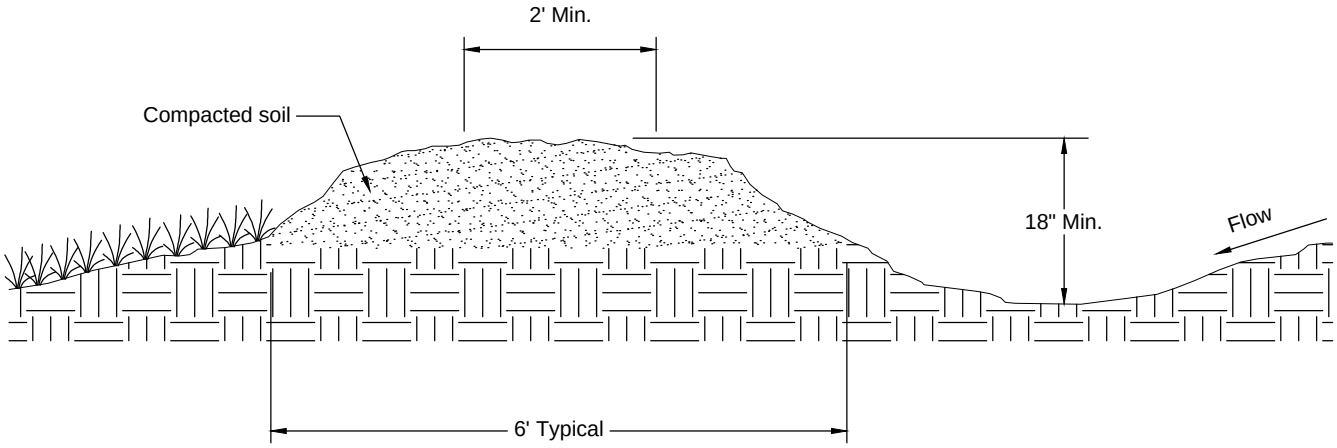


Construction Entrance Detail (NTS)

Construction Specifications

1. Clear the entrance/exit area of all vegetation, roots, and other objectionable material.
2. Grade the road foundation so that the entrance/exit will drain to the south.
3. Place stone to the dimensions, grade and elevation shown.
4. Used washed stone 2-3 inch washed stone.

PIEDMONT GEOLOGIC SMART EARTH SOLUTIONS		Gauging Date:
		Drawing Date: 3/18/16
		ACAD File: Fig 6.dwg
Designed: JBL	Construction Entrance Detail	
Detailed: JBL	Client: Swannanoa - DJJDP Property	Project No.: 1632
Checked: JBL	Location: Swannanoa, North Carolina	Figure: 6



Diversion Channel Cross Section (NTS)

Construction Specifications

1. Remove all trees, brush and stumps from diversion foundation.
2. Construct ridge to dimensions shown (allow 10 percent for settling).
3. Compact ridge by wheels of construction equipment.
4. Ensure that the top of the diversion is on design grade or higher at all points.
5. Seed and straw immediately after construction.

PIEDMONT GEOLOGIC SMART EARTH SOLUTIONS		Gauging Date:
		Drawing Date: 3/18/16
		ACAD File: Fig 7.dwg
Designed: JBL	Diversion Channel Cross Section	
Detailed: JBL	Client: Swannanoa - DJJDP Property	Project No.: 1632
Checked: JBL	Location: Swannanoa, North Carolina	Figure: 7

FINANCIAL RESPONSIBILITY/OWNERSHIP FORM
SEDIMENTATION POLLUTION CONTROL ACT

No person may initiate any land-disturbing activity on one or more acres as covered by the Act before this form and an acceptable erosion and sedimentation control plan have been completed and approved by the Land Quality Section, N.C. Department of Environment and Natural Resources. (Please type or print and, if the question is not applicable or the e-mail and/or fax information unavailable, place N/A in the blank.)

Part A.

1. Project Name: Swannanoa DJJP Property
2. Location of land-disturbing activity: County Buncombe City or Township Swannanoa

   Highway/Street Clover Lane Latitude 35.61921°N Longitude -82.37660°W

3. Approximate date land-disturbing activity will commence: November 2016

4. Purpose of development (residential, commercial, industrial, institutional, etc.): Soil Remediation

5. Total acreage disturbed or uncovered (including off-site borrow and waste areas): 1.84 acres

6. Amount of fee enclosed: $130.00. The application fee of $65.00 per acre (rounded up to the next acre) is assessed without a ceiling amount (Example: a 9-acre application fee is $585).

7. Has an erosion and sediment control plan been filed? Yes_____ No_____ Enclosed ✓

8. Person to contact should erosion and sediment control issues arise during land-disturbing activity:

   Name Bill Sessoms E-mail Address bill.sessoms@doa.nc.gov

   Telephone (919 807-4141 Cell # _____ Fax # (919) 807-4110

9. Landowner(s) of Record (attach accompanied page to list additional owners):

   Name _____ Telephone _____ Fax Number _____

   Current Mailing Address _____ Current Street Address _____

   City State Zip _____ City State Zip _____

10. Deed Book No._____ Page No._____ Provide a copy of the most current deed.

Part B.

1. Person(s) or firm(s) who are financially responsible for the land-disturbing activity (Provide a comprehensive list of all responsible parties on an attached sheet):

   Name _____ E-mail Address _____

   Current Mailing Address _____ Current Street Address _____

   City State Zip _____ City State Zip _____

   Telephone_____ Fax Number_____

2. (a) If the Financially Responsible Party is not a resident of North Carolina, give name and street address of the designated North Carolina Agent:

Name	E-mail Address
Current Mailing Address	Current Street Address
City State Zip	City State Zip
Telephone	Fax Number

(b) If the Financially Responsible Party is a Partnership or other person engaging in business under an assumed name, **attach a copy of the Certificate of Assumed Name.** If the Financially Responsible Party is a Corporation, give name and street address of the Registered Agent:

Name of Registered Agent	E-mail Address
Current Mailing Address	Current Street Address
City State Zip	City State Zip
Telephone	Fax Number

The above information is true and correct to the best of my knowledge and belief and was provided by me under oath (This form must be signed by the Financially Responsible Person if an individual or his attorney-in-fact, or if not an individual, by an officer, director, partner, or registered agent with the authority to execute instruments for the Financially Responsible Person). I agree to provide corrected information should there be any change in the information provided herein.

William Sessoms	Building Systems Engineer
Type or print name	Title or Authority
William Sessoms	29 March 2016
Signature	Date

I, Jim R. YANCEY, a Notary Public of the County of Granville State of North Carolina, hereby certify that _____ appeared personally before me this day and being duly sworn acknowledged that the above form was executed by him.

Witness my hand and notarial seal, this 29 day of March, 2016

Notary

Seal

My commission expires 6-30-2019

EROSION and SEDIMENTATION CONTROL PLAN PRELIMINARY REVIEW CHECKLIST

The following items shall be incorporated with respect to specific site conditions, in an erosion & sedimentation control plan:

NPDES Construction Stormwater General Permit NCG010000

_____ Designation on the plans where the 7 or 14 day ground stabilization requirements apply per Section II.B.2 of the permit.
_____ Design of basins with one acre or more of drainage area for surface withdrawal as per Section II.B.4 of the permit.

LOCATION INFORMATION

✓ Project location & labeled vicinity map (roads, streets, landmarks)
✓ North arrow and scale
✓ Identify River Basin.
✓ Provide a copy of site located on applicable USGS quadrangle and NRCS Soils maps if it is in a River Basin with Riparian Buffer requirements.

GENERAL SITE FEATURES (Plan elements)

✓ Property lines & ownership ID for adjoining properties
✓ Existing contours (topographic lines)
✓ Proposed contours
✓ Limits of disturbed area (provide acreage total, delineate limits, and label). Be sure to include all access to measures, lots that will be disturbed, and utilities that may extend offsite.
✓ Planned and existing building locations and elevations
✓ Planned & existing road locations & elevations, including temporary access roads
✓ Lot and/or building numbers
✓ Hydrogeologic features: rock outcrops, seeps, springs, wetland and their limits, streams, lakes, ponds, dams, etc. (include all required local or state buffer zones and any DWQ Riparian Buffer determinations)
_____ Easements and drainageways, particularly required for offsite affected areas. Include copies of any recorded easements and/or agreements with adjoining property owners.
_____ Profiles of streets, utilities, ditch lines, etc.
_____ Stockpiled topsoil or subsoil locations
_____ If the same person conducts the land-disturbing activity & any related borrow or waste activity, the related borrow or waste activity shall constitute part of the land-disturbing activity unless the borrow or waste activity is regulated under the Mining Act of 1971, or is a landfill regulated by the Division of Waste Management. If the land-disturbing activity and any related borrow or waste activity are not conducted by the same person, they shall be considered separate land-disturbing activities and must be permitted either through the Sedimentation Pollution Control Act as a one-use borrow site or through the Mining Act.
_____ Location and details associated with any onsite stone crushing or other processing of material excavated. If the affected area associated with excavation, processing, stockpiles and transport of such materials will comprise 1 or more acres, and materials will be leaving the development tract, a mining permit will be required.
_____ Required Army Corps 404 permit and Water Quality 401 certification (e.g. stream disturbances over 150 linear feet)

EROSION & SEDIMENT CONTROL MEASURES (on plan)

✓ Legend (provide appropriate symbols for all measures and reference them to the construction details)
✓ Location of temporary measures
✓ Location of permanent measures
✓ Construction drawings and details for temporary and permanent measures. Show measures to scale on plan and include proposed contours where necessary. Ensure design storage requirements are maintained through all phases of construction.
✓ Maintenance requirements for measures
✓ Contact person responsible for maintenance

SITE DRAINAGE FEATURES

_____ Existing and planned drainage patterns (include off-site areas that drain through project and address temporary and permanent conveyance of stormwater over graded slopes)
_____ Method used to determine acreage of land being disturbed and drainage areas to all proposed measures (e.g. delineation map)
_____ Size, pipe material and location of culverts and sewers
_____ Soil information: type, special characteristics
_____ Soil information below culvert storm outlets
✓ Name and classification of receiving water course or name of municipal operator (only where stormwater discharges are to occur)

STORMWATER CALCULATIONS

_____ Pre-construction runoff calculations for each outlet from the site (at peak discharge points). Be sure to provide all supporting data for the computation methods used (rainfall data for required storm events, time of concentration/storm duration, and runoff coefficients).
_____ Design calculations for peak discharges of runoff (including the construction phase & the final runoff coefficients for the site)
_____ Design calcs for culverts and storm sewers (include HW, TW and outlet velocities)
_____ Discharge and velocity calculations for open channel and ditch flows (easement & rights-of-way)
_____ Design calcs for cross sections and method of stabilization for existing and planned channels (include temporary linings). Include appropriate permissible velocity and/or shear stress data.
_____ Design calcs and construction details for energy dissipaters below culvert and storm sewer outlets (include stone/material specs & apron dimensions). Avoid discharges on fill slopes.
_____ Design calcs and dimension of sediment basins (note current surface area and dewatering standards as well as diversion of runoff to the basins). Be sure that all surface drains, including ditches and berms, will have positive drainage to the basins.

VEGETATIVE STABILIZATION

✓ Area & acreage to be stabilized with vegetation
✓ Method of soil preparation
✓ Seed type & rates (temporary & permanent)
_____ Fertilizer type and rates
_____ Mulch type and rates (include mulch anchoring methods to be used)

NOTE: Plan should include provisions for groundcover in accordance with NPDES Construction Stormwater General Permit NCG010000 and permanent groundcover for all disturbed areas within 15 working days or 90 calendar days (whichever is shorter) following completion of construction or development.

FINANCIAL RESPONSIBILITY/OWNERSHIP FORM

✓ Completed, signed & notarized FR/O Form
✓ Accurate application fee payable to NCDENR ($65.00 per acre rounded up the next acre with no ceiling amount)
✓ Certificate of assumed name, if the owner is a partnership
✓ Name of Registered Agent (if applicable)
_____ Copy of the most current Deed for the site. Please make sure the deed(s) and ownership information are consistent between the plan sheets, local records and this form.
✓ Provide latitude & longitude (in decimal degrees) at the project entrance.

NOTE: For the Express Permitting Option, inquire at the local Regional Office for availability.

NARRATIVE AND CONSTRUCTION SEQUENCE

✓ Narrative describing the nature & purpose of the construction activity
✓ Construction sequence related to erosion and sediment control (including installation of critical measures prior to the initiation of the land-disturbing activity & removal of measures after areas they serve are permanently stabilized). Address all phases of construction and necessary practices associated with temporary stream bypasses and/or crossings.
_____ Bid specifications related only to erosion control

APPENDIX F

REPUBLIC LANDFILL PERMIT CERTIFICATE AND ACCEPTANCE LETTER

NCDENR

North Carolina Department of Environment and Natural Resources
Division of Waste Management
Dexter R. Matthews
Director

Pat McCrory
Governor

John E. Skvarla, III
Secretary

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT
SOLID WASTE SECTION

SOLID WASTE MANAGEMENT FACILITY
Permit No. 1403

CALDWELL COUNTY (OWNER)
And REPUBLIC SERVICES of North Carolina, LLC, (OPERATOR)
a wholly owned subsidiary of Republic Services, Inc,
d.b.a. FOOTHILLS REGIONAL LANDFILL
is hereby issued a

PERMIT TO CONSTRUCT
Not Applicable

PERMIT TO OPERATE
1403-MSWLF-1998, Foothills Environmental Landfill

PERMIT FOR CLOSURE
Not Applicable

Located at *2800 Cheraw Road, near the City of Lenoir, Caldwell County,* North Carolina, in accordance with Article 9, Chapter 130A, of the General Statutes of North Carolina and all rules promulgated thereunder and subject to the conditions set forth in this permit. The legal description of the site is identified on the deeds recorded for this property listed in Attachment 1 of this permit.

Digitally signed by Edward F. Mussler III, P.E.
DN: cn=Edward F. Mussler III, P.E., o=Solid Waste Section, ou=NC DWM, email=ed.mussler@ncdenr.gov, c=US
Date: 2013.07.22 09:52:12 -04'00'

Edward F. Mussler, III, P.E.,
Permitting Branch Supervisor
Solid Waste Section

REPUBLIC SERVICES

Charlotte Motor Speedway Landfill 5105 Morehead Road Concord, NC 28027
o 704.782.2004 f 704.782.2177 republicservices.com

March 4, 2016

Joseph B Lee, III, PE
Piedmont Geological, PC
6003-145 Chapel Hill Rd.
Raleigh, NC 27607

NC Department of Administration, Swannanoa

Dear Mr. Lee:

We have approved the disposal of approximately10,000 yards of non-hazardous solids, debris and soil from the Swannanoa DJJDP landfill remediation project. Our disposal price for MSW and soil comingled is $41.88 per ton plus $2.00 per ton and we will waive our fuel and environmental fees. In the event that we are able to use some of the material as ADC, (alternative daily cover) we can provide you with disposal pricing of $25.00 per ton no taxes or fees.

In order to use the material as ADC we will need to visually inspect it to ensure there is no MSW or other type of debris in it that could cause the State to cite us for noncompliance due to flagging, (debris or MSW visible in the daily cover). If you can segregate the clean soils in stockpiles after screening or whatever means you choose to remove MSW or debris or stockpile debris free soil we can come to the site and verify that the material will meet the States requirement for our use as an ADC and we will be happy to provide you with that reduced rate.

We will be able to give you two different manifests set up with both prices. Thank you again for this opportunity and we will wait for your response on how to proceed. These rates will be valid until 10/31/16. If you need anything please don't hesitate to call or email

Thank you,

John Marston
Republic Services

REPUBLIC SERVICES

Charlotte Motor Speedway Landfill 5105 Morehead Road Concord, NC 28027
o 704.782.2004 f 704.782.2177 republicservices.com

March 9, 2016

Joseph B Lee, III, PE
Piedmont Geological, PC
6003-145 Chapel Hill Rd.
Raleigh, NC 27607

NC Department of Administration, Swannanoa

Dear Mr. Lee:

We have approved the disposal of approximately10,000 yards of non-hazardous solids, debris and soil from the Swannanoa DJJDP landfill remediation project. The approval code for that project is 3044 16 3481 and I will send a copy of that along with our operating permit.

As a private subtitle D disposal facility operating in North Carolina under the regulatory oversight and guidance from NCDEQ we are permitted to accept this type of material and there is no notification or special permission from the State required for us to accept these non-hazardous solids.

Thank you,

John Marston
Republic Services

Republic Services, Inc.

18500 N. Allied Way, Phoenix, AZ 85054

SPECIAL WASTE DEPARTMENT DECISION

	Waste Profile # 3044163481	**Expiration Date** 3/2/2017	
I. Decision Request:	☑ **Initial** ☐ **Recertification** ☐ **Change**		

Disposal Facility: 3044 - Foothills Regional MSW Landfill

Generator Name: NC Department of Administration

Generator Site Address: Clover Lane

City: Swannanoa	**County:**	**State:** NC	**Zip:**

Name of Waste: Swannanoa DJJDP Landfill

Estimated Annual Volume: 10,000 Tons

II. Special Waste Department Decision: ☑ **Approved** ☐ **Rejected**

Management Method(s): ☑ Landfill ☐ Solidification ☐ Bioremediation ☐ Transfer Facility

Problematic Special Waste according to Republic? ☐ Yes ☑ No

If yes, which one?

Approved by Special Waste Review Committee? ☐ Yes ☐ No ☑ Not Applicable

Precautions, Conditions or Limitations on Approval

Special Waste Analyst Signature: _____ **Name (Printed):** Suzanne Glass

Date: 3/2/2016

III. Facility Decision: ☐ **Approved** ☐ **Rejected**

Precautions, Conditions or Limitations on Approval

By signing below, the General Manager or Designee agrees that a fully executed Special Waste Service Agreement is on file for this profile and that the special waste file is complete.

General Manager or Designee: _____ **Name (Printed):** _____

Date: 3/2/2016

REPUBLIC SERVICES **SPECIAL WASTE PROFILE**

Requested Disposal Facility: 3044 Foothills Regional MSW Landfill NC

Waste Profile #
3044-16-3481
Sales Rep #: 116

Saveable fill-in form. Restricted printing until all required (yellow) fields are completed.

I. Generator Information

Generator Name: NC Department of Administration			
Generator Site Address: Clover Lane			
City: Swannanoa	County: Buncombe	State: North Carolina	Zip: 28778
State ID/Reg No:	State Approval/Waste Code: (if applicable)		NAICS #:
Generator Mailing Address (if different): ☑ 1307 Mail Service Center			
City: raleigh	County: Wake	State: North Carolina	Zip: 27699-1307
Generator Contact Name: Bill Sessoms		Email: bill.sessoms@ncmail.net	
Phone Number: (919) 807-4131	Ext:	Fax Number: (919) 807-4110	

II. Billing Information

Bill To: NC Department of Administration		Contact Name: Bill Sessoms	
Billing Address: 1307 Mail Service Center		Email: bill.sessoms@ncmail.net	
City: Raleigh	State: NC	Zip: 27699	Phone: (919) 807-4141

III. Waste Stream Information

Name of Waste: Swannanoa DJJDP Landfill	
Process Generating Waste: Excavation of landfill debris and soil	
Type of Waste:	☑ INDUSTRIAL PROCESS WASTE ☐ POLLUTION CONTROL WASTE
Physical State:	☑ SOLID ☐ SEMI-SOLID ☐ POWDER ☐ LIQUID
Method of Shipment:	☑ BULK ☐ DRUM ☐ BAGGED ☐ OTHER:
Estimated Annual Volume:	10,000 Tons
Frequency:	☑ ONE TIME ☐ ONGOING
Disposal Consideration:	☑ LANDFILL ☐ SOLIDIFICATION ☐ BIOREMEDIATION

IV. Representative Sample Certification ☐ NO SAMPLE TAKEN

Is the representative sample collected to prepare this profile and laboratory analysis, collected in accordance with U.S. EPA 40 CFR 261.20(c) guidelines or equivalent rules?	☑ YES or ☐ NO
Type of Sample: ☑ COMPOSITE SAMPLE ☐ GRAB SAMPLE	
Sample Date: 9/13/2011	
Sample ID Numbers: Crematorium Composite Landfill Soil Boring Composite Operations at the former landfill were terminated in the 1950s. The landfill has been secure by a fence and locked gate since 2009.	

© Republic Services, April 2013

REPUBLIC SERVICES **SPECIAL WASTE PROFILE**

Waste Profile #
3044-16-3481

V. Physical Characteristics of Waste

Characteristic Components	% by Weight (range)
1. Debris, Glass, Ceramic, Plastic, Metal	10
2. Soil	90
3.	
4.	
5.	

Color	Odor (describe)	Does Waste Contain Free Liquids?	% Solids	pH:	Flash Point
Reddish	None	☐ YES or ☑ NO	100	N/A	N/ °F

Attach Laboratory Analytical Report (and/or Material Safety Data Sheet) Including Chain of Custody and Required Parameters Provided for this Profile

Does this waste or generating process contain regulated concentrations of the following Pesticides and/or Herbicides: Chlordane, Endrin, Heptachlor (and its epoxides), Lindane, Methoxychlor, Toxaphene, 2,4-D, or 2,4,5-TP Silvex as defined in 40 CFR 261.33?	☐ Yes or ☑ No
Does this waste contain reactive sulfides (greater than 500 ppm) or reactive cyanide (greater than 250 ppm)[reference 40 CFR 261.23(a)(5)]?	☐ Yes or ☑ No
Does this waste contain regulated concentrations of Polychlorinated Biphenyls (PCBs) as defined in 40 CFR Part 761?	☐ Yes or ☑ No
Does this waste contain concentrations of listed hazardous wastes defined in 40 CFR 261.31, 261.32, 261.33, including RCRA F-Listed Solvents?	☐ Yes or ☑ No
Does this waste exhibit a Hazardous Characteristic as defined by Federal and/or State regulations?	☐ Yes or ☑ No
Does this waste contain regulated concentrations of 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8-TCCD), or any other dioxin as defined in 40 CFR 261.31?	☐ Yes or ☑ No
Is this a regulated Radioactive Waste as defined by Federal and/or State regulations?	☐ Yes or ☑ No
Is this a regulated Medical or Infectious Waste as defined by Federal and/or State regulations?	☐ Yes or ☑ No
Is this waste a reactive or heat generating waste?	☐ Yes or ☑ No
Does the waste contain sulfur or sulfur by-products?	☐ Yes or ☑ No
Is this waste generated at a Federal Superfund Clean Up Site?	☐ Yes or ☑ No
Is this waste from a TSD facility, TSD like facility or consolidator?	☐ Yes or ☑ No

VI. Certification

I hereby certify that to the best of my knowledge and belief, the information contained herein is a true, complete and accurate description of the waste material being offered for disposal and all known or suspected hazards have been disclosed. All Analytical Results/Material Safety Data Sheets submitted are truthful and complete and are representative of the waste.

I further certify that by utilizing this profile, neither myself nor any other employee of the company will deliver for disposal or attempt to deliver for disposal any waste which is classified as toxic waste, hazardous waste or infectious waste, or any other waste material this facility is prohibited from accepting by law. I shall immediately give written notice of any change or condition pertaining to the waste not provided herein. Our company hereby agrees to fully indemnify this disposal facility against any damages resulting from this certification being inaccurate or untrue.

I further certify that the company has not altered the form or content of this profile sheet as provided by Republic Services Inc.

Bill Sessoms, Building Systems Engineer	NC Department of Administration
Authorized Representative Name And Title (Type or Print)	Company Name
Bill Sessoms	3/1/2016
Authorized Representative Signature	Date

© Republic Services, April 2013

APPENDIX G

BUNCOMBE COUNTY NOTIFICATION OF DEMOLITION AND/OR ASBESTOS RENOVATION

WESTERN NORTH CAROLINA REGIONAL AIR QUALITY AGENCY
30 VALLEY STREET. ASHEVILLE, NC 28801
828/250-6777

NOTIFICATION OF DEMOLITION AND OR ASBESTOS RENOVATION

POSTMARK _____ DATE RECEIVED _____ NOTIFICATION NUMBER _____

1. **TYPE:** ( ) NESHAP ASBESTOS REMOVAL ( ) NON-NESHAP ASBESTOS REMOVAL ( ) NESHAP DEMOLITION
( ) NON-NESHAP DEMOLITION ( ) ORDERED DEMOLITION ( ) EMERGENCY (Y) / (N) IS ASBESTOS PRESENT?

2. **FACILITY INFORMATION**

OWNER NAME: NC Department of Administration

ADDRESS: 301 N. Wilmington Street, Suite 450 CITY/STATE Raleigh/NC ZIP 27601

CONTACT: Peter J. Dressel, PG, Piedmont Geologic, PC PHONE NUMBER (919) 854-9700

3. **FACILITY LOCATION** (INCL. BUILDING NAME, FLOOR, ROOM #, ETC, IF APPLICABLE)

ADDRESS: Clover Lane CITY/STATE Swannanoa/NC ZIP 28778

BLDG. SIZE N/A SQ. FT. # FLOORS: N/A AGE: N/A WORK LOCATION sm landfill on site

CONTACT: Peter J. Dressel, PG/Piedmont Geologic, PC PHONE NUMBER (919) 854-9700

PRESENT USE: Not in use PRIOR USE VA Med Facility/Women's Prison, etc.

4. **CONTRACTOR** ( ) ASBESTOS REMOVAL ( ) PARTIAL DEMOLITION ( ) TOTAL DEMOLITION

COMPANY NAME: _____

ADDRESS: _____ CITY/STATE _____ ZIP _____

CONTACT: _____ PHONE NUMBER _____

5. **OTHER CONTRACTOR** ( ) ASBESTOS REMOVAL ( ) PARTIAL DEMOLITION ( ) TOTAL DEMOLITION

COMPANY NAME: _____

ADDRESS: _____ CITY/STATE _____ ZIP _____

CONTACT: _____ PHONE NUMBER _____

6. **WAS AN ASBESTOS INSPECTION PERFORMED ON THE FACILITY?** YES / NO REPORT ATTACHED? YES / NO

IF YES, NAME OF INSPECTOR AND NCHHCB ACCREDITATION NUMBER _____

7. **ASBESTOS MATERIALS IN FACILITY: TYPE, AMOUNT, FRIABILITY, REMOVAL**

A. FLOOR TILE / LINOLEUM AMNT:_____SQ. FT. FRIABLE? YES / NO REMOVE? YES / NO

B. ROOFING AMNT:_____SQ. FT. FRIABLE? YES / NO REMOVE? YES / NO

C. TRANSITE (SIDING / ROOFING) AMNT: 3,671 SQ. FT. FRIABLE? YES / NO REMOVE? YES / NO

D. PIPE INSULATION (TSI) AMNT:_____LN. FT. FRIABLE? YES / NO REMOVE? YES / NO

E. BOILER INSULATION (TSI) AMNT:_____SQ. FT. FRIABLE? YES / NO REMOVE? YES / NO

F. DUCT INSULATION / DUCT TAPE AMNT:_____SQ. FT. FRIABLE? YES / NO REMOVE? YES / NO

G. PLASTER / SHEETROCK / JOINTS AMNT:_____SQ. FT. FRIABLE? YES / NO REMOVE? YES / NO

H. OTHER _____ AMNT:_____SQ. FT. FRIABLE? YES / NO REMOVE? YES / NO

I. OTHER _____ AMNT:_____SQ. FT. FRIABLE? YES / NO REMOVE? YES / NO

8. **SCHEDULED DATES ASBESTOS REMOVAL, (MM/DD/YY):** START _____ COMPLETE _____

9. **SCHEDULED DATES FOR DEMOLITION, (MM/DD/YY):** START _____ COMPLETE _____

10. **ASBESTOS REMOVAL / DEMOLITION WORK PRACTICES** (CHECK ALL THAT APPLY)

A. ( ) CONTAINMENT
B. ( ) NEGATIVE AIR
C. ( ) CRITICAL BARRIERS, NO NEG. AIR
D. ( ) WET METHODS
E. ( ) OTHER _____

F. ( ) GLOVE BAG
G. ( ) STRIP AND REMOVE
H. ( ) HEAT MACHINE (FLOOR TILE ONLY)
I. ( ) REMOVE INTACT W/ FACILITY COMPONENT
J. ( ) OTHER _____

K. ( ) STRUCTURAL DEMOLITION BY HAND
L. ( ) DEMOLITION BY HEAVY EQUIPMENT

M. ( ) DEMOLITION BY FIRE DEPT. LIVE BURN TRAINING
N. ( ) OTHER excavation of all materials in landfill

11. **WASTE TRANSPORTER**

NAME: _____

ADDRESS: _____ CITY/STATE _____ ZIP _____

CONTACT: _____ PHONE NUMBER _____

12. **WASTE TRANSPORTER 2**

NAME: _____

ADDRESS: _____ CITY/STATE _____ ZIP _____

CONTACT: _____ PHONE NUMBER _____

13. **WASTE DISPOSAL SITE**

NAME: _____

ADDRESS: _____ CITY/STATE _____ ZIP _____

CONTACT: _____ PHONE NUMBER _____

14. **WASTE DISPOSAL SITE 2**

NAME: _____

ADDRESS: _____ CITY/STATE _____ ZIP _____

CONTACT: _____ PHONE NUMBER _____

15. IF ORDERED DEMOLITION, IDENTIFY GOVERNMENT AGENCY

NAME: _____ CONTACT _____

ADDRESS: _____ PHONE NUMBER _____

DATE OF ORDER (MM/DD/YY) _____ DATE ORDERED TO BEGIN (MM/DD/YY) _____

16. **FOR EMERGENCY DEMOLITION / ASBESTOS REMOVAL:**

DESCRIPTION OF EVENT _____

DATE AND HOUR OF EVENT _____

17. FOR RACM REMOVAL, I CERTIFY THAT AN INDIVIDUAL TRAINED IN ACCORDANCE WITH 40 CFR PART 61 WILL BE ON-SITE DURING THE DEMOLITION OR RENOVATION AND EVIDENCE THAT THE REQUIRED TRAINING HAS BEEN COMPLETED BY THIS PERSON WILL BE AVAILABLE FOR INSPECTION DURING WORKING HOURS.

SIGNED: _____ DATE: _____

18. I CERTIFY THAT THE ABOVE INFORMATION IS CORRECT, AND THAT I AM RESPONSIBLE FOR FOLLOWING ALL APPLICABLE FEDERAL, STATE, AND LOCAL DEMOLITION AND ASBESTOS REMOVAL REGULATIONS. IN THE EVENT THAT PREVIOUSLY NON-FRIABLE ASBESTOS CONTAINING MATERIAL IS RENDERED FRIABLE, OR UNFORSEEN FRIABLE ASBESTOS MATERIAL IS DISCOVERED DURING DEMOLITION, I WILL STOP WORK AND CONTACT WNCRAQA. ANY AND ALL MODIFICATIONS TO THIS NOTIFICATION SHALL BE MADE IN WRITING TO WNCRAQA.

SIGNED: _____ DATE: _____

_____ DATE: _____
WNC REGIONAL AIR QUALITY AGENCY

APPENDIX H

ASBSESTOS-CONTAMINATED SOIL REMOVAL DESIGN

ASBESTOS-CONTAMINATED SOIL REMOVAL DESIGN

Swannanoa DJJDP Property
Swannanoa, North Carolina

For:
Mr. Peter Dressel, PG
Piedmont Geologic, P.C.
6003-145 Chapel Hill Road
Raleigh, NC 27607

By:
Douglas P. Guild
Environmental/Industrial Hygiene
Manager, North Carolina
Hurt & Proffitt, Inc
536 Bowden Road
Chapel Hill, NC 27516
NC Asbestos Project Designer
License No.: 40225

H&P Project No: 20160273

Date: March 31, 2016

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Drawing A- (General Site Layout Map)-Asbestos-Contaminated Soil Removal Design
Copies of NC Asbestos Licenses: Inspector and Asbestos Abatement Project Designer

1.0 INTRODUCTION

Hurt & Proffitt, Inc. has been contracted to provide this asbestos-contaminated soils abatement design for landfilled soils located at the DJJDP Property at Clover Lane, Swannanoa, Buncombe County, North Carolina.

It is understood that the landfilled soils and miscellaneous materials were willfully dumped on the subject property over the years during site operations and during uncontrolled public dumping events. The removal of landfilled soils and miscellaneous materials is part of a project being conducted by the NC Department of Administration through the Inactive Hazardous Sites Branch of the NC DEQ. The landfill contains regulated asbestos-containing material (RACM) and is being removed from the site and disposed of at a licensed landfill.

2.0 PURPOSE

This document is to provide guidance for the safe removal and disposal of the asbestos-contaminated soils from the subject site. The approximate amount of soils to be removed that may contain asbestos and disposed of by a Contractor that is licensed by the state, is1,900 tons.

Future management of the regulated waste is the main concern. This asbestos-contaminated soils removal design has been prepared according to all applicable laws, federal, state and local in nature.

Furthermore, the project will be deemed complete once the final close-out report has been completed and approved by a licensed asbestos abatement project designer.

3.0 DEFINITIONS

The following words and terms, when used in this design, shall have the following meanings, unless the context clearly indicates otherwise:

“Adequately wet” means sufficiently mix or penetrate with liquid to completely prevent the release of particulate material and fibers into the ambient air. If visible emissions are observed coming from asbestos-contaminated soil or asbestos-containing material, then the material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet. Guidance on determining when a material is adequately wet can be found in EPA’s *Asbestos NESHAP Adequately Wet Guidance*, EPA 340/1-90-019 (December 1990).
"Asbestos" means the asbestiform varieties of serpentinite (chrysotile), riebeckit**e** (crocidolite), amosite (cummingtonite-grunerite), anthophyllite, and actinolite-tremolite.
“Asbestos-contaminated soil” means soil containing any amount of asbestos.
"Asbestos waste" means any asbestos-containing material whether it contains friable or non-friable asbestos, that is not intended for further use. This term includes but is not limited to asbestos mill tailings, asbestos from pollution control devices, and containers that contain asbestos.
"Asbestos-containing material" means any material that contains more than one percent (1%) asbestos by weight, area or volume, or such percentage established by EPA final rule.
"Asbestos waste disposal area" means an area approved for the disposal of asbestos waste at a solid waste facility, including, but not limited to, a trench or monofill.

"Emergency" means an unexpected situation or sudden occurrence of a serious and urgent nature that demands immediate action and that constitutes a threat to life or health, or that may cause major damage to property.
"Friable" means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously non-friable material after such previously non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.
"Leak tight" means that solids, liquids, or gases cannot escape or spill out. It also means dust tight.
"Management" means the handling, storage, collection, transportation and disposal of solid waste.
"Mechanical" means operated or produced by mechanism or machine. This may include, but shall not be limited to, an excavator, backhoe, grader, tiller, auger, or hand shovel.
"Non-friable" means material which, when dry, may not be crumbled, pulverized, or reduced to powder by hand pressure.
"**Remediation"** or **"Remediate"** means a cleanup or removal to prevent or minimize the possible current or future release of hazardous substances to prevent an unacceptable threat to present or future public health, welfare or the environment.
"Site" means the area or areas where soil-disturbing activities are occurring or will occur.
"Soil-disturbing activities" means excavation, grading, tilling, or any other mechanical activity used to disturb the soil.
"Structurally rigid container" means a container capable of maintaining its shape when unsupported.
"Visible emissions" means any emissions which are visually detectable without the aid of instruments, coming from material containing asbestos, asbestos waste, asbestos-contaminated soil, or from handling and disposal of asbestos waste, material containing asbestos or asbestos-contaminated soil.
"Working day" means Monday through Friday and including holidays that fall on any of the days Monday through Friday.

4.0 QUALITY ASSURANCE

Contractor shall assume full responsibility for compliance with all applicable federal, state, and local codes, rules, regulations, and standards pertaining to asbestos work practices, transport and disposal of asbestos waste, and protection of workers, visitors, and the public from the work site. Contractor shall comply with all aspects of the Asbestos Hazard Emergency Response Act (AHERA) regulations as governed by the USEPA that are applicable to the project.

Except to the extent that more stringent requirements are written directly into this document, the following regulations shall have the same force and effect as if copied directly into this document, or as if copies were bound herewith:

- OSHA 29 CFR Part 1910.134-Respiratory Protection
- OSHA 29 CFR Part 1910.145-Accident Prevention
- OSHA 29 CFR Part 1926.1101–Asbestos
- OSHA 29 CFR Part 1910.1200-Hazard Communications
- USEPA 40 CFR Part 61-Asbestos National Emission Standards For Hazardous Air Pollutants
- USEPA 40 CFR Part 763-Asbestos Abatement Projects Rule
- NC Asbestos Hazard Management Regulations
- NC Solid Waste Management Regulations

Contractor shall consult with the local fire/rescue department in the preparation of the Emergency Procedures Plan for fire and/or medical emergencies. They shall notify the local fire/rescue department at least seven days prior to the start of removal work. Provide copies of this Emergency Procedures Plan to the Owner prior to the start of removal activities. The Plan should, at a minimum, establish a system for alerting project personnel of fire or other hazards that require escape routes, development of an assigned meeting place(s). Provide an on-site telephone for emergency notification to authorities, provide a person who is trained in First Aid and in the treatment of heat stress, and chemical fire extinguishers on site for emergencies.

A qualified Industrial Hygiene firm with adequate industrial hygiene experience with a wide variety of hazardous contaminants, working as the Project Monitor is authorized by the Owner to oversee all removal work, interpret all procedures and enforce all provisions of this project design pertaining to asbestos removal and disposal. The Project Monitor is authorized to stop work if, in his/her judgment, there is substantial non-compliance with the project design, or there is a situation of serious health risk to workers or occupants due to the performance of work by the Contractor. Such stop work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been remedied to the satisfaction of the Owner***. Standby time required to resolve such situations shall be at the Abatement Contractor's own expense***.

Upon completion of the project, the NC-accredited Asbestos Abatement Project Designer for the project will submit to the Owner a full Close-out Report as required by Section 12.10 of this design.

5.0 SITE CHARACTERIZATION

The site has a single-story concrete incinerator building which is being removed as part of this project. There are no other buildings on the subject portion of the site. Only a portion of the main landfill area includes asbestos-containing materials. The topographic gradation of the site is sloping up from front to the back to the rear property line (south to north). There are no visible water bodies on the removal site, IE: streams, lakes, and/or ponds, etc. The site is primarily wooded with cleared areas visible within the proposed boundaries of the removal site.

The asbestos-contaminated soils are located within the landowner's landfill (see Site Map), with an estimated area of 3,761 square feet and a depth of 9 feet. The landfilled materials were placed in a ravine on a sloping hillside. It is estimated that there is approximately 1,900 tons of soil and/or debris that may contain asbestos to be removed and disposed of by means described within this design.

It is unsafe for equipment to travel on and/or across the slope. The extent of asbestos contamination throughout the landfilled soils is unknown by simple visual observation, though what has been visually observed is considered to be friable by definition. (See Site and Vicinity Map for approximate locations and dimensions for the asbestos-contaminated soils to be removed and disposed of.)

6.0 SCOPE OF WORK

The Code of North Carolina allows only those persons licensed within the State of North Carolina to work on asbestos abatement projects being performed within the state. The following persons are allowed on this site as regulated by federal, state, and local laws:

- The Land/Property Owner(s) and their officially designated Consultant/Project Manager;
- Regulatory Officer(s); (IE: USEPA Officials, NC Department of Health & Human Services, Health Hazard Control Unit, OSHA Compliance Officers, NCDOT and other regulatory agenies with jurisdiction over such proceedings.)
- A NC-Licensed Asbestos Project Monitor, Asbestos Inspector, and Asbestos Project Designer;
- Contractor-Licensed Asbestos Abatement Supervisor(s), and Asbestos Abatement Worker(s);
- Contractor-Asbestos Licensed Equipment Operators and Transportation Personnel

Contractor must keep posted a copy of their NC asbestos license(s) on the job site at all times during asbestos removal activities, preferably within the personnel decontamination unit or trailer.

Contractor must submit a copy of the forms to be used for maintenance of waste shipment records in compliance with the USEPA's NESHAPS Regulations, and/or North Carolina Solid Waste Management Regulations to H&P 10 days prior to the projected removal start date.

7.0 MOBILIZATION

The Contractor must mobilize licensed personnel with the appropriate equipment onto the site to establish a presence for project implementation, which includes those activities associated with the administrative facilities. The extent and nature of mobilization activities should be commensurate with the project scope and site specific conditions. Following is a list of activities which may be conducted as part of the mobilization effort if appropriate:

- Establish office, sanitary facilities and storage trailers,
- Establish personnel and decontamination stations,
- Establish roadway and traffic controls,
- Establish parking and walkways, and
- Establish pedestrian communications.

Following is a list of equipment and materials that should be mobilized, based on the site specific conditions and needs:

- Water supply;
- Excavation machinery;
- Load-out stations;
- Properly poly-lined dump trucks;
- Fencing and windscreen (critical barriers).

8.0 SAFETY MEETINGS

Daily safety meetings shall be conducted prior to the start of each workday and documented in the project daily logbook. These meetings shall focus primarily on the safe completion of the work plan for the day, as well as safe work practices and contingencies associated with the scheduled tasks. Other topics may be discussed as deemed appropriate by site health and safety personnel. New work or different site conditions should be discussed. At a minimum, it is recommended that daily safety meetings include and confirm the following:

- Delineation of the removal, including width, length, and depth;
- Establishment of the work zone(s);
- Utility identification;
- Haul routes and site access;

- Equipment mobilization;
- Dust and particulate emissions control;
- Water source and weather proofing, and
- Fencing and wind break barriers as required.

9.0 SUBMITTALS

Prior to the start of the asbestos abatement project, Contractor shall submit the following Pre-Abatement Submittals at least 10 days prior to the designated start date. The Owner or Owner's representative, the NC-accredited Asbestos Abatement Project Designer will review, for approval, the Contractor's submittal package prior to commencing asbestos-contaminated soils/debris removal work.

- Contractor: NC Asbestos License(s), and Class A Contractors License(s).
- Asbestos Plan: Submit a detailed plan of the work procedures to be used in the removal and disposal of ACM and asbestos-contaminated soil. The work plan shall include location of control areas, layout of decontamination chambers, sequencing of asbestos related work, disposal plan, type of wetting agent, asbestos sealer to be used if applicable, personal air monitoring program, and a detailed description of the method to be employed in order to control air pollution, erosion/sediment, also including but not limited to emergency procedures for fire and medical emergencies.

This plan must be approved by the Owner's designated NC-accredited Asbestos Abatement Project Designer prior to the start of any asbestos-contaminated soils removal.

Contractor must submit a copy of the forms to be used for maintenance of waste shipment records in compliance with USEPA, NESHAPS regulations.

- Waste Transporter Permit: Contractor shall submit a Waste Transporter Permit issued by the State of North Carolina specifically for transporting regulated asbestos-containing materials (RACM) waste and debris to an approved treatment, storage, or disposal facility. The permit shall include the name and location of each treatment, storage, or disposal facility, and a list of vehicles permitted to haul/transport asbestos waste within the State of North Carolina.

- Wastewater Discharge Permit: If applicable to the project, a Wastewater Discharge Permit issued by the County or local enforcement/ permitting agency to discharge filtered wastewater to the municipal sanitary sewer system, including any and all written notifications, correspondences, and testing/analytical data related to each permit issued. If such a permit is not required, the Abatement Contractor shall submit a letter stating the procedure and intent for handling and disposal of asbestos-containing wastewater generated during the asbestos project.

- Asbestos Project Notifications: The Abatement Contractor shall submit, if applicable to the project, notification(s) to:

  Western NC Regional Air Quality
  125 S. Lexington Avenue, Suite 101
  Asheville, NC 28801-3661
  828-250-6777

- The Abatement Contractor shall prepare a written notification to occupants of the site or the asbestos removal work, and post such notifications where the work will be performed in accordance with all applicable regulations.
- The Abatement Contractor shall prepare a written notification to the local fire/rescue department for the asbestos removal work.
- Legible copy of each asbestos abatement supervisor's Asbestos Handling License and Certificate of Training anticipated to be working at the project. An asbestos abatement supervisor shall be on site during all removal activities.
- Legible copy of each asbestos abatement project personnel's Asbestos Handling License and Certificate of Training that is anticipated to be working on the project.
- Legible copy of each asbestos abatement project personnel anticipated to be working at the project of having been fit-tested within the past 12 months for using a negative-pressure air purifying respirator equipped with a high efficiency particulate air (HEPA) filter cartridges.
- Legible copy of each asbestos abatement project personnel anticipated to be working on the project of having been examined by a qualified physician within the past 12 months, being capable of wearing respiratory protection and able to perform asbestos abatement work.
- Product information/performance data and Material Safety Data Sheets for all materials and equipment as specified in this design or otherwise proposed for use on the project by the Contractor.

Upon completion of the asbestos abatement work and as a condition of acceptance, Contractor shall submit the following Post-Abatement (Close-out) Submittals:

- All waste manifests and landfill receipts detailing disposal of all asbestos waste generated by the work at the Project. (Cradle-To-Grave)
- All certified analytical results of all personal air samples collected as required by OSHA to document the 8-hour TWA and 30-minute STEL concentrations of asbestos fibers in the breathing zone of the asbestos abatement project personnel.
- A legible copy of the Contractor's project daily logbook containing the day-to-day record of personnel entering the project site as well as the regulated asbestos work area(s), and any significant events occurring during the project.

10.0 SITE PREPARATION

Contractor shall, prior to commencement of any site operations, perform a pre-remediation site assessment of existing site conditions. This assessment should identify any hazards that may be present and that may affect the health and safety of persons at the site. For example, the assessment should:

- determine safe access and movement within work areas, walkways and passageways;
- identify and assess the risks of working near overhead and/or underground high voltage or telephone lines, if any;
- establish sufficient overhead clearance for power and/or telephone lines, if any;
- assess the risks of working near other overhead and underground utilities; and

determine the location of sanitary facilities and drinking water sources for project personnel.

All utilities should be field-located prior to commencement of site activities. No excavation shall begin without first performing an underground utilities check.

Silt fencing shall be placed down gradient of the planned removal area(s), establish erosion control prior to removal start date. The erosion and sediment control devices shall be maintained throughout the duration of the soil removal process. Should, at anytime, the silt fencing breakdown, and/or have pass through it is the sole responsibility of the Contractor's supervisors to take corrective action to mitigate erosion control.

11.0 SPILL REPONSE PLAN

At any time, should the NC-accredited project monitor recognize that there is visible emissions as defined by the USEPA's NESHAPs Rule, the project will be stopped and corrective action will be taken. **Dust of any kind will not be allowed during the removal and transportation of the soil from the site.**

Additionally, Contractor must develop a spill response plan to provide a systematic and controlled response to an asbestos-contaminated soil spill that could adversely impact human health or the environment. The plan should not only include response actions for spills that occur onsite, but should also include response actions for spills that occur during transportation to the landfill.

12.0 PLANNED SOIL-DISTURBING ACTIVIES

12.1 SOIL REMOVAL TECHNIQUES

Soil removal activities should be conducted in a manner that minimizes soil handling in order to minimize emissions. Emissions are most likely to occur at the point of excavation, when pushing or moving soils around and at the dumping point (where a large surface area of soil is exposed), with the latter two activities presenting the greatest chance for emissions. Therefore, the staging of soil should be avoided whenever practicable (e.g., excavate the soil and load it directly into the truck), and dumping of soil should be done in a careful and controlled manner with misting to control emissions.

Regardless of what wet methods are used to control dust, the goal is to achieve No Visible Emissions.

12.1.1 SOIL REMOVAL AND PROJECT DETAILS

Approximately twenty-four hours in advance of soil disturbing activities, the work area should be adequately wetted to prevent any visible dust emissions that may be generated during mobilization and site setup. In order to prepare the work area, amended water (water to which surfactant chemicals have been added) may be applied using a root watering wand or other mechanism to allow sufficient penetration of water into the soil. Injection wetting is preferred over surface wetting to ensure the most even distribution of

water. Surface wetting has the potential to create areas of ponding and mud pits if not carefully conducted, resulting in difficult working conditions and increased potential for cross-contamination. If surface wetting is conducted, it should be done in such a manner as to prevent generation of dust, run-off or splattering. During actual soil disturbing activities, water should be applied to the site of the disturbance as appropriate to suppress any visible emissions. Adequate dust control protocols should be maintained throughout the course of the removal project. It is generally recommended that removal of asbestos-contaminated soil be done with heavy equipment to minimize dust emissions at the point of removal. (See Erosion Control Plan for potential placement of entrances, barriers, and silt fencing to be maintained throughout the removal process)

Utilizing equipment appropriate to the site conditions (IE: excavator, mini excavator, backhoe, etc.), soil excavation should proceed within the designated work area. Hand wetting may be accomplished as long as no dust, run-off or splattering results. It is recommended that a dedicated misting station be used at the dump point, which encloses the entire bucket and surface area of soil being dumped. Use of garden hoses may not be adequate to cover the entire area. The dump point is probably the most critical emissions point. Therefore, misting at this point is very important.

Excavation of asbestos-contaminated soil must not overreach the bounds of wetting. Excavation should be conducted in lifts small enough to ensure that disturbed soil remains adequately wet. Over reaching is one of the biggest problems encountered during asbestos-contaminated soil removal, and can be avoided by adequately pre-wetting the site before commencing soil disturbance. The Project Monitor/Inspector shall over see this portion this portion of the project. Once satisfied that the contaminated soil is adequately wet per definition Contractor will be allowed to start soils removal activities.

Generally, removal of asbestos-contaminated soil should begin at one edge of the work area and proceed across to the opposite edge of the planned excavation. Removal should be conducted in a direction to prevent the spread of contamination. Uncontaminated soil in the swing radius of heavy equipment should be covered with poly to prevent contamination during removal activities. The bucket of the excavator should only be filled to 2/3 its normal capacity to minimize the chance of spillage.

At all times, a NC-licensed asbestos project monitor shall be on site, he/she will monitor the work area under active removal. Should any area under active removal prove too large for adequate stabilization of asbestos-contaminated soil, the work area will be reduced.

All asbestos-contaminated soil that is not being actively removed shall be adequately stabilized in order to prevent the spread of contamination.

If at any time visible emissions are observed, all removal activities will immediately cease until such time as the work practices are altered so as to prevent further visible emissions.

Occurrences of visible emissions will be recorded in the project monitor log, and shall be recorded in Contractor project log.

The excavation will be monitored and visually inspected by the project monitor/inspector and the contractor or qualified site personnel during removal activities. If subsurface anomalies are encountered (such as unexpected debris or materials), all work should stop and the project designer shall be notified. Work should then proceed only when directed by the project designer and project monitor in conjunction with other qualified site personnel.

12.1.2 EXCAVATION EQUIPMENT AND PLACEMENT OF THE EXCAVATOR

Equipment to be used for removal of asbestos contaminated soil will vary depending on the site-specific conditions. Equipment appropriate to topography, soil type and other field conditions should be used. Before leaving the work area, all excavation equipment will be decontaminated in accordance with Section 4.0 of this design.

Site access controls should be established for each individual and primary work area in accordance with the procedures described in this Section. These controls should allow for the incorporation of a contamination reduction zone to be utilized for the dry decontamination of heavy equipment (buckets, tires and tracks) between work areas if needed.

Every attempt should be made to keep the excavation equipment on clean or non-contaminated soil. In the event the excavator must be placed onto asbestos-contaminated soil, the following or equivalent engineering controls should be implemented to avoid contamination:

- Place a suitable impermeable lining (e.g., plastic) over contaminated soils,
- Import rocks, recycled asphalt road material or clean soil, etc., and place on the liner over the impacted area,
- Use an alternate (rubber tired) excavator,
- Utilize barriers (plywood, plastic, railroad ties) on impacted soils taking care to decontaminate such barrier(s) before reuse in other areas.

At the completion of the project, all contaminated liners, barriers and/or potential fill materials must be disposed of as asbestos-contaminated waste. Equipment should be decontaminated with amended water within a collection basin. Waste water must be drummed and disposed of according to all regulations that apply as described in Section 4.0 and NC DOT hauling of regulated wastes.

12.1.3 DIRECTION TO PREVENT SPREAD OF CONTAMINATION

The excavation protocols shall include control for any asbestos-contaminated soil, which might fall from excavation equipment. Asbestos-contaminated soil falling within the work area should fall only on the contaminated portion of the work area or should be removed by the equipment operator prior to completion of the remaining work area. Asbestos-contaminated soil falling onto the plastic-lined load station should be cleaned and added to the truckload prior to the truck moving off the plastic, or cleaned after the truck leaves the plastic and added to the next truckload. The excavator and load station shall be moved as required to complete multiple work areas.

When feasible, excavated asbestos-contaminated soil shall be directly loaded into double lined dump trucks. The linings for each shall consist of 6 mil polyethylene sheeting or thicker, and be self contained so that there is no potential for dust, debris and/or asbestos piping to fall out of the rear of the vessel during transport to the landfill.

A plastic-lined load-out station shall be created close to the edge of the work area(s). Trucks that will transport asbestos-contaminated soil to an approved disposal facility should be directed onto the load-out station(s).

12.1.4 STORMWATER MANAGEMENT

Storm water should be managed in accordance with all applicable federal, state, and local regulations. The property owner must provide the Erosion and Sediment Control Plan to the Contractor who will perform any necessary tasks required by the plan.

Once the E&S Plan has been approved the soil removal project may begin.

12.2 AIR MONITORING

During the removal of asbestos-contaminated soil, the licensed Project Air Monitor will collect air samples to assist in determining the adequacy of engineering and environmental controls employed at the site. In addition, personal air monitoring shall be performed in accordance with OSHA requirements.

Air samples will be collected inside the work area. A minimum of four static air samples will be collected per day inside each regulated work area, samplers will be placed on personnel or equipment in the work area, or both. The goal is to collect information regarding worst-case emissions by collecting samples as close to the area of soil disturbance as possible. Static air samples will cover all four points of the compass and will be located as close as possible to the point of excavation and loading activities. In all cases the sample points must be located to capture the worst-case emissions during that particular activity. The sample locations will not be fixed, and will be changed as necessary to keep pace with the point of excavation and loading.

Additional “floating” samples may be needed to monitor worst-case emissions.

Personnel air monitoring samples may also be used as point of operation work area samples, and may be used in conjunction with, or in place of, perimeter samples. For instance, in the event that ambient air samplers cannot be placed within close proximity to the work area, personnel air monitoring samples will provide a more representative look at conditions in the work area. It is suggested that at least 25% of workers, with no fewer than two workers, wear personnel sampling cassettes. It should be noted that this “personnel” sampling is different, and in addition to, personal monitoring mandated by OSHA.

Air samples must be collected on phase contrast microscopy (PCM) 25 mm cassettes, and submitted for appropriate analysis. Samples for analysis shall be submitted to a NVLAP (National Voluntary Laboratory Accreditation Program) accredited laboratory (administered by the National Institute of Standards and Technology (NIST)), and shall be submitted to a laboratory showing successful participation in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program. Although analysis using phase contrast microscopy is commonly performed during asbestos abatement projects, transmission electron microscopy analysis is generally preferred for asbestos-contaminated soil projects since transmission electron microscopy analysis specifically detects asbestos fibers, thus aiding in decisions regarding the adequacy of work practices and engineering controls. If samples are submitted for phase contrast microscopy analysis, it is recommended that at least two samples (one sample for the highest phase contrast microscopy result and one randomly selected among the remaining samples) be analyzed by transmission electron microscopy each day that active asbestos-contaminated soil removal activities are being conducted. The results of transmission electron microscopy sampling will be used to assess the adequacy of work practices and engineering controls to determine if adjustments are necessary.

If the work practices and environmental controls are deemed adequate by the Supervising Air Monitor, the number of daily transmission electron microscopy samples may be reduced; however, the frequency of transmission electron microscopy samples shall be increased, if at any time, subsequent phase contrast microscopy air samples indicate an increase in emissions.

Air samples collected should be delivered to the laboratory at the end of the workday using appropriate chain-of-custody procedures. Phase contrast microscopy verbal results will be made available to the Project Monitor and onsite personnel during the next work day and/or before the work day begins. Transmission electron microscopy verbal results will be made available within 24 hours of receipt of samples by the laboratory. Hard copy results should be on site within 24 hours of verbal communication, or as soon as practicable.

12.2.1 OSHA PERSONNEL MONITORING

Air monitoring of personnel shall be conducted in accordance with OSHA Regulations during asbestos-contaminated soil removal activities. Air samples will be collected to ensure personnel protection as Contractor as measure the adequacy of engineering and environmental controls employed in the work areas. Personnel and area air sampling will be conducted throughout the duration of the project. The following sampling protocol shall be followed to ensure the health and safety of persons inside and outside of the work zones:

- Short Term Exposure Level (STEL) samples (30 min. duration) shall be collected, per OSHA Regulations at the beginning of each work shift, and at the highest moment of removal activities. One (1) Contractor employee for each task being performed each day. (IE: Backhoe operator, and then another on the Truck driver, etc.)
- Daily full shift air samples shall be collected, per OSHA Regulations, throughout each daily work shift, one (1) Contractor employee for each task being performed each day shall wear a personal air sampling pump throughout the entire work shift. The Contractor must change the employee being sampled each day, (IE: not one person may be sampled on back to back days, unless that person is the only person performing that specific task) throughout the duration of the project.
- The Contractor sample analysis shall be performed as described in Section 12.2.
- H&P shall perform area air sampling per Section 12.2.

12.3 DUST CONTROL/EMISSIONS CONTROL MEASURES

Dust generated during removal activities presents a potential impact to air quality and off-site citizens. Soils contaminated with asbestos present an even greater threat and pose a risk to human health and the environment.

Accordingly, dust suppression and emissions controls are critical elements of asbestos-contaminated soil removal activities. The types of emissions controls used are job specific and dependent upon the type of asbestos, the amount of contamination, the integrity of the asbestos material and the type of soil being disturbed. For example, amosite asbestos that has separated from its structural matrix will cause substantial emissions that cannot be controlled with the wetting techniques discussed below, mainly because amosite is resistant to water absorption and the fibers that have separated from the matrix are no longer bound in a material. Similarly, relatively high concentrations of chrysotile asbestos fibers in loose soil that have lost adhesion to a matrix will cause

emissions that cannot be effectively controlled by standard wetting techniques. In cases such as these, the use of containment structures may be the only way to effectively control emissions. Should all efforts to control dust during this project fail, Contractor will be required to provide a containment structure in compliance with Section 12.3.5 of this design.

Whenever potentially contaminated soil and debris are being disturbed, Contractor and licensed air monitoring firm shall have a representative on site at all times to ensure that no visible emissions are generated at any time during soil-disturbing activities.

The Project Monitor will be on site at all times to monitor the moisture of the asbestos-contaminated soil being removed and to ensure that it is adequately wet. If visible emissions are observed during the removal process, work practices will be reviewed and modified by Contractor and Project Monitor.

At no time should vehicle traffic be allowed on surfaces where the surface samples have shown positive test results or where visible asbestos is present. In addition to restricted access for vehicles, all other vehicle access should be limited to surfaces with a reinforced, tear-resistant polyethylene sheeting or equivalent liner. This excludes equipment that is to remain off road throughout the project. The off-road equipment may travel on soils that do not have surface contamination and have been saturated for the control of visible emissions.

To prevent the possible cross contamination of clean surfaces, 6-mil polyethylene sheeting should be placed over clean surfaces in the vicinity of the work area. In addition, reinforced tear-resistant polyethylene sheeting or equivalent liners should be applied to surfaces where truck traffic will be moving from the work area onto non-surface contaminated soils.

Potential dust emissions from stockpiled soils should be mitigated by the application of water or stabilizing agents (such as magnesium chloride), and/or by covering with tarps or other appropriate cover material.

At the end of each work day, the work area(s) and subsequent stockpiled asbestos-contaminated soils, and the soils that have the potential to be asbestos-contaminated are to be misted with amended water, and then covered with tarps. The edges of the tarps are to be weighted down to prevent the tarps from blowing and/or moving during off hours.

12.3.1 SOIL WETTING OR STABILIZING

A continuous water supply (i.e., water truck, water tanks, fire hydrant and fire hose, etc.) should be available at all times during removal activities. The water truck or water hose should be capable of applying water or a water mist directly to the ground surface to minimize dust and prevent emissions.

A misting system localized to the work area shall be installed prior to removal activities.

The water misting system shall be constructed out of PVC piping or equivalent materials so that a low energized mist of water droplets is generated large enough to minimize drift but fine enough to control any fiber emissions generated from the work area without over-saturation of the soil. There are two types of misting systems that can be utilized; one type is mounted around the immediate excavation area and one type is mounted on the equipment. Ground mounted misting systems are very effective on small excavations.

Equipment mounted misting systems are typically not as effective as ground mounted systems; however, they are generally used on large excavation projects because the use of ground mounted misters is usually not practical for work in large areas. In addition, if improperly designed, ground mounted misters can cause a buildup of water. However, if fine misters are used with a wind fence, ground mounted misters work much better than equipment mounted misters.

During the removal process, all areas of impact should be kept adequately wet. Wetting may be accomplished with amended water, such as a 50:50 mixture of polyoxyethylene ester and polyoxyethylene ether, or the equivalent, in a 0.16 percent solution (1 ounce to 5 gallons) of water. The amended water should be applied at low pressure in order to prevent dust generation or splattering.

Soil shall have water or amended water applied at the point of contact. The excavator or other removal equipment should handle the material wet and direct load the soil into a tractor trailer or other appropriate waste container. The trailer or other waste container should contain a leak tight container constructed out of 6-mil polyethylene sheeting. In addition to the point of impact wetting, additional wetting should occur within the trailer or waste container itself to provide additional emissions control at the point of loading.

12.3.2 WIND BREAK BARRIERS

Wind break barriers should be constructed by Contractor prior to commencement of removal activities. Wind break barriers may be constructed out of materials appropriate to site conditions. For example, temporary chain link fencing at a level of up to approximately 6 feet in height with fence screen installed and fitted to each panel may be used to assist in controlling any potential migration of dust and debris throughout the removal process. All wind speed measurements should be taken inside any wind break barriers and in locations in close proximity to, and representative of, the work area in which the soil is being handled. This would include both the point of removal and the dumping point since the potential for emissions is greatest in these two areas. The wind break barriers must be visually inspected each day, even on weekends. Should there be a need for repair the Contractor must be prepared for such activities at anytime.

12.3.3 HIGH WIND WORK STOPPAGE

Shutdown conditions – Soil removal/disturbance operations should immediately and temporarily cease when one or more of the following four conditions have been met:

- Any wind gust reaches or exceeds 20 miles per hour as determined by hand-held instruments;
- Sustained wind speeds reach or exceed 12 miles per hour averaged over a period of 10 minutes;
- Winds produce visible emissions or create movement of dust or debris in or near the removal/disturbance area or loading area; or
- Winds impact the ability of engineering controls to work as designed.

During wind-related work shutdowns, other work activities not involving soil removal or disturbance (e.g. lining dumpsters) may continue.

Startup conditions – Soil removal/disturbance operations may resume after all of the following four conditions have been met:

- All wind gust readings drop below 20 miles per hour for a period of 20 minutes as determined by hand-held instruments;

- Sustained wind speeds are below 12 miles per hour averaged over a period of 20 minutes;
- Winds are no longer producing visible emissions or creating movement of dust or debris in or near the removal/disturbance area; and
- Winds are not impacting the ability of engineering controls to work as designed.

12.3.4 COVERS

Exposed clean surfaces within the work area shall be protected with 6-mil polyethylene sheeting or an equivalent cover to eliminate the potential for contamination during removal of soil within the work area.

Exposed asbestos-contaminated soil should be covered or otherwise stabilized during high wind work stoppages, and other periods when active removal/disturbance is not occurring. The covers must be inspected by Contractor each day, even on weekends. Should there be a need for repair and/or replacement the Contractor shall be prepared to perform such activities at anytime.

12.4 EQUIPMENT DECONTAMINATION

All excavation equipment should be thoroughly cleaned before being mobilized to the work area. Cleaning procedures should be conducted in such a manner as to ensure that all residual soil and contaminants are removed and other hazards are not present. Equipment should also be inspected for leaking fluids in order to prevent introducing other contaminants to the site. Leaking equipment should not be allowed on site.

Once the removal process is complete, decontamination of the equipment should occur within a waste container when possible. The equipment that was in contact with the contaminated material should be thoroughly cleaned using water (or amended water) and rags. The water and rags should be containerized and the container then sealed for transportation and disposal. The final decontamination of equipment should occur within a catch basin constructed out of 10 mil polyethylene sheeting and at least 12 inches deep for the purposes of collection and filtration of the water generated during the decontamination process. Decontamination water should be filtered to 5 microns prior to collection for offsite disposal or being discharged into a contaminated soil loaded truck.

Alternatively, the filtered decontamination water can be used for wetting of asbestos-contaminated areas that will be removed. If areas where decontamination water has been applied are not to be excavated prior to drying, the surface must be covered or stabilized until excavation occurs to prevent the emissions of any fibers that were not removed during filtration. Disposal of decontamination water into the sanitary sewer may be allowed after filtration to 5 microns, or to local requirements if such requirements are more stringent.

All vehicles and other equipment that were used in the intrusive removal activities should receive a thorough and invasive cleaning, as described above, prior to being removed from the site. Each vehicle and piece of equipment shall receive a documented inspection by the asbestos project monitor prior to its demobilization.

12.5 WORKER DECONTAMINATION

Contractor shall construct a fully functioning decontamination unit or a mobile trailer shall be utilized on the site. The decontamination unit should be located within 100 feet of the property and as near the removal area as practical. The decontamination unit should consist of 3 chambers, should have fully operational hot and cold running water, adjustable at the shower tap, and a functioning water filtration unit that will filter the waste water down to 5 microns prior to being drummed for offsite disposal, or discharged into contaminated soil loaded truck. If disposal into the sanitary sewer is anticipated, water should be filtered to 5 microns, or to local requirements if such requirements are more stringent.

Workers should wear a clean outer protective suit as they exit from the work area to the decontamination area. Workers should either wear double suits and remove the exterior suit or don a second, clean suit over the single suit within the work area prior to moving into the decontamination unit. The decontamination unit should be utilized by the workers each time they exit the work area. Workers may not wear street clothes under suits.

12.6 WASTE HANDLING

12.6.1 LOADING

The Contractor will during removal of asbestos-contaminated soil utilize a direct load system. Asbestos-contaminated soil should be removed wet and transported directly from the contaminated work area to a waste container that contains a minimum 6-mil polyethylene sheeting, leak tight disposal bag. Soil that contains visible friable asbestos must be loaded into a waste container that contains at least two 6-mil polyethylene sheeting, leak tight, in accordance with the disposal requirements for friable asbestos waste Section 4.0.

Once each dump has been executed within the disposal container, the excavator shall return the bucket to a closed position prior to returning to the specific area undergoing removal activities.

While the excavation equipment operator is loading the disposal container, the walls of the container should act as the wind break barrier until the load is wrapped and ready for disposal. During the process of loading the container, the excavation equipment operator shall lower the bucket as close as possible to the interior of the container before dumping, and dump the load slowly to allow adequate misting. The loading site should be equipped with a dedicated misting station on the opposite side of the disposal container (opposite the loading point). This misting station must be provided with enough water pressure and personnel to ensure that the entire surface area of the dump is shrouded in the mist. The most effective misting system is a prefabricated misting bar that can be quickly hooked on the edge of the disposal container and water turned on with a single valve (the bar is almost as long as the container so that mist/spray covers the entire container). If personnel are used to mist the loads manually, they should be positioned on a scaffold system that runs the length of the disposal container. The number of personnel and hoses is dictated by the ability to mist the entire surface area of the dump.

Throughout the entire loading process, water or amended water should be applied to suppress any visible emissions that might occur. The swing radius of the excavator should have a 6-mil polyethylene liner over the clean surface to control cross contamination as material is transferred.

In addition, the excavation bucket should not be filled to more than 2/3 its normal capacity so as to minimize spillage. Once the trailer or container has been loaded to a safe level for transportation, it should be sealed within the 6-mil polyethylene sheeting container and transported for disposal. Each vehicle shall receive a documented inspection by the project monitor prior to it leaving the site. This should include an inspection of the tailgate to ensure that it is securely latched and chained to prevent it from opening during transportation.

12.6.2 PACKAGING

Containers or trucks should be lined with a minimum of one 6-mil thick pre-formed polyethylene liner. In accordance with the disposal requirements for asbestos waste from Section 4.0.

At least two 6-mil polyethylene liners must be used for soil that contains visible asbestos. Polyethylene liners should be designed and sized for the container to be used and should be folded over the sides of trailers or containers to protect against contamination during loading and to facilitate decontamination. After loading, both liners should be sealed separately. The liners must be sealed in a manner that ensures that they remain leak-tight during transportation and disposal operations.

Containers of asbestos waste, or asbestos-contaminated soil with visible asbestos, must be labeled in accordance with the requirements of the Solid Waste Regulations within the state of North Carolina and NC DOT regulations. Each polyethylene liner must be label on all visible sides with one of the two following notifications:

(1)	**CAUTION** **CONTAINS ASBESTOS** **AVOID OPENING OR BREAKING CONTAINER** **BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH**
(2)	**DANGER** **CONTAINS ASBESTOS FIBERS** **AVOID CREATING DUST** **CANCER AND LUNG DISEASE HAZARD**

In addition, NC Department of Transportation (DOT) asbestos placards shall be placed on all four vertical sides of the container or vehicle being used.

12.6.3 TRANSPORTATION

It will be the sole responsibility of the Contractor's site supervisor to direct the schedule of transportation for the asbestos-contaminated soil. When loaded, each truck shall be assigned a manifest to serve as the shipping document for that particular load. Asbestos-contaminated soil must be transported and disposed of in a leak tight container in accordance with the disposal requirements discussed in the following section. Documentation stating that the soil originating from the site shall not be used as a daily cover or sold as clean fill must accompany each load of asbestos-contaminated soil removed from the site. The Project Monitor shall inspect each waste manifest, and receive a copy of all "cradle-to-grave" documentation as discussed in the following section.

12.6.4 DISPOSAL

Disposal of asbestos-contaminated soil must be conducted in accordance with the following requirements, in accordance with all North Carolina Department of Transportation, Environmental Protection Agency, North Carolina Department of Environmental Quality rules and regulations:

- Asbestos-contaminated soils containing visible friable asbestos shall be disposed of in a leak tight container as friable asbestos waste in accordance with the requirements of Section 5.3 of the Solid Waste Regulations.
- Asbestos-contaminated soil containing visible non-friable asbestos that has not been rendered friable shall be disposed of as friable asbestos
- Asbestos-contaminated soils containing no visible asbestos shall be disposed as friable asbestos waste,
- Soils that are not asbestos-contaminated, based on analysis showing no detectable amounts of asbestos, may be replaced into the disturbed area as needed, used as fill, or disposed of as solid waste.

The Contractor is also required to show documentation stating that the asbestos-containing soil contamination originating from the site shall not be used as daily cover or sold as clean fill accompany each load of asbestos-contaminated soil removed from the site.

12.7 CLEARANCE

Due to the nature of this project, federal, state and/or local regulations do not require final clearance sampling.

Due to the wet nature of the removal process, adequate drying time should be allowed before a final visual inspection is conducted. In this case, it will be beneficial to conduct a pre-final visual inspection while the area is moist, as it may be easier to see some forms of asbestos when they are still wet. However, final visual inspections will only be conducted when soil is dry.

12.8 DEMOBILIZATION

After the project has been determined complete, the misting system, wind break barriers and other fencing can be removed by the Contractor and the decontamination unit/trailer can be de-mobilized.

Waste containers shall be removed from the site and taken to an approved landfill for disposal; immediately upon completion. Any remaining protective barriers shall then be removed from the site.

12.9 CLOSE-OUT REPORT

The Contractor, Project Manager and Project Monitor shall maintain complete documentation of the project. It is required that a project close-out report be prepared and, at a minimum, include the following:

- Property description and description of area(s) with asbestos-contaminated soil;
- Description of soil disturbing activities;

- Description of all field operations or daily logs;
- Air monitoring logs and analytical results;
- Description/results of all asbestos sampling events, including sample locations;
- Analytical results;
- Disposal summaries and manifests;
- Maps showing the location of any asbestos left in place (where appropriate);
- Description of any engineering or institutional controls for any asbestos left in place;
- Photographs showing pre- and post-removal conditions; and
- Worker certifications, and licenses, etc.

The Contractor shall provide the previously mentioned documentation to the Project Monitor for review and final compilation for the client/owner. Three exact copies of the final close-out report will be compiled and distributed to the following recipients:

4/8/10

NC Asbestos Project Designer #40225

END OF ASBESTOS-CONTAINING SOIL REMOVAL DESIGN TEXT

APPENDIX I

HEALTH AND SAFETY PLAN

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

6003-145 Chapel Hill Rd.
Raleigh, NC 27607
P: 919-854-9700 F: 919-854-9532
www.piedmontgeologic.com

HEALTH AND SAFETY PLAN/ EMERGENCY RESPONSE PLAN

Department of Juvenile Justice and
Delinquency Prevention Property
Clover Lane
Swannanoa, Buncombe County, North Carolina
IHSB Inventory No. NONCD0002801

Prepared for:

State of North Carolina
Department of Administration
301 N. Wilmington Street, Suite 450
Raleigh, North Carolina 27601

Prepared by:

Piedmont Geologic, P.C.
6003 Chapel Hill Road, Suite 145
Raleigh, North Carolina 27607

April 2016

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SWANNANOA-DJJDP PROPERTY SITE
Department of Administration
Swannanoa, North Carolina

HEALTH AND SAFETY PLAN/ EMERGENCY RESPONSE PLAN APRIL 2016

Site Name:	Swannanoa-DJJDP Property Site	**Prepared by:**	Piedmont Geologic, P.C. 6003-145 Chapel Hill Rd. Raleigh, NC 27607 (919) 854-9700
Site Address:	Clover Lane Swannanoa, North Carolina		
Telephone:	(919) 417-5065 (Pete Dressel)	**Date:**	April 30, 2016

1.0 GENERAL INFORMATION

Client:	State of North Carolina Department of Administration	
Client Contact:	Bill Sessoms	
Address:	301 N. Wilmington Street, Suite 450 Raleigh, North Carolina 27601	
Telephone:	919 807-4141	

2.0 INCIDENT MANAGEMENT TEAM

Incident Manager:	Pete Dressel	**Site Contact:**	Tripp Lee
Company:	Piedmont Geologic	**Company:**	Piedmont Geologic
Work Telephone No.:	919-854-9700	**Work Telephone No.:**	919 854-9700
Cellular No.:	919-417-5065	**Cellular No.:**	910-398-4927
Home Telephone No.:	919-776-5744	**Home Telephone No.:**	N/A

3.0 EMERGENCY RESPONSE INFORMATION

Hospital:	**Mission Hospital** **509 Biltmore Ave Ashville, NC**	**Telephone No.:**	**828-213-1111**
DIRECTIONS TO HOSPITAL ON NEXT PAGE			

Driving directions to 509 Biltmore Ave, Asheville, NC 28801

Woodland Dr
Swannanoa, NC 28778

1. Head **south** on **Woodland Dr** toward **Sky Forest Dr**
0.4 mi

2. Slight left onto **Eastwood Ave**
0.5 mi

3. Turn right onto **Old US Hwy 70**
1.0 mi

4. Turn left onto **Whitson Ave**
226 ft

5. Take the 1st right onto **US-70 W**
0.3 mi

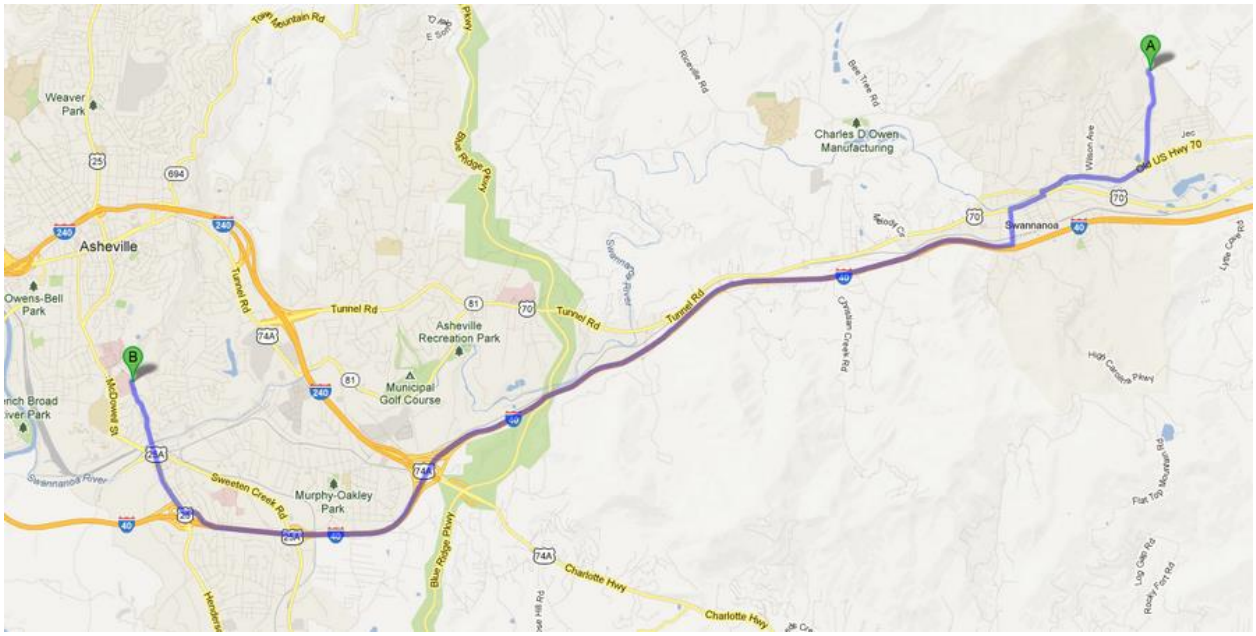
6. Turn left onto **Patton Cove Rd**
0.3 mi

7. Turn right to merge onto **I-40 W**
8.3 mi

8. Take exit **50B** to merge onto **US-25 N/ Hendersonville Rd** toward **Asheville/ Biltmore Estate**
Continue to follow Hendersonville Rd
1.1 mi

9. Continue onto **Biltmore Ave**
Destination will be on the left
0.6 mi

509 Biltmore Ave
Asheville, NC 28801



4.0 EMERGENCY CONTACTS:

*********CALL 911 IN CASE OF EMERGENCY**********

Police:	Black Mountain Police	**Telephone No.:**	828 669 6437/ **911**
Ambulance:	Swannanoa Fire & Rescue	**Telephone No.:**	**911**
Fire Department:	Swannanoa Fire & Rescue	**Telephone No.:**	828 686-3335 / **911**

Poison Control Center: 1-800-282-5846
National Response Center: 1-800-424-8802
DOT, Office of Haz Ops: 1-202-426-0656
CHEMTREC: 1-800-424-9300
EPA Emergency Response: 1-908-321-6660
Center for Disease Control: 1-404-488-4100

5.0 LINES OF AUTHORITY/NOTIFICATION PROCEDURES

1. Site personnel call 911 and emergency contacts (pg. 1);
2. Site personnel call Incident Manager:
   Primary contact:
   Pete Dressel; (919) 854-9700 (w); (919) 417-5065 (c)
   Secondary contact:
   Tripp Lee; (910) 398-4927 (c)
3. Incident Manager notifies Department of Administration
   Primary contact:
   Bill Sessoms; (919) 407-4141 (w),

Site Personnel → Call 911/Emergency Contacts → Call Incident Manager

6.0 SITE AND WORK DESCRIPTION

Site Description:
The approximately 2.25-acre site is part of an approximately 273-acre State-owned collection of property parcels that have historically been used for a variety of functions. The site contains remnants of an incinerator/crematorium that was utilized by the former Moore General Hospital, a U.S. Army hospital and training facility that operated from 1942-47. The site also contains an unpermitted non-hazardous solid waste landfill, a former incinerator/crematorium containing residual, non-hazardous, ash/sand, and assorted surficial waste debris resulting from undocumented dumping activities over several decades.

Results of site media sampling/analysis indicate that the landfill and former incinerator/crematorium contents are non-hazardous. However, metals, VOCs, SVOCs, and dioxins/furans are present in the materials at concentrations above Health-Based Soil Remediation Goals (SRGs).

Surficial soils outside the landfill area contain constituents of concern, mostly metals with occasional SVOCs, PCBs, pesticides, and dioxins/furans at concentrations above Health-Based SRGs. Site groundwater is not contaminated.

Asbestos-containing materials (ACMs), in the form of siding/tiles, has been observed amongst site landfill materials. The observed ACMs have been non-fibrous in nature, with laboratory analysis indicating 15% chrysotile.

A site remedial investigation is being completed to support the development of a remedial action plan. The remedial investigation will include surficial soil sampling/analysis, test pit excavations, monitoring-well installations, surface water sampling/analysis, and groundwater sampling/analysis. The only activities to be conducted during which contact with known contaminated materials may occur will be soil sampling and, potentially, test pits. Monitoring-well installations will be completed in non-contaminated, background, off-site locations.

Work Description:
Site cleanup will be conducted in accordance with the site Remedial Action Plan, dated April 30, 2016.

1. The concrete shell of the former incinerator will be razed and the residual ash contents removed for offsite transportation/disposal.
2. Soils around the perimeter of the incinerator will be excavated to a depth of 6-inches below grade for offsite transportation/disposal. Post-excavation soil samples will be collected for laboratory analysis.
3. Soils in Area 2 will be excavated to a depth of 2-feet below grade for offsite transportation/disposal. Post-excavation soil samples will be collected for laboratory analysis.
4. Soils in Area 3 and Area 4 will be excavated to depths of 1-foot and 6-inches below grade, respectively, for offsite transportation/disposal. Post-excavation soil samples will be collected for laboratory analysis.
5. Surface debris/refuse in Area A will be collected for offsite transportation and disposal/recycling.
6. Surface refuse/debris in Areas C through F will be collected for offsite transportation and disposal/recycling.
7. Site preparation for subsequent remedial actions will be completed, including removal of portions of the security fence necessary to facilitate site ingress/egress and soil excavation/loading, plus installation of temporary security barriers; removal of trees/brush as necessary to allow for site preparation and subsequent activities; preparation of site ingress/egress routes and equipment staging areas; installation of erosion control and stormwater retention measures; installation of the equipment/personnel decontamination station; and installation of a public water supply line.
8. Site monitoring wells will be decommissioned by a North Carolina licensed well driller by tremie grouting with cement slurry. Monitoring-well stick-up casings will be removed for disposal/recycling.
9. Surface debris/refuse in Area B will be collected for offsite transportation and disposal/recycling.

10. Exposed waste in Area B and the landfill contents, as well as any previously excavated ash/soil staged on the landfill as part of Steps 2 through 4, will be excavated and transported offsite for disposal. Post-excavation samples from native soil at the base of the landfill will be collected for laboratory analysis.
11. Sediments in Area 5 will be excavated and transported offsite for disposal. Post-excavation sediment samples will be collected for laboratory analysis.

Special Site Restrictions and Requirements:

- Eating and drinking in designated areas only.

Personnel Training Requirements:

- Hazardous waste training in accordance with OSHA 29 CFR 1910.120(e)(8);
- Medical monitoring program;
- Field procedure and protocol training.

7.0 HAZARDS INFORMATION

Physical Hazards:

Check Applicable Hazards:

Slip-Trip-Fall Hazards:	X	**Weather:**	X	**Heavy Equipment:**	X
Lifting Hazards:	X	**Overhead Lines:**	X	**Biological hazards**	X
Excavations/Trenches:	X	**Underground Lines**	X	**Traffic**	X

Hazard Types and Preventative Measures

Hazard Type	Preventative Measures
Slip-Trip-Fall	• Utilize proper footwear with non-slip soles. • Keep work areas free of clutter and obstructions. • Minimize mud/water around drill rig. • Spread driller's sand around drill area to improve traction.
Lifting Hazards	• Lift with legs, not back. • Keep load close to body. • Do not lift heavy objects without assistance.
Excavation/Trenches	• Do not enter excavations under any circumstances. • Remain a minimum distance of 10-feet from sides of excavation.
Weather	• Lightning – stop work and go indoors or inside vehicles. • Rainfall – stop work if tool slippage may occur. • Heat stress – drink water liberally and take frequent breaks. Wear a hat and apply sunscreen. Stop work if symptoms of heat fatigue develop. • Cold stress – wear appropriate clothing. Take response measures if numbness of hands, feet, or limbs occurs.
Overhead Lines	• Look overhead prior to drilling, using heavy equipment, putting up ladders, etc. • No drilling within 15 lateral feet of power lines.
Underground Lines	• Call public utility mark out service at least 72 hrs in advance of work. • Procure private utility mark out for onsite utilities.
Heavy Equipment	• Equipment must be operated by licensed personnel only. • Equipment must be in safe operating condition. • Equipment must have backup alarm. • Operators must wear seat belts and hard hats. • Equipment must be turned off prior to fueling. • Maintain safe distance between equipment and power lines.
Biological Hazards	• If snakes are encountered, give wide berth and leave alone. • Wear insect repellent to repel insect bites. • Wear appropriate clothing if poison ivy, oak, sumac, etc., are suspected.
Traffic	• Wear traffic vest. • See below Traffic Protection Level protocols.

Check Applicable Traffic Protection Level (TPL)

X	**TPL 1**	High visibility traffic cones (42-in. high min.) with flags and/or delineators.
	TPL 2	Caution tape on posts or 42-in.-high cones and field vehicle with flashing yellow lights.
	TPL 3	Plastic security fencing or traffic blockades. Flashing yellow light on vehicle.
	TPL 4	DOT-required signage and protection.

Chemical Hazards:

Summary of Potential Chemical Exposures

Chemical	OSHA PEL	Chronic Health Hazards/Target Organs
Asbestos	0.1 fiber/cm^3	Target organs: respiratory system and eyes. Exposure risks: dyspnea, interstitial fibrosis, restricted pulmonary function, finger clubbing, mesothelioma, lung cancer.
Arsenic	0.002 mg/m^3	Target organs: skin, liver, nervous system, digestive system, lungs. Exposure risks: skin discoloration/warts, skin/lung/liver cancer, circulatory and nervous disorders.
Benzo(a)pyrene	0.2 mg/m^3	Target organs: reproductive organs, skin. Exposure risks: reproductive hazards (tumors in offspring of those exposed while pregnant, reduced fertility), increased risk of cancer
Cadmium	0.005 mg/m^3	Target organs: cardiovascular and nervous system, digestive system, respiratory system, kidneys, reproductive system. Exposure risks: lung damage, kidney disease, bone damage, anemia, brain damage, lung cancer.
Copper	1 mg/m^3	Target organs: digestive system, liver. Exposure risks: liver and kidney damage.
4,4-DDT	1 mg/m^3	Target organs: liver, reproductive system, nervous system, endocrine system. Exposure risks: liver, nervous system, and reproductive system damage.
Lead	0.05 mg/m^3	Target organs: cardiovascular and nervous systems, eyes, kidneys, digestive system. Exposure risks: neurological disorders, anemia, brain and kidney damage, reproductive hazards.
Manganese	5 mg/m^3	Target organs: cardiovascular and nervous systems, respiratory system, liver. Exposure risks: neurological disorders, irritation of lungs/pneumonia, respiratory effects, reproductive hazards, kidney damage.
Mercury	0.1 mg/m^3	Target organs: nervous system, digestive system, kidneys, eyes. Exposure risks: neurological damage, kidney disease, intestinal damage.
Nickel	1 mg/m^3	Target organs: skin, cardiovascular and respiratory systems. Exposure risks: skin irritation, asthma attacks, chronic bronchitis, lung and nasal cancer.
PCB 1242	1 mg/m^3	Target organs: skin, eyes, liver, reproductive system. Exposure risks: eye irritation, chloracne, liver damage, reproductive effects.
Pentachlorophenol	0.5 mg/m^3	Target organs: kidneys, liver, lungs, nervous system, circulatory system. Exposure risks: possible carcinogen, liver and kidney damage, bronchitis, bone marrow damage, fetal damage during pregnancy.
Zinc	15 mg/m^3	Target organs: digestive and respiratory systems. Exposure risks: metal fume fever (through inhalation), anemia, pancreas and kidney damage.

Hazardous Characteristics (check):
Toxic: X **Flammable/Volatile:** _____ **Ignitable:** _____ **Corrosive:** _____ **Reactive:** _____

Health Hazards:

Route	Symptom	First Aid
Inhalation	irritated eyes, nose, respiratory system	Eye: irrigate
Absorption	headache, nausea, staggered gait; abdominal pain	Skin: soap and water wash Breathing: artificial respiration
Ingestion	stomach pain	Ingestion: immediate medical attention

8.0 PERSONNEL PROTECTION REQUIREMENTS

Level of Personnel Protection (check initial level; appropriate upgrades are specified below):

LEVEL D X

- Nitrile gloves or work gloves
- Steel toe / Shank boots
- Traffic vest
- Hard hat
- Goggles / safety glasses
- Long pants and long-sleeve work shirt or overalls
-

Exceptions: Polycoated tyvek coveralls shall be worn if potential exposures to dust will occur.

LEVEL C

- Nitrile gloves or work gloves
- Steel toe / Shank boots
- Traffic vest
- Hard hat
- Goggles / safety glasses
- Long pants and long-sleeve work shirt
- Full-face respirator: Type: GCM/H
- Chemical resistant clothing: Type: Polycoated tyvek
- Outer gloves/boot coverings: Type: Nitrile

Exceptions:

LEVEL B

- Nitrile gloves or work gloves
- Steel toe / Shank boots
- Traffic vest
- Hard hat
- Goggles / safety glasses
- Long pants and long-sleeve work shirt
- SCBA: full-face mask, positive-pressure, self-contained or airline.
- Chemical resistant Type: Polycoated tyvek

clothing:

- Outer gloves/boot coverings: Type: Nitrile

Exceptions:

LEVEL A_____

- Nitrile gloves or work gloves
- Hard hat
- Goggles / safety glasses
- Steel toe / Shank boots
- Long pants and long-sleeve work shirt
- Traffic vest
- SCBA: full-face mask, positive-pressure, self-contained or airline.
- Fully encapsulating chemical resistant clothing.
- Fully encapsulating chemical resistant clothing: Type: Polycoated tyvek
- Outer gloves/boot coverings: Type: Nitrile

Exceptions:

Air Monitoring Requirements:

- **See next pages;**
- **Also refer to Asbestos-Contaminated Soil Removal Plan.**

Ambient air monitoring will be completed during all excavation activities. The majority of the excavation areas will be completed in one to two days, and only one day of monitoring for each different contaminant will be completed for these areas. Once historical data is available for a particular contaminant, further monitoring will be discontinued. For the primary landfill excavation, however, continuous monitoring for four (4) key contaminants will be completed during the entire (estimated) two-week period of excavation. These contaminants include asbestos, arsenic, dioxins and lead. Three of these contaminants are considered carcinogenic, and one is a high priority for school children. The primary areas of monitoring will be along the eastern (high school) and western (camp) boundaries.

Personnel/worker monitoring will be completed for each major task/worker. These include the heavy equipment operator(s), the site Project Manager/Supervisor personnel, and general laborers as required. All workers will also be required to have a blood test for lead prior to work on the site, once during the work, and after the site work is complete.

Personnel Decontamination Procedures:

Disposable personal protective equipment (gloves, etc.) to be placed in site sanitary waste containers for removal.

Outer gloves/boot coverings to be washed with soap and water and rinsed.

9.0 SITE TASK PROTOCOLS

Following are specific site tasks to be completed during completion of the site remedial actions and associated health and safety protocols. Surrounding community considerations are presented in Section 10.0.

Soil and Landfill Excavations

Excavations, down to approximately 22-feet below grade, will be completed. Excavations will be completed utilizing heavy equipment operated by qualified and experienced personnel. The following health and safety protocols are required for all participating personnel.

- Review hazard types and preventative measures in Section 7.0.
- If third party observers are present, set up exclusion zone around work area using traffic barriers and/or caution tape.
- Complete an underground utility mark-out prior to commencing task.
- Visually check for overhead utilities prior to starting each test pit. Do not dig within 15-lateral feet of any power lines.
- Remain in visual contact with equipment operator(s) at all times.
- Maintain distance from equipment equal to length of bucket arm.
- Visually monitor for excavation-wall collapse potential. Maintain distance from excavation walls equal to excavation depth.
- Conduct air monitoring as specified in Section 8.0.
- Perform tasks under Level D PPE protocols (see Section 8.0), to include,
    - Nitrile gloves.
    - Steel toe/shank boots.
    - Hard hat.
    - Goggles/safety glasses.
    - Traffic vest.
    - Long pants and long-sleeve shirt.
- No eating, drinking, or smoking during task.
- Visually check for snakes prior to entering work area. Generate noise to drive off any snakes or other unwanted animals. Postpone activity if snakes or other unwanted animals are observed in work area.
- Visually check for poison ivy or sumac. Clear suspect brush prior to commencing sampling.
- If dust is generated during sampling, don a dust mask and/or implement dust suppression measures by spraying air space with water during excavation activities.

10.0 SURROUNDING COMMUNITY CONSIDERATIONS

The site is in a relatively isolated corner (i.e., the "back forty") of a 200+ acre collection of State-owned property parcels. Site neighbors include Charles D. Owen High School to the east and a camp operated by the Black Mountain Home for Children to the north and west (see Figures). Other neighbors include a women's correctional center to the south and the North Carolina State Veterans Home to the southwest; however, these latter facilities are considered at a suitable distance from the site as to not warrant concerns regarding potential exposures to site contaminants or physical hazards.

The area of the site where the landfill and incinerator/crematorium are situated, and in which surficial soil contamination has been delineated, is secured/contained within a 6-feet high chain link security fence topped with barbed wire, which serves as a barrier to incidental site entry or trespassing by unauthorized personnel. As a result, risks to the surrounding community to contaminant exposures and/or physical hazards are very minimal with respect to surficial soil and groundwater sampling to be completed within the fenced site area.

Recognized potential risks to the surrounding community posed by site work to be conducted under this health and safety plan include exposure to site contaminants through airborne dust transport and physical hazards from operation of backhoes and drilling rigs. Minimization of such risks will be maintained through strict compliance with the task-specific health and safety protocols outlined in Section 9.0 and the following.

<u>Control/Minimization of Airborne Dust Transport and Exposure</u>
Site soil excavations are expected to take up to 30 days to complete. All work will be conducted during normal working hours (e.g., 8:00 a.m. to 6:00 p.m.). Risk minimization procedures for the activity are listed as follows.

- Maintain compliance with all task-specific health and safety protocols in Section 9.0.
- Postpone the activity if any community members are present within 50 yards of the excavation area.
- If dust is observed to be entering/accumulating within worker breathing space, commence dust suppression measures, to include spraying potable water within the work area to keep dust down. Water is supplied from the fire hydrant located near the work area.

<u>Control/Minimization of Physical Hazards from Heavy Equipment</u>
Risk minimization procedures with respect to physical hazards from operation of heavy equipment are listed as follows.

- Maintain compliance with all task-specific health and safety protocols in Section 9.0.
- Set up exclusion zone around work area using traffic barriers and/or caution tape.
- If vehicle or pedestrian traffic is present, set up and maintain traffic barriers around work area.

11.0 AMENDMENTS TO HEALTH AND SAFETY PLAN

(must be approved by Project Manager)

Amendment	**Project Manager's Approval / Date**

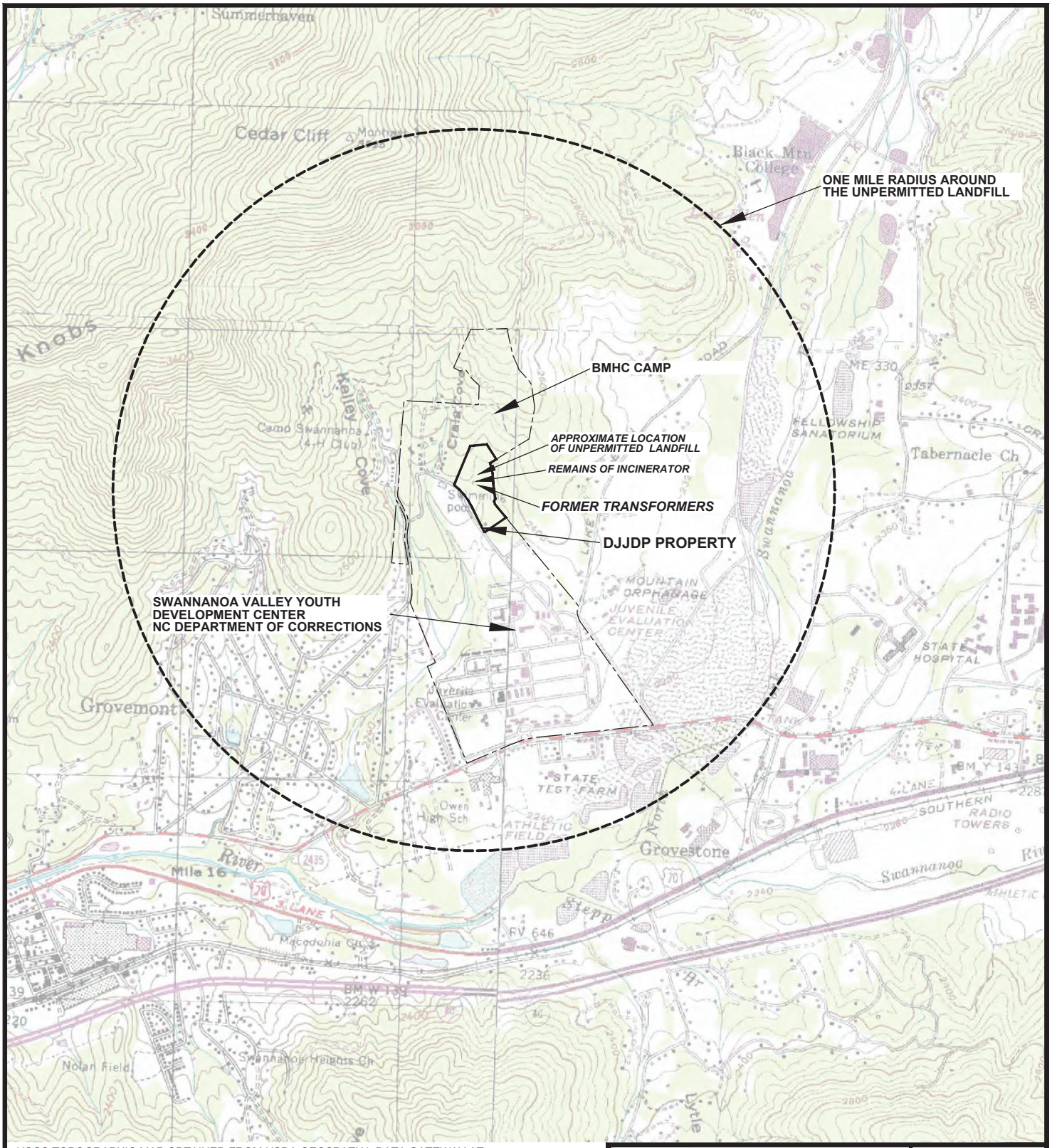
12.0 CERTIFICATION

Project Name/Location: Swannanoa-DJJDP Property, Swannanoa, NC

My signature certifies that I have read, fully understand, and agree to comply with this health and safety plan. I further certify that I understand the appropriate responses to the site hazards described herein, will enact appropriate responses as necessary, and have received appropriate training and health monitoring as required by OSHA rules.

PRINTED NAME	SIGNATURE	COMPANY	DATE

FIGURES



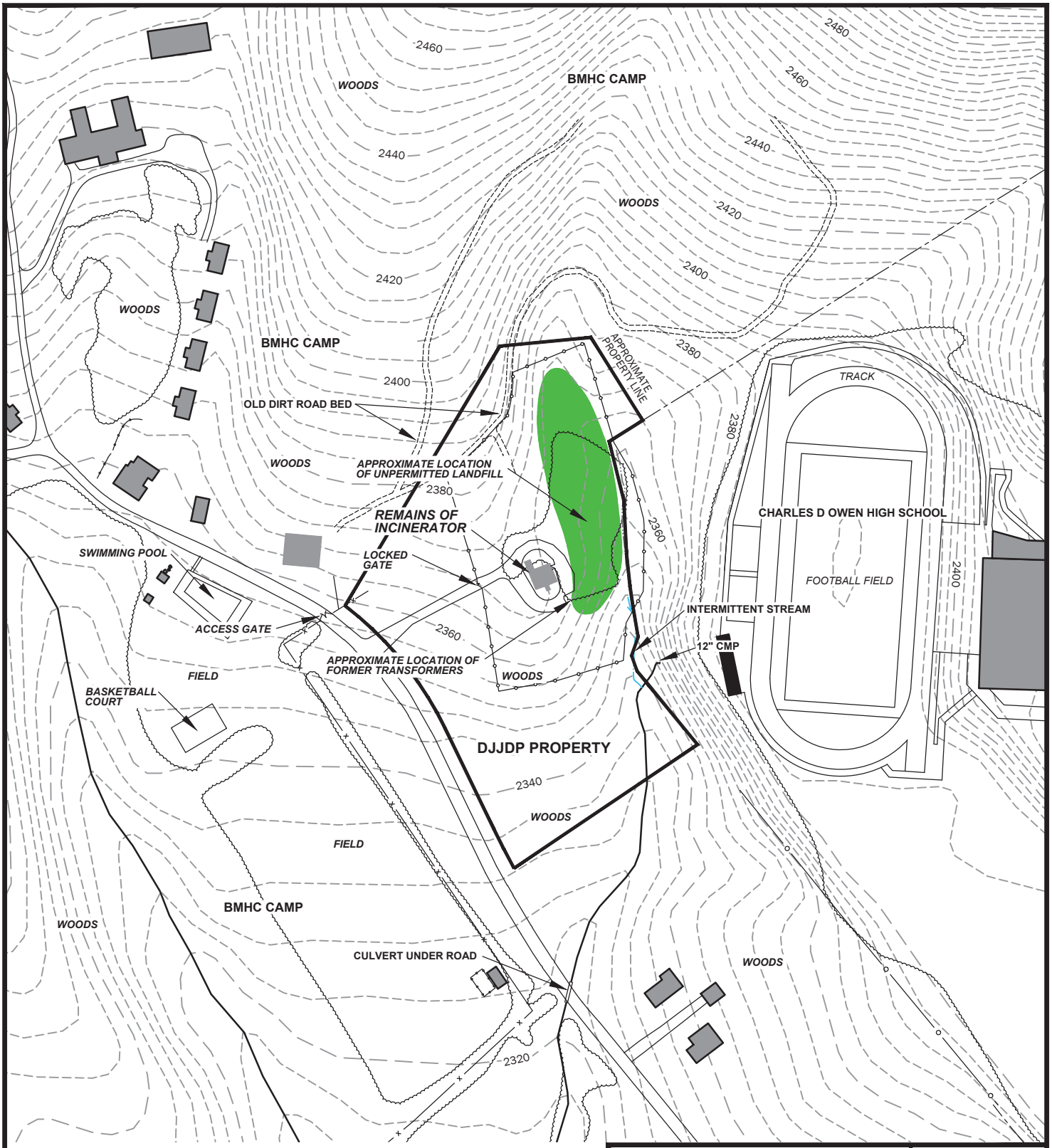
USGS TOPOGRAPHIC MAP OBTAINED FROM USDA GEOSPATIAL DATA GATEWAY AT
http://datagateway.nrcs.usda.gov/

Scale (ft.)

0 2000 4000

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 1.dwg		
Designed: PD	Site Location Map	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: PD	Location: Swannanoa, North Carolina	Figure: 1



Map based on 2006 aerials obtained from Buncombe County Geographical Information System at: http://www.buncombecounty.org/governing/depts/GIS/dataDownload.asp

Scale (ft.)

0 200 400

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 2.dwg		
Designed: PD	Site and Vicinity Map	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: PD	Location: Swannanoa, North Carolina	Figure: 2

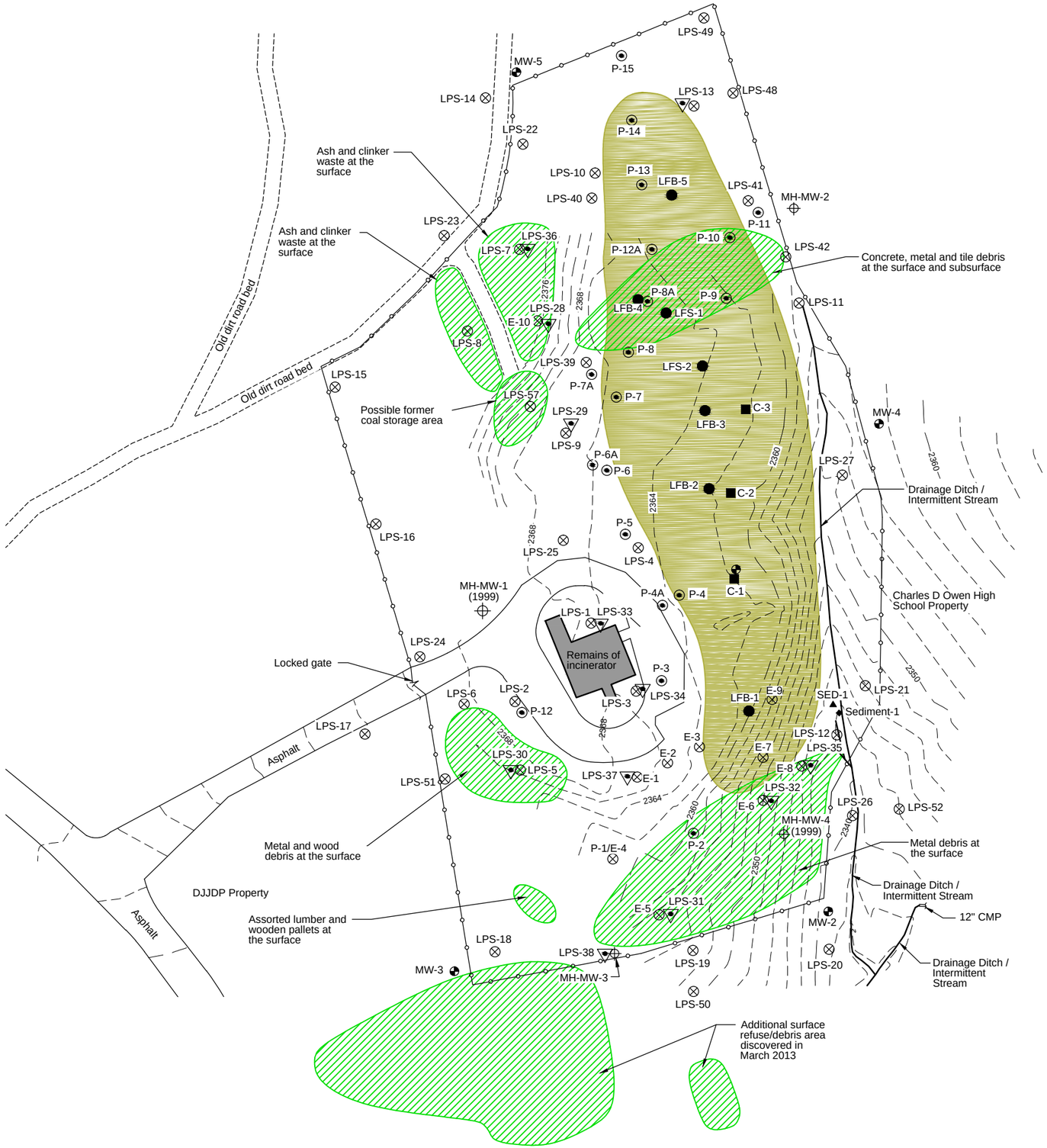
SOURCES:
PROPERTY LINE BASED ON SURVEY BY DENNIS CLINKSCALES, PLS - DATED SEPTEMBER 18, 2009
2006 AERIAL PHOTOGRAPHS OBTAINED FROM BUNCOMBE COUNTY GIS AT
http://www.buncombecounty.org/governing/depts/GIS/dataDownload.asp

Figure provided courtesy of MEG (2010)

Scale (ft.)
0 300 600

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 11/13/13		
ACAD File: Fig 3.dwg		
Designed: PD	Aerial Photograph of Site Area	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1304
Checked: PD	Location: Swannanoa, North Carolina	Figure: 3



LEGEND:

P-10	Landfill Perimeter Exploratory Boring
LFB-1	Landfill Interior Boring/Sample
C-1	Landfill Cap-Thickness Boring
LPS-1	Surface Soil Sample
	Subsurface Soil Sample
SED-2	Sediment Sample
MW-1	Monitoring Well
MH-MW-1	Monitoring Well - Decommissioned
	Approximate Extent Of Landfill
	Surface Refuse/Debris Area
	Fence Line
2360	Topographic Contour (ft. rel. MSL)

Scale (ft.)

0 60 120

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 12/28/15		
ACAD File: Fig 4.dwg		
Designed: PD	Site Map	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina	Figure: 4

LEGEND:

P-10	Landfill Perimeter Exploratory Boring
LFB-1	Landfill Interior Boring/Sample
C-1	Landfill Cap-Thickness Boring
LPS-1	Surface Soil Sample
	Subsurface Soil Sample
SED-2	Sediment Sample
MW-1	Monitoring Well
MH-MW-1	Monitoring Well - Decommissioned
	Approximate Extent Of Landfill
A	Surface Refuse/Debris Area
	Fence Line
2360	Topographic Contour (ft. rel. MSL)
1	Landfill-Perimeter Area to be Excavated

Scale (ft.)

0 60 120

PIEDMONT GEOLOGIC
SMART EARTH SOLUTIONS

Gauging Date:		
Drawing Date: 3/15/16		
ACAD File: Fig 15.dwg		
Designed: PD	Summary of Proposed Site Remedial Action	
Detailed: PD	Client: Swannanoa - DJJDP Property	Project No.: 1404
Checked: PD	Location: Swannanoa, North Carolina	Figure: 5

APPENDIX A

MATERIAL SAFETY DATA SHEETS

International Chemical Safety Cards

CHRYSOTILE

ICSC: 0014

CHRYSOTILE
Serpentine chrysotile
White asbestos
$Mg_6Si_4H_8O_{18}$ / $Mg_6(Si_4O_{10})(OH)_8$
Molecular mass: 554

CAS # 12001-29-5
RTECS # CI16478500
ICSC # 0014
UN # 2590 (white asbestos)

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	
• INHALATION	Cough.	Breathing protection. Closed system and ventilation.	
• SKIN		Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• EYES			First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Well closed.	Use dust-proof packaging. UN Hazard Class: 9 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the

Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

CHRYSOTILE

ICSC: 0014

IMPORTANT DATA		
	PHYSICAL STATE; APPEARANCE: WHITE, GREY, GREEN OR YELLOWISH FIBROUS SOLID.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation.
	PHYSICAL DANGERS:	**INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV: 2 fibres/cc (as TWA) A1 ppm; mg/m^3 (ACGIH 1992-1993). MAK: class III A1 (1993).	**EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the lungs , resulting in pulmonary fibrosis and mesothelioma. This substance is carcinogenic to humans.

PHYSICAL PROPERTIES	Melting point: see Notes °C	Relative density (water = 1): 2.55
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air.	

NOTES

The substance is heat resistant up to 500°C and completely decomposed at temperature of 1000°C. Smoking enhances harmful effects. Depending on the degree of exposure, periodic medical examination is indicated. Do NOT take working clothes home. The recommendations on this Card also apply to other forms of asbestos.

Transport Emergency Card: TEC (R)-913

ADDITIONAL INFORMATION

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Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the

IMPORTANT LEGAL NOTICE:	use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

Material Safety Data Sheet
Antimony

ACC# 01610

Section 1 - Chemical Product and Company Identification

MSDS Name: Antimony
Catalog Numbers: A845-500
Synonyms: Stibium; antimony regulus
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7440-36-0	ANTIMONY	>=99.5	231-146-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: silver white solid.
Warning! Causes eye, skin, and respiratory tract irritation. Harmful if inhaled or swallowed. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. May cause blood abnormalities. May cause cardiac disturbances. Inhalation of fumes may cause metal-fume fever.
Target Organs: Kidneys, liver, cardiovascular system.

Potential Health Effects
Eye: Causes eye irritation. May cause conjunctivitis.
Skin: Causes skin irritation. Chronic exposure may cause dizziness, dry throat, sleepiness, anorexia, and nausea. Chronic inhalation may result in liver, kidney, and cardiac changes.
Ingestion: May cause severe digestive tract irritation with abdominal pain, nausea, vomiting and diarrhea. May cause slow pluse, low blood pressure, shallow breathing, and
Inhalation: Dust is irritating to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may cause dizziness, dry throat, sleepiness, anorexia, and nausea. Chronic inhalation may result in liver, kidney, and cardiac changes.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.
Antidote: The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Material will burn in a fire. Dust can be an explosion hazard when exposed to heat or flame. Bulk metal is combustible in air at high temperatures.
Extinguishing Media: DO NOT USE WATER, CO2, OR FOAM DIRECTLY ON FIRE ITSELF. Use dry sand, graphite powder, dry sodium chloride-based extinguishers.
Flash Point: Not applicable.
Autoignition Temperature: 330 deg C (626.00 deg F)
Explosion Limits, Lower:0.42 oz/ft3
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

Section 7 - Handling and Storage

Handling: Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes. Keep away from heat, sparks and flame. Avoid ingestion and inhalation.
Storage: Keep away from heat and flame. Do not store in direct sunlight. Store in a cool, dry, well-ventilated area away from incompatible substances. Tarnishes in moist air.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
ANTIMONY	0.5 mg/m3 TWA	0.5 mg/m3 TWA 50 mg/m3 IDLH	0.5 mg/m3 TWA

OSHA Vacated PELs: ANTIMONY: 0.5 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: silver white
Odor: none reported
pH: Not available.
Vapor Pressure: Negligible.
Vapor Density: Not available.
Evaporation Rate: Negligible.
Viscosity: Not available.
Boiling Point: 1635 deg C
Freezing/Melting Point:630 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density: 6.684
Molecular Formula: Sb
Molecular Weight:121.71

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Incompatible materials, ignition sources, moisture.
Incompatibilities with Other Materials: Incompatible with ammonium nitrate, bromine, bromine trifluoride, bromoazide, chloric acid, chlorine, chlorine monoxide, chlorine trifluoride, fluorine, iodine, nitric acid, potassium nitrate, potassium permanganate, potassium peroxide, sodium nitrate, and sodium peroxide.
Hazardous Decomposition Products: Stibine fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7440-36-0: CC4025000

LD50/LC50:
CAS# 7440-36-0:
Oral, rat: LD50 = 7 gm/kg;
.

Carcinogenicity:
CAS# 7440-36-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Present evidence in humans is inconclusive regarding an increased risk of lung cancer and reproductive disorders from antimony exposure.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ANTIMONY POWDER	ANTIMONY POWDER
Hazard Class:	6.1	6.1
UN Number:	UN2871	UN2871
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7440-36-0 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 7440-36-0: Effective 10/4/82, Sunset 10/4/92
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 7440-36-0: 5000 lb final RQ (no reporting of releases of this hazardous substance is requir

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7440-36-0: immediate, delayed.

Section 313

This material contains ANTIMONY (CAS# 7440-36-0, >=99.5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 7440-36-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-36-0 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7440-36-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN N

Risk Phrases:

R 20/22 Harmful by inhalation and if swallowed.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 7440-36-0: No information available.

Canada - DSL/NDSL

CAS# 7440-36-0 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7440-36-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 5/26/1998
Revision #6 Date: 2/11/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

International Chemical Safety Cards

ARSENIC

ICSC: 0013

ARSENIC
Grey arsenic
Metallic arsenic
As
Atomic mass: 74.9

CAS # 7440-38-2
RTECS # CG0525000
ICSC # 0013
UN # 1558
EC # 033-001-00-X

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion is slight if in the form of fine powder or dust when exposed to hot surfaces or flames.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• **INHALATION**	Cough. Diarrhoea. Shortness of breath. Sore throat. Vomiting. Weakness. Grey skin.	Closed system and ventilation.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• **EYES**	Redness.	or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	Diarrhoea. Nausea. Sore throat. Unconsciousness. Vomiting (further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment (extra personal	Provision to contain effluent from fire extinguishing. Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. T symbol R: 23/25 S: (1/2-)20/21-28-45

protection: complete protective clothing including self-contained breathing apparatus).		UN Hazard Class: 6.1 UN Packing Group: II Marine pollutant.

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013

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International Chemical Safety Cards

ARSENIC

ICSC: 0013

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens causing fire and explosion hazard. Reacts with nitric acid, hot sulfuric acid. Toxic arsine gas may be formed in contact with acid or acidic substances and certain metals, such as galvanized or light metals.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: ppm; 0.01 mg/m^3 (as TWA) A1 (ACGIH 1994-1995).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes, the skin and the respiratory tract. The substance may cause effects on the circulatory system, nervous system, kidneys and gastrointestinal tract, resulting in convulsions, kidney impairment, severe hemorrhage, losses of fluids, and electrolytes, shock and death. Exposure may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged contact may cause skin sensitization. The substance may have effects on the mucous membranes, skin, kidneys, liver, resulting in neuropathy, pigmentation disorders, perforation of nasal septum and tissue lesions. This substance is carcinogenic to humans.

PHYSICAL PROPERTIES	Sublimation point: 613°C Relative density (water = 1): 5.7	Solubility in water: none
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment.	

NOTES

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is indicated. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC # 0377), Arsenic trichloride (ICSC # 0221), Arsenic trioxide (ICSC # 0378), Arsine (ICSC # 0222).

ADDITIONAL INFORMATION

ICSC: 0013 **ARSENIC**

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Material Safety Data Sheet
Lead

ACC# 12510

Section 1 - Chemical Product and Company Identification

MSDS Name: Lead
Catalog Numbers: S71957, S719571, S75257, S80049, L18-500, L246-500, L27-1LB, L27-1RL, NC9657609, NC9888945, XXL24625KG
Synonyms: Lead metal.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7439-92-1	Lead	99.8	231-100-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: bluish white, silvery gray solid.
Warning! Possible cancer hazard. May cause cancer based on animal data. Causes eye and skin irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. May be absorbed through intact skin. May cause central nervous system depression. May cause kidney damage. May cause adverse reproductive effects. May cause fetal effects.
Target Organs: Kidneys, central nervous system, blood forming organs.

Potential Health Effects
Eye: Causes eye irritation.
Skin: Causes skin irritation. May be absorbed through the skin.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Ingestion of lead compounds can cause toxic effects in the blood-forming organs, kidneys and central nervous system. Symptoms of lead poisoning or plumbism include weakness, weight loss, lassitude, insomnia, and hypotension. It also includes constipation, anorexia, abdominal discomfort and colic.
Inhalation: May cause respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause effects similar to those described for ingestion.
Chronic: Possible cancer hazard based on tests with laboratory animals. Chronic exposure may cause

reproductive disorders and teratogenic effects. Chronic exposure to lead may result in plumbism which is characterized by lead line in gum, headache, muscle weakness, mental changes.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Discard contaminated clothing in a manner which limits further exposure.
Ingestion: Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.
Antidote: The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel. The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. The use of Calcium disodium EDTA as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use extinguishing media appropriate to the surrounding fire. Substance is noncombustible. Dust can be an explosion hazard when exposed to heat or flame.
Extinguishing Media: For small fires, use water spray, dry chemical, carbon dioxide or chemical foam. Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Wash

clothing before reuse.
Storage: Store in a cool, dry place. Keep from contact with oxidizing materials. Keep containers tightly closed.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Lead	0.05 mg/m3 TWA	0.050 mg/m3 TWA 100 mg/m3 IDLH	50 æg/m3 TWA; 50 æg/m3 TWA (as Pb); 30 æg/m3 Action Level (as Pb. Poison - see 29 CFR 1910.10 25)

OSHA Vacated PELs: Lead: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves and clothing to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: bluish white, silvery gray
Odor: none reported
pH: Not applicable.
Vapor Pressure: 1.3 mm Hg @ 970C
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: 1740 deg C
Freezing/Melting Point:327.4 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density:11.3
Molecular Formula: Pb
Molecular Weight:207.2

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation, excess heat.

Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Lead/lead oxides.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7439-92-1: OF7525000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7439-92-1:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 10/1/92
- **NTP:** Suspect carcinogen
- **IARC:** Group 2A carcinogen

Epidemiology: There are several reports that certain lead compounds administered to animals in high doses are carcinogenic, primarily producing renal tumors. Salts demonstrating carcinogenicity in animals are usually soluble salts. Epidemiological studies have not shown a relationship between lead exposure and the incidence of cancer in lead workers. However, one study of lead-exposed workers demonstrated a statistically significant elevation in the standardized mortality ratio for gastric and lung cancer in battery plant workers only.
Teratogenicity: Lead penetrates the placental barrier and has caused fetal abnormalities in animals. Excesssive exposure to lead during pregnancy has caused neurological disorders in infants.
Reproductive Effects: Reproductive effects from lead have been documented in animals and human beings of both sexes. In battery workmen with a mean exposure of 8.5 years to lead, there was an increased frequency of sperm abnormalities as compared with a control group.
Mutagenicity: Mutagenic effects have occurred in humans.
Neurotoxicity: Subtle neurologic effects have been demonstrated with relatively low blood levels of lead. The performance of lead workers on various neurophysiological tests was mildly reduced when compared with a control group. Anxiety, depression, poor concentration, forgetfulness, mild reductions in motor and sensory nerve conduction velociities have been documented in lead-exposed workers.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. LC50 Japanese quail (Coturnix japonica), males or females, 14 days old, oral (5-day adlibitum in diet) >5,000 ppm; at 1000, 2236 & 5000 onset of toxic signs began at 7, 7 & 7 days and remissed at 11, 11 & 12 days, respectively, no mortality was observed; control references were dieldrin & dicrotophos; corn oil diluent was added to diet at ratio of 2:98 by wt; (extreme concentrations: 1,000-5,000 ppm) /Lead metal, 100%.
Environmental: Terrestrial: Extremely stable metal. While some corrosion may be expected in soil, generally an inert coat of an insoluble salt will form and limit further corrosion. Aquatic: Lead will simply sink into the sediment. Atmospheric: Will be in particulate matter and be subject to washout and gravitational settling. Will biodegrade and bioconcentrate.
Physical: No information available.
Other: For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated	Not Regulated
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7439-92-1 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 7439-92-1: 10 lb final RQ (no reporting of releases of this hazardous substance is required
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 7439-92-1: immediate, delayed.
Section 313
This material contains Lead (CAS# 7439-92-1, 99.8%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 7439-92-1 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7439-92-1 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7439-92-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Lead, a chemical known to the state of California to cause cancer.
WARNING: This product contains Lead, a chemical known to the state of California to cause male reproductive toxicity.
California No Significant Risk Level: CAS# 7439-92-1: 15 æg/day NSRL (oral)

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 20/22 Harmful by inhalation and if swallowed.
R 33 Danger of cumulative effects.
R 61 May cause harm to the unborn child.
R 62 Possible risk of impaired fertility.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardou s waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 7439-92-1: No information available.

Canada - DSL/NDSL

CAS# 7439-92-1 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7439-92-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/29/1999
Revision #5 Date: 5/22/2007

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International Chemical Safety Cards

MANGANESE

ICSC: 0174

MANGANESE
(powder)
Mn
Atomic mass: 54.9

CAS # 7439-96-5
RTECS # OO927500
ICSC # 0174

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Dry sand, special powder.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• INHALATION	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN			
• EYES		Safety goggles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	Abdominal pain. Nausea.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place (extra personal protection: P2 filter respirator for harmful particles).	Separated from acids. Dry.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0174

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International Chemical Safety Cards

MANGANESE

ICSC: 0174

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
GRAY-WHITE POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with concentrated hydrogen peroxide. Reacts slowly with water more rapidly with steam and acids to produce flammable gas (hydrogen see - ICSC # 0001) causing fire and explosion hazard. Burns in nitrogen gas above 200°C.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV (as TWA): ppm; 5 (dust) or 1 (fume) mg/m^3; as STEL: 3 mg/m^3 (fume) (ACGIH 1994-1995).
MAK: ppm; 0.5 mg/m^3 (1994).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol or fumes, and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
Inhalation of dust may cause bronchitis and pneumonitis. The effects may be delayed.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the lungs and nervous system, resulting in bronchitis, pneumonitis, neurologic and neuropsychiatric disorders (manganism). Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES	Boiling point: 1962°C Melting point: 1244°C	Relative density (water = 1): 7.2-7.4 Solubility in water: none
ENVIRONMENTAL DATA		

NOTES

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to ferro manganese.

ADDITIONAL INFORMATION

ICSC: 0174 **MANGANESE**

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International Chemical Safety Cards

SELENIUM

ICSC: 0072

SELENIUM
(powder)
Se
Atomic mass: 79.0

CAS # 7782-49-2
RTECS # VS7700000
ICSC # 0072
UN # 2658 (powder)
EC # 034-001-00-2

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with oxidants.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion with oxidants.		Use extinguishing media appropriate to surrounding fire conditions. NO contact with water.
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
• **INHALATION**	Irritation of nose. Cough. Dizziness. Headache. Laboured breathing. Nausea. Sore throat. Vomiting. Weakness. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• **SKIN**	Redness. Skin burns. Pain. Discolouration.	Protective gloves. Protective clothing.	Rinse skin with plenty of water or shower. Refer for medical attention. Remove and isolate contaminated clothes.
• **EYES**	Redness. Pain. Blurred vision.	Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	Metallic taste. Diarrhoea. Chills. Fever (further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into containers; if appropriate, moisten first to prevent	Fireproof. Separated from strong oxidants, strong acids, food and feedstuffs. Dry.	Airtight. Do not transport with food and feedstuffs. T symbol

dusting. Carefully collect remainder, then remove to safe place (extra personal protection: P3 filter respirator for toxic particles).		R: 23/25-33 S: (1/2-)20/21-28-45 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0072

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International Chemical Safety Cards

SELENIUM

ICSC: 0072

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS SOLID IN VARIOUS FORMS. DARK RED-BROWN TO BLUISH-BLACK AMORPHOUS SOLID OR RED TRANSPARENT CRYSTALS OR METALLIC GREY TO BLACK CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with oxidants and strong acids. Reacts with water at 50°C forming flammable hydrogen (see ICSC # 0001) and selenious acids. Reacts with incandescence on gentle heating with phosphorous and metals such as nickel, zinc, sodium, potassium, platinum.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: ppm; 0.2 mg/m^3 as TWA (ACGIH 1991-1992).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly by dispersion.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes and the respiratory tract. Inhalation of dust may cause lung oedema (see Notes). Inhalation of fume may cause symptoms of asphyxiation, chills and fever and bronchitis. The effects may be delayed.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the respiratory tract, gastrointestinal tract, and skin , resulting in nausea, vomiting, cough, yellowish skin discolouration, loss of nails, garlic breath and bad teeth.

PHYSICAL PROPERTIES

Boiling point: 685°C
Melting point: 170-217°C
Relative density (water = 1): 4.8
Solubility in water: none
Vapour pressure, Pa at 20°C: 0.1

ENVIRONMENTAL DATA

NOTES

Do NOT take working clothes home.

ADDITIONAL INFORMATION

ICSC: 0072 **SELENIUM**

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Material Safety Data Sheet
Silver

ACC# 20770

Section 1 - Chemical Product and Company Identification

MSDS Name: Silver
Catalog Numbers: S163-10
Synonyms: Argentum.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7440-22-4	Silver	100	231-131-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white solid.
Caution! May cause respiratory and digestive tract irritation. May cause eye and skin irritation. Danger of cumulative effects.
Target Organs: Kidneys.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. May cause skin discoloration.
Ingestion: May cause irritation of the digestive tract. Effects may be cumulative. Ingestion of silver compounds may cause abdominal pain, rigidity, convulsions and shock.
Inhalation: May cause respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.
Chronic: Chronic inhalation or ingestion of silver salts may cause argyria characterized by a permanent blue-gray discoloration of the eyes, skin, mucous membranes, and internal organs. This malady results from the accumulation of silver in the body.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation develops, get medi cal aid.
Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. Wash mouth out with water. Get medical aid if irritation or symptoms occur.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Use with adequate ventilation.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. No special precautions indicated.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
		0.01 mg/m3 TWA (dust)	

Silver	0.1 mg/m3 TWA	10 mg/m3 IDLH (dust)	0.01 mg/m3 TWA

OSHA Vacated PELs: Silver: 0.01 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: white
Odor: none reported
pH: Not available.
Vapor Pressure: 100 mm Hg @ 1865 C
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not available.
Boiling Point: 2212 deg C
Freezing/Melting Point:961 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density:10.5
Molecular Formula: Ag
Molecular Weight:107.8682

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, exposure to air.
Incompatibilities with Other Materials: Strong acids, strong bases, ethyleneimine.
Hazardous Decomposition Products: Irritating and toxic fumes and gases, silver fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7440-22-4: VW3500000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7440-22-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: IARC Group 4: Substance nonclassifiable with regard to carcinogenicity.Tumorigenic

:See RTECS
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Aquatic Fate: Sorption and precipitation processes are effective in reducing the concn of dissolved silver and result in higher concn in the bed sediments than in the overlying waters. Sorption by manganese dioxide and precipitation with halides are probably the dominant controls on the mobility of silver in the aquatic environment.
Physical: Algae, daphnia, fresh water mussels, and fathead minnows were all found capable of accumulating silver; but the food chain was not an important route of silver accumulation for animals at higher tropic levels, suggesting no food chain magnification.
Other: For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7440-22-4 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 7440-22-4: 1000 lb final RQ (no reporting of releases of this hazardous substance is requir

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7440-22-4: delayed, fire.

Section 313

This material contains Silver (CAS# 7440-22-4, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 7440-22-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-22-4 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7440-22-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

Not available.

Risk Phrases:

R 33 Danger of cumulative effects.

Safety Phrases:

S 37 Wear suitable gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 28A After contact with skin, wash immediately with plenty of water
.

WGK (Water Danger/Protection)

CAS# 7440-22-4: 0

Canada - DSL/NDSL

CAS# 7440-22-4 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7440-22-4 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 12/12/1997
Revision #8 Date: 2/15/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

International Chemical Safety Cards

THALLIUM

ICSC: 0077

THALLIUM
Ramor
Thallium (metal)
Tl
Atomic mass: 204.4

CAS # 7440-28-0
RTECS # XG3425000
ICSC # 0077

EC # 081-001-00-3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
• **INHALATION**	Abdominal pain. Diarrhoea. Nausea. Vomiting. Loss of hair, pain in legs and chest, and dry skin. Symptoms may be delayed (see Notes).	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	(Further see Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• **EYES**		Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	Loss of vision, polyneuritis, psychic disturbances, delirium, convulsions, respiratory paralysis, coma, cardiac disturbances (further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place.	Separated from strong acids, fluorine, other halogens, food and feedstuffs.	Do not transport with food and feedstuffs. T+ symbol R: 26/28-33 S: (1/2-)13-28-45

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0077

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

THALLIUM

ICSC: 0077

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
BLUISH-WHITE, VERY SOFT METAL. TURNS GREY ON EXPOSURE TO AIR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Reacts violently with fluorine. Reacts with other halogens at room temperature.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV (as Tl (soluble compounds)): ppm; 0.1 mg/m^3 (as TWA) (skin) (ACGIH 1994-1995).
MAK not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance may cause effects on the peripheral and the central nervous system, liver and kidneys, the gastrointestinal tract, skin (hair) and the cardiovascular system, resulting in polyneuritis, optic nerve atrophy, encephalopathy, cardiac disturbances, liver and kidney damage, alopecia. Exposure may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the vision, nervous system, skin (hair), heart, gastrointestinal tract. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES	Boiling point: 1457°C Melting point: 304°C	Relative density (water = 1): 11.9 Solubility in water: none
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to plants. It is strongly advised not to let the chemical enter into the environment because it persists in the environment.	

NOTES

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of acute thallium poisoning (except for gastrointestinal symptoms) do not become manifest until 12 hours to 4 days after exposure. Do NOT take working clothes home. Refer to cards for specific thallium compounds (e.g., thallous sulfate - see ICSC # 0336).

ADDITIONAL INFORMATION

ICSC: 0077 **THALLIUM**

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IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

Material Safety Data Sheet
Zinc, Dust

ACC# 01854

Section 1 - Chemical Product and Company Identification

MSDS Name: Zinc, Dust
Catalog Numbers: AC198340000, AC198340010, AC198340025, AC198340100, AC198341000
Synonyms: None
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7440-66-6	Zinc	100	231-175-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: grey solid.
Danger! Water-reactive. Reacts violently and/or explosively with water, steam or moisture. May ignite or explode on contact with moist air. Causes eye and skin irritation. Causes digestive and respiratory tract irritation.
Target Organs: Kidneys.

Potential Health Effects
Eye: Causes eye irritation.
Skin: Causes skin irritation.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.
Chronic: Repeated inhalation may cause chronic bronchitis.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid if irritation develops or persists. Wash clothing before reuse. Flush skin with plenty of soap and water.

Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically.
Antidote: The use of Calcium disodium EDTA as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Water reactive. Material will react with water and may release a flammable and/or toxic gas. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. May ignite or explode on contact with steam or moist air.
Extinguishing Media: Use dry sand or earth to smother fire. DO NOT USE WATER! Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: Not available.
Autoignition Temperature: 460 deg C (860.00 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 3; Instability: 2; Special Hazard: -W-

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up or absorb material, then place into a suitable clean, dry, closed container for disposal. Avoid generating dusty conditions. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Do not expose spill to water.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not allow water to get into the container because of violent reaction. Avoid contact with skin and eyes. Avoid ingestion and inhalation. Do not allow contact with water. Keep from contact with moist air and steam.
Storage: Store in a cool, dry place. Keep away from water. Keep containers tightly closed.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs

Zinc	none listed	none listed	none listed

OSHA Vacated PELs: Zinc: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: grey
Odor: odorless
pH: Not available.
Vapor Pressure: 1 mm Hg @ 487C
Vapor Density: Not available.
Evaporation Rate: Not applicable
Viscosity: Not applicable
Boiling Point: 908 deg C
Freezing/Melting Point:419 deg C
Decomposition Temperature: Not available.
Solubility: Reacts with water
Specific Gravity/Density:7.14
Molecular Formula: Zn
Molecular Weight:65.38

Section 10 - Stability and Reactivity

Chemical Stability: Stable. Combines vigorously or explosively with water.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat, strong oxidants, exposure to moist air or water, mechanical shock.
Incompatibilities with Other Materials: Halogenated agents, strong oxidizing agents, alkali hydroxides.
Hazardous Decomposition Products: Mechanical shock, toxic fumes of zinc oxide.
Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:
CAS# 7440-66-6: ZG8600000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7440-66-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ZINC POWDER	ZINC DUST
Hazard Class:	4.3	4.3(4.2)
UN Number:	UN1436	UN1436
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7440-66-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 7440-66-6: 1000 lb final RQ (no reporting of releases of this hazardous substance is requir
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7440-66-6: immediate.

Section 313

This material contains Zinc (CAS# 7440-66-6, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 7440-66-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-66-6 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7440-66-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

F

Risk Phrases:

R 15 Contact with water liberates extremely flammable gases.
R 17 Spontaneously flammable in air.

Safety Phrases:

S 7/8 Keep container tightly closed and dry.

WGK (Water Danger/Protection)

CAS# 7440-66-6: 0

Canada - DSL/NDSL

CAS# 7440-66-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B6.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7440-66-6 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/09/1998
Revision #4 Date: 10/07/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
Benzo[a]pyrene, 98%

ACC# 37175

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzo[a]pyrene, 98%
Catalog Numbers: AC105600000, AC105600010, AC105601000, AC377200000, AC377200010, AC377201000 AC377201000
Synonyms: 3,4-Benzopyrene; 3,4-Benzpyrene; Benzo[def]chrysene.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
50-32-8	Benzo[a]pyrene	>96	200-028-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow to brown powder.
Danger! May cause harm to the unborn child. May impair fertility. May cause eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Cancer hazard. May cause allergic skin reaction. May cause heritable genetic damage.
Target Organs: Reproductive system, skin.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. May be harmful if absorbed through the skin. May cause an allergic reaction in certain individuals.
Ingestion: May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated. May be harmful if swallowed.
Inhalation: May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. May be harmful if inhaled.
Chronic: May cause cancer in humans. May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzo[a]pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar

	pitches).	mg/m3 IDLH (listed under Coal tar pitches).	pitches).

OSHA Vacated PELs: Benzo[a]pyrene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: yellow to brown
Odor: faint aromatic odor
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 495 deg C @ 760 mm Hg
Freezing/Melting Point:175 - 179 deg C
Decomposition Temperature: Not available.
Solubility: 1.60x10-3 mg/l @25°C
Specific Gravity/Density: Not available.
Molecular Formula:C20H12
Molecular Weight:252.31

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 50-32-8: DJ3675000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: Adverse reproductive effects have occurred in experimental animals.
Mutagenicity: Mutagenic effects have occurred in humans.Mutagenic effects have occurred in experimental animals.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 50-32-8: waste number U022.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NOT REGULATED FOR DOMESTIC TRANSPORT	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL (Benzo{a} pyrene)
Hazard Class:		9
UN Number:		UN3077
Packing Group:		III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 50-32-8 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 50-32-8: immediate, delayed.

Section 313

This material contains Benzo[a]pyrene (CAS# 50-32-8, >96%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzo[a]pyrene, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 50-32-8: 0.06 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 43 May cause sensitization by skin contact.
R 45 May cause cancer.
R 46 May cause heritable genetic damage.
R 60 May impair fertility.
R 61 May cause harm to the unborn child.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardou s waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 50-32-8: No information available.

Canada - DSL/NDSL

CAS# 50-32-8 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #7 Date: 6/30/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
Naphthalene

ACC# 16120

Section 1 - Chemical Product and Company Identification

MSDS Name: Naphthalene
Catalog Numbers: AC164210010, AC164210025, AC180200010, AC180200050, AC180202500, AC180900010, AC180902500, S76307, S763071, S93309, N134-500, N7-500
Synonyms: Coal tar camphor; Tar camphor; Naphthalin; White tar; Naphthene; Moth flakes: Moth balls.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
91-20-3	Naphthalene	>98	202-049-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white solid. Flash Point: 78 deg C.
Warning! Flammable solid. Harmful if inhaled or swallowed. Causes eye, skin, and respiratory tract irritation. May be harmful if absorbed through the skin. May cause blood abnormalities. Hygroscopic (absorbs moisture from the air).
Target Organs: Blood, respiratory system, eyes, skin.

Potential Health Effects
Eye: Naphthalene is an eye irritant. The vapor causes eye irritation at 15 ppm. Eye contact with the solid material may result in conjunctivitis, superficial injury to the cornea, diminished visual acuity, and other effects. It may cause cataracts.
Skin: Causes mild skin irritation. May be absorbed through the skin in harmful amounts. Incidence of skin hypersensitivity is not widespread in the general population &, based on the long history of use of naphthalene as a consumer product, this effect is mostly confined to industrial exposure where coal tar contamination may be present.
Ingestion: Harmful if swallowed. May cause liver and kidney damage. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, and death. May cause severe digestive tract irritation with abdominal pain, nausea, vomiting and diarrhea. Ingestion of large quantities may cause severe hemolytic anemia and hemoglobinuria.

Inhalation: Harmful if inhaled. Causes respiratory tract irritation. Readily absorbed when inhaled. Material volatilizes at room temperature. Hemolytic anemia (destruction of red blood cells) is the primary health concern for humans exposed to naphthalene for either short or long periods of time. Other effects may include nausea, profuse perspiration, vomiting, kidney damage and liver damage. Optic neuritis (inflammation of the optic nerve) has been observed. Cataracts have also occurred.
Chronic: Prolonged or repeated skin contact may cause dermatitis. May cause liver and kidney damage. May cause anemia and other blood cell abnormalities. Animal studies have reported that fetal effects/abnormalities may occur when maternal toxicity is seen. Effects may be delayed. Chronic exposure may cause lung damage. Laboratory experiments have resulted in mutagenic effects. Chronic exposure may cause corneal injury, optical neuritis, blurred vision, and possible cataract formation. Chronic inhalation, skin absorption or ingestion of naphthalene have caused severe hemolytic anemia.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Individuals with a glucose-6-phosphate dehyrogenase deficiency are hypersensitive to the effects of naphthalene.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Flammable solid. Dusts may be an explosion hazard if mixed with air at critical proportions and in the presence of an ignition source. Volatile solid that gives off flammable vapors when heated.
Extinguishing Media: Water or foam may cause frothing. Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: 78 deg C (172.40 deg F)
Autoignition Temperature: 526 deg C (978.80 deg F)
Explosion Limits, Lower:0.90 vol %
Upper: 5.90 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Avoid generating dusty conditions. Remove all

sources of ignition. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid breathing dust, mist, or vapor. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Use only with adequate ventilation.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Storage under a nitrogen blanket has been recommended. Store protected from moisture. Separate from oxidizing materials.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Naphthalene	10 ppm TWA; 15 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous r oute	10 ppm TWA; 50 mg/m3 TWA 250 ppm IDLH	10 ppm TWA; 50 mg/m3 TWA

OSHA Vacated PELs: Naphthalene: 10 ppm TWA; 50 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: white
Odor: mothball-like
pH: Not available.
Vapor Pressure: 0.05 mm Hg @ 20 deg C
Vapor Density: 4.4 (air=1)
Evaporation Rate:<1.0 (butyl acetate=1)
Viscosity: Not available.
Boiling Point: 218 deg C
Freezing/Melting Point:79 - 82 deg C
Decomposition Temperature:540 deg C
Solubility: Insoluble.
Specific Gravity/Density:0.9900g/cm3
Molecular Formula:C10H8

Molecular Weight:128.17

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Ignition sources, dust generation, moisture, excess heat, exposure to moist air or water, steam.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 91-20-3: QJ0525000
LD50/LC50:
CAS# 91-20-3:
Draize test, rabbit, eye: 100 mg Mild;
Inhalation, rat: LC50 = >340 mg/m3/1H;
Oral, mouse: LD50 = 316 mg/kg;
Oral, rat: LD50 = 490 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Skin, rat: LD50 = >2500 mg/kg;

Carcinogenicity:
CAS# 91-20-3:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/19/02
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

Epidemiology: Incidents in which blankets or clothing containing naphthalene caused acute hemolysis in infants, in some cases fatal, have been described.The percutaneous absorption and systemic intoxication with naphthalene can be facilitated by oily vehicles.
Teratogenicity: Naphthalene and its metabolites have been reported to cross the human placenta in amounts sufficient to cause fetal toxicity.Oral, rat: TDLo = 4500 mg/kg (female 6-15 day(s) after conception).Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus) and Specific Developmental Abnormalities - other developmental abnormalities.Intraperitoneal, rat: TDLo = 5925 mg/kg (female 1-15 day(s) after conception) Specific Developmental Abnormalities - musculoskeletal system and cardiovascular (circulatory) system.
Reproductive Effects: No information available.
Mutagenicity: Micronucleus Test: Human, Lymphocyte = 30 mg/L.; Cytogenetic Analysis: Hamster, Ovary = 30 mg/L.; Sister Chromatid Exchange: Hamster, Ovary = 15 mg/L.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 1.60 mg/L; 96 Hr; Flow-through at 15 CFish: Fathead Minnow: LC50 = 6.14 mg/L; 96 Hr; Flow-through at 24.5 CWater flea Daphnia: EC50 = 2.16-8.60 mg/L; 48 Hr; UnspecifiedBacteria: Phytobacterium phosphoreum: EC50 = 0.93 mg/L; 30 min; Microtox testFish: Pink salmon: LC50 = 1.24 mg/L; 96 Hr; (fry) Static bioassay at 12°C Releases into water are lost due to volatilization, photolysis, adsorption, and biodegradation. The principal loss processes will depend on local conditions but half-lives can be expected to range from a couple of days to a few months. When adsorbed to sediment, biodegradation occurs much more rapidly than in the overlying water column. When spilled on land, naphthalene is adsorbed moderately to soil and undergoes biodegradation. However, in some cases it will appear in the groundwater where biodegradation still may occur if conditions are aerobic.
Environmental: Bioconcentration occurs to a moderate extent but since depuration and metabolism readily proceed in aquatic organisms, this is a short term problem. transport and disposal of fuel oil, coal tar, etc. In the atmosphere, naphthalene rapidly photodegrades (half-life 3-8 hr). Naphthalene shows low biological oxygen demand and is expected to cause little O2 depletion in aquatic systems.
Physical: Log P (oct) = 3.01 - 3.59
Other: Harmful to aquatic life in very low concentrations.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 91-20-3: waste number U165.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NAPHTHALENE, CRUDE	NAPHTHALENE
Hazard Class:	4.1	4.1
UN Number:	UN1334	UN1334
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 91-20-3 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 91-20-3: Effective 6/1/87, Sunset 6/1/97
Chemical Test Rules
CAS# 91-20-3: 40 CFR 799.5115
Section 12b
CAS# 91-20-3: Section 4

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 91-20-3: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 91-20-3: immediate, delayed, fire.

Section 313

This material contains Naphthalene (CAS# 91-20-3, >98%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 91-20-3 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 91-20-3 is listed as a Hazardous Substance under the CWA. CAS# 91-20-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 91-20-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Naphthalene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 91-20-3: 5.8 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN N

Risk Phrases:

R 22 Harmful if swallowed.
R 40 Limited evidence of a carcinogenic effect.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 36/37 Wear suitable protective clothing and gloves.
S 46 If swallowed, seek medical advice immediately and show this con tainer or label.
S 60 This material and its container must be disposed of as hazardou s waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 91-20-3: 2

Canada - DSL/NDSL

CAS# 91-20-3 is listed on Canada's DSL List.

Canada - WHMIS

not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 91-20-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 5/14/1999
Revision #7 Date: 11/28/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
Pentachlorophenol

ACC# 63018

Section 1 - Chemical Product and Company Identification

MSDS Name: Pentachlorophenol
Catalog Numbers: AC161120000, AC161120010
Synonyms: PCP; 1-Hydroxypentachlorobenzene; 2,3,4,5,6-Pentachlorophenol.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
87-86-5	Pentachlorophenol	>86	201-778-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: dark colored solid.
Danger! May be fatal if inhaled, absorbed through the skin or swallowed. Possible risks of irreversible effects. Causes eye, skin, and respiratory tract irritation. May cause blood abnormalities. May cause cancer based on animal studies. May cause lung damage. May cause liver and kidney damage. May cause cardiac disturbances. Dangerous for the environment. May cause fetal effects.
Target Organs: Kidneys, liver, lungs, immune system, nervous system, circulatory system.

Potential Health Effects
Eye: Causes eye irritation and possible burns. May cause visual damage, inflammation of the conjunctiva, corneal opacity and slight physiologic dilatation of the pupil.
Skin: May be fatal if absorbed through the skin. Substance is rapidly absorbed through the skin. Causes symptoms similar to those of inhalation. Causes skin irritation and possible burns.
Ingestion: May be fatal if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause liver and kidney damage. May cause effects similar to those of acute inhalation.
Inhalation: May be fatal if inhaled. May cause increased perspiration, increased temperature, increased heart rate, increased breathing, weakness, nausea, vomiting, abdominal pain, headache, Systemic intoxication is cumulative and has been fatal. May cause violent sneezing and coughing. Inhalation may cause damage to the circulatory system and heart and possible death due to cardiac failure. Causes irritation of the mucous membrane and upper respiratory tract.
Chronic: Possible cancer hazard based on tests with laboratory animals. May cause liver and kidney damage. Animal studies have reported that fetal effects/abnormalities may occur when maternal toxicity is seen. Chronic exposure has resulted in an increased prevalence of conjunctivitis, sinsuitis, bronchitis, polyneuritis, and dermatitis. Exposure may cause blood effects and bone marrow damage.

Chronic exposure may cause lung damage. Laboratory experiments have resulted in mutagenic effects.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Call a poison control center. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Treat symptomatically and supportively. Persons with pre-existing skin disorders or impaired respiratory or pulmonary function may be at increased risk to the effects of this substance. Effects may be delayed.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam. Use extinguishing media most appropriate for the surrounding fire. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Use only in a chemical

fume hood.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Poison room locked.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Pentachlorophenol	0.5 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.5 mg/m3 TWA 2.5 mg/m3 IDLH	0.5 mg/m3 TWA

OSHA Vacated PELs: Pentachlorophenol: 0.5 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: dark colored
Odor: Benzene like
pH: Not available.
Vapor Pressure: 40 mm Hg @ 211.2 C
Vapor Density: 9.2
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 310 deg C @ 760 mmHg
Freezing/Melting Point:190-191 C
Decomposition Temperature:310 deg C
Solubility: slightly soluble
Specific Gravity/Density:1.9790g/cm3
Molecular Formula:C6HCl5O
Molecular Weight:266.33

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, acid anhydrides,

alkalies, acid chlorides, organic materials.
Hazardous Decomposition Products: Hydrogen chloride, carbon monoxide, carbon monoxide, carbon dioxide, chlorinated phenols.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 87-86-5: SM6300000; SM6314000; SM6321000
LD50/LC50:
CAS# 87-86-5:
Draize test, rabbit, eye: 100 uL/24H Mild;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, rat: LC50 = 355 mg/m3;
Inhalation, rat: LC50 = 200 mg/m3;
Inhalation, rat: LC50 = 335 mg/m3;
Oral, mouse: LD50 = 36 mg/kg;
Oral, mouse: LD50 = 117 mg/kg;
Oral, mouse: LD50 = 30 mg/kg;
Oral, rabbit: LD50 = 200 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 50 mg/kg;
Skin, rat: LD50 = 96
Carcinogenicity:
CAS# 87-86-5:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

Epidemiology: No data available.
Teratogenicity: Oral, rat: TDLo = 60 mg/kg (female 9 day(s) after conception) Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).; Oral, rat: TDLo = 50 mg/kg (female 6-15 day(s) after conception) Specific Developmental Abnormalities - musculoskeletal system.; Oral, rat: TDLo = 4 gm/kg (female 77 day(s) pre-mating - 28 day(s) post-birth) Effects on Newborn - weaning or lactation index (e.g., # alive at weaning per # alive at day 4) and Effects on Newborn - growth statistics (e.g.%, reduced weight gain).; Subcutaneous, mouse: TDLo = 450 mg/kg (female 6-14 day(s) after conception) E
Reproductive Effects: No information found
Mutagenicity: Morphological Transformation: Hamster, Embryo = 100 mg/L.; Cytogenetic Analysis: Hamster, Ovary = 80 mg/L.; Sister Chromatid Exchange: Hamster, Ovary = 3 mg/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 0.052 mg/L; 96 Hr; Static bioassay at 11C (pH 7.2-7.5)Fish: Fathead Minnow: LC50 = 0.205 mg/L; 96 Hr; Static bioassay at 20C (pH 7.2-7.5)Fish:

Bluegill/Sunfish: LC50 = 0.032 mg/L; 96 Hr; Static bioassay at 15C (pH 7.2-7.5)Bacteria: Phytobacterium phosphoreum: EC50 = 0.519 mg/L; 30 min; Microtox testAlgae: Green algae: EC50 = 0.09 mg/L; 96 Hr; Unspecified In soil, pentachlorophenol will slowly biodegrade and leaching into ground water is expected. When released into water it adsorbs considerably to sediment, photodegrades (especially at higher pHs) and slowly biodegrades. Pentachlorophenol is expected to moderately bioconcentrate in fish.
Environmental: POPs, World Wildlife Fund proposes adding to Stockholm Convention list of banned substances.
Physical: No information available.
Other: Harmful to aquatic life in very low concentrations.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	PENTACHLOROPHENOL	PENTACHLOROPHENOL
Hazard Class:	6.1	6.1
UN Number:	UN3155	UN3155
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 87-86-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 87-86-5: 10 lb final RQ; 4.54 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
Section 313
This material contains Pentachlorophenol (CAS# 87-86-5, >86%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR
Clean Air Act:

CAS# 87-86-5 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 87-86-5 is listed as a Hazardous Substance under the CWA. CAS# 87-86-5 is listed as a Priority Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 87-86-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Pentachlorophenol, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 87-86-5: 40 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 26 Very toxic by inhalation.
R 36/37/38 Irritating to eyes, respiratory system and skin.
R 40 Limited evidence of a carcinogenic effect.
R 24/25 Toxic in contact with skin and if swallowed.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 22 Do not breathe dust.
S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 52 Not recommended for interior use on large surface areas.
S 60 This material and its container must be disposed of as hazardou s waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 87-86-5: 3

Canada - DSL/NDSL

CAS# 87-86-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 87-86-5 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 5/12/1999
Revision #6 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

APPENDIX J

DOCUMENTATION OF OFFSITE ACCESS PERMISSION

Peter Dressel

From: Tim Fierle <tim.fierle@bcsemail.org>
Sent: Sunday, September 14, 2014 7:17 PM
To: Peter Dressel
Cc: Sessoms, Bill; Meg Turner
Subject: Re: Permission to access of portion of Owens H.S. property

We are OK in concept with the work you have outlined at Owen HS. Please meet with Meg Turner the principal before starting work. She is copied in this email.

Our concern is that it is not disruptive to school activities and is isolated by const fencing or other clear demarcation.

I will get involved on an as needed basis or if requested by Meg.

Thanks. Keep me informed of schedule and upon completion.

On Sep 4, 2014 12:06 PM, "Peter Dressel" <pjdressel@piedmontgeologic.com> wrote:

Tim:

Thanks for taking the time to speak to me this morning regarding the former Dept. of Juvenile Justice and Delinquency Prevention (DJJDP) site and our access needs with regard to the Owen High School property. I have copied Bill Sessoms of the NC Dept. of Administration, State Construction Office. Piedmont Geologic has been retained by DOA to perform assessment and remediation efforts for the DJJDP property, and Bill is the project manager for DOA. DOA and Piedmont Geologic are requesting permission from Buncombe County Schools to gain access and enter a portion of the Owen High School property in order to facilitate the assessment and remediation efforts for the DJJDP property.

I have attached a site map and a site image showing the DJJDP property site in relation to Owen High School. As you can see, the DJJDP site adjoins the western side of the school property. The DJJDP site contains an abandoned landfill containing non-hazardous waste and an abandoned incinerator/crematorium from when the property was owned and used by the U.S. Army and the U.S. Veterans Administration during the 1940s to 1950s. The site also contains assorted surficial waste debris from unauthorized dumping by unknown persons over the years. A security fence currently surrounds the DJJDP site.

Upcoming work to be conducted at the DJJDP site will include various site soil sampling efforts, a very limited amount of which is slated to be completed along the western boundary of the school property. This work is scheduled to be completed from around mid-October through December 2014. We anticipate that site cleanup will be completed in the fall and early winter of 2015. That work will probably require removal of the security fence along the school property line and possibly some excavation of any waste materials that are on the school side of the property line. The fence may eventually be removed completely and permanently if the site efforts

result in a "clean closure." If this is not possible, then the fence may be put back up after the cleanup efforts and kept in place into the future.

The area of encroachment on the school property that is anticipated at this time is shown in the attached image/map. The area is in the woods to the west of the school stadium. Due to the forestation and a steep slope, this area does not appear to be typically accessed by students or school visitors. Contractor access to the DJJDP site is from the west side of the DJJDP property, from Clover Lane.

Piedmont Geologic is able to provide BCS with documentation of insurance coverages. Let me know if there is any other information you need regarding our request.

Thank you.

Pete Dressel, P.G.

Piedmont Geologic, P.C.

6003-145 Chapel Hill Road

Raleigh, NC 27607

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