ARCADIS
Infrastructure, environment, facilities

PRECONSTRUCTION REPORT: SOURCE REMEDY

UNC Chapel Hill,
Airport Road Waste Disposal Area,
Chapel Hill, North Carolina

April 2008

Imagine the result

ARCADIS

Preconstruction Report: Source Remedy

UNC Chapel Hill, Airport Road Waste Disposal Area, Chapel Hill, North Carolina

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Prepared for:
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Our Ref.:
NC000239.0016

Date:
April 2008

Remediating Party 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."

Mary Beth Koza – Director, Environment, Health & Safety
(Name of Remediating Party Official)

Mary Beth Koza 4-25-08
(Signature of Remediating Party Official) Date

North Carolina

Alamance COUNTY

I, Christine K Morrison, a Notary Public of said County and State, do hereby certify that Mary Beth Koza did personally appear and sign before me this the 25 day of April 2008.

Christine K Morrison
Notary Public (signature) (OFFICIAL SEAL)

My commission expires: 10·10·2011

Registered Site Manager 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 G.S. 130A-3 10, et seq, and the voluntary remedial action program Rules 1 5A NCAC 1 3C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

James E. Shilliday III, L.G.,RSM
(Name of Registered Site Manager)

4/30/08
(Signature of Registered Site Manager) Date

North Carolina

WAKE COUNTY

I, WATTS B. FEARRINGTON Jr., a Notary Public of said County and State, do hereby certify that JAMES E. SHILLIDAY III. did personally appear and sign before me this the 30TH day of ~~2008~~ APRIL 2008.

Watts B. Fearrington Jr.
Notary Public (signature) (OFFICIAL SEAL)

My commission expires: 6/4/08

North Carolina Department of Environment
and Natural Resources
Division of Waste Management
Superfund Section
Inactive Hazardous Sites Branch

REMEDIAL DESIGN COMPLETION CERTIFICATION
15A NCAC 13C.0306(b)(5)(D)

Media (check all that apply): All Media___ Soil _x_ Ground water _x_ Surface water___ Sediment___

Site Name UNC Airport Road Waste Disposal Area Street Address Municipal Drive

County Orange Chapel Hill, North Carolina

Site ID No. NCD980557623

The remedial design, which is the subject of this certification has, to the best of my knowledge, been completed in compliance with the Inactive Hazardous Sites Response Act G.S. 130A-310, et seq. and the voluntary remedial action program Rules 15A NCAC 13C .0300, and ARCADIS G&M of North Carolina, Inc.
[REC Name]
is in compliance with Rules .0305(b)(2) and .0305(b)(3), of this section. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information.

RSM Signature

4/30/08
Date

James E. Shilliday, III
RSM Name

ARCADIS G&M of North Carolina, Inc.
REC Name

801 Corporate Center Drive, Suite 300
Mailing Address

00021
REC No.

Raleigh, North Carolina 27607
City, State, ZIP

NORTH CAROLINA (Enter State)
WAKE **COUNTY**

I, WATTS B. FEARRINGTON, JR., a Notary Public of said County and State, do hereby certify that JAMES E. SHILLIDAY, III did personally appear and sign before me this the 30TH day of APRIL, 2008.

Notary Public (signature)
My commission expires: 6/4/08

WATTS B. FEARRINGTON, JR. NOTARY PUBLIC WAKE COUNTY, N.C.
(OFFICIAL SEAL)

Form G - IV

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1. Introduction

1.1 Purpose and Objectives

The University of North Carolina at Chapel Hill (UNC) retained ARCADIS G&M of North Carolina, Inc. (ARCADIS) to implement a voluntary party site cleanup using the Registered Environmental Consultant (REC) Program at the UNC Airport Road Waste Disposal Area (the site).

UNC has contracted with WRS/Compass (Contractor) to excavate and remove buried laboratory waste containers from the former waste disposal area. The purpose of this report is to document the proposed procedures for conducting the work within the REC program frame work for performing waste removal actions.

1.2 Site Background

In accordance with the Implementation Guidance of the REC Program (North Carolina Department of Environment & Natural Resources, [NCDENR] 2007), two steps in the process, the Remedial Investigation (RI) and the Remedial Action Plan (RAP), have already been completed.

The RI Report (ARCADIS 2004) described the scope of the RI and results of hydrogeological assessments. The RI Report also defined the nature and extent of the dissolved contaminant plume in the groundwater at the site and the extent of impacts to the soils at the site. Following completion of the RI, a RAP was prepared (ARCADIS 2005) that recommended remedial actions for source materials (excavation and off-site disposal) and groundwater contamination (extraction and treatment). The proposed source area remedy outlined in the RAP included excavation and off-site disposal of the source materials and impacted soils.

As required by the Implementation Guidance of the REC Program (NCDENR 2007), the next step following completion of the RAP is preparation of the Preconstruction Reports for the proposed remedial actions. The Groundwater Remediation System Preconstruction Report was completed in March 2006 (ARCADIS 2006a) and was implemented during the summer of 2006. A Construction Completion Report for the Groundwater Remediation System was completed in October 2006 (ARCADIS 2006b).

The groundwater remedy includes vacuum enhanced recovery (VER) of shallow aquifer groundwater immediately downgradient of the source area, and conventional

recovery (pumping) of impacted groundwater in the shallow and bedrock aquifers downgradient (north) of the source area. The extracted groundwater is treated on-site using an air stripper and then discharged into the Orange Water and Sewer Authority sanitary sewer. Groundwater treatment commenced on October 5, 2006 and is ongoing.

This Preconstruction Report has been prepared to address the source area remedy, which will be implemented in 2008. This report includes an introduction to the site history/setting, a brief synopsis of the RI and RAP, a summary of additional soil analytical data collected in April 2007, and a detailed discussion of the proposed source remedy.

1.3 Site Description

1.3.1 Site Location and Surrounding Land Use

The Airport Road Waste Disposal Area is located near Martin Luther King, Jr. Boulevard (Historic Airport Road) in northern Chapel Hill, Orange County, North Carolina. The site latitude is 35° 56’ 18.0” N, and the longitude is 79° 03’ 22.0” W (NCDEHNR 1993). The site consists of a 0.489 acre wooded parcel of UNC property that is located adjacent to the entrance road for the Airport Road Inactive Sanitary Landfill (see Figures 1-1 and 1-2).

An approximately 0.2 acre area of this tract was used from 1973 through 1978, with the approval of the State of North Carolina, to dispose of chemical waste from UNC’s laboratory facilities in 16 separate burial trenches. An additional 0.289 acres adjacent to the 0.2-acre area was proposed for use when the original area was full. However, only two burials were conducted in this expanded area, both in 1979. The approximate locations of the 18 burial pits are depicted on Figure 1-3. It should be noted that the burial pit numbers shown on Figure 1-3 do not coincide with the actual chronological sequence under which the pits were constructed. All references to “site” or “waste disposal area” in this report include the original 0.2-acre area (16 burials) and that portion of the expanded area used for two burials in 1979. Access to the site is restricted by an 8-foot-high locked fence erected by UNC in early 1994. Several warning signs surround the site.

Former municipal facilities for the Town of Chapel Hill are to the east and south of the site on a parcel leased from UNC since 1979. The municipal facilities include but are not limited to paved roadways, parking lots, a street and bus maintenance facility, and an animal shelter. The Horace Williams Airport is south of the site, and the Airport

Road Inactive Sanitary Landfill, formerly used by the Town of Chapel Hill, is to the west. The area north of the site is heavily wooded. Crow Branch Creek is located north/northwest of the site in the wooded area. A small residential area accessible from Airport Road is located approximately 1,200 feet north of the site. Most of the property east of Airport Road is also developed for residential use (NCDEHNR, 1993).

1.3.2 Site History

UNC used the site from 1973 to 1979 to dispose of wastes from UNC's teaching, research, and hospital laboratories. A total of 18 burials in trenches were made at the site between 1973 and 1979 (NCDEHNR 1993). Each burial trench had a size of approximately 10 feet (ft) wide, 20 ft long, and 10 ft deep. The burial pits are located adjacent to one another with approximately 4 to 8 ft of native soil separating each pit. Buried wastes consisted of a variety of constituents, including halogenated and non-halogenated solvents and other organic compounds, pesticides, metals, acids, bases, and PCBs, based on a Notification of Hazardous Waste Site (EPA Form 8900-1) completed in 1981. A list of laboratory chemical wastes disposed at the site (North Carolina Department of Human Resources ([NCDHR] 1984) and the approximate dimensions of the individual burial pits are included in Appendix A. No records or indications that pesticides or PCBs have been disposed of at the site are available.

1.3.3 Topography

The site and surrounding property are relatively flat, sloping gently to the north-northwest in the general direction of Crow Branch Creek. Surface elevations in the vicinity of the site are approximately 485 feet above mean sea level (ft msl) and slope to approximately 460 ft msl in the vicinity of Crow Branch Creek. The site location is depicted on a portion of the Chapel Hill 1967 (photorevised 1988) 7.5-minute United States Geologic Survey topographic map which is included as Figure 1-1. A more detailed site map that illustrates various site features, including topography, is presented in Figure 1-2.

1.3.4 Geology

Intrusive investigative activities (bedrock core holes and soil borings) conducted at the site have revealed a relatively thin layer of residual soils and weathered rock (saprolite) overlying competent bedrock. The saprolite layer, which contains the surficial aquifer, varies in lithology from sandy clay to clayey sand, and extends from land surface to approximately 13 to 25 feet below land surface (ft bls). Competent granodiorite bedrock underlies the saprolite. Lithologic information gathered at the site indicated

that a competent granodiorite unit occurs at depths ranging from 13 to 25 ft bls and extends to a depth of at least 195 ft bls. The equigranular granodiorite contains abundant high-angle fractures commonly filled with pyrite, calcium carbonate, and chlorite. Occasional brecciated zones were noted at various depths during coring, and no evidence of diabase dikes was observed (Geraghty & Miller 1996).

1.3.5 Hydrogeology

The surficial (shallow) and shallow bedrock aquifer units are the primary areas of concern for groundwater at the site. The surficial aquifer at the site is encountered in the saprolitic soils above bedrock, and extends to depths ranging from 5 to 25 ft bls. Beneath the waste burial pits, groundwater is generally encountered around 14 ft bls.

Vertical leakage from the surficial aquifer supplies the groundwater present in the fractures within the shallow bedrock layer. Groundwater flow in the shallow aquifer, from the site, is generally to the north, towards Crow Branch Creek. The groundwater flow direction for the shallow aquifer on the north side of Crow Branch Creek is generally toward the east/southeast convergent on Crow Branch Creek. The groundwater flow direction in the bedrock aquifer is similar to that of the shallow aquifer, and trends to the north/northeast.

1.4 Remedial Investigation Summary

The RI Report (ARCADIS 2004) summarized the findings of numerous investigations conducted at the site between 1995 and 2004. The results of the investigation activities indicated that the surficial and bedrock aquifers downgradient of the site are impacted with volatile organic compounds (VOCs) at concentrations exceeding established groundwater standards. The following subsections discuss the extent of contamination detected in the surficial and bedrock aquifers based on data collected in July 2004.

1.4.1 Surficial Aquifer

Analytical data from the July 2004 RI activities indicated that the horizontal extent of the VOC plume within the shallow aquifer has been delineated. VOCs were detected at concentrations exceeding established groundwater standards at 5 of the 11 shallow monitor wells sampled during this event. Nine compounds (acetone, benzene, chloroform, 1,2-dichloroethane [DCA], diethyl ether, methylene chloride, 1,1,2,2-trichloroethane [TCA], trichloroethene [TCE], and total xylenes) were detected within groundwater at levels in excess of their respective standards. The highest

concentrations of site constituents typically and historically have been detected immediately downgradient of the source area in monitor wells MW-1 and MW-2.

1.4.2 Bedrock Aquifer

Bedrock zone monitor wells were utilized to delineate the horizontal and vertical extent of VOCs in the bedrock aquifer. The analytical results from the July 2004 RI activities indicated that VOCs were detected at concentrations above established groundwater standards in 8 of the 22 bedrock site monitor wells (MW-7, MW-9, MW-11, MW-13, MW-14, MW-15, MW-17, and MW-31). Seven compounds (acetone, benzene, chloroform, 1,2-DCA, diethyl ether, TCE, and vinyl chloride) were determined to be present in the bedrock zone wells above their respective standards. It should be noted that the VOC concentrations in the most impacted bedrock aquifer monitor well (MW-15) were orders of magnitude lower than the VOC concentrations detected in the most impacted shallow aquifer monitor wells (MW-1 and MW-2).

1.4.3 Soils

Soil samples were collected from the area immediately outside of the existing chain link fence surrounding the waste burial pits in 1996 (Geraghty & Miller 1996). No samples were collected from the waste pits or within the fenced area of the site, due to safety concerns.

The 1996 analytical results indicated trace concentrations of volatile organics (methylene chloride and chloroform) in two soil samples which were collected from borings located within 5 feet of the fence surrounding the waste burial area. Low concentrations of metals, attributed to background concentrations were reported in all samples. The data indicated that impacted soils do not extend outside the limits of the current fenced area.

Additional soil quality data were collected in April 2007 to better define volumes of impacted soils surrounding the burial pits. The results of this sampling are presented in Section 2.0 of this report.

1.5 Summary of the Remedial Action Plan

The RAP (ARCADIS 2005) evaluated the effectiveness of remedial alternatives for source area and groundwater contamination at the site. The findings of the source remediation alternative analysis indicated that excavation and off-site disposal of the

waste material and impacted soils were the best options that satisfied the remedial action objectives.

2. Cover Assessment April 2007

Between April 2 and April 4, 2007 a total of 48 soil borings were advanced within the existing chain link fence marking the limits of the burial area (Figure 2-1). The borings were advanced to confirm the location of the burial pits, determine the soil quality above and surrounding the burial pits, and to determine the thickness of the soil cover over individual pits.

2.1 Boring Installation

The boring locations were initially selected to coincide with the existing steel posts that have historically been reported to mark the boundaries of individual burial pits. Additional borings were added to the western side of the fenced area to confirm the absence of waste material in that area (Figure 2-1).

Soil borings were advanced using direct push technology (DPT). At each boring location, a soil boring was advanced until waste material or bedrock was encountered. Waste material was generally present in the burial pits at 9.5 to 10 ft bls and bedrock encountered at 13 ft bls.

At select locations across the site, soil samples for laboratory analysis were collected from the burial pit overburden at 4 and 6 ft bls. Select individual borings between pits were sampled for laboratory analysis at 5 ft bls and 10 ft bls. A total of 64 soil samples were submitted to STL Savannah Laboratories for VOC analysis by USEPA Method 8260.

Upon completion, each borehole was immediately filled to land surface with bentonite pellets.

2.2 Soil Sample Results

A summary of the laboratory analytical results from the April 2007 soil sampling event listing only those compounds which were detected above their reporting limits is presented in Table 2-1. The laboratory analytical data indicated the presence of several VOCs above reporting limits. However, only chloroform was present above the NCDENR Inactive Hazardous Sites Branch Soil Remediation Goals (SRGs) for unrestricted land use. Chloroform was detected at concentrations exceeding the SRG of 220 µg/kg in 24 of the 64 samples submitted for laboratory analysis.

The SRGs that are listed on Table 2-1 for the various VOCs detected in the soil samples collected from the burial pit area will be used as remediation goals to evaluate completion of soil remediation for unrestricted land use.

Laboratory data certificates are included in Appendix B.

2.3 Waste Pit Volumes

The depth to waste along with the historic waste pit dimensions were combined to calculate the approximate volume of each waste pit. For the purposes of calculations, the depth of the waste is assumed to be a maximum of 13 ft bls. The total estimated volume of waste (chemical containers and fly ash) for the 18 burial pits is estimated to be 641 cubic yards (CY).

3. Responsibilities and Authority

This section identifies the key contacts associated with implementing the specified corrective actions and their respective areas of responsibility and authority. A project organization chart has been provided as Figure 3-1.

3.1 The University of North Carolina at Chapel Hill

UNC is the owner and current operator of the site. UNC will be responsible for communications with regulatory agencies, government officials, and media organizations. Project communications from UNC to the Contractor may be performed either directly by UNC representatives or through ARCADIS. The UNC representatives are as follows:

Larry Daw, L.G.
Project Manager
Environmental Affairs Section
Department of Environment, Health & Safety
The University of North Carolina at Chapel Hill
1120 Estes Drive Extension, CB #1650
Chapel Hill, NC 27599-1650
(919) 962-6666

Richard L. Miller, Ph.D.
Environmental Affairs Manager
Department of Environment, Health & Safety
The University of North Carolina at Chapel Hill
1120 Estes Drive Extension, CB #1650
Chapel Hill, NC 27599-1650
(919) 962-5718

3.2 ARCADIS

This section identifies the responsibilities of key ARCADIS personnel involved with the removal action. UNC has contracted with ARCADIS to assist and oversee project implementation through the REC program. ARCADIS is responsible for maintaining compliance with all REC program requirements.

During source removal activities, ARCADIS will perform Contractor supervision; construction quality assurance; sampling of wastes, soil, and water; submittal of samples for laboratory analysis (excluding sampling by Contractor for disposal of

waste containers); and developing soil remedial action completion documents for the specified removal actions.

The ARCADIS project engineer or designated representative will be onsite during the project. ARCADIS will be the Quality Assurance Manager (QAM) and conduct specific tasks, as specified herein, to verify the quality and progress of the work. Several of the construction quality assurance (CQA) positions may overlap or be fulfilled by one individual.

ARCADIS Project Engineer is designated as follows:

Donald R. Malone, P.E.
Senior Engineer
ARCADIS G&M of North Carolina, Inc.
801 Corporate Center Drive, Suite 300
Raleigh, North Carolina 27607
(919) 854-1282

ARCADIS Registered Site Manager is designated as follows:

James E. Shilliday, III, LG
Principal Scientist/Project Manager
ARCADIS G&M of North Carolina, Inc.
801 Corporate Center Drive, Suite 300
Raleigh, North Carolina 27607
(919) 854-1282

The Project Engineer and Registered Site Manager will be accessible via telephone or pager during the construction activities. In addition, ARCADIS will review the Contractor's weekly construction quality-control (CQC) reports issued by the Contractor to monitor CQC issues and project progress.

The specific responsibilities of ARCADIS include the following:

- Compare the actual field activities to the work plan, contract documents, and bid items to ensure conformance with scope, cost, and schedule.
- Serve as a liaison with the Contractor in interpreting project construction documents.

- Provide assistance to the Contractor, when necessary, to modify the work while complying with the Bid Documents/Technical Specifications.
- Perform periodic CQA inspections, and observe and document testing activities performed by the Contractor in association with all excavation, waste packaging, disposal, and construction.
- Complete CQA Daily Summary Report (Figure 3-2).
- Facilitate communications regarding any significant modification to the work. All agencies and key personnel associated with the removal action will be involved in the decision regarding all significant modifications that impact the scope, schedule, or cost. The ARCADIS field representative does not have the authority to approve any modification to the scope of work or contractual documents.
- Collection of samples and analyses in accordance with the Sampling and Analysis Plan (Section 6.5).
- Collect, review, and verify completeness of CQC data provided by the Contractor.
- Maintain CQA records to document that all measurements, inspections, and field tests are performed, and all requirements stated in the Bid Documents/Technical Specifications and other project documents (e.g., Health and Safety Plan [HASP]) are met.
- Provide UNC with weekly reports on the inspection and testing results.
- Halt any and all work activities, in the event that potential unsafe working conditions exist.

3.3 Remediation Contractor

The Contractor shall be responsible for all aspects of the corrective actions including site setup; construction; excavation; waste handling; and packaging, labeling, coordinating disposal, and disposal of wastes. The Contractor will collect and analyze all samples required by their disposal company for the disposal of the chemical containers.

The Contractor will haul and dispose of all wastes generated during the performance of the scope of work. The Contractor's site manager will assume responsibility for

conformance with Bid Documents/Technical Specifications, including all required quality control requirements and direct oversight of their personnel and subcontractors.

The Contractor will be responsible for implementing the work using Contractor-provided equipment, as well as specialized procedures and techniques. During construction, the Contractor will be responsible for providing daily CQC documentation regarding construction work activities to ARCADIS for review and approval. The Contractor's CQC team will be subject to the review and approval of UNC before mobilization is authorized. Team members may be employed directly by the Contractor or as subcontracted firms or individuals.

The Contractor will furnish all materials, labor, tools, equipment, utilities, potable and decontamination water, fuel, vehicular transportation, field-log preparation, and necessary incidental services for the following:

1. Excavation, characterization, and segregation of wastes and soils. ARCADIS will guide the contractor with respect to segregation of soils;

2. Construction, operation, and maintenance of soil stockpiles;

3. Conduct sampling of waste containers as required by the disposal facility;

4. Provide a health and safety officer to implement the approved HASP;

5. Provide a qualified field chemist(s) and hazard categorization (HazCat) equipment to properly identify, classify, and package unknown chemical containers according to Department of Transportation (DOT) and EPA regulations;

6. Complete CQC Inspection Daily Record (Figure 3-3) forms each day and Problem Identification and Corrective Measures Report forms (Figure 3-4) for each work activity requiring resolution by either ARCADIS or UNC. Approved alternate forms will also be accepted.

7. Loading and on-site transportation of soil to stockpiles;

8. Soil and wastes impacted above the remediation goals will be packaged by the Contractor in DOT-approved waste containers in accordance with the approved profiles. Once loaded, the outside of the containers will be

decontaminated by the Contractor, as necessary, to facilitate compliance with all federal and state transportation regulations;

9. Sampling and analysis of all waste container samples required by the Contractor's disposal facilities;

10. Off-site hauling and disposal of waste soil and wastes to UNC-approved facilities. The Contractor will provide audit packages for Contractor proposed waste disposal facilities;

11. Containment, storage and off-site disposal of all water generated from decontaminating equipment and personnel and from dewatering excavations;

12. Dismantling and decontaminating the soil stockpiles at the completion of the project;

13. Backfilling, grading, seeding, and other site-restoration activities;

14. All necessary incidental services not specifically noted but which are required for completion of the specified work;

15. Environmental Reporting. This includes submittal of the following items:

    a. Proof of qualification credentials;

    b. Analytical field reports for each individual HazCat analysis;

    c. Logs, reports, and recordkeeping, as required by ARCADIS;

    d. CQC reports and figures; and

    e. Shipping documents and certified weigh tickets.

During performance of the work, the Contractor may need to hire multiple subcontractors, depending on the Contractor's capabilities and company structure. The subcontractors to be hired by the Contractor may include, but not be limited to, the following:

- Fencing contractor

- Office trailer leasing company;
- Excavation subcontractor;
- Waste-disposal Contractors;
- Certified industrial hygienist or suitably competent and experienced Health and Safety officer;
- Waste hauler; and
- Electrical Contractor for connections to the office trailer.

4. Health and Safety Planning

This section describes the health and safety planning required by ARCADIS for perimeter air monitoring to protect the surrounding community and the health and safety planning required by the Contractor to minimize workers' exposure through engineering controls, administrative controls, PPE, and safe work practices for the planned corrective actions at the Airport Road Waste Disposal Site located at UNC.

4.1 Responsibilities

ARCADIS will be responsible for confirmation that the contractor's site activities will not have an adverse effect on the surrounding community. While not responsible for the contractor's personnel ARCADIS will review their data and supplement with additional monitoring as needed.

The Contractor will be completely responsible for the health and safety of all personnel engaged in site work under the Contractor's direction. ARCADIS or UNC will not be responsible for the Contractor's employees or subcontractors. Prior to mobilization to the site, the selected Contractor will be required to prepare a site-specific Contractor's Site Safety Plan (CSSP) to provide for the safety of its on-site and subcontractor personnel. This plan must include, but not be limited to, the following:

- Evaluation of potential physical, and chemical hazards present at the site;
- Description of air monitoring activities to be performed during the remediation activities;
- Description of levels of protection required for site activities;
- Action-level procedures for all planned field activities;
- Description of decontamination procedures;
- Injury reporting procedures; and
- An emergency action plan including emergency telephone numbers, location of on-site emergency equipment, and directions to the nearest hospital.

The CSSP will be in compliance with the Hazardous Waste-Site Operations and Emergency Response and Hazard Communications regulations found in 29 CFR

1910.120 and 29 CFR 1910.1200, respectively. The CSSP will include specific provisions to ensure adequate worker safety for all required activities of work and levels of protection required to complete the work.

The Contractor will submit two copies of their CSSP to ARCADIS for review and approval (by ARCADIS and UNC) at least 2 weeks prior to mobilization of any personnel or equipment to the site. The Contractor will modify the CSSP to address review comments to the satisfaction of ARCADIS and UNC.

At least 2 weeks prior to mobilization to the site, the Contractor will provide training certificates for all on-site employees to certify completion of 40 hours of initial training, plus 24 hours of field experience under the supervision of a trained, experienced supervisor, and current 8 hours of refresher HAZWOPER training, in accordance with 29 CFR 1910.120(e). All of the Contractor's field personnel will be familiar with the stated health and safety policies, and will review and sign their plan prior to conducting any fieldwork activities. The Contractor will be solely responsible for ensuring the health and safety of its personnel, equipment, and all subcontractor personnel.

4.2 Air Monitoring

Air monitoring will be conducted at this site during all planned field activities to ensure that the workers and the surrounding community are appropriately protected from the potential physical and chemical hazards. This monitoring will be in accordance with the Site-Specific HASP (Appendix C). This HASP primarily deals with monitoring the perimeter of the site with limited monitoring of the exclusion zone. The contractors CSSP will cover detailed monitoring of the exclusion zone and chemical container handling. The Contractor's SSO/RSO will be completely responsible for all site monitoring activities, including monitoring with respect to the site workers employed by the Contractor's subcontractors, ARCADIS, and UNC.

The Town of Chapel Hill maintenance facility and the bus garage will be vacant during implementation of the source remedy. The Orange County Animal Shelter will remain open during source remedy and is located approximately 350 feet south of the burial area, and outside the exclusion zone.

Areas within and immediately adjacent to the exclusion zone will get the following monitoring. An intrinsically safe photoionization detector (PID) or flame ionization detector (FID) will be used to measure trace quantities of VOCs in air and generally have a low ppm sensitivity range. A combination meter (e.g., combustible gas indicator [CGI] and oxygen meter) will also be used to monitor the presence of

oxygen, flammable/explosive gases and vapors, and hydrogen sulfide. Dust monitoring will be required to measure and mitigate any wind-borne dust problems that may occur at the site. A real-time dust monitor or MiniRam (MIIE Model PDM-3, or equivalent) that can monitor dust values of 0.01 to 100 milligram per cubic meter (mg/m^3) as particulates will be utilized.

Four monitoring stations will be established around the perimeter of the site at the direction of ARCADIS for collection of VOC readings at least twice daily through the entire project duration. One of these stations will be in close proximity to the fence at the Orange County Animal Shelter. Should any elevated PID readings above background be recorded then chemical detector tubes will be used for benzene and vinyl chloride. These two chemicals were selected due to the low time weighted average established by OSHA.

4.3 Site Security

Entrance to the actual work site is limited to only UNC authorized personnel. The Contractor will be responsible for maintaining a secure, restricted-access site.

4.4 Work Zones

Establishing suitable work zones will be the responsibility of the Contractor's Site Health and Safety officer. Work zones are necessary to limit the potential for exposure of workers to contamination, protect the public and surrounding environment from site hazards, prevent unauthorized entry into the work area, and protect against vandalism. To accomplish these goals, the site will be divided into the following three zones: a support zone, a contamination-reduction zone, and an exclusion zone. These three zones are depicted on Figure 4-1. The location of the support zone will be established to allow access to the contamination-reduction zone, to reduce traffic flow in the contamination-reduction zone, and reduce potential exposures to site hazards. Excavation activities will commence only after preparation of the contamination-reduction and support zones.

4.4.1 Support Zone

The support zone will contain the site access road, project office and mobile laboratories (if required), portable toilets, water and food supplies, and the containerized waste storage area. All traffic entering and leaving the site will pass through this zone. Access to the site will be restricted to individuals involved with the

project. All emergency telephone numbers and directions will be posted in the support zone by the Contractor.

4.4.2 Contamination-Reduction Zone

A contamination-reduction zone will be established between the exclusion zone and the support zone. Allowing the contamination-reduction zone to be constructed next to the support zone enables the movement of equipment and personnel in and out of the waste burial area. Equipment and personnel decontamination activities will occur in this zone.

4.4.3 Exclusion Zone

An exclusion zone will be established within the perimeter of the proposed temporary structure and surrounding any waste containers or potentially impacted soil stockpiles.

5. Environmental Protection and Planning

Prior to the start of any on-site construction activities, UNC, ARCADIS, and the Contractor will make a joint condition survey of the site and outline the sequence of the work. Access routes, truck routes, stockpile areas, storage areas, and the decontamination area will be designated. Except for any work or storage area and access routes specifically assigned for the use of the Contractor, the land areas outside the waste burial pit area will be preserved in their present condition.

5.1 Protection of Trees and Shrubs

The Contractor will not deface, injure, remove, cut, or destroy any trees or shrubs without specific authority from ARCADIS or UNC. In addition, no ropes, cables, or guys will be fastened or attached to any existing trees for anchorage. Any tree scarred or damaged by the Contractor's equipment or operations will be restored as nearly as possible to its original condition or replaced with a nursery-grown tree of the same species and size.

5.2 Protection of Water Resources

The Contractor will control the use and disposal of fuels, oils, bitumens, calcium chloride, acids, and other harmful materials, both on and offsite, and will comply with applicable federal, state, county, and municipal laws concerning pollution of rivers, streams, and other surface or ground waters. Special measures will be taken to prevent sediment, chemicals, or other harmful materials from entering public waters. Water used for on-site material processing, clean up, and other wastewater or groundwater will not be allowed to enter the public surface waters.

5.3 Handling of Debris

The Contractor will place all general site debris and refuse in an on-site storage area and/or containers to be provided by the Contractor and as directed by ARCADIS. Land-clearing materials that will not be reused as backfill will be separated from general refuse and transported to an appropriate facility for disposal. No materials will be burned on the project site.

5.4 Dust Control

The Contractor will maintain all excavations, stockpiles, access roads, waste areas, and all other work areas free from excess dust to such reasonable degree as to avoid

causing a hazard or nuisance. Approved temporary methods for dust control consist of covering soil with plastic-liner materials, or sprinkling with clean Contractor-provided potable water. Dust control will be performed as the work proceeds and whenever a dust nuisance or hazard occurs. Chemical treatment, light bituminous treatment, or similar methods will not be considered for dust control.

6. Remedy Implementation

The following sections describe the elements of the source remedy and how the source remedy will be implemented.

6.1 Project Kick-Off Meeting

A mandatory project kick-off meeting will be performed at the site with representatives from UNC, ARCADIS, and the Contractor. During this meeting, items such as personnel assignments, schedule, and work hours will be discussed. Meeting attendees will include at a minimum the Contractor's Project Manager, Site Supervisor, excavation contractor, and fencing contractor along with appropriate personnel from ARCADIS and UNC.

6.2 Site Preparation Activities

The following sections describe the necessary site preparation activities for implementation of the source remedy. A proposed site layout map depicting the various site preparation activities is included as Figure 6-1.

6.2.1 Temporary Construction Fence Installation and Signage

A temporary chain link fence will be installed to mark the outer limits of the source remedy activities (Figure 6-1). The fence will be removed upon completion of the project. All fence installation will consist of 6-foot high chain link fencing with a top rail. All posts will be secured with concrete. Barbed wire is not required. Areas along Municipal Drive bypass will be privacy screened.

The fence will be maintained throughout the entire project and promptly repaired if any damages occur. Metal signs will be installed every 200 linear feet of fencing. The signs will measure 12 by 18 inches and contain the following language:

UNAUTHORIZED PERSONNEL

KEEP OUT

FOR INFORMATION CALL:
UNC ENVIRONMENT, HEALTH & SAFETY 962-5507

IN CASE OF EMERGENCY CALL: 911 OR
UNC PUBLIC SAFETY 962-6565

A single project identification sign will be posted near the main entrance to the project site at a location to be field determined. The project sign will identify the name of the project, UNC, the designer (ARCADIS) and Contractor (WRSCompass).

6.2.2 Erosion and Sedimentation Control

An Erosion and Sediment Control permit is not required for the site because the disturbed area will be less than 1 acre. However, silt fencing will be installed during the removal action along the periphery of the waste burial area to minimize potential impact to surface water, as well as to demarcate the limits of disturbance. The erosion control devices will be maintained as required to function properly. In addition, the cuts and/or fills within the construction limits will be graded, as needed, to limit surface drainage and to control silt migration.

6.2.3 Site Clearing

Prior to initiating the excavation activities, trees along the access road will be trimmed as required to promote easy access to the site by large construction vehicles. In addition, all trees, brush, and debris of all kinds will be cleared from within the waste burial area, staging area, and vehicle parking areas. All trees, and brush cleared from the site will be sectioned, cut up, and hauled from the site. Vegetation removed will be hauled offsite to the UNC vegetation recycling facility located approximately 0.5 miles west of the site. No refuse will be burned or buried onsite.

6.2.4 Grading, Compaction and Drainage

A proposed grading plan is depicted in Figure 6-2. The purpose of the grading work is to ensure that storm water sheds from the proposed excavation areas and doesn't enter the excavation. In addition, the grading work will be performed to provide a stable, evenly graded, and compacted earthen foundation for the proposed temporary structure. Clean compactable soil from an off-site source will be used as fill for constructing an appropriate foundation for the proposed temporary structure. Soil will be placed in the fill areas in lifts not exceeding 9 inches (loose). Within 10 feet of either side of the proposed work cover temporary structure, soil will be compacted using vibratory tampers such as a small walk-behind vibratory sheep's-foot roller. After completion of each lift, a licensed geotechnical-testing company will verify soil compaction to 98 percent maximum density using ASTM Method D-2922 - Density of Soil in Place by the Nuclear Methods. Soil will be placed in lifts in this fashion until the contours proposed in Figure 6-2 are achieved, and field verified by ARCADIS.

It is estimated that approximately 120 yards of soil will be cut in the southwest corner of the site and approximately 300 yards of clean soil will be needed to fill the southeast corner of the site.

6.2.5 Temporary Storage of Soil

This section describes the temporary storage of topsoil, suspect clean soil and suspect dirty soil. Mixed soils and waste is a separate item and will be covered under Section 6.3.

Topsoil, suspect clean soil and suspect dirty soil will be stored in stockpiles at the site as depicted on Figure 6-3. Separate stockpiles will be created for topsoil, suspect clean soil and suspect dirty soil.

Jersey barriers will be constructed around each stockpile to prevent soils from migrating. The stockpiles will be inspected daily or more often as weather or site conditions warrant. In the event that damage to the stockpile is identified, the issue will be corrected immediately.

The bottom liner for the stockpiles will be a continuous sheet of polyethylene (RUFCO 4000B or approved equivalent) with a minimum thickness of 40-mil. A minimum 6-inch thick layer of sand will be placed between the bottom liner and soils being stored. The cover will be a minimum 20-mil polyethylene (RUFCO 2000B or approved equivalent). The cover may be composed of more than one sheet of polyethylene;

however, there will be sufficient overlap to prevent precipitation infiltration into the soils. The liner and cover will be sufficiently larger than the area of stored soil to cover the stored soil and allow for sufficient excess on all sides.

At no time will stockpiles be left uncovered and unattended. Soil-containment structures (e.g., berming, plastic sheeting, hold-down weights, etc.) will be replaced and secured whenever the site is left unattended, until such time that the entire quantity of stockpiled material is safely removed and the site has met final restoration requirements. All necessary precautions will be taken to prevent contaminating or allowing recontamination of areas excavated and backfilled (remediated).

6.2.6 Decontamination Facilities

A suitable decontamination pad and other associated facilities will be constructed to decontaminate all personnel and equipment used for this removal action including, but not limited to, all PPE, sampling equipment, hand tools, heavy equipment, and dump trucks. No trucks, equipment, tools, or personnel that contacted impacted soils or wastes will leave the site without adequate decontamination.

6.2.7 Installation of a Temporary Tent Structure

A temporary tent structure will be installed over the burial site and the structure with an approximate size of 100 feet wide by 180 feet long. The tent structure will be installed over the proposed work area, with the overall intended purposes of minimizing the potential for precipitation to enter the excavation, and reduce the potential for dust migration from the work site. The installation and construction of the structure will comply with all relevant facets of the North Carolina Building Code for the Chapel Hill area, including wind loads, snow loads, seismic loads (as appropriate), and anchoring requirements.

The tent structure will be installed in accordance with the design and alignment depicted on Figure 6-4.

6.3 Source Removal

This section discusses the work tasks associated with the excavation, segregation, handling, and disposal of buried wastes and soils.

The soil and waste pits will be sequentially excavated in three separate zones as depicted on Figure 6-5. Zone 1 begins on the western side of the burial pits with Zones

2 and 3 located in the central and eastern portion of the burial area, respectively. The stages of a typical excavation of a single zone in cross sectional view are shown on Figure 6-6. Depths of the excavations will be up to 13 ft bls in most areas of the site. Excavated materials will be segregated and stockpiled separately, depending on its potential to contain constituents of concern. The following terms define materials that may be found at the site.

- Top Soil – Soil that is located within the upper 1-foot below land surface (ft bls). The topsoil will be stored in a separate location so it may be used as the final layer for backfill.

- Suspect clean soil – Soil located between 1 ft bls and 6 ft bls. This soil will be stockpiled as depicted in Figure 6-3 pending characterization.

- Suspected dirty soils – Soil located between 6 ft bls and 9 ft bls. This soil also will be stockpiled as depicted in Figure 6-3 pending characterization.

- Mixed soil and waste – Soil/fly ash mixture located between 9 ft bls and 13 ft bls, that includes broken chemical containers within waste pits.

- Chemical containers – Glass, metal or plastic containers that may contain solid or liquid reagents, or chemical wastes and are a subset of the mixed soil and waste zone (9-13 ft bls).

Estimated quantities of mixed soil and waste, suspect dirty soils and suspect-clean soils are calculated and provided below. Actual quantities may differ.

Estimated volume of Topsoil: 361 CY

Estimated volume of Suspect Clean Soils: 2670 CY

Estimate volume of Suspect Dirty Soils: 1,574 CY

Estimated volume of Mixed Soil and Waste: 802 CY

Estimated volume of Waste Pits (Chemical containers and fly ash): 641 CY

The total excavation volume is estimated at 6,048 CY in place.

6.3.1 Excavation Sequence

The initial stage of the excavation process will consist of removing all topsoil and suspect clean soil from zones 1, 2, and 3 and placing the material in stockpiles.

The excavation of suspect dirty soils and materials from the waste pits will then commence with Zone 1 and be completed with Zone 3 as shown on Figure 6-5. Each individual zone will be excavated and following review of confirmatory sampling results at least partially backfilled with clean soil prior to moving into the next zone.

Heavy equipment such as a trackhoe will be used for removal of suspect clean and suspect dirty soils. To minimize breakage of chemical containers, the Contractor will only use an excavator bucket that contains no teeth for removal of the mixed soil and waste zone. A plate may be welded to the teeth to create a flat cutting surface if a toothless bucket is not available. The intent in removal of the containers is to remove them in a manner that minimizes breakage.

Once excavated, the mixed soil and waste will be sorted to separate the chemical containers from the soil/fly ash mixture. Handling of chemical containers will be further discussed in following sections.

The excavation will likely be sequenced from Zones 1 through 3 proceeding west to east, respectively. Pending completion of each zone, ARCADIS will collect soil samples from the base and sidewalls of the zone as outlined in following sections.

Excavated mixed soil and waste will be segregated in a logical manner that will minimize rehandling.

Wastes (i.e. gloves, tyvek, filter cartridges, etc.) resulting from remedial activities will be handled and disposed of in an environmentally sound manner in accordance with NCDENR policy regarding investigation-derived waste (IDW) handling, characterization, and disposal.

6.3.2 Infiltration Gallery Installation

After the excavation sidewalls and base samples have been collected and the analytical results reviewed to confirm that soil SRGs have been obtained, infiltration galleries will be constructed at the base of each of the three excavation zones (3 total) prior to backfilling.

Each of the three infiltration galleries will be constructed separately and at the completion of each of the three excavation zones. The infiltration galleries in each of the three excavation zones will consist of two horizontal wells covered with sand and separated by a layer of clay. In the base of the open excavation, the Contractor will install the infiltration gallery within an 18-inch layer of medium to coarse grained sand. The infiltration galleries/horizontal wells will consist of 4-inch diameter PVC slotted screens (0.020-inch slot size) equally spaced in the excavations and orientated north to south. The wells will cover the entire length of the base of the excavation. Along the northern wall of the excavation a 90-degree elbow will be installed with sufficient PVC casing to approximately 2 foot above grade. The wells will be completed with a 4-inch diameter PVC slip cap.

It is estimated that a total of 636 linear feet of slotted screen and 135 feet of solid casing will be needed to complete the gallery. In addition, it is estimated that 450 cubic yards of sand and 60 cubic yards of clay will be needed to construct the gallery. The final layout of the infiltration gallery will be based upon site conditions encountered in the excavation.

6.3.3 Dewatering and Storage Operations

It is possible that it will be necessary to dewater the excavation area during work activities to ensure the wastes and excavated soils do not contain drainable liquids. The bases of the burial pits are believed to be at or near the water table. Over time, surface water infiltration may have also filled the pits with water. Excavation may also be required below the pits to removed potentially impacted soil. Equipment will be maintained onsite capable of pumping water from the excavations, on a continuous basis, due to naturally occurring groundwater in addition to flooding and rainwater. At least one 20,000 gallon storage capacity frac tank will be maintained on-site. Depending on the analytical results of characterization analyses, the water that is recovered from the excavations may be processed using the existing groundwater treatment system that was constructed in 2006.

6.3.4 HazCat of Waste Containers

The exact number of containers buried in the 18 burial pits remains unknown. For planning purposes it is estimated that there will be 12,000 containers that require HazCat analysis. The actual number of containers is expected to vary.

The chemical containers will be segregated, staged, labeled and logged separate from the other wastes. A HazCat analysis sheet will be prepared for each sample submitted

for analyses. HazCat will be performed during the same day that the chemical containers were excavated and lab-packed the same day pending HazCat results. Adequate storage will be provided for all liquid waste containers and drums including secondary containment pallets and an adequate cover (i.e., tarp or covered enclosure). OSHA-trained field chemist(s) will be onsite to perform the HazCat analysis of unknowns. The Contractor will provide an adequate number of trained competent personnel to complete the required analyses within the timeframe provided by the other work scopes, ensuring that excess containers do not accumulate.

The on-site field chemist will prepare detailed, legibly written daily logs and a HazCat analyses sheet showing detailed calculations (i.e. dilutions) and results for each sample. The HazCat analysis will include the following data at a minimum:

- Container Number;
- Container Size;
- Container Type (Plastic, Glass, or Metal);
- Matrix (Liquid, Sludge, or Solid);
- Color;
- pH;
- Oxidizer Test;
- Cyanide Test;
- Polychlorinated biphenyl (PCB) (oils only);
- Flashpoint; and
- Any other analyses required by the disposal facility.

6.3.5 Backfilling and Compaction

Suspect-clean soil and off-site clean fill will be used as backfill, following completion of the previously described infiltration gallery. Prior to using the suspect clean soil, the soil stockpile will be sampled on a basis of one sample per 100 CY and the composite samples will be analyzed to confirm that the soils meet the SRGs. Suspect-clean soil will be used first; clean off-site fill next, and finally, the last remaining foot will be backfilled with the topsoil layer retained for reuse. The topsoil will be added last across the entire site and not over individual excavation zones.

Pending characterization of the suspect dirty soil, the soil may potentially be reused as fill material. If the suspect dirty soil is found to be suitable for backfill (i.e. VOC and SVOC concentrations do not exceed SRGs), the volume of offsite fill required will be reduced accordingly.

Soil will be compacted in place by tamping in 1-foot lifts using the bucket of the excavator. In the event that any free water is present in any excavation, the water will be removed from the excavation prior to backfilling. If suspect clean soil excavated from a particular area of the site is unsuitable for stable backfill material, more stable fill material will be used.

After the excavation is backfilled to the ground surface, tracking with the excavator's tracks will be used as an acceptable method of compaction and compaction testing will not be conducted.

6.3.6 Final Grading and Establish Temporary Vegetative Surface Cover

Once the entire burial area has been excavated and backfilled, a final grade will be completed over all disturbed areas. All disturbed areas will be evenly graded and a 1-foot layer of the retained topsoil will be added to the disturbed areas. The final grade of the burial area will be slightly elevated from surrounding areas to ensure positive drainage from the burial area and eliminate the potential for ponding. Annular rye grass seed, or approved equal, will be spread over all disturbed areas upon completion of final grade. A thin layer of wheat-straw mulch will be added thereafter to reduce the potential for seed movement due to rain.

6.4 Packaging and Off-Site Disposal of Chemical Containers and Waste Materials

The Contractor will be responsible for all packaging, transporting, and off-site disposal of the chemical containers and associated waste materials. Following HazCat analysis, chemical containers will be properly lab packed with compatible chemicals for offsite disposal. Yard boxes or drums may be used depending on the requirements of the final disposal facility. The Contractor will ship waste materials on at least a weekly basis. All shipments of lab packed waste containers will meet all applicable requirements for highway transportation.

Based on the assumed usage of 55-gallon drums, it is estimated that 1,000 lab packs will be generated. Yard boxes may also be used depending on the requirements of final disposal facility.

It is estimated that the 1,000 lab packs will each weigh 200 pounds each including the waste containers, drum and packing materials. It is anticipated the following will be generated, and actual quantities may differ.

- Lab packed chemical containers classified as toxic (50% of current waste stream) = 500 lab packs or 100,000 pounds.
- Lab packed chemical containers classified as flammable (25% of current waste stream) = 250 lab packs or 50,000 pounds.
- Lab packed chemical containers classified as corrosive (20% of current waste stream) = 200 lab packs or 40,000 pounds.
- Lab packed chemical containers classified as high hazard (5% of current waste stream) = 50 lab packs or 10,000 pounds.

Impacted soils and wastes designated for off-site disposal will be transported offsite for disposal at a preapproved facility. The Contractor will package the impacted soil and waste materials into Contractor-provided waste containers or trucks. The outsides of the waste containers will be cleaned and decontaminated prior to loading onto trucks. It is anticipated that the Contractor will haul and dispose of all wastes generated during the specified scope of work. However, depending on the types and volume of wastes generated, UNC may choose to dispose of a portion of the wastes directly.

Based on the site conditions, topsoil and suspect clean soils will be re-used at the site and will not need offsite treatment or disposal. Suspect dirty soils will be removed from the excavation and temporarily stored onsite while being characterized. Pending receipt of characterization data the suspect dirty soils will be 1) used as backfill material or 2) taken offsite and disposed of as non-hazardous waste or 3) taken offsite and disposed of as hazardous waste. It is assumed that the mixed soil and waste will be disposed of as hazardous waste.

6.5 Confirmatory Soil Sampling Program and SRGs

This section describes the proposed soil sampling program including proposed sampling procedures and proposed sample collection locations that will be implemented to ensure that the performed corrective actions comply with the site remediation goals. The site remediation goals ("Health-Based" Remediation Goals) for soils for unrestricted land use require removal of all soils which contain VOCs and/or SVOCs at concentrations that exceed NCDENR IHSB SRGs. The SRGs, as obtained from the REC Program Implementation Guidance (NCDENR, 2007) for the primary constituents of concern detected in the site soils are listed on Table 2-1. In addition to the SRGs listed on Table 2-1, the soil remediation program will adhere to

the SRG for diethyl ether (1,360 µg/kg) and SRGs for SVOCs as listed in the REC Program Implementation Guidance (NCDENR, 2007).

In addition to the "Health-Based" Remediation Goals, it will be necessary to adhere to "Protection of Groundwater" SRGs (NCDENR, 2007). The "Protection of Groundwater" SRGs require that confirmatory soil samples be analyzed to determine the leachability of organic contaminants. Soils which leach organic contaminants in excess of the 2L Groundwater Standards will require further remediation. Based on discussions with the REC Program Coordinator (Kim Caulk), it was agreed that use of the synthetic precipitation leaching procedure (SPLP) (USEPA Method 1312) would be appropriate for evaluating leachability of VOCs and SVOCs for confirmatory soil samples.

The procedures contained in this section are site-specific and designed to allow for the collection of representative samples for field screening and laboratory analysis while implementing the approved corrective actions. The number and placement of sampling locations discussed herein were formulated as a reference guide, however, the actual sample locations and frequency may vary depending on the field conditions. ARCADIS will perform all sampling associated with characterization of soils (i.e. suspect clean soils, suspect dirty soils, mixed soil and waste, and stockpile confirmation samples). A summary of the proposed confirmatory soil sampling activities is provided in Table 6-1.

6.5.1 Sample Custody and Recordkeeping Procedures

Sample custody procedures will be performed to document preparation, handling, storage, and shipping of all samples collected during the source remedy implementation. The samples collected from the site will be the responsibility of authorized personnel from the time they are collected until they are submitted to the analytical laboratory. ARCADIS will complete chain-of-custody forms that will accompany the collected samples during shipment. These forms will include the project name and number, the sample identification(s), the analytical parameter(s), the sample collection date and time, the number of sample containers, the name of the shipper, the date shipped, and the signatures of all personnel relinquishing and accepting the samples.

Upon transfer of custody, the ARCADIS project engineer will verify the information on each sample label and ensure that each container is intact. He/she will subsequently sign and date the chain-of-custody form. The individuals receiving the samples will sign, date, and note the time that they receive the samples on the chain-of-custody

form. This form documents transfer-of-custody of samples from the field investigator to another person, laboratories, or other organizational elements.

Documentation of the field operations will be achieved through use of daily field logs. All entries in field logs will be dated, legible, and contain accurate and inclusive documentation of an individual's project activities. All aspects of sample collection and handling as well as visual observations will be documented in these field logs. At the end of each day's activity, or a particular event as appropriate, all documents in the field will be secured by the field manager for each task. Once completed, these field logs and/or preprinted forms become accountable documents and will be maintained as part of project files. Entry errors will be corrected by drawing a single line through the erroneous entry and changing the entry. All entry errors/corrections will be initialed and dated.

6.5.2 Sample Packaging and Shipment

Sample packaging and shipment will be conducted in accordance with the USEPA guidelines, as described in the USEPA Region IV manual entitled, "Standard Operating Procedures and Quality Assurance Manual." Each glass container will be bubble-wrapped and placed into a sealed plastic bag. Next, all samples will be placed into a cooler of ice at less than 4 degrees Celsius (°C). Signed and dated custody seals, prepared by ARCADIS, will be affixed to each cooler to ensure that no tampering will occur to the contents.

6.5.3 Bottom of Excavation Areas

The overall excavation will be extended to a depth of approximately 13 ft bls or until bedrock or groundwater are encountered, whichever comes first. Areas of the excavation that are extended to 13 ft bls without encountering bedrock or groundwater will be sampled by ARCADIS for soil quality within each of the three excavation zones, prior to construction of the infiltration galleries.

One grab sample will be collected from beneath each of the 18 burial pits. Each sample will be collected at a depth of 0 to 6 inches below the floor of the excavation using a clean, stainless-steel hand auger with an extension handle. Other collection techniques may be used. The proposed sample collection frequency for the base of the excavation area significantly exceeds the frequency of one sample every 50 linear feet referenced in the REC Program Implementation Guidance (NCDENR, 2007).

ARCADIS will submit each sample from the bottom of the excavation for analysis of VOCs and SVOCs and SPLP for VOCs/SVOCs (Table 6-1). The samples will be labeled with the site name (UNC) followed by the matrix type (soil from below waste pits [SBWP]), location sampled, sample number, date and time collected, analytical parameters, and sampler name(s).

6.5.4 Excavation Sidewalls

Soil samples will be collected from sidewall locations of the excavation for the purpose of ensuring that sufficient soil and waste materials have been excavated to meet or exceed the established remediation goals. Soil samples will be taken along the perimeter of the waste disposal area at 20-foot intervals. Two grab samples will be collected from each location, at approximately 5 ft bls and 10 ft bls and composited and ARCADIS will submit each of the composite samples for analysis of VOCs, SVOCs and SPLP for VOCs/SVOCs (Table 6-1). The proposed sample collection frequency for the excavation sidewalls significantly exceeds the frequency of one sample every 50 linear feet referenced in the REC Program Implementation Guidance (NCDENR, 2007).

The samples will be labeled with the site name (UNC) followed by the matrix type (soil from side of excavation [SSE]), location sampled, sample number, date and time collected, analytical parameters, and sampler name(s).

6.5.5 Topsoil

The upper 1 foot of surface soil (topsoil) will be removed in each excavation area and stockpiled in an area designated for topsoil. Topsoil will not be sampled as part of the source remedy.

6.5.6 Suspect Clean Soil

Soil excavated from between 1 ft bls and 6 ft bls will be classified as suspect-clean soil and stockpiled separate from topsoil.

The suspect-clean soil stockpile will be gridded into equal sections of approximately 100 CY. Each 100 CY grid area will be sampled by hand augering at a minimum of three boring locations and collecting samples from two depths. The six samples from each grid area will be composited and ARCADIS will submit each sample for analysis of VOCs, SVOCs, and SPLP for VOCs/SVOCs (Table 6-1). The samples will be labeled with the site name (UNC) followed by the matrix type (suspect clean soil

[SCS]), location sampled, sample number, date and time collected, analytical parameters, and sampler name(s).

6.5.7 Suspect Dirty Soil

The excavated soils between 6 ft bls and 9 ft bls will be stockpiled and designated as suspected dirty soils. One grab soil sample will be collected for each 100 cy of suspected dirty soils. The suspect-dirty soil stockpile will be gridded into equal sections of approximately 100 CY. Each 100 CY grid area will be sampled by hand augering at a minimum of three boring locations and collecting samples from two depths. The six samples from each grid area will be composited and ARCADIS will submit each sample for VOCs, SVOCs and SPLP for VOCs/SVOCs (Table 6-1). The samples will be labeled with the site name (UNC) followed by the matrix type (suspect dirty soil [SDS]), location sampled, sample number, date and time collected, analytical parameters, and sampler name(s).

6.5.8 Clean Fill

ARCADIS will collect 1 grab soil sample for the clean fill source used for backfill. ARCADIS will submit these samples for analysis of VOCs, SVOCs, and SPLP for VOCs/SVOCs (Table 6-1). The samples will be labeled with the site name (UNC) followed by the matrix type (clean fill [CF]), location sampled, sample number, date and time collected, analytical parameters, and sampler name(s).

6.6 Air Monitoring

Air monitoring will be conducted at this site during all planned field activities to ensure that the workers and the surrounding community are appropriately protected from the potential physical and chemical hazards. Details regarding the monitoring program are provided in Section 4.2.

6.7 Handling of Remediation-Derived Wastes

Wastes (i.e. gloves, tyvek, filter cartridges, etc.) resulting from remedial activities will be handled and disposed of in an environmentally sound manner in accordance with NCDENR policy regarding investigation-derived waste (IDW) handling, characterization, and disposal. When possible, all solid and/or liquid IDWs will be characterized and subsequently combined with other waste types generated during the removal action.

6.8 Fluids from Dewatering and Decontamination Operations

All liquid wastes including extracted groundwater, decontamination water, and water drained from the contaminated stockpile will be stored in an aboveground 20,000 gallon frac tank. A water sample will be collected from the tank for characterization prior to disposal.

Samples will be collected using a clean sampling device. ARCADIS will coordinate analysis of the water sample for VOCs, SVOCs, and RCRA Metals, low level mercury and pH (Table 6-1) to allow for potential disposal through the onsite groundwater treatment system. The analytical procedures listed for the water samples are consistent with the groundwater remediation system discharge permit. The samples will be labeled with the site name (UNC) followed by the matrix type (Decontamination /Dewatering [DWS]), location sampled, sample number, date and time collected, analytical parameters, and sampler name(s). If the analytical results indicate that the water in the frac tank is suitable for discharge through the onsite groundwater treatment system, then the water will be pumped to the system for treatment and disposal. If the analytical results indicate the water is not suitable for discharge through the groundwater treatment system, then the water will be hauled offsite for disposal at a permitted facility.

6.9 Data Analysis, Quality Assurance/Quality Control, and Reporting

ARCADIS will ship all samples, except waste characterization samples, to STL or another laboratory to complete all analyses. All analyses will be performed using Level II-plus reporting. ARCADIS has specified a turnaround time of 2 weeks for all analyses. Any deviations from the published methods or procedures will be noted by the laboratory and will be included in the analytical reports. A trip blank will accompany each cooler containing samples for VOC analyses.

All field data will be maintained in a logbook which will be validated at two different levels. Data will be validated at the time of collection by the Contractor's sampler and verified by his/her signature. At the second level of review, the Contractor's site supervisor (or the health and safety officer or his/her designee) will technically review all field data and verify it with his/her signature.

6.10 Site Dismantling and Restoration Activities

During this phase, the site will be restored (at a minimum) to its condition prior to commencement of work. The site dismantling activities may include, but are not

limited to: decontaminating all UNC facilities used by the Contractor, removal of temporary tent structure, site facilities, repairing and replacing all monitoring wells (with the exception of wells located within the burial area) and/or repairing utilities damaged by the Contractor during the project. The Contractor will decontaminate the temporary tent structure cover prior to removal from the site.

As part of site restoration activities, the Contractor will remove the construction fence installed during site preparation activities. The Contractor will remove all vestiges of the fence.

The Contractor will provide original copies of all project documentation, including field log books, ancillary notes, CQC reports, laboratory analytical reports, data tables, survey data, photographic records, and as-built drawings.

6.11 Construction Completion Reporting

At the conclusion of the remedial activities, a Construction Completion Report will be generated and submitted to NCDENR. The purpose of the Construction Completion report is to provide "as-built" plans and specifications, a summary of major variances from the design plans, and a summary of any problems encountered during construction. The Construction Completion Report will also include the following items:

- Temporary tent structure design specifications;
- All transport manifests, bills of lading, and certified weigh tickets for recycling and/or disposal of all materials;
- Any laboratory analytical data and/or other testing data generated during source remedy;
- Summary tables documenting confirmatory soil sample analytical results;
- Figures depicting soil sample collection locations for both the excavation area and the soil stockpiles;
- Analytical field reports for each individual HazCat analysis;
- Logs, reports, and recordkeeping, as required by UNC and/or ARCADIS;
- CQC reports and figures; and

- Shipping documents and certified weigh tickets.

6.12 Source Remedy Schedule

The source remedy is scheduled for 2008. The following is a brief outline of the proposed schedule of activities:

- March-April 2008 – Site setup, including fencing, temporary tent structure, staging areas, and decontamination areas.
- May-July 2008 – Removal and disposal of chemical containers and impacted soils
- August 2008 – Site restoration and demobilzaton.

Upon completion of the source remedy, a Construction Completion Report will be prepared that will include "as-built" plans and specifications, a summary of major variances from the final design plans, and a summary of any problems encountered during construction. The Construction Completion report is anticipated to be submitted late 2008.

7. References

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